Ocean Next

Reference Manual

Ocean Next Reference Manual - English - Version 3.0A

RTI part number: n/a

Welcome to Ocean Next

Ocean Next with Quick Check is a is a powerful tool for everybody working with Quality Assurance of X-ray systems. Ocean Next can be used with the X-ray meters Mako, Piranha, Cobia and RTI Scatter Probe.

INDEPENDENT X-RAY QUALITY ASSURANCE

NOTICE

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Intended Use of the Ocean Next Software

Together with instruments from RTI Group AB the Ocean Software is intended to be used for independent service and quality control, including measurements of kerma, kerma rate, kVp, tube current, exposure time, luminance, illuminance, and dose area product, within limitations stated below.

If installed according to accompanying documents, the product is intended to be used together with all diagnostic X-ray equipment except for:
- therapeutical X-ray sources.
- X-ray equipment w ith tube potential below 18 kV or above 160 kV.
- X-ray equipment on w hich the instrument cannot be mounted properly.
- specific types of X-ray equipment listed in the instructions for use or in additional information from the manufacturer.

With the X-ray installation without patient present, the product is intended to be used:
- for assessing the performance of the X-ray equipment.
- for evaluation of examination techniques and procedures.
- for service and maintenance of the X-ray equipment.
- for quality control of the X-ray equipment.
- for educational purposes, authority supervision etc.

The product is intended to be used by hospital physicists, X-ray engineers, manufacturer's service teams, and other professionals w ith similar tasks and competencies. The operator needs training to be able to use the product as intended. This training can be achieved either by study of the manual, study of the built-in help function in measurement softw are or, on request, by a course ordered from the manufacturer.

The product is intended to be used inside X-ray rooms ready for clinical use and can safely be left sw itched on and in any measuring mode in the vicinity of patients.

The product is NOT intended to be used:
- for direct control of diagnostic X-ray equipment performance during irradiation of a patient.
- so that patients or other unqualified persons can change settings of operating parameters during, immediately before, or after measurements.
- for any guidance to diagnosis of patients.

Table of Contents

Chapter 1

About the manual

1 About the manual

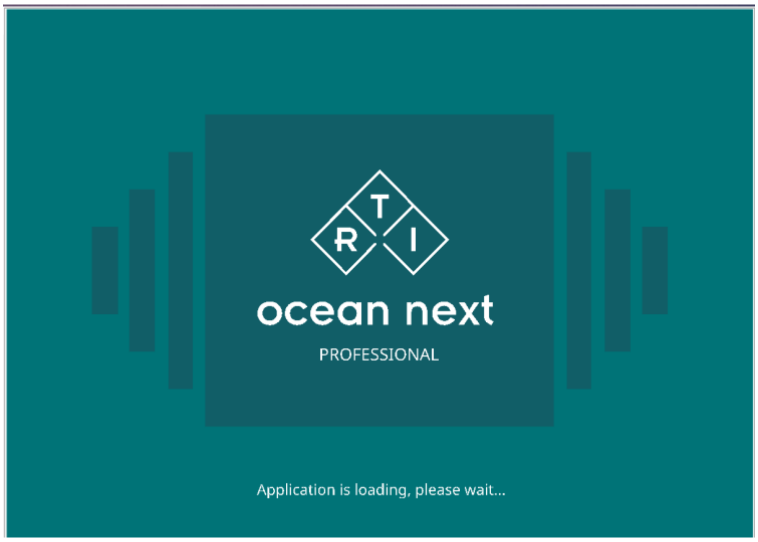
This printed **Ocean Next User's Manual** gives an overview of Ocean Next and myRTI, our cloud services. For a complete description including how to create and modify session templates, read the **Ocean Next Reference Manual**.

It is available in PDF format from RTIGroup web page. Go to **Resource Center**, scroll down and click on **Documentation** and select the **Manuals** tab.

Chapter 2

Introduction to Ocean Next

2 Introduction to Ocean Next



- ***Ocean Next*** *is a powerful software for X-ray Quality Assurance work. Use Ocean Next with the Mako, Piranha, Cobia Flex/Sense and/or RTI Scatter Probe significantly increase the quality and efficiency of your X-ray QA process.*

- ***Ocean Next*** *allows you to set up templates to automate X-ray equipment testing, analyze the test data and store the data, waveforms and analysis results for future reference or re-use.*

- ***Ocean Next*** *uses myRTI and myBox, cloud services, to safely store your data and allows you to directly share your data with your colleagues.*

Ocean Next must be activated within 30 days. This is done by getting an myRTI account at https://myrti.rtigroup.com. Do that now, if you haven't done it yet.

It is recommended that you run Ocean Next on a computer that has internet connection. You must not have access to internet all the time, but it recommended that the device you run Ocean Next on has the possibility to synchronize as often as possible but at least every 30 day. With internet connection Ocean Next will be able to use the myRTI and myBox cloud services to increase your productivity. You can read more in the topics myRTI Overview and How to use myBox.

A good way to get started with Ocean Next and your RTI meter is to do your first measurements with Quick Check. Quick Check is a "display function" that automatically sets up the measurement for you as soon as you connect a meter and probe (plug-n-play). In this way, you can quickly get started and begin to learn how to use both Ocean Next and your RTI meter.

2.1 Compatible meters and license level

The tables below shows compatible meters for Ocean Next compared to Ocean 2014:

Ocean Next	Ocean 2014
Connects to myRTI	
Black Piranha product version 5.5 or higher, firmware 4.0A or higher and **Cobia Flex** and **Sense** and **RTI Scatter Probe**	**Black Piranha** product version 5.5 or higher, firmware 4.0A or higher and **Cobia Flex** and **Sense**
Red Piranha that has been converted to Black Piranha, product version 5.5 or higher, firmware 4.0A or higher	**Red Piranha** that has been converted to Black Piranha, product version 5.5 or higher, firmware 4.0A or higher
Red Piranha with firmware 4.0A or higher	**Red Piranha** with firmware 4.0A or higher

All red Piranha can be upgraded with the latest firmware and used with Ocean Next.

Mako firmware

Each version of Ocean includes the relevant Mako firmware. Every time you connect to Mako, Ocean Next will check your Mako system and directly make it possible to install a suitable firmware. Follow the instructions in Ocean Next to complete the firmware installation.

License level

The license level is stored in your meter and is set every time you connect to a meter. This means that license level, and the available functions in Ocean, might change when you use different meters if they have different license levels stored. License level CONNECT used in Ocean 2014 has now been renamed to ADVANTAGE.

You can read more about the different license levels in the topic License levels.

2.2 Installation

Requirements

Ocean Next requires Windows 10 or 11. You must also create an account and sign in to myRTI; our customer platform. It is also recommended that you run Ocean Next on a computer with access to internet. You don't need constant access, but it is good if Ocean Next frequently can synchronize with myRTI.

The screen you use must at least have resolution of 1280 x 800 with factor of 100% (setting in Windows). The table below shows minimum screen size with other scale factors:

Scale factor	Minimum screen size
100%	1280 x 800
125%	1600 x 1000
150%	1920 x 1200
175%	2240 x 1400

200%	2560 x 1600
250%	3200 x 2000
300%	3840 x 2400
350%	4480 x 2800
400%	5120 x 3200

Example: Your screen has a resolution of 1920 x 1080, maximum scaling you can use in Windows is 125%.

Ocean will warn if screen size is incorrect and continue to run but certain objects may not be visible on the screen and it might be confusing and difficult to use the application.

Installation

During the installation the following applications are installed:

- Ocean Next
- Ocean Sync
- Various applications required for the RTI meters

Run the installer and follow the on screen instructions.

In case you are updating from Ocean 2014 and the installer finds Ocean 2014 installed on your computer, you will be asked during the installation process if you want to import your database from Ocean 2014. If you accept this, all your data from Ocean 2014 will be moved over to Ocean Next. Read more about updating from Ocean 2014 in the topic Update from Ocean 2014 to Ocean Next.

When the installation is completed you shall see the Ocean Sync icon on the **Tray** bar:

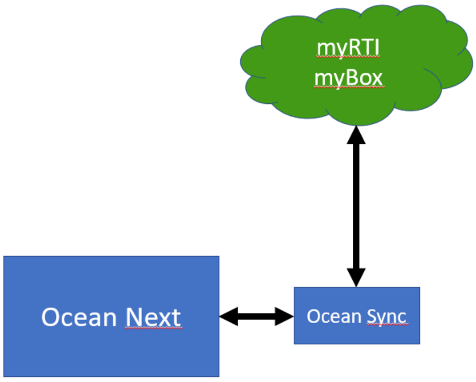
NOTE! You will sign in when you start Ocean Next, do not sign in directly with Ocean Sync even if it is possible.. You can read more about Ocean Sync in the Ocean Sync topic.

Ocean Next is installed for one user and will require you to activate it via myRTI or with an activation code withing 30 days. After 30 days without activation, Ocean Next will **no longer communicate with your meters**. All other functions will remain and all your data will be available. If you don't have internet access on your computer, or if you for any other reason don't want to connect to myRTI, activation with a code is also possible. See topic Starting Ocean Next for the first time and activation to read more.

It is recommended, in case you are more than one person using the same computer to run Ocean, that each user has a personal Windows account on the computer and installs their own copy of Ocean with their own username and password. Working in this way, will make your and your colleagues setup more compatible with future functions coming from RTI Group.

2.3 Ocean Sync

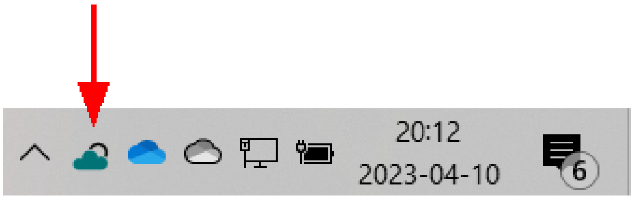
Ocean Sync is a utility software, installed with Ocean Next. This software functions in the background, to allow Ocean Next to communicate with myRTI.



You do not always need internet to use Ocean Next, but when you have connection, Ocean Sync will work silently in the background. Normally, you don't need to do anything with Ocean Sync, it starts automatically when you login to your Windows account on your computer.

Ocean Sync status

Ocean Sync appears on the **Tray** bar of your computer:



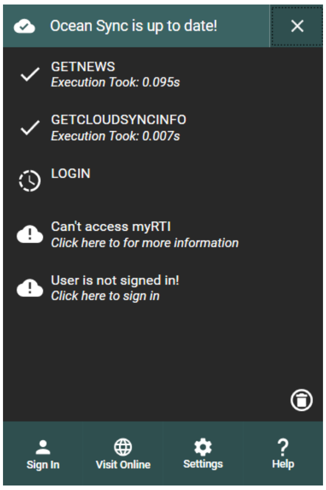
The icon shows status for Ocean Sync:

 Ocean Sync is running and you are signed in to myRTI.

 Ocean Sync is running but you are not signed in to myRTI.

The Ocean Sync Window

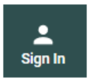
If you click on the Ocean Sync icon on Windows **Tray** bar, the Ocean Sync window is opened:



The Ocean Sync window shows the communication with the cloud. Normally you don't need pay any attention to this but it may be of use if any problem occur with the cloud communication.

Click on the ✕ button in the upper right corner to close the window.

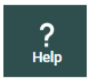
The Ocean Sync buttons has the following functions:



This button opens the Sign in dialogue.
NOTE: You shall normally never Sign in here, this is always done from Ocean Next.

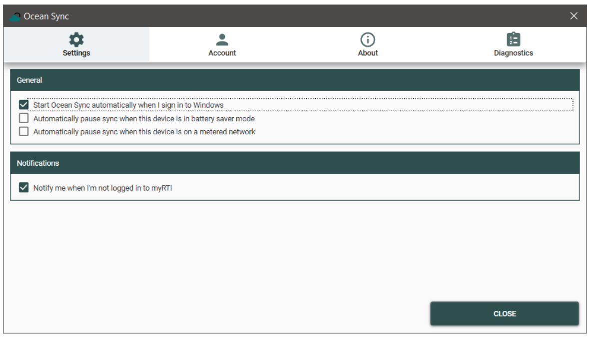
This button starts your web browser and the myRTI web page is opened.

This button opens Ocean Sync's **Settings** dialogue, see below.



This button starts your web browser and opens RTI's Support portal.

Ocean Sync's Settings

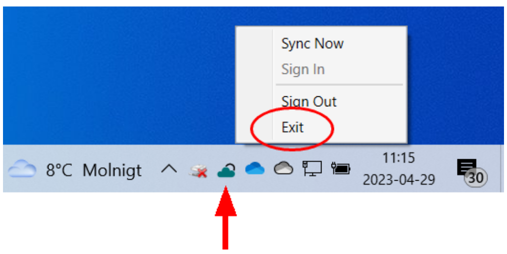


You can on the Settings page control when Ocean Sync shall synchronize depending on battery mode and internet access mode.

The other pages are not for normal use.

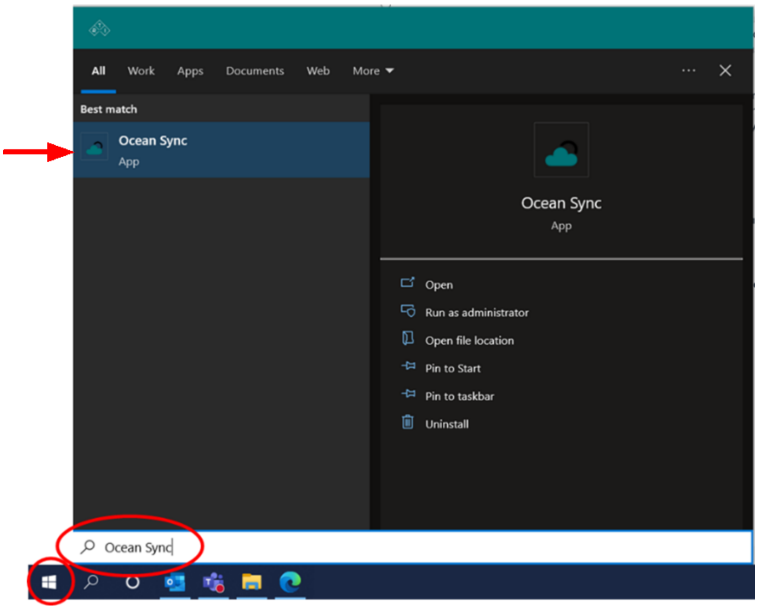
How to exit Ocean Sync

Normally, you don't need to stop Ocean Sync but if it may be needed in special situations. Right-click on the Ocean Sync icon on the Tray bar and select Exit to stop Ocean Sync:



How to restart Ocean Sync manually

Normally, you don't need start Ocean Sync manually since it starts automatically. However, there might be specific situations when this is needed, then do the following:



If you cannot see Ocean Sync in the **Tray** bar, or need to restart the software, follow the instructions below.

1. Close down Ocean Next software if it is running.
2. Find the Ocean Sync App; use the Windows start-menu, type "Ocean Sync" and it should appear.
3. Start Ocean Sync clicking on it.

2.4 Update from Ocean 2014 to Ocean Next

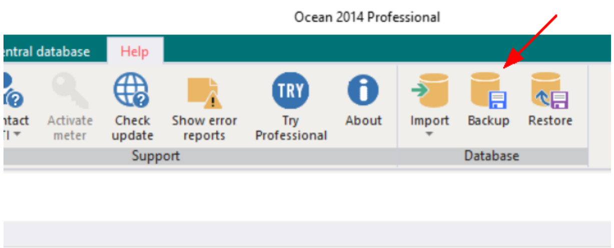
Update if Ocean Next is installed on the same computer as Ocean 2014

When you update to Ocean Next on the same computer where you have Ocean 2014, all your existing data can be imported to Ocean Next. During the installation you will get a question and if you select this option when asked, your current Ocean 2014 database is moved to Ocean Next. The conversion of the database file will occur when you start Ocean Next for the first time.

Update if Ocean Next is installed on a different computer

You must manually move the database file if you install Ocean Next on different computer than the one you use for Ocean 2014. This procedure is described below.

1. Start Ocean 2014 and go to the Help tab.
2. Click on the **Backup** button:



3. A backup file of your Ocean 2014 database is created on your Desktop. It will have the name "Ocean2014_db_date_time".

4. Rename the file to "AllData".

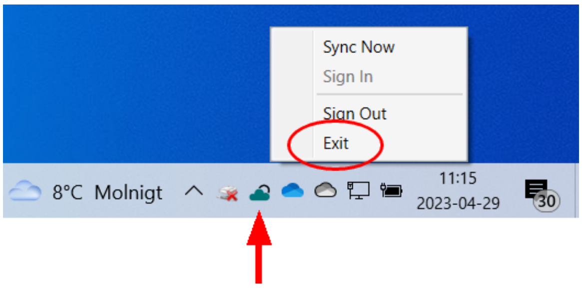
5. In some way, move over the file to the computer where you will be running Ocean Next on.

Important! if you already have been using Ocean Next on this computer and has activated with myRTI and maybe also myBox, then you must do the following:

- Deactivate myBox if you have used this service, see topic Activation of myBox for more information.
- Deactivate Ocean Next from myRTI, see topic myRTI for more information.

Now continue with step #6.

6. Stop Ocean Sync, right-click on the Ocean Sync icon on the **Tray** bar and select "Exit" from the menu:



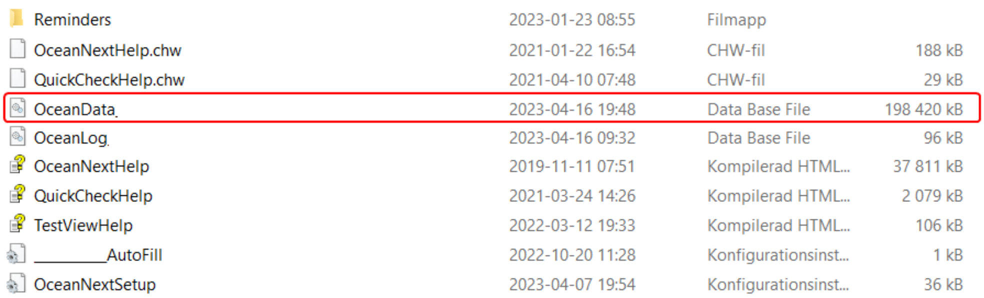
7. Make sure that Ocean Next isn't running.

8. On the computer you use for Ocean Next, open Ocean Next's Data Folder. This folder is found here:

   C:\Users\your username\AppData\Local\RTI Group\Ocean Next\ProgramData.

9. Copy the file "AllData" to this folder.

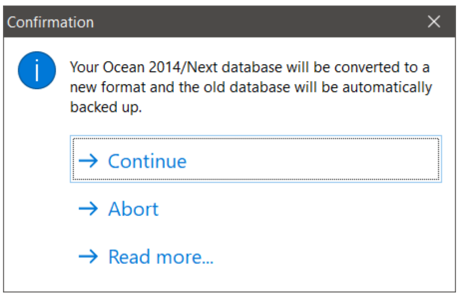
10. Locate the existing Ocean Next database file. The file name is "OceanData". Rename it or delete it if you are sure that you never want to revert back to this database.



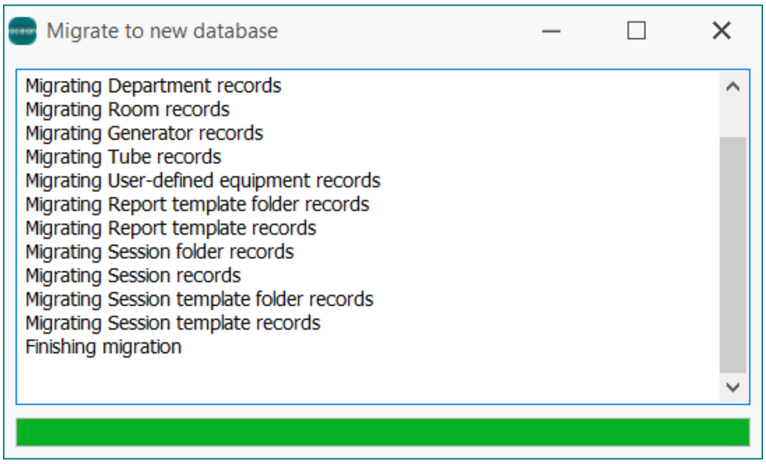
11. Now log out from your Windows account and log in again (or restart the computer) to restart Ocean Sync.

12. Now start Ocean Next.

13. Ocean Next will automatically find the Ocean 2014 database and show the following dialogue:



14. Select **Continue**, the conversion starts and a dialogue is shows the progress:



15. Wait until the conversion is completed, it might take a while depending on the size of the database and computer.

16. You will now find all your Ocean 2014 data in Ocean Next.

If you are new into Ocean Next, read the topic Ocean Next Overview to learn more about how your data is organized in Ocean Next.

2.5 Activation of Ocean Next

Ocean Next requires activation with your myRTI account. You can activate Ocean Next in three different ways:

- The device you run Ocean Next on has internet access now: You can be activate directly by signing in with your myRTI account.
- The device you run Ocean Next on hasn't internet access now but will be on a regular basis has that: You can activate later by signing in with your myRTI account when you have internet access.
- The device you run Ocean Next on will never have access to internet: You must use an other device with access to internet to get an Activation Code by signing in to your myRTI account.

You can use Ocean Next for 30 days without activation but when time expires communication with your RTI meters will be blocked until Ocean Next is activated but all other functions and your data will be available to you.

When activation is ready, Ocean Next, your measurements and your equipment will be logged and registered in your myRTI account. If you for any reason would need to change myRTI account, this can be done by deactivating myRTI and activate again with another myRTI account. You can see how this is done by reading the topis myRTI.

Start Ocean Next for the very first time:

1. It is recommended that you first sign up for an myRTI account if you not yet have one. Go to https://myrti.rtigroup.com to create an account.

2. If you, during the installation process, chose to import a database from Ocean 2014, a migration process starts that will take a few minutes depending on the size of the database. The progress is shown on your screen. Note that your existing installation of Ocean 2014 is not affected, it is kept exactly as it is.

3. Next a setup wizard will start and ask you to enter some basic information:

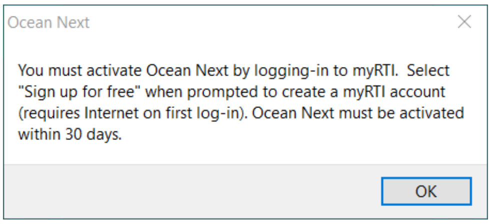
   - Language: Only English is currently available.
   - Tester information: This is the name, organization and contact information that is included in reports.
   - Default units for Exposure, Length, Temperature, Air pressure, Ambient light and Light intensity.

   Fill in the required information and finish the wizard.

4. Ocean Next will now try to connect to myRTI and ask you to sign in with your account to activate Ocean Next.

5. Depending if internet is available or not, you will see the following, if you have internet access continue to step #6.

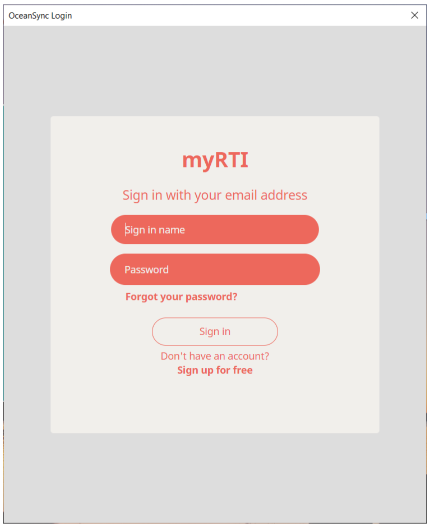
   If you don't have internet access, this dialogue will be shown:



   - Internet isn't available now but will be later on a frequent basis; do not activate no, do it later when you have internet connection, go to step 8.
   - Internet will never be available; activation by code will be required, go to step #11.

Activation by directly signing in to myRTI:

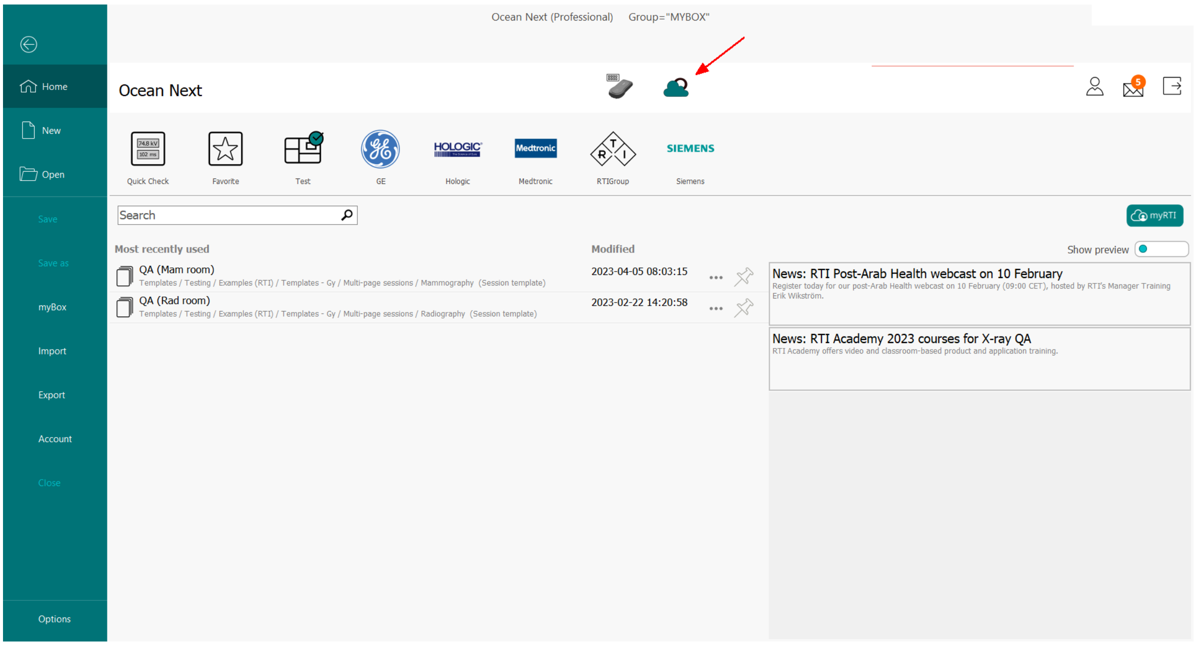
6. If your computer has internet connection it will prompt you to sign in to myRTI:
   (if you have other applications running, this dialogue may be hidden behind other windows on your screen)



   Enter your sign in name and password to sign in. Ocean Next will show a message and confirm that activation is now completed.

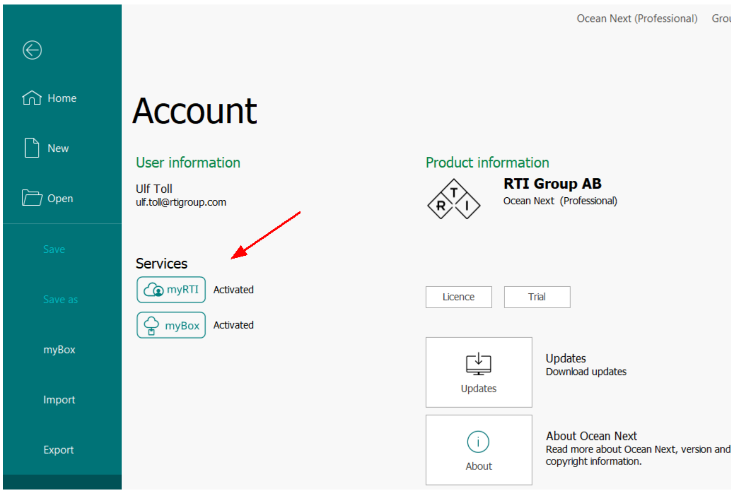
   If you for some reason don't want to activate at this point, click in the upper right corner to close the sign in dialogue. Ocean will show a message that tells you that you must activate within 30 days and you can start using Ocean Next.

7. Ocean Next starts and the Backstage is shown:



The icon at the top of the page indicates that Ocean Next now is connected to myRTI.

You can also go to the Backstage Account page and here see what cloud services you have activated:

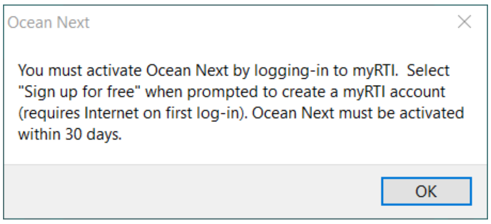


You have now activated Ocean Next and you are now ready to start using Ocean Next.

It is recommended that you continue with reading the next topic; Workflow with Ocean Next. However, if you have a valid myBox subscription you may want to activate that first. The myBox button will indicate this by saying "Click to activate" if you have one. You can read more about how to start up with myBox in the next topic; Activation of myBox.

Activation by signing in to myRTI later:

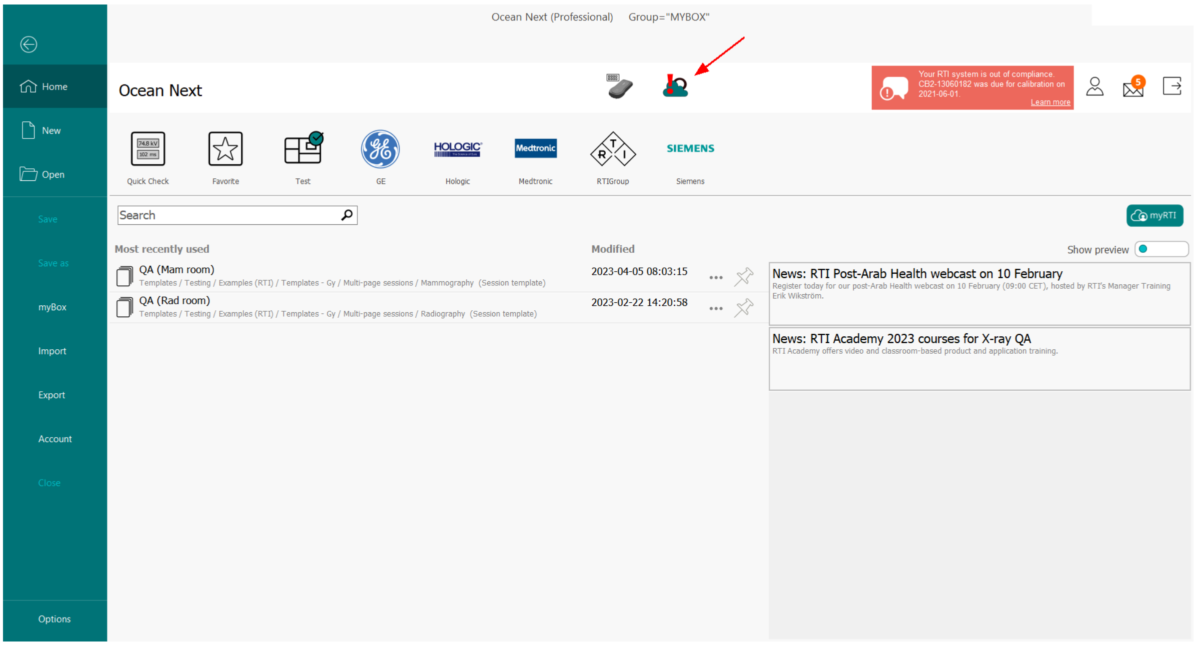
8. If internet isn't available now, the following message is shown:



This message will be shown every time you start Ocean Next until you activate it. When you start Ocean Next later and internet is available, follow the procedure starting with step 6 above. Make sure to do this before the 30 day period expires.

9. Click OK, to continue and use Ocean Next without activate it.

10. Ocean Starts and the Backstage is shown:

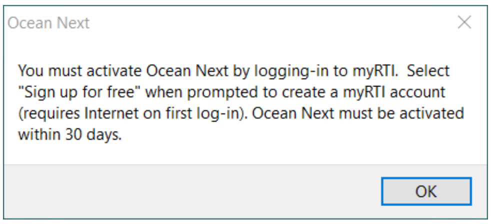


The icon at the top of the page shows that myRTI isn't available.

You have not yet activated Ocean Next but you can start using Ocean Next. However, it is recommended that you continue with reading the next topic; Workflow with Ocean Next.

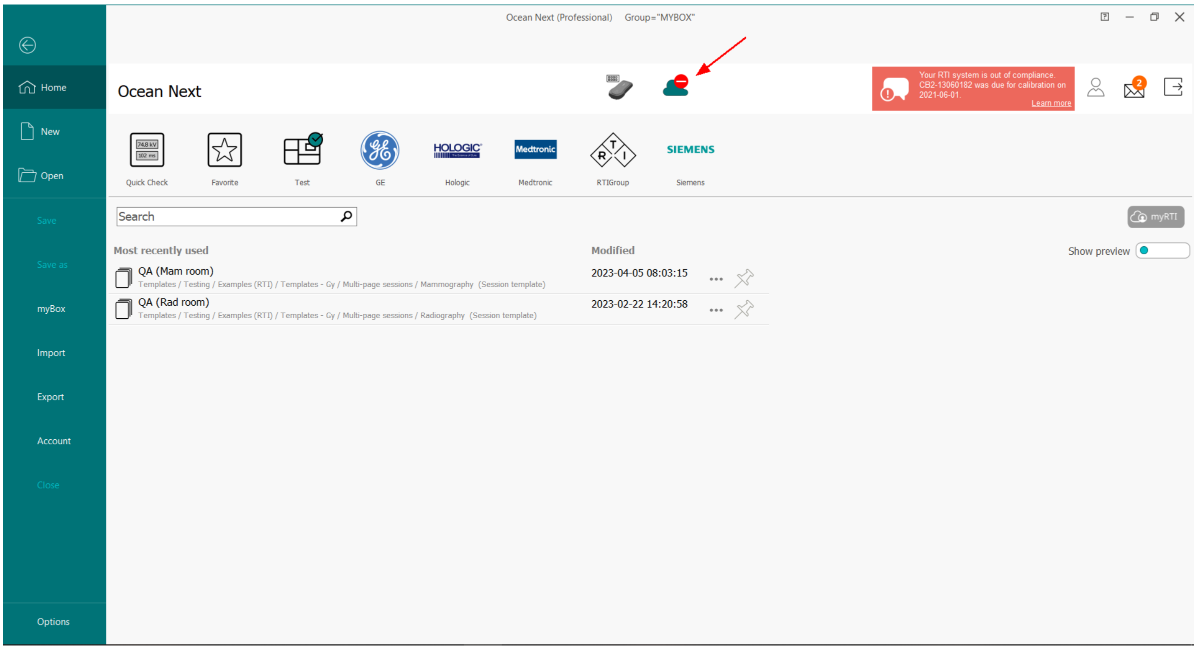
Activation by code:

11. If the device you run Ocean Next on can't use internet, Ocean Next can't connect to myRTI and activate. The following message will be shown when you start Ocean Next:



Click OK to continue.

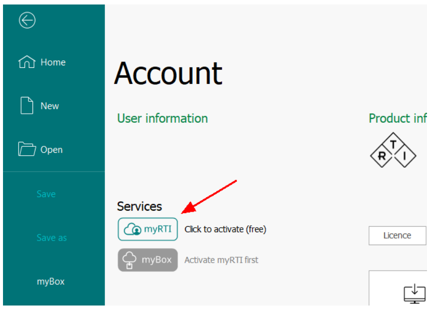
12. Ocean Starts and the Backstage is shown:



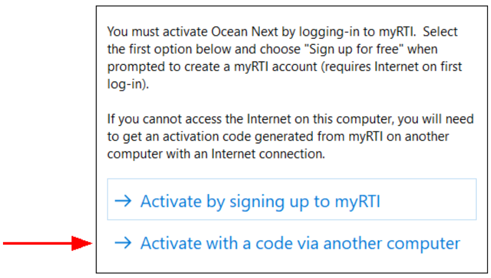
The icon at the top of the page shows that myRTI isn't available. If you don't have internet connection on this device, Ocean Next must be activated by using another computer and a code. To do this follow step 13 and forward.

13. Click on Account in the Backstage menu on the left side.

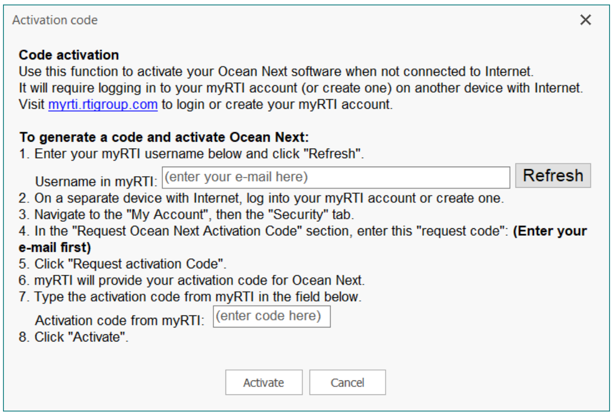
14. Click on the **myRTI** button under Services.



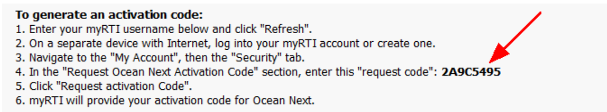
15. A dialogue is shown, select the second option.



16. A dialogue is shown:



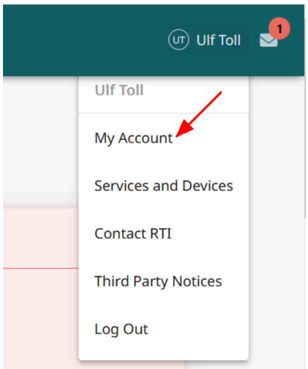
17. Follow the instructions in the dialogue. Enter your myRTI sign in name and click "Refresh", a "request code", it will be generated and used in step #4.



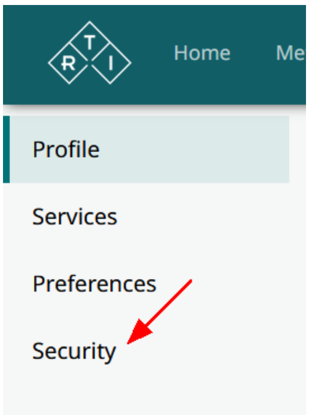
If you don't have access to your myRTI account now, do step #1 and write down the "request code" shown in step 4. You can now click "Cancel" in the dialogue and start using Ocean Next. Come back here as soon as you have been able to visit myRTI and got the activation code and complete the activation. Make sure to do this before the 30 day period expires.

18. Use a separate device to sign in to your myRTI account and follow the instructions in the dialogue.

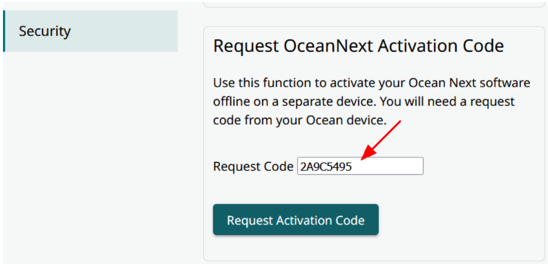
19. Click on your name in the upper right corner of the myRTI web page and select "My Account":



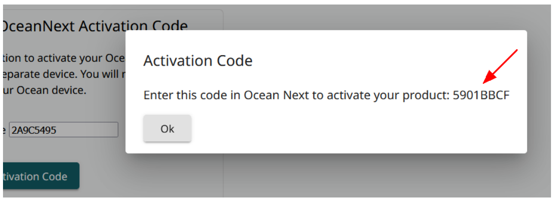
20. From the menu on the left side select "Security":



21. Enter the "request code" you created in Ocean Next:

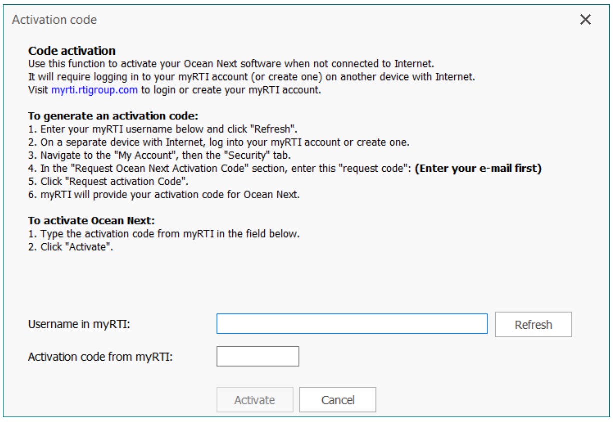


22. Click on "Request Activation Code". The code will be shown:

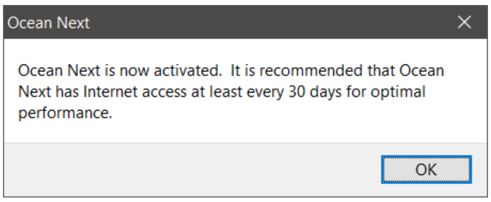


23. Now go back to Ocean Next. Write down the Activation Code if you want to continue later.

24. Enter the Activation Code and click "Activate":



25. Ocean is now activated and a dlg is shown to confirm this:



If you at any time want to use Ocean Next with myRTI connection; make sure your Ocean Next computer has internet access and click on the **Sign in** button  at the top of the Backstage Home page.

You have not yet activated Ocean Next but you can start using Ocean Next. However, it is recommended that you continue with reading the next topic; Workflow with Ocean Next.

2.6 Difference between Ocean 2014 and Ocean Next

Read this topic if you are used to Ocean 2014 to understand the differences between Ocean 2014 and Ocean Next.

The main differences are:

1. Ocean Next starts with the Ocean Next Backstage view, this is described later in the topic Backstage View.

2. Ocean Next has three different views where you work and perform different tasks.

   - The main view in Ocean 2014 still exists in Ocean Next and is now called Studio View. It can be used in the same way as in Ocean 2014 but is now intended to be used when you design templates.

   - With Ocean Next, measurements are performed in the Test View. This view offers a fixed screen layout where different objects (grid, waveforms, analysis, etc.) appear on the same place regardless of how you have designed the template or the type of screen you use. This saves time when designing templates since you don't need think about how to layout different panels and objects. Every time somebody use a template, it will look the same on the screen. This means that the templates you have used in Ocean 2014 appears differently in Ocean Next's Test View but all functions will still be available. You can do your measurements in the Studio View, if you for any reason, need to use the Ocean 20014 layout.

   - The Quick Check View in Ocean Next is similar to the one in Ocean 2014 but is now limited to do only quick measurements, the application part present in Ocean 2014 is removed in Ocean Next. Quick Check is now basically a "display" that, in the same way as in Ocean 2014, automatically adapts (plug-n-play) to the meter and probes you connect. The measurements can be saved and printed. Another new thing in Ocean Next is that Quick Check measurements now has a page for the site information and can be saved in the Site section of the database if you have the PROFESSIONAL license.

3. There are less document type in Ocean Next compared to Ocean 2014. The Real-Time-Display document type in Ocean 2014 does not exist in Ocean 2014. When migrating from Ocean 2014 to Ocean Next and the database is converted, all "Real-Time Display" measurements and templates are converted to single-page sessions and single-page session templates, respectively. A single-page session is a session with site section and on "page" for measurements.

4. It is possible with Ocean Next to have multiple Session and Session Templates open at the same time, no need to close a document if you need to open another one.

5. The database structure in Ocean Next is slightly different compared to Ocean 2014.

   - Both Measurements and Library content are shown in the same tree, there is no separate Library tab in Ocean Next.

   - The Measurements folder in each Room is removed, measurements are saved directly in the Room. It is now possible to create sub folders in a Room to further organize measurements.

   - Real-time Displays does not exist in Ocean Next

   - The dedicated storage place for Quick Checks does not exist in Ocean Next. Quick Check measurement are now single-page sessions and can be saved in the same locations as session.

   - The entire content in Library; Session templates, Test templates, Real-time displays templates and Checklist templates are in Ocean Next represented by one single type, Session templates. These are located in the Testing folder under Templates in Ocean Next.

   - In Ocean Next a new location called Folders has been added for storage of measurements. You can in Folders create your own sub folder structure and store measured data here as an alternative to Sites. Folders is available with all license levels while Sites is available only with PROFESSIONAL.

     Note: If you imported your Ocean 2014 database when you update to Ocean Next, all your existing templates will be found in separate folders that makes it easy for you to identify them in the new database structure.

6. Ocean Next has a Trash folder where all content you delete will be saved. It is possible to recover content you have deleted.

7. Ocean Next uses three license levels as Ocean 2014 but CONNECT has been renamed to ADVANTAGE. The functions available for the different levels has changed slightly. The main difference is that your now with ADVANTAGE (called CONNECT before) instead of Real-time Displays templates now can create and use single-page Session Templates. You can in these single-page sessions include all capabilities like site information, analysis, graphs and user-defined calculations that in Ocean 2014 only was available with license level PROFESSIONAL. The only limitation with ADVANTAGE is that each Session Template only can have one page for measurements.

2.7 How To Get Support

You can always contact the RTI Support if you encounter a problem. The RTI Support can be reached by e-mail or phone:

E-mail: support@rtigroup.com
Phone: +46 31 746 36 28

1. First visit our website and go to Support and see if you can find a solution here.
2. Get in contact with our Support. Make sure to have the following information:
   - If you have problem with a measurement or template, save it, export it and send it to RTI Support.
   - Supply a good description, step-by-step on how to reproduce the problem or specify that it is an intermittent problem.
   - Make a "Support file".

How to make a Support file

You can send it directly if you have a mail program on the computer you use, otherwise select **Save** and send it from another computer. You will find a button for making the support file on the Ribbon bar:

In Quick Check: Click on the **Options** button and select "Make Support file".

In the Test View: Go to the Ribbon bar Help page and select "Make support file".

In the Studio View: Go to the Ribbon bar Help page and click on the **Contact RTI** button and select "Make Support file".

2.8 License levels

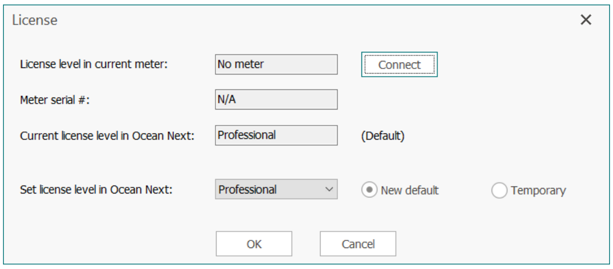
The license level is stored in the meter. It is recommended that you make sure that all meters you use regularly have the same license level. When you connect to a meter, Ocean Next will directly adapt to the license level stored in the meter. This means the you may not have access to functions and Sessions you use with one meter, when you use another one. If you are not connected to a meter, you are allowed to use any license level. You can for example, in a situation when you can't open a Session since a higher license level is required, temporarily raise the license level. To do this:

1. Disconnect from your meter.

2. Go to the Backstage View.

3. Click on Account on the File Menu.

4. Click on the **License** and the following dialogue is shown:



5. From the drop-down list after "Set license level in Ocean Next", select the level you want to use.

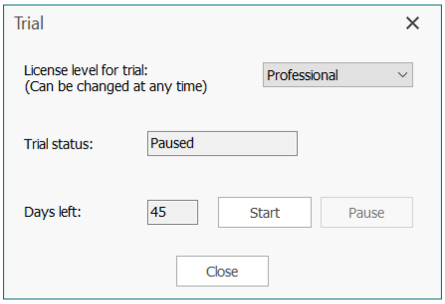
6. Select "Temporary" or "New default" if you want to change it permanently. The default level, is the level Ocean Next returns to after you have used a meter with a license level other than your default one.

   New default means that this level will always be used when Ocean starts, before you have connected to a meter.
   Temporary means that Ocean will use the license level you specify only temporary and return to the default level when you start Ocean next time.

If you purchase an upgrade to a higher level and got a license key, your meter must be activated. Read more in the topic Activate meter.

2.9 Try a higher license level

If you are using license level QUICK or ADVANTAGE a trial function is available that makes it possible during 45 days to try a higher license. When you click the Trial button the following is shown:



You can chose license level for the trial and you can change as many times you want during your trial. You can also pause the trial if you want and your 45 days count is also paused.

Important: If you save content with a higher license level, it may be locked for you when your go back to your normal license level.

Chapter 3

Cloud Services

3 Cloud Services

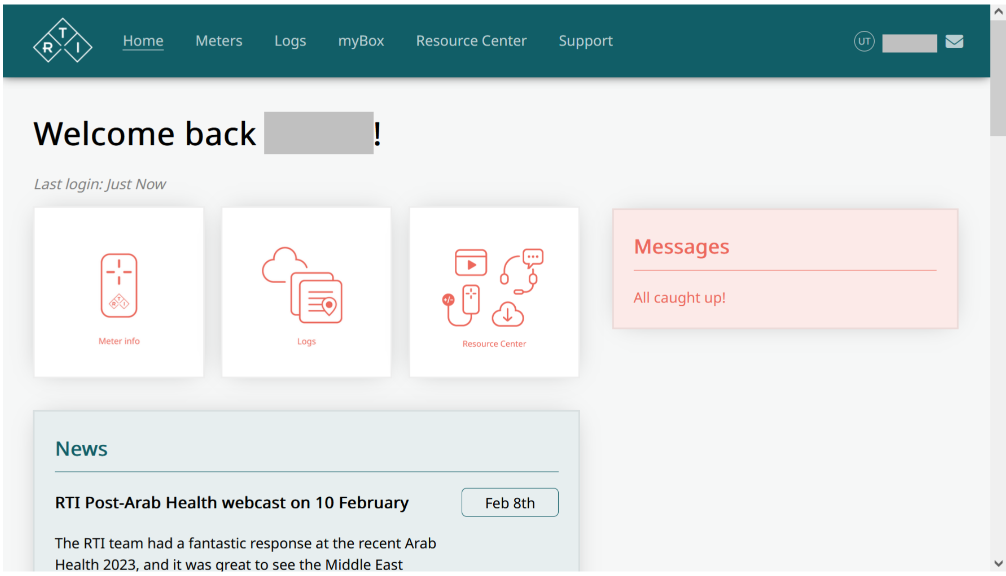
Here you can read about our customer platform, myRTI, that will help you to use our meters and software in the most effective way and maximize your productivity. myRTI is free of charge and is available as soon as you have registered an account at https://myrti.rtigroup.com and the Web Storage service, myBox, for Ocean Next.

Read more in the topics:

- myRTI Overview
- myBox overview

3.1 myRTI Overview

myRTI is our customer platform that will help you to use our meters and software in the most effective way and maximize your productivity. myRTI is free of charge and is available as soon as you have registered an account at https://myrti.rtigroup.com.



myRTI is available to everybody free of charge. Here you will find news about products, software releases and much more. If you also activate Ocean Next by connecting to myRTI (requires internet) a lot of other capabilities become available to you:

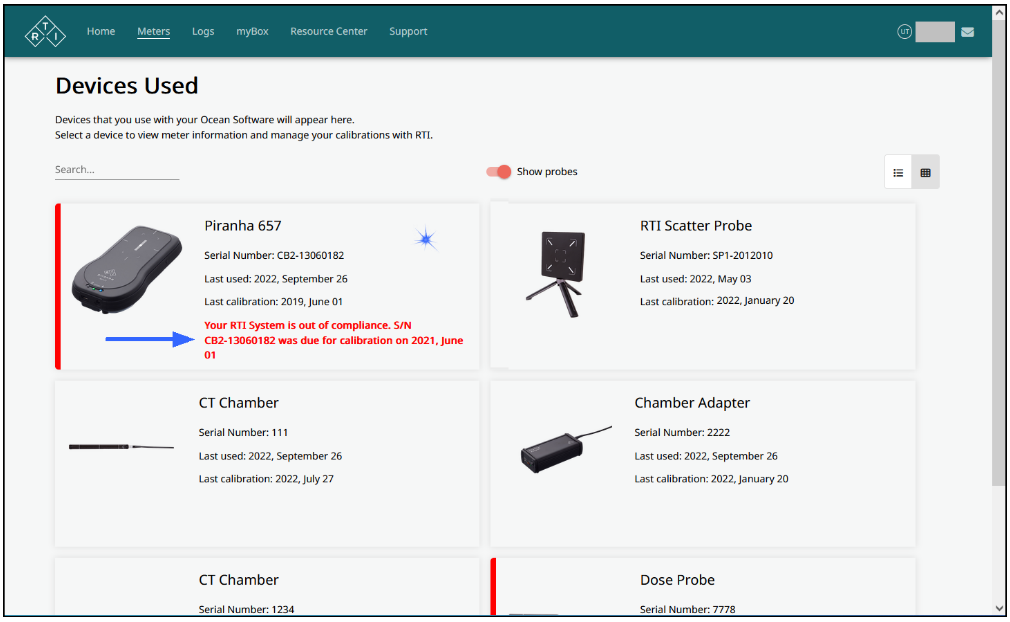
Keep track of your RTI equipment. All information about the RTI equipment you use is saved in the cloud. You can also download your calibration records here.

The result from every exposure you do is saved in the cloud.

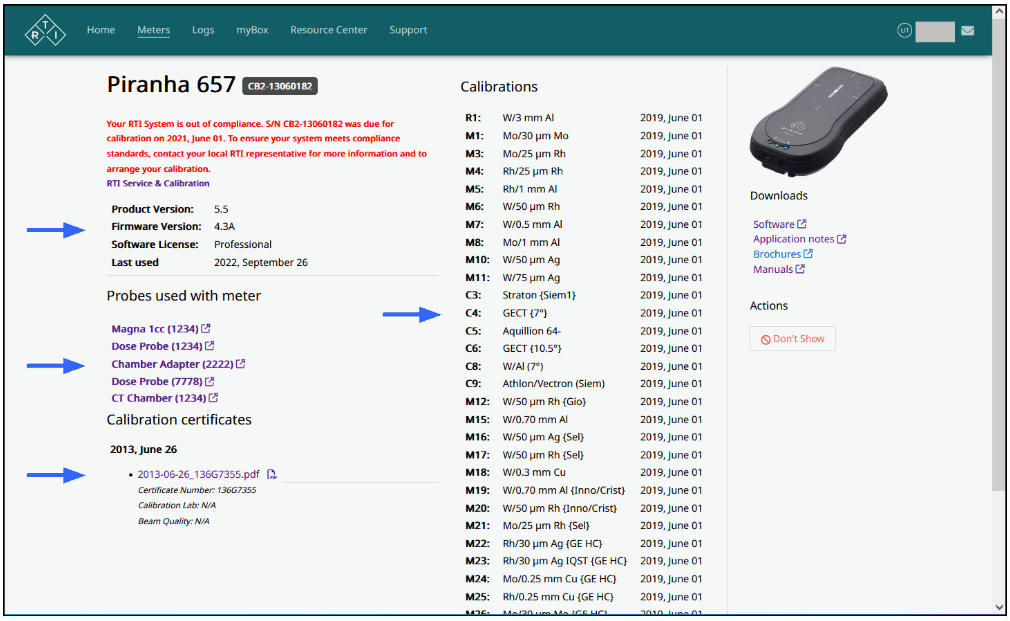
Keep-up-to date with new from RTI.

Meters - your RTI equipment

In this section of myRTI you can find your meters and probes from RTI that you use. The content here is automatically registered when you use meters and probes with and Ocean Next synchronizes with myRTI. Click on **Meters**.



Your different meters and probes are shown and you can see basic information about each; serial number, when it was last used andlast calibration date. It is indicated if calibration is due. You can click on a device to get more detailed information about it

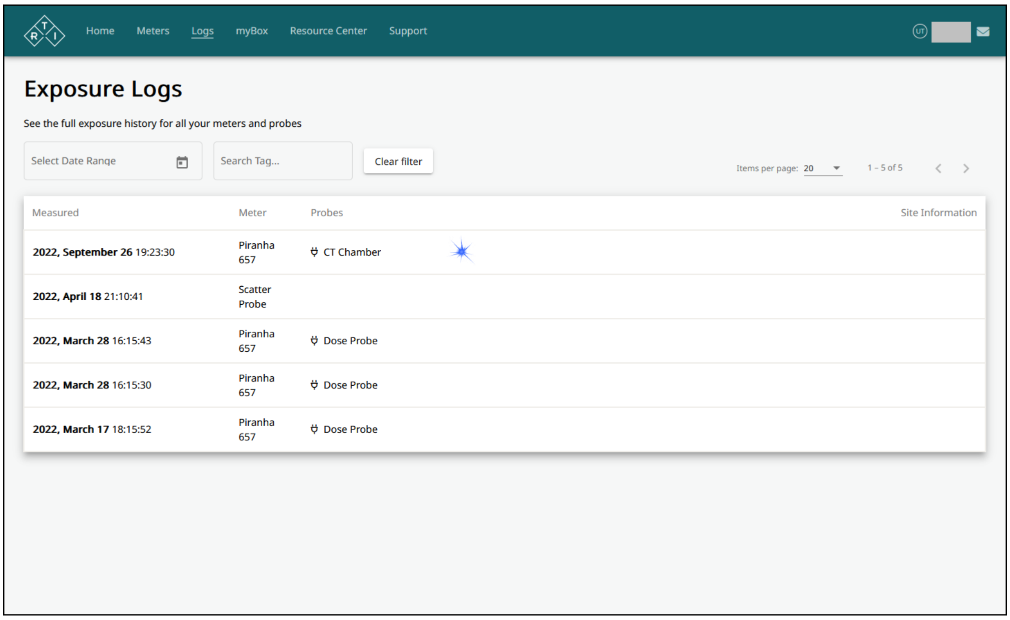


When you click on a device, you will see more detailed information:

- Product and hardware version.
- Which other devices it has been used with.
- Download of calibration records
- Detailed list with all calibrations

Logs - your measurements

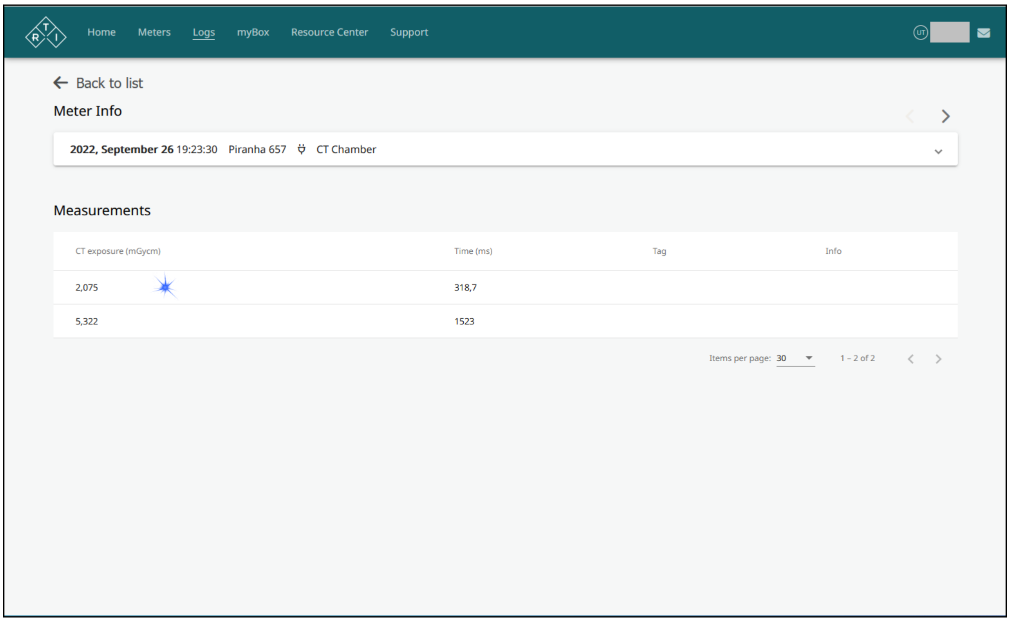
In this section of myRTI you can find all exposures you have done with your meters and probes from RTI. The content here is automatically registered when you use meters and probes with and Ocean Next synchronizes with myRTI. Click on **Logs**.



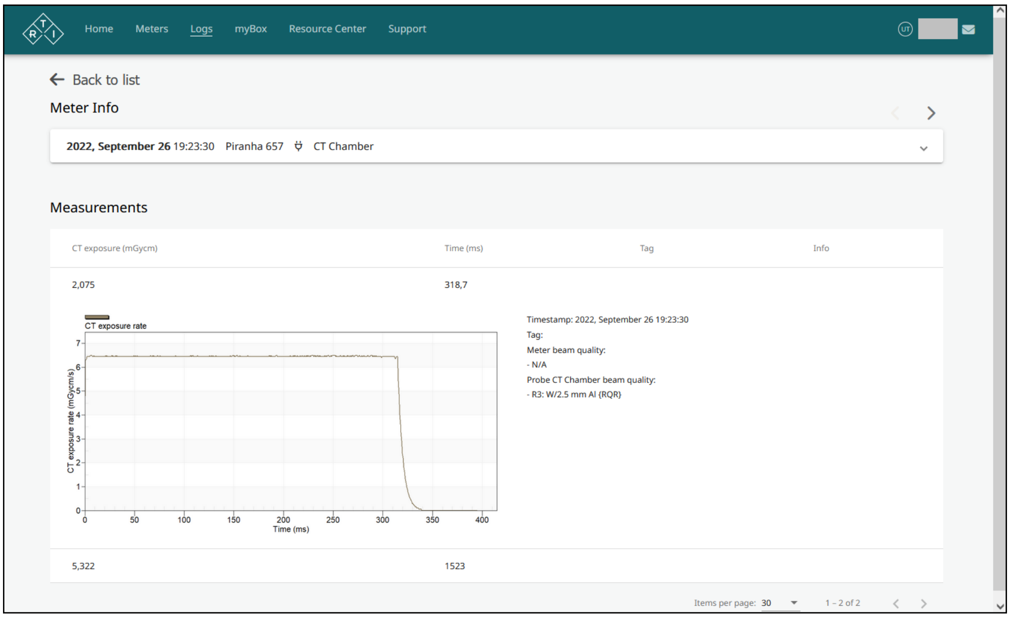
The list shows different dates/times when you performed measurements and meter/probe you used. A new item in this list is created each time you:

- Start a Quick Check.
- Start a new page in a Ocean Next session
- Each time you change probe or modifies the Ocean Next session in some way

You cab click a an item in the list to see the individual exposures:



The individual exposures are listed. To see more details you can click on a specific exposure:



You can see details from selected exposure:

- Measured values and waveforms.
- Used meter and probe calibrations.

Resource Center and Support

Here you can find help and support that increases your efficiency when you work with Ocean Next, RTI meters and probes.

3.2 myBox Overview

myBox is a Web Storage service for Ocean Next. Your entire Ocean Next database is automatically backed up in the cloud. myBox gives you the following features:

Automatic backup of your Ocean Next database. If you ever would lose your computer or it breaks down, you will be quickly up and running with another computer and have direct access to your data.

Share your measured data and templates directly from Ocean Next with your colleagues. Forget export to files and e-mails. Your colleagues will get the data you share directly in Ocean Next and can directly use it. If you update something you have shared, it will automatically be updated for your collaugues.

Run Ocean Next from multiple computers and use one synchronized database. What you do on one of your computers is directly available on your other computer(s). No need to shuffle around data manually between your computers.

You must have a subscription or a trial before you can activate and use myBox. If you don't have a subscription you need to get one and activate myBox before you can continue. Read more aboyt this in the topic Activation of myBox.

3.2.1 Activation of myBox

You must have a subscription or a trial before you can activate and use myBox. Visit https://myrti.rtigroup.com to get a subscription or trial. You can activate more than one computer using the same myRTI account with Ocean Next to your myBox. When you do this, all your computers will get the same Ocean Next database. If you have been using Ocean 2014 and/or Ocean Next before with more than one computer you may have your data you want to keep "spread out" on more than one computer. In this case, you may want to reorganize your data and create a "mater database" before you activate myBox.

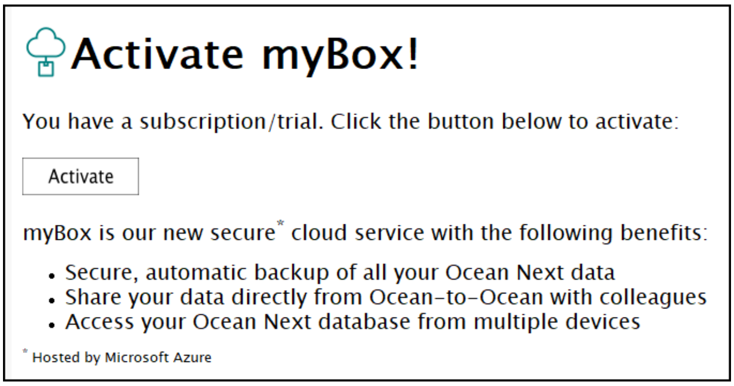
How to use the various myBox functions in Ocean Next is described in the topic How to use myBox.

Activation of myBox on the first computer

1. Make sure that your computer has internet access and start Ocean Next.

2. Click on **myBox** on the Backstage File menu.

3. If you have a subscription you will see the following:



4. Click on the **Activate** button (you can also activate from the Account page, the process is similar to what is described here).

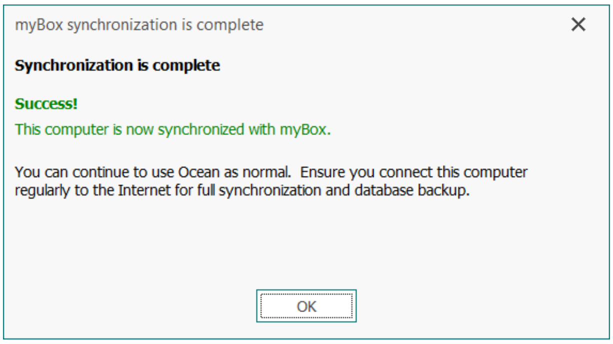
5. A dialogue will be shown. At the top you find information information about the subscription. Read the text and click **Continue**.

6. A new dialogue is shown, read the message and click **Continue**.

7. The last dialogue is shown where you click **Continue** to start the activation process, or click **Abort** if you for some reason don't want to upload your database to the cloud.

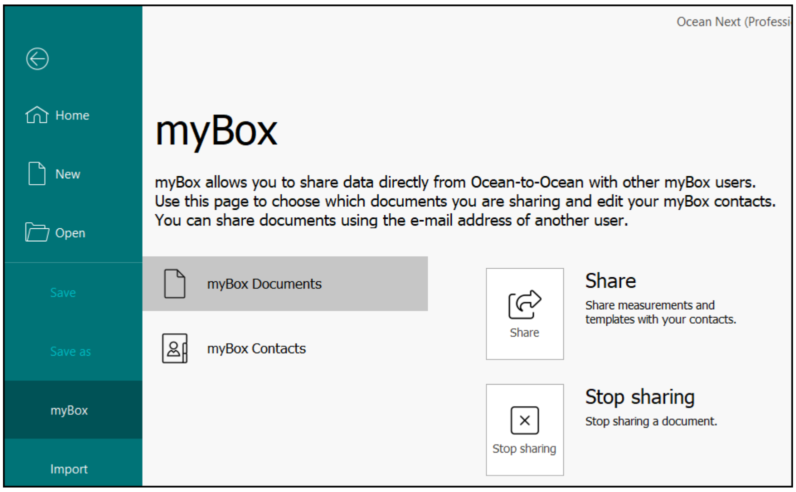
8. If you clicked on Continue, the activation process now starts. You will a progress bar, the time it takes finish depends on the database size.

9. When the process is completed a dialogue is shown:



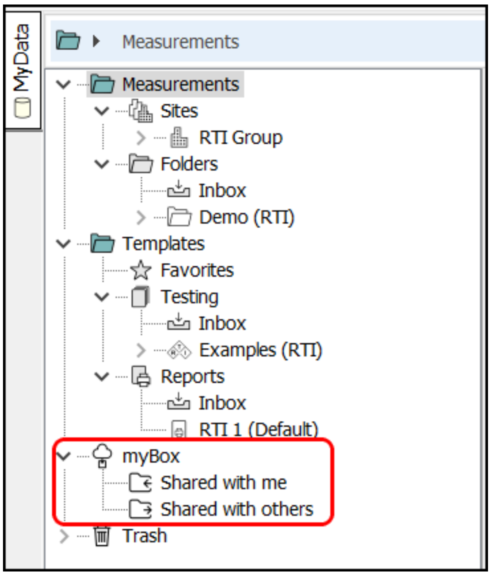
   Click on **OK** to finish.

10. You will now see that the myBox Backstage page now shows the following:



The different functions are described in the topic myBox.

11. You can also see that two new folders has been added to the database tree:



myBox is now activated and your local Ocean Next database will now continuously be synchronized with myBox as soon as your computer has internet access. You can now start to directly from Ocean Next share data with other colleagues that also has myBox. Read more in the topic myBox.

You can also go to the myRTI web page and select **myBox** from the main menu:

Activation of myBox on the 2nd, 3rd, ... computer

If you already has one computer activated with myBox, the following computers you activate will get the same database as you have on the first one. This means that, when activating a computer after the first one, it's database will be erased. Before that occur a local backup copy will be created.

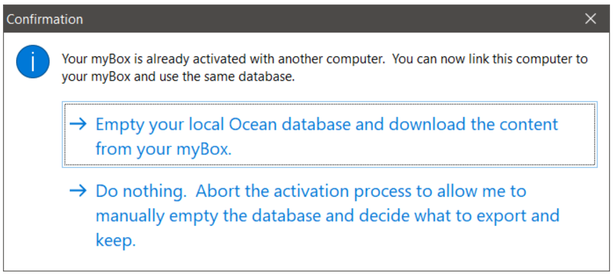
1. If you have content on this computer you want to add to your myBox: Export content (sessions and templates). Use the **Export** function and export to file(s).

2. Make sure that your computer has internet access and start Ocean Next.

3. Click on **myBox** on the Backstage File menu and click on the **Activate** button

4. A dialogue will be shown. At the top you find information information about the subscription. Read the text and click **Continue**.

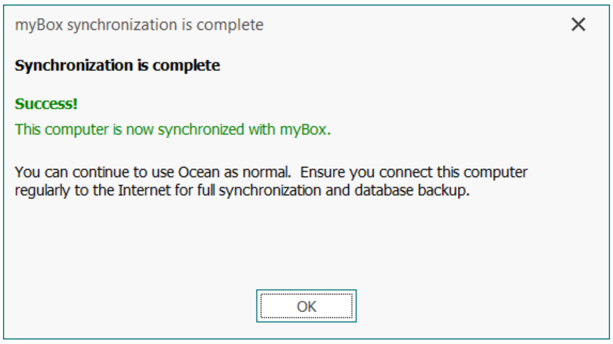
5. A new dialogue is shown:



6. As described earlier, the local database will now be erased. A backup copy will be created in Ocean Next's Data folder that you find here: *C:\Users\your username\AppData\Local\RTI Group\Ocean Next\ProgramData.* The filename will be "DataBackupBeforeCleaningForMyBoxSync_Date_Time".

7. Select "Empty your local ....", the activation process starts and a progress bar is shown.

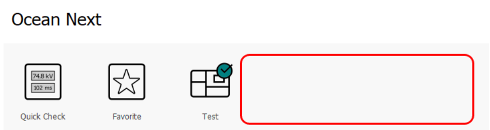
8. When the process is completed a dialogue is shown:



click on **OK** to finish.

9. Import any content you exported if you did that istep #1.

10. If you are using any customized templates that are provided by a special installer, and accessed via button(s) in the area shown in the picture below:



These templates must then be installed manually with that installer on the new computer.

myBox is now activated and your local Ocean Next database will now continuously be synchronized with myBox as soon as your computer has internet access. You can now start to directly from Ocean Next share data with other colleagues that also has myBox. Read more in the topic myBox.

3.2.2 How to use myBox

It is recommended that you make sure that the computer you use for Ocean Next has internet access as often as possible to ensure optimal function for myBox and ensure continuous backup of your data. If you use more than one computer with your myBox this even more important to avoid conflicting copies.

Automatic Backup

Your local database is automatically backed up in the background. Approximately every third minute, the database is synchronized with the cloud as soon as your computer has internet access, you don't even need to start Ocean Next. This means that you have backup in the cloud of your database in case you lose your computer or it breaks down. The backup will help you to quickly get up and running without loss of data using a another computer. Read topic How to restore your data if you have lost the computer to learn more.

Sharing of Measured Data and Templates

Sharing with others:

You can share measured data and templates with others and they can share with you as long as they also have myBox. Documents you share with others will be updated in the recipients' "Shared with me" folders if you update a document on your computer. Recipients will be notified.

To share with somebody else:

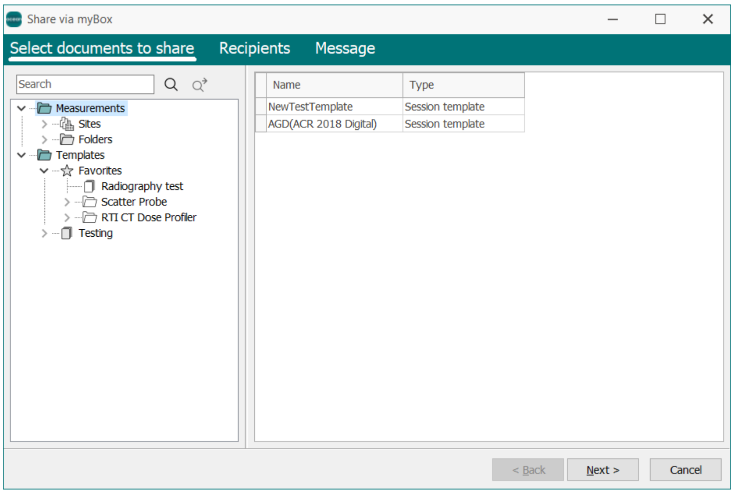
1. You can select what you want to share in three different ways:

   - Go to the Backstage, select myRTI and click on Share, go to step #4.
   - Locate the content you want to share in the database tree, go to step #2.
   - You can also share from the myBox page if you visit the myRTI web page. Not described here.

2. Go to the Test (or Studio) View and click on the **myData** tab on the left side if the database tree isn't visible.

3. Locate and select (multi-select is possible) the content you want to share and right-click on it. From the menu select "Share via myBox...".

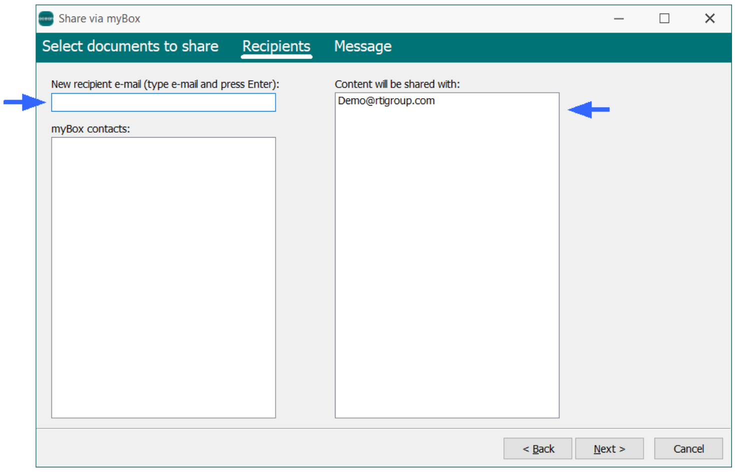
4. The "Share via myBox" wizard is open and the content you selected is preselected and shown on the right side in the wizard:



   You can add more content by selecting items on the left side and use drag-n-drop or double-click to move them to the right side. You can also, on the left side, right-click on folders and rooms and from the menu select "Select all" to move multiple items to the right side. You can use the **Delete** key on the keyboard to delete items from the right side.

5. Click on **Next** when you have selected the items you want to share.

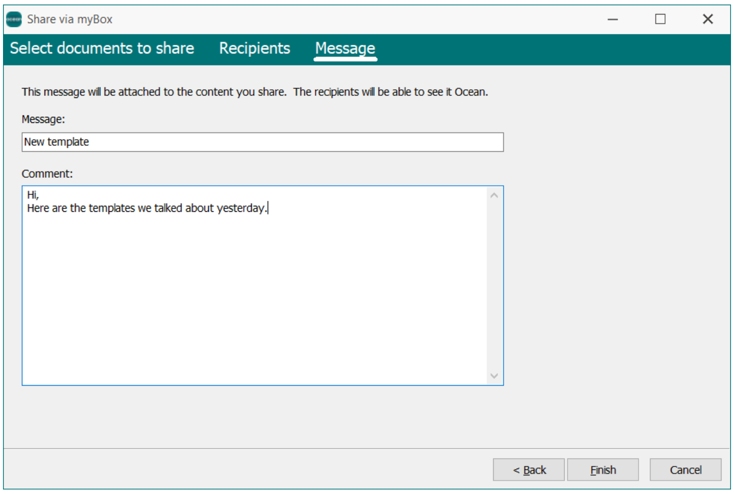
6. In the next step shall the recipients be specified:



Type the e-mail of the recipient in the upper left field one by one and press Enter. Each address is added to the "send list" on the right side. If the contact already exits under "myBox contacts, you can just double-click on the e-mail address. Add more if you want to share with more than one person. If you previously has shared something with somebody, their e-mail address will be remembered and shown in the list under "myBox contacts" and you can just double-click to add them to the "send list".

7. Click on **Next** when you have added all recipients.

8. In the next step you have the possibility to add a message to the recipients:



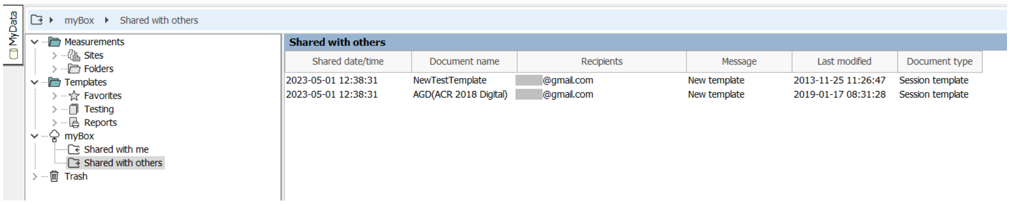
You must type something in the "Message" field, the "Comment" field is optional.

9. Click **Finish** to send away the content to your colleagues.

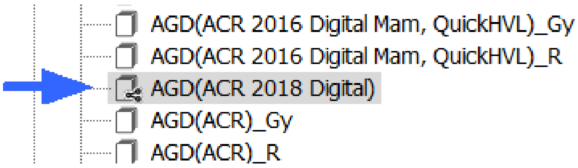
Your colleagues will get a notification in Ocean Next that you have shared something with them, and the content will appear in their "Shared with me" folder and they can use it directly. If someone that you have shared something with, doesn't have myBox, they will receive an e-mail telling them that you have tried to share something with them and how they can access it by getting myBox.

When you share something for the first time with somebody that has myBox will also get an e-mail and a message in Ocean saying that you want to share something. They can accept or deny shared content from you. If they deny, you will be blocked from further sharing with that person until they "unblock" you. In any case, you will always, when you share for the first time with somebody, get a message back informing you if they accepted or denied what you shared. You can read more about where you find your messages in the topic Backstage View.

The content you have shared with others will be shown in the folder "Shared with others":



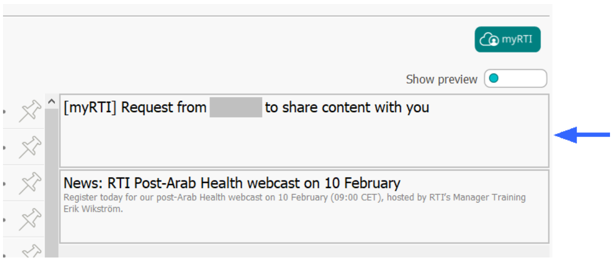
It is indicated in the database tree if a document is shared:



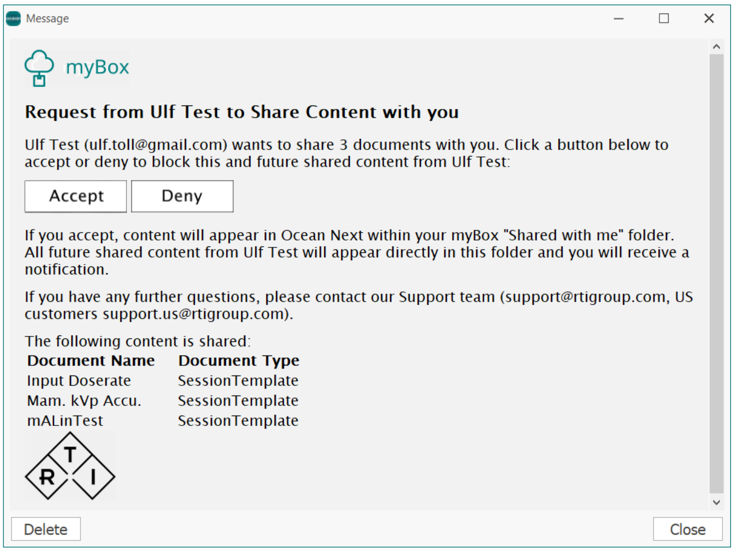
Other sharing with me:

Other persons can share measured data and templates with you if they have myBox.

1. When somebody shares something with me for the first time you get a message, one in Ocean Next and one e-mail. You can accept to receive it in two ways:
   - Open the e-mail and accept it.
   - Open the message you get in Ocean Next and accept it.
2. When somebody shares something for the first time, the message appears on the Backstage Home page:

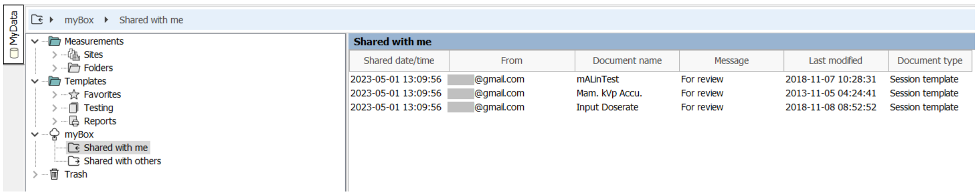


Click on the message to open it (you can also go to the Message Inbox and open it there).



Click on **Accept**.

3. The items you accepted will now be shown in the "Shared with me" folder:



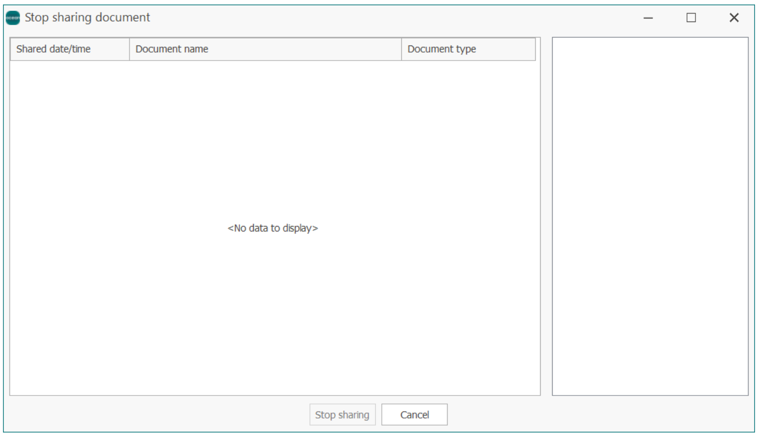
4. You can do the following with the content in the "Shared with me" folder:

   - You can use drag-n-drop to copy an item from the "Shared with me" folder to an other place in the database.
   - You can right-click on an item and select "Preview/Print", "New measurement", "Open" or "Delete".

If the person that shared something with you updates an item that is shared with you, the copy you have in this folder will also be updated. You will receive message and the "Last modified date" will change.

Stop sharing

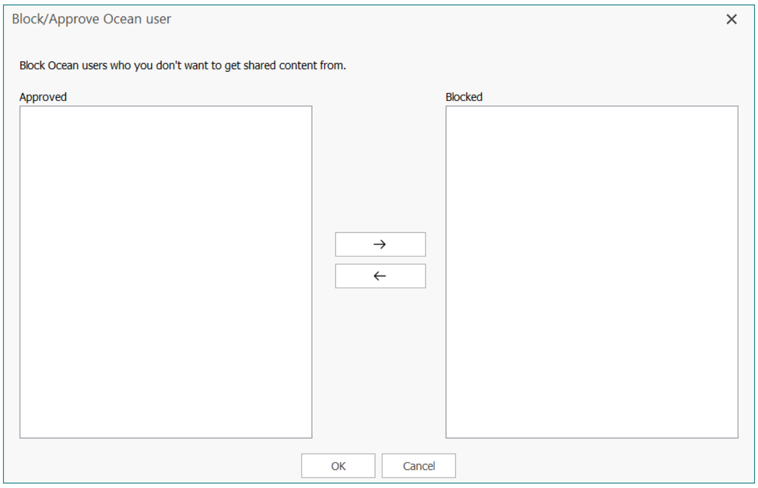
Here you can stop sharing documents that you earlier have shared with others:



The documents you have shared will be shown to the left. If you select a document, the recipient(s) will be listed to the right. Select the names you want to stop sharing with.

Block/Approve

Here you can block and approve contacts from sharing documents with you:



Contacts that has shared something with you will appear on the left side and contacts you have denied at the first request or contacts that you have blocked appear on the right side. You can select a contact and move it from Approved to Blocked or vice verse.

3.2.3 Conflicting copies

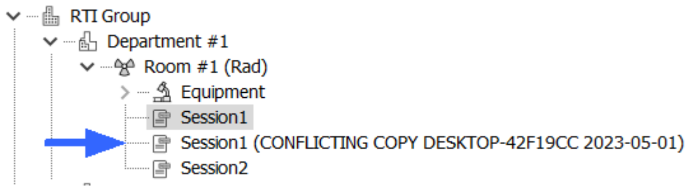
If you have more than one computer connected to the same myBox the databases all your computers will be synchronized with myBox and you will see the same content on all of them. This means that you don't need to manually export and import data from one computer to another if you use more than one computer. Of course, this require that all your computers as often as possible has internet access to allow data to be synchronized. This is important to avoid conflicting copies. The most common conflict that can occur is the following:

- Assume you have two computers.
- You use Ocean Next on both without internet access.
- You modify the same document (session or a template) on both computers.
- When the first computer has internet access the document is synchronized to the cloud.
- When the second computer gets it, and it tries to synchronize the same document, a conflict occur.
- Nothing will be overwritten, instead are both documents kept. The document that couldn't be synchronized is renamed and after that synchronized.

  To it's original document name is information added:

  "conflict type" "computer name" "date "

  It can look like this when a conflict occur with a session called "Session1":



Conflict type: CONFLICTING COPY
Computer name: DESKTOP-42F19CC
Date: 2023-05-01

You must manually, if necessary merge data, to solve the conflict.

3.2.4 How to restore your data if you have lost your computer

If you have lost your computer or just want to replace it with a new one; do the following:

1. It is recommended that you deactivate a computer you have lost a computer or your for some reason don't want to continue to use. You can deactivate in two different ways:

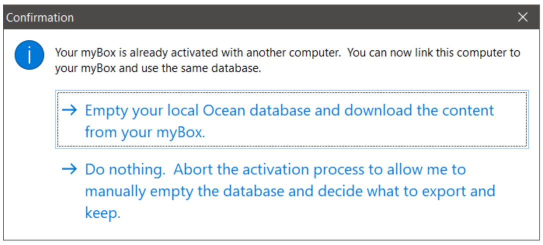
   - If you have access to the computer: go to the Account page in Ocean Next, click on Tools and select "Deactivate myBox". You can read more about deactivation in the topic Account.
   - If you have lost the computer or if you can't start Ocean Next: go to the myRTI web page, click on your name in the upper right corner and select **Services and Devices**, find the myBox section and the computer you want to deactivate and click on the **Deactivate** button.

2. Start up your new computer and install Ocean Next.

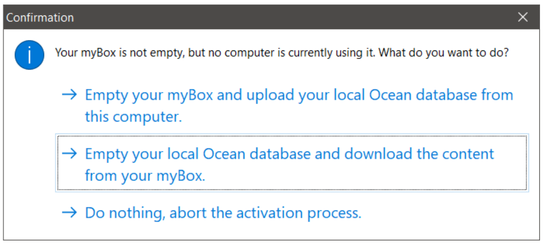
3. Activate Ocean Next with myRTI by signing in when you start Ocean Next for the first time.

4. After Ocean Next is activated, go to the myBox page in the Backstage and click on the **Activate** button.

5. You will see one of these dialogues:

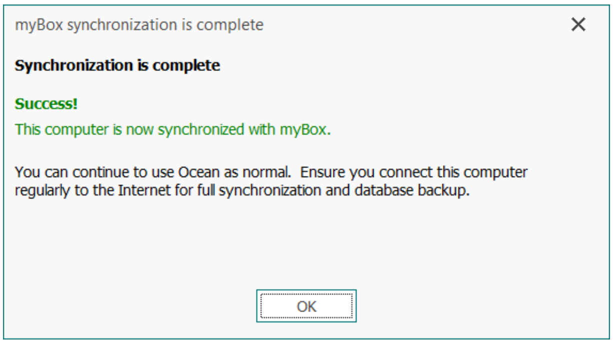


Or



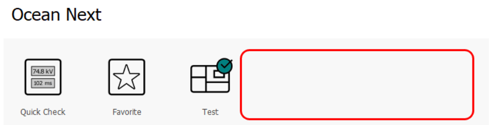
6. In both cases select "Empty your local database and download the content from your myBox".

7. When the process is completed a dialogue is shown:



   Click on **OK** to finish.

8. If you are using any customized templates that are provided by a special installer, and accessed via button(s) in the area shown in the picture below:



9. These templates must then be installed manually with that installer on the new computer.

Your are now set up to continue your work with the new computer.

3.2.5 How to activate Ocean Next with a different user name

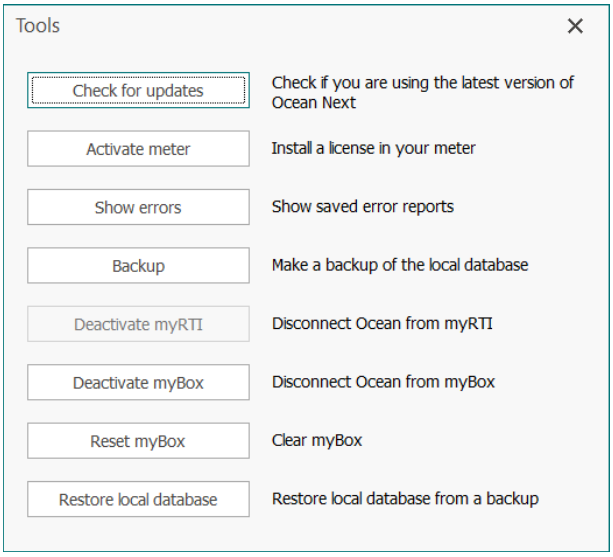
In case you would need to change the user name (e-mail address), activate myRTI with a different myRTI account, you need to do the following steps:

- Deactivate myBox if you have this service.
- Deactivate myRTI.
- Sign in with the new user name (e-mail address).

Switch user with access to the existing account

1. Start Ocean Next and sign in with the existing account. If you don't know the sign in credentials, skip this and start without signing in.

2. Go to the Account page on the Backstage and click on the Tools button. The Tools dialogue is shown:



3. If the **Deactivate myBox** button is enabled, click on it and confirm. Ocean Next is now "disconnected" from the myBox service.

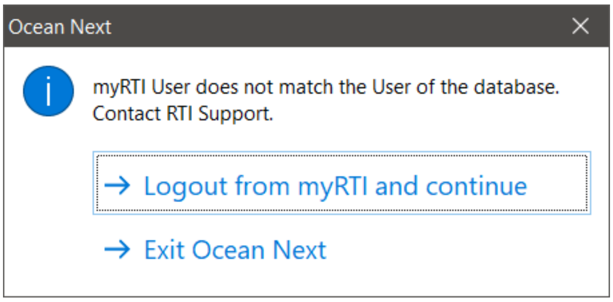
4. Go back to the Tools dialogue and click on the **Deactivate myRTI** button and confirm.

5. Ocean Next closes and is now "disconnected" from the old myRTI account and Ocean Next is quit.

6. If you want to use a different database with the new user, you can now use the **Restore local database** button on the "Tools" dialogue. If you want to import a database from Ocean 2014, read the topic Update from Ocean 2014 to Ocean Next to see how you can do this. If you want to change database it must be done before you activate with the new myRTI account.

7. Restart Ocean Next and sign in with the new myRTI account.

8. If you don't get this message, continue to step #13.



9. Select **Logout from myRTI and continue**.

10. When Ocean starts click on the **Account** button on the Home page.

11. Select **Tools** and click on **Deactivate myRTI,** Ocean Next quits.

12. Restart Ocean Next and Sign in again with the new user name (e-mail address).

13. Ocean Next is now "connected" to the new myRTI account. Activate also myBox if you have one with the new account.

Ocean Next is now setup for the new user.

3.2.6 Renewal and expiry of myBox

When the myBox subscription is about to expire, you will get a warning in Ocean Next. The first warning will come when 60 days remain and after that several more warnings will come the close to the end data you are. You will also receive e-mail reminders. Visit the myRTI web page to renew your subscription or contact your local representative.

If you don't extend and your subscription expires, you can not any longer use your myBox. However, it will remain in Ocean Next but you can't use it. Data will be buffered and if you renew your subscription within 60 days, your myBox will continue to work and your buffered data will be backed up in the cloud and all myBox functions will be available again.

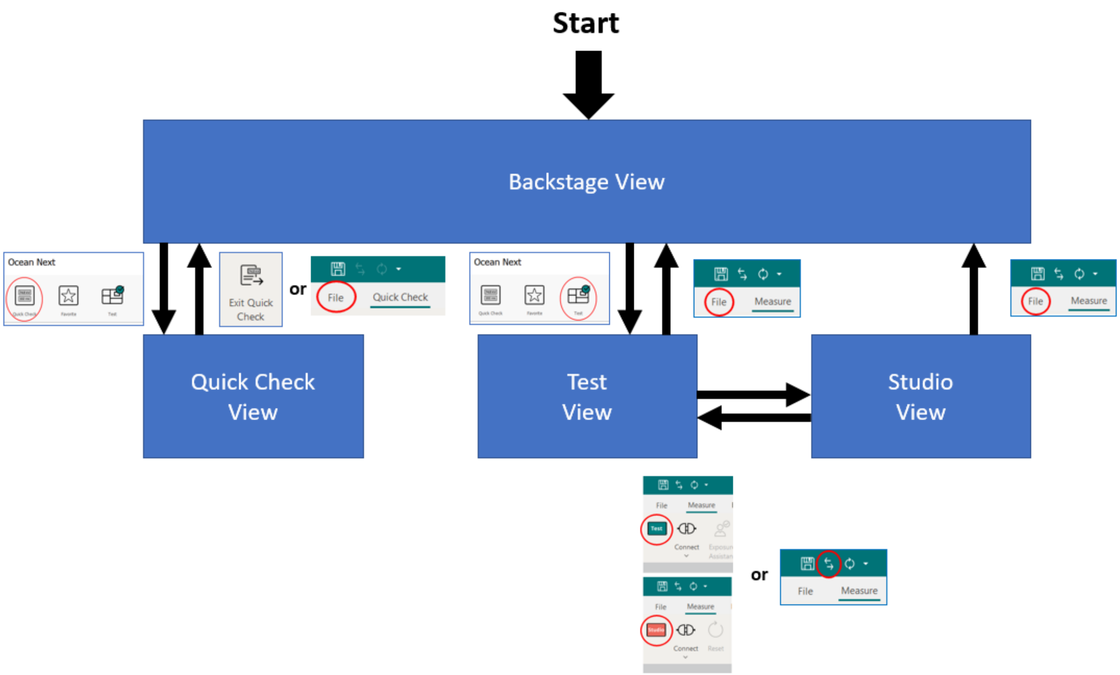
If you don't renew within 60 days after expiry, your myBox will be canceled and you can't access it any longer or the data you had in the cloud. **Note**: It doesn't affect your local data in any way, you will not lose any data that are present on your computer.

Chapter 4

Workflow with Ocean Next

4 Workflow with Ocean Next

When you start Ocean Next you will see the Backstage View. The picture below describes how to navigate between the different views:



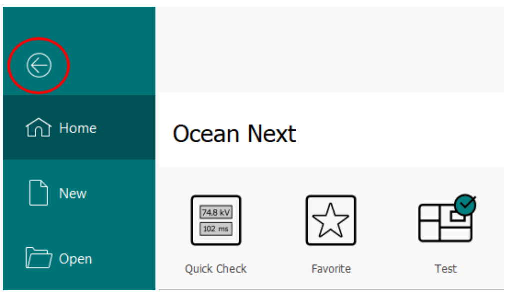
From the Backstage View you can access Quick Check and Test views:

- Go to Quick Check bu clicking the **Quick Check** button on the Home page.
- Go to Test view by clicking on the **Test** button on the Home page.

You can easily toggle between Test and Studio Views in the following ways:

- Click on the "double arrow" button on the Application bar.
- Click on the **Test** and **Studio** button, respectively.

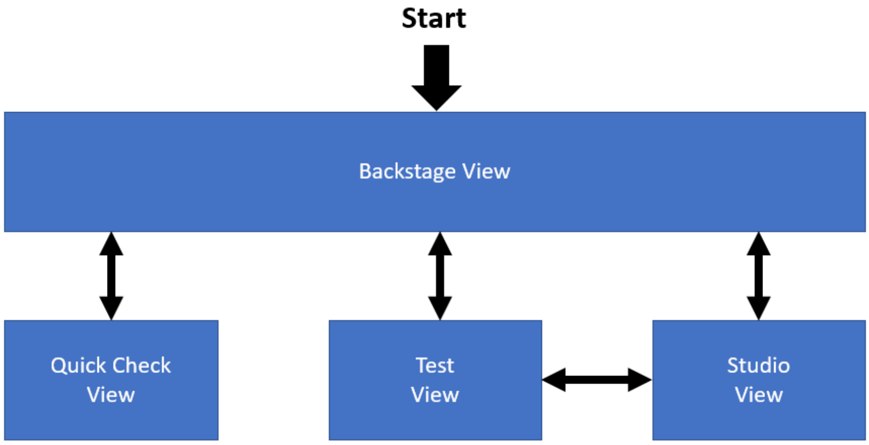
From the Quick Check, Test and Studio Views you can return to the Backstage by clicking on the File tab. When you do this, any Sessions or Session Templates open, will stay open. To go back to the view your came from, click the **Back** button:



The two following topics will describe the workflow when doing a measurement in the Quick Check View and in the Test View.

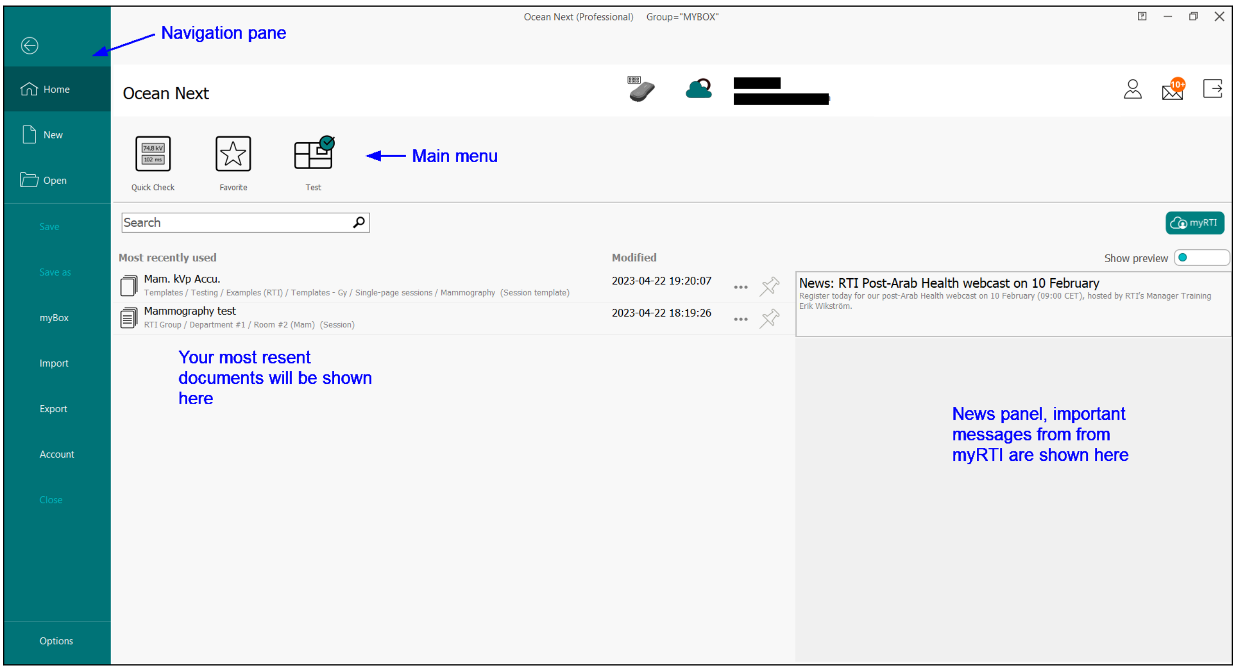
4.1 Ocean Next Overview

When you start Ocean Next, you can see the Ocean Next Backstage view. From the Backstage you can access the Quick Check, Test and the Studio view:



Backstage View

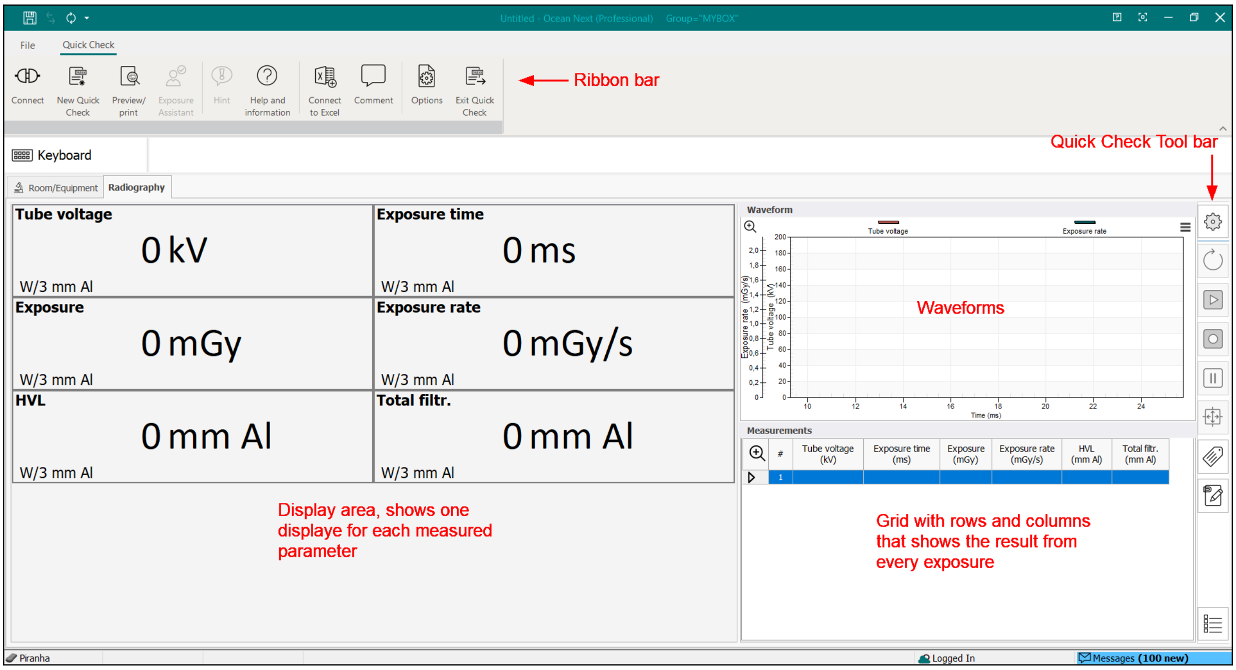
When you start Ocean Next, or after you click the **File** tab, you can see the Ocean Next Backstage view. If you need to create start a new measurement, create a new template, open an existing measurement or template, print, save, change options or more, Backstage is the place to do it. In short, it is everything that you do to a document that you don't do in the document.



You can read more in the topic Backstage View.

Quick Check View

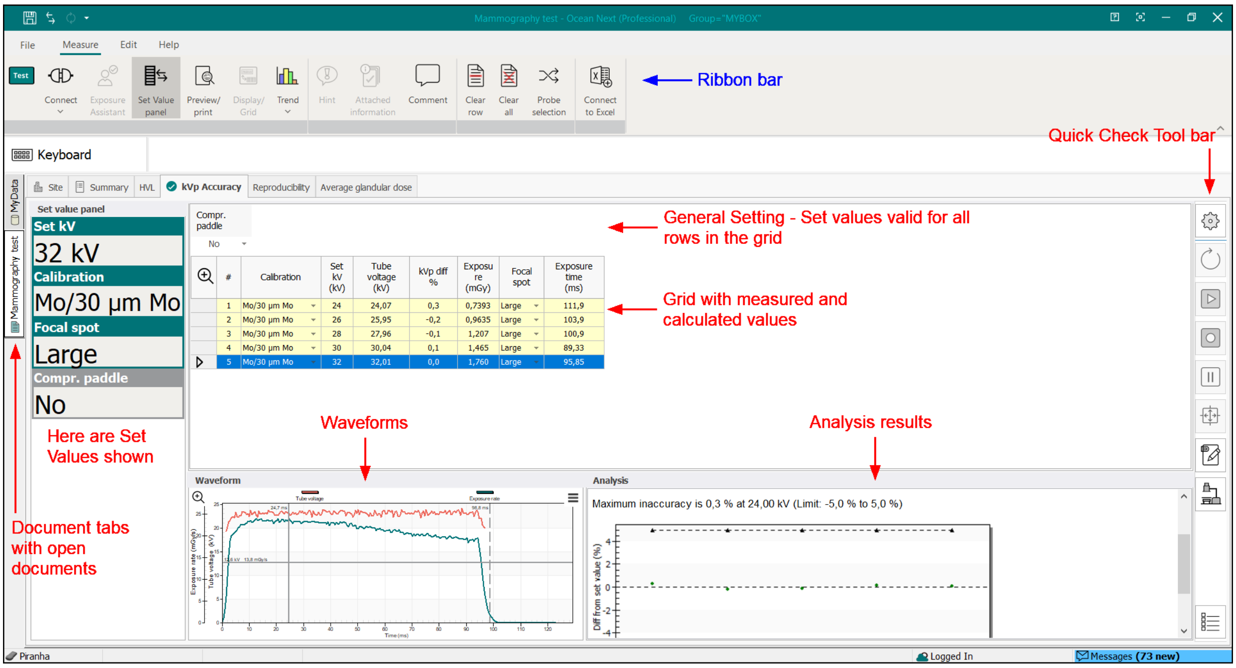
Quick Check is the display for your meter when you just need to make a quick measurement. Quick Check uses plug-and-play and adapts to the meter you use and the probe(s) you have connected.



You can read more in the topic Quick Check View but it is recommended that you continue to read the manual even if you have used Ocean 2014 before.

Test View

The Test View is the place to do measurements when you use your session templates (you must have license level ADVANTAGE or PROFESSIONAL). You can from the Test view use your various session templates to do all type of measurements, see measured data, waveforms, analysis results, save your data and print reports. You can also control your meters and probes to ensure that they are used in the most optimal way. The Test View uses a fixed screen layout to show all required information. The screen layout adapts to different screen resolutions and height/width ratios.



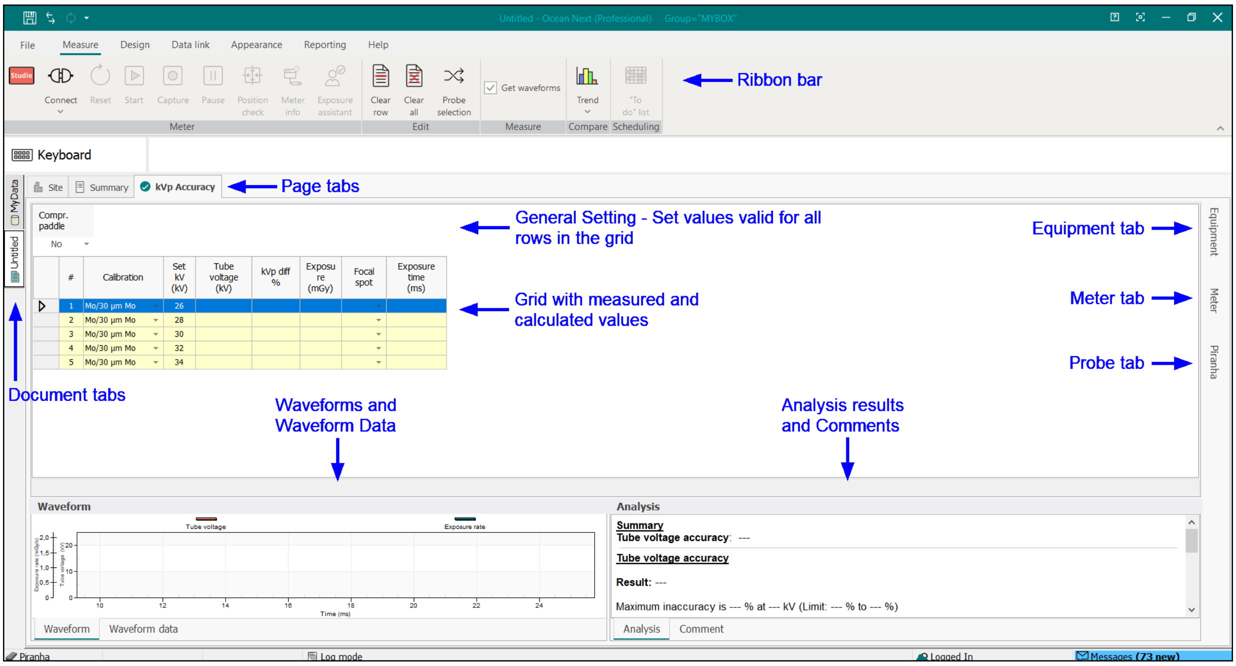
You can read more in the topic Test View. If you have used Ocean 2014 before we recommend that you continue and read at least the topics myRTI Overview, myBox Overview, Workflow with Ocean Next, Backstage View and Test View.

You are probably familiar with the Studio View since this is the same as the main view in Ocean 2014.

Studio View

The Studio View is mainly used to create and design your templates according to you requirements, meters and probes you use. A session template defines all exposures included in a session, analysis and meter settings. The template allows you to quickly collect, analyze and store your measurements.

The Studio View is the same as the main view from Ocean 2014. It is also possible, as in Ocean 2014, to do all type of measurements in the Studio View if you prefer the old Ocean 2014 work flow.



You can read more in the topic Studio View but it is recommended that you continue to read the manual even if you have used Ocean 2014 before.

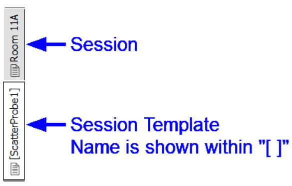
Different type of documents

All information that Ocean Next uses is stored in a local database. The database can be synchronized and also stored in the cloud if you are using myRTI and the cloud service myBox. The different document types are:

Session This is a document with measured data and results.

Session Template This is document that has no measured data, it only describes the measuring procedure. It contain set values, analysis, meter settings, report setting, etc. Session templates be created and stored and re-used every time you want to perform a specific measurement.

When you open a Session or a Session template in the Test or Studio View, the document name (the name shown in the database tree) is shown on a Document tab on the left side. Sessions and Session Templates are show differently:



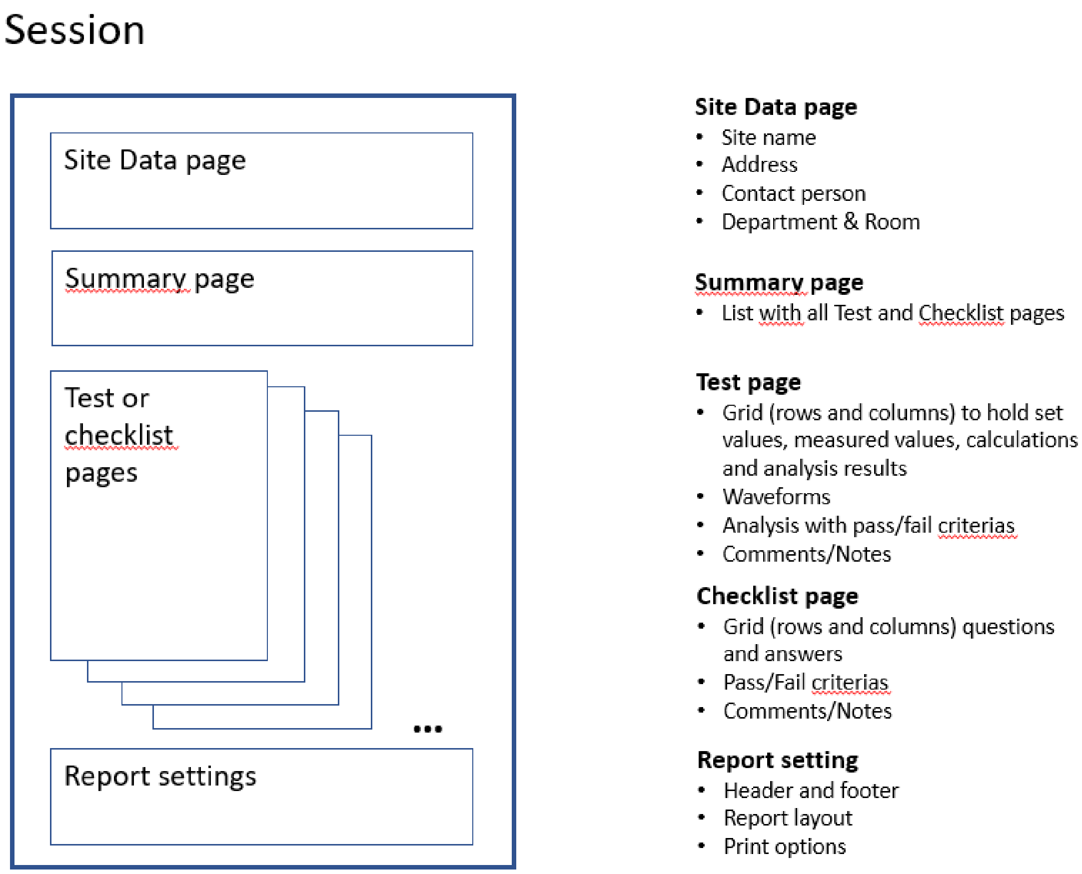
Report templates are also shown in the tree but are only "files" that contains settings for the report, for example printer settings, header/footer, etc. A report template can be added to a Session template to ensure that when it is used for a work, the printed result or created PDF file gets the format you want.

Document structure

Sessions and Session Templates have the same structure. A Session Template is a description of a specific measurement. The settings for the report are included in a Session and Session Template can be stored in a separate Report Template. The Report Template can be added to any Session and Session Template. In this way can settings for printing and PDF creation easily be reused in different Session Templates.

The benefit of setting up Session Templates for different tasks you perform is that when you do the measurement all is predefined, all you have to do is to connect the meter and start measurement by using a template for the work you intend to do. Just set the x-ray generator according to the set value shown for the specific test and make the exposure, Ocean Next will follow the template and collect required data and perform calculations as defined by the template. When you are ready you can review the report to make sure that all looks good before you leave the room. You also know that you have followed the correct procedure since that was defined in your template.

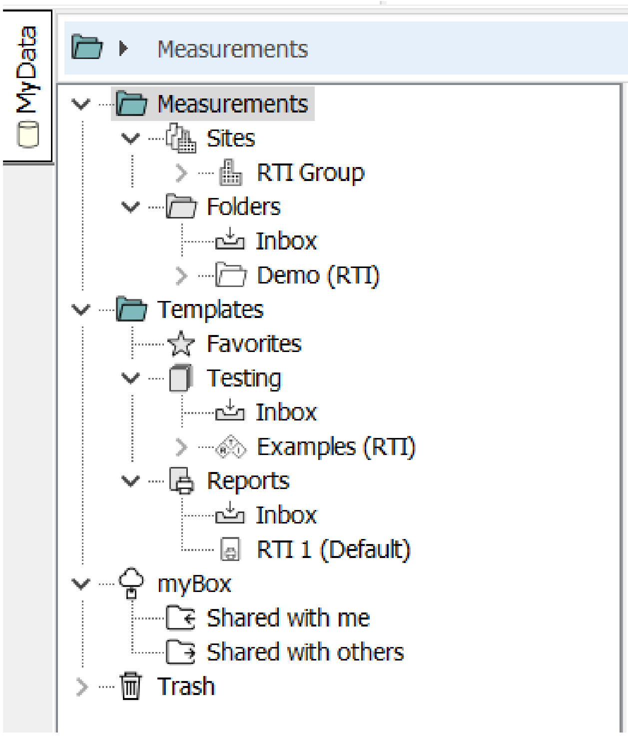
The picture below shows the structure for a Session (and a Session Template):



You are limited to Sessions with only one Test or Checklist page if you have license level ADVANTAGE, you must have PROFESSIONAL to be able to use Sessions with more than one Test or Checklist included.

Database Structure and Storage of Documents

The database structured as tree as show in the picture below:



Measurements - storage of measured data

- Sites: Predefined structure where you can define your facilities, departments, rooms and equipment. You can store Session in the room folders.
- Folders: You can here create sub-folders and store Sessions.
    - Inbox: If Sessions are imported via a file they arrive here.

Templates - storage of templates

- Favorites: Session templates stored here can easily be accessed via the Favorite button on the Backstage Home page.
- Testing: Storage for your Session Templates. Sub folder can be created to organize the templates.
    - Inbox: If Session Templates are imported via a file they arrive here.
    - Examples (RTI): Session Template examples that comes with Ocean Next.
- Reports: Storage of your Report Templates.
    - Inbox: If Report Templates are imported via a file they arrive here.

myBox - storage of shared Sessions and Session Templates

- Shared with me: Here are all Sessions and Session Templates shown that other users has shared with you.
- Shared with others: Here are all Sessions and Session Templates shown that you have shared with other users.

Trash

- Here you find entities that you have deleted.

License levels

The license level is stored in the meter you connect. This means that, if you have more than one meter and they have different license levels, Ocean Next will adapt to this when you connect to e meter and you will only have access to functionality according to current license level. This can be problematic and it is recommended that you have the same Ocean license for all your meters you use regularly.

There are three different levels for Ocean Next that gives you different levels of functionality. There is a forth one called ADAPTIVE that is only used for the RTI Scatter Probe.

QUICK

With QUICK you get access to Quick Check. Quick Check is optimized for ease of use and suitable when you just need to do some quick measurements. It simply adapts to the meter and probes you connect (plug-and-play) and loads a pre-defined setup. Data can be stored and printed.

- Only Quick Check can be used for measurements.
- Predefined setup for different type of measurements.
- Measurements can be saved.
- Printout of a standard report, you can customize header and footer.
- Basic Excel connection.

ADVANTAGE

ADVANTAGE allows you to design your own single-page measuring Session Templates for collection measured data with waveforms and analysis. You can save your templates and measurements. You can connect your templates with Excel and automatically fill in your spreadsheets with measured data.

- All functions available for QUICK.
- Access to Test and Studio View.
- User-defined templates, single-page sessions.
- Full analysis with user-defined pass/fail criteria.
- Print-out of a user-defined reports.
- Full Excel connection.

PROFESSIONAL

PROFESSIONAL allows you to design and use multi-page Session Templates and provides a predefined Site database for storage of your measured data.

- All functions available in QUICK and ADVANTAGE.
- Site database for storage of measurements.
- Multi-page Sessions.
- Trend analysis.

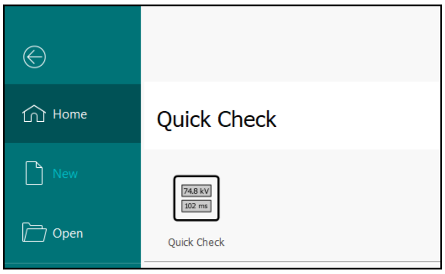
ADAPTIVE

This is used only for RTI Scatter Probe. When the RTI Scatter probe is connected, the current license level is kept.

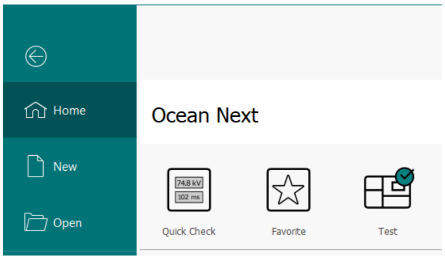
Contact RTI Group or any if the representatives if you want to upgrade to a higher license level.

Start of Ocean Next with different license levels

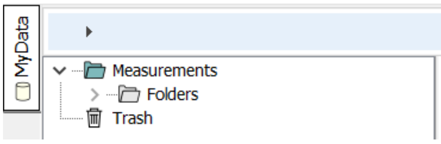
When you start Ocean Next, it will look slightly different depending on the license level you have. With QUICK only Quick Check is available:



With **ADVANTAGE** and **PROFESSIONAL** bot Favorites and the Test View are available:

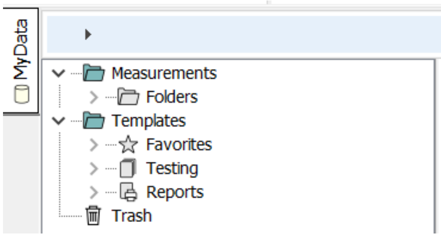


Also the database tree looks different and different parts are available depending on the license level. With **QUICK** the following parts are available:



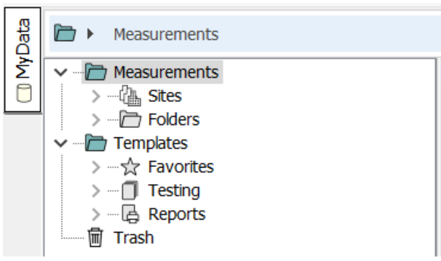
With Quick Check the only available part is Folders where Quick Check measurements can be saved.

With **ADVANTAGE** the following parts are available:



ADVANTAGE allows you to design and use single-page Session Templates. These templates are saved in the folder Testing. Measurements are saved in Folders. You can also add your own favorites to the **Favorite** button by adding session templates to the Favorites folder.

With **PROFESSIONAL** the following parts are available:



PROFESSIONAL also makes it possible to store your measurements (including those with Quick Check) in a predefined Site structure, where you define your sites (name, departments, rooms) and the equipment you are testing (generators, tubes, etc..

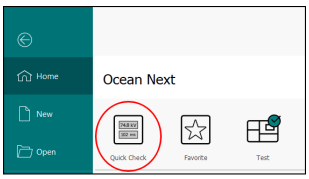
4.2 Quick Check Workflow

This topic is describing the main workflow with Quick Check. The functions available are described in detail in the topic Quick Check View and it's sub-topics.

Typical Workflow with the Quick Check View

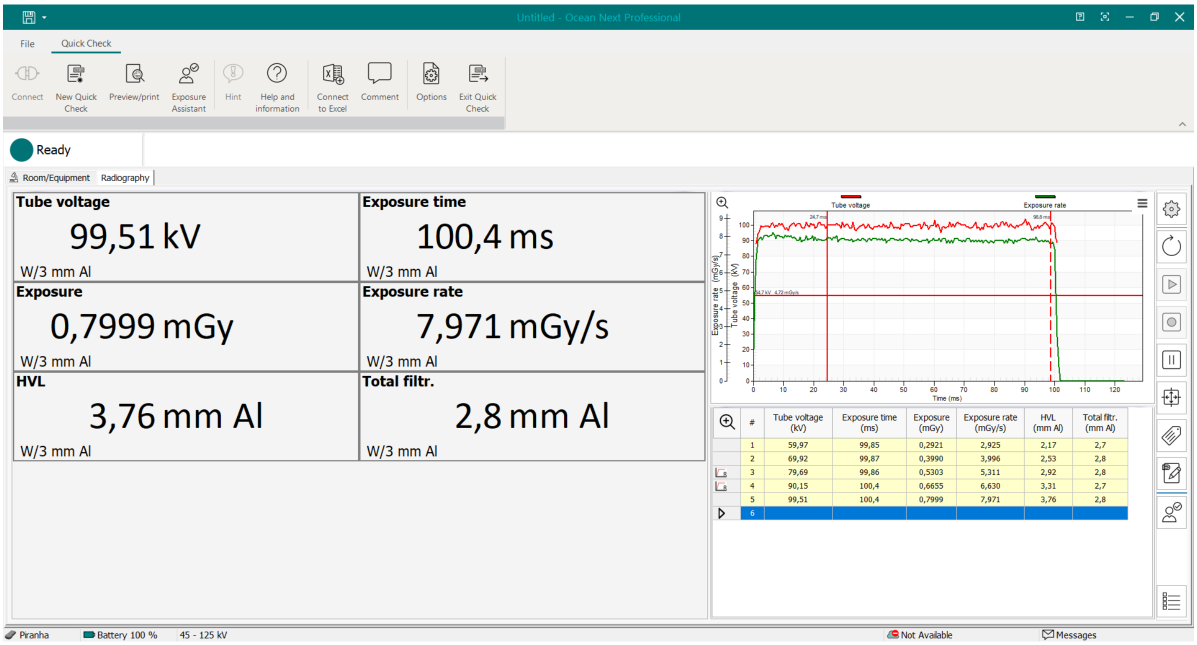
1. Make sure the meter is powered on and connect, if necessary, a probe.

2. From the Backstage Home page click on the **Quick Check** button:



3. Quick Check starts and Ocean Next connects to your meter. Depending on meter and probe, some dialogues may appear. Make selections suitable for the measurement you want to do.

4. The Quick Check View is shown and you can start to measure:



5. You have access to several useful functions on the menu to the right. You can optionally, click on the Room/Equipment tab and specify site information.

6. Make the exposures.

7. To save your measurement, click on the **Save** button to the left on the title bar or click on the **File** tab to go to the Backstage and select Save from the menu.

8. You can preview and/or print by clicking on the **Preview/Print** button.

9. Click on the **Back** button at the upper left corner of the Backstage to go back to the Quick Check View.

10. The Quick Check View provided plug-and-play and you can at any time disconnect a probe and connect another one and the Quick Check View will directly adapt to the new meter/probe configuration.

11. Click on the **Exit** Quick Check button to quit.

All Quick Check functions are described in detail in the topic Quick Check View and it's sub-topics.

4.3 Test View Workflow

This topic is describing the main workflow with Test View. The functions available are described in detail in the topic Test View and it's sub-topics.

Typical Workflow with the Test View

1. Make sure the meter is powered on and connect, if necessary, and set it up for your first measurement in the Session Template you are going to work with.

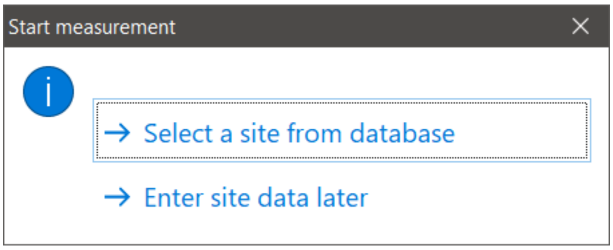
2. A new measurement always starts with loading a Session Template, you can do this in different ways:

    a. Click on **New** in the Backstage File menu, click on **Measurement** and further on **New from template** button. Locate a template and click on it.

or

b. Click on the **Test** button in the Backstage Home page. The Test View is shown with the database tree on the left side. Open the Templates folder and further the Testing folder. Locate a template, right-click on it and select "New measurement...".

3. A dialogue is now shown (only PROFESSIONAL license):

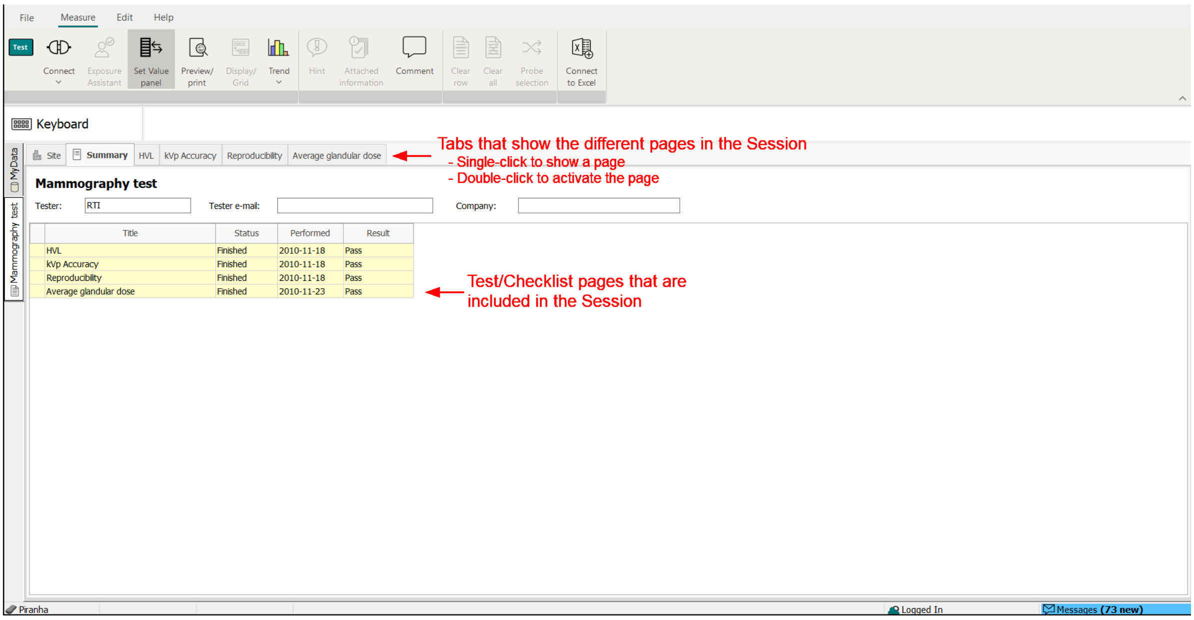


The normal workflow here is that you select the Site you want to store your measurement to. The site information will then automatically be added to your Session. You can also enter this information later and also store your Session in the Folders section of the database instead of the Site section.

4. Ocean Next connects to your meter.

5. The session's Summary page is shown and after a few seconds the first page (in this case "HVL") is **activated**. This means that your meter is set to do the first measurement on this pag, see more about this below.

6. The session's Summary page has the following content:

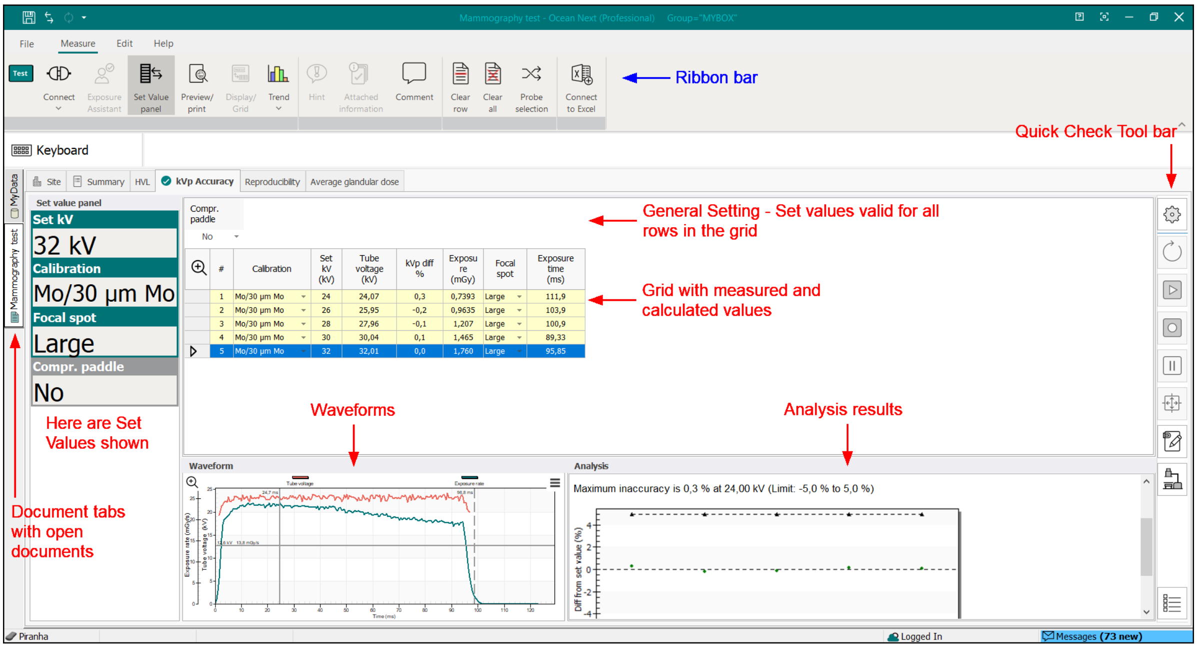


7. You can click on the different Session tabs. For the Test/Checklist tabs is the following valid:

Single click: **Selects** the page and shows the content.
Double click: **Activates** the page and prepares the meter to do the measurements on this page.

8. The page is activated if your meter and connected probe(s) are suitable for the measurement. If meter and probe can't do the measurement, the Probe Selection dialogue will appear that allows you either skip the parameter(s) not supported or connect the required probe.

9. The first page is activated automatically and you will see it:



10. You are now ready to make exposures.

11. You can see the result from each exposure in the grid. waveform and analysis results below the grid.

12. To the left you see the set values for each exposure. If you need to change something, just click on it and edit it. You can also edit directly in the grid.

13. When you have completed one page, click at the next tab to activate the next test or checklist.

14. To save your measurement, click on the **Save** button to the left on the title bar or click on the **File** tab to go to the Backstage and select Save from the menu.

15. You can preview and/or print by clicking on the **Preview/Print** button.

16. Save the Session when you have completed it. To close it; right click on the document tab and select "Close" or click on the **File** tab to open the Backstage and here click on **Close**.

All Test View functions are described in detail in the topic Test View and it's sub-topics.

Chapter 5

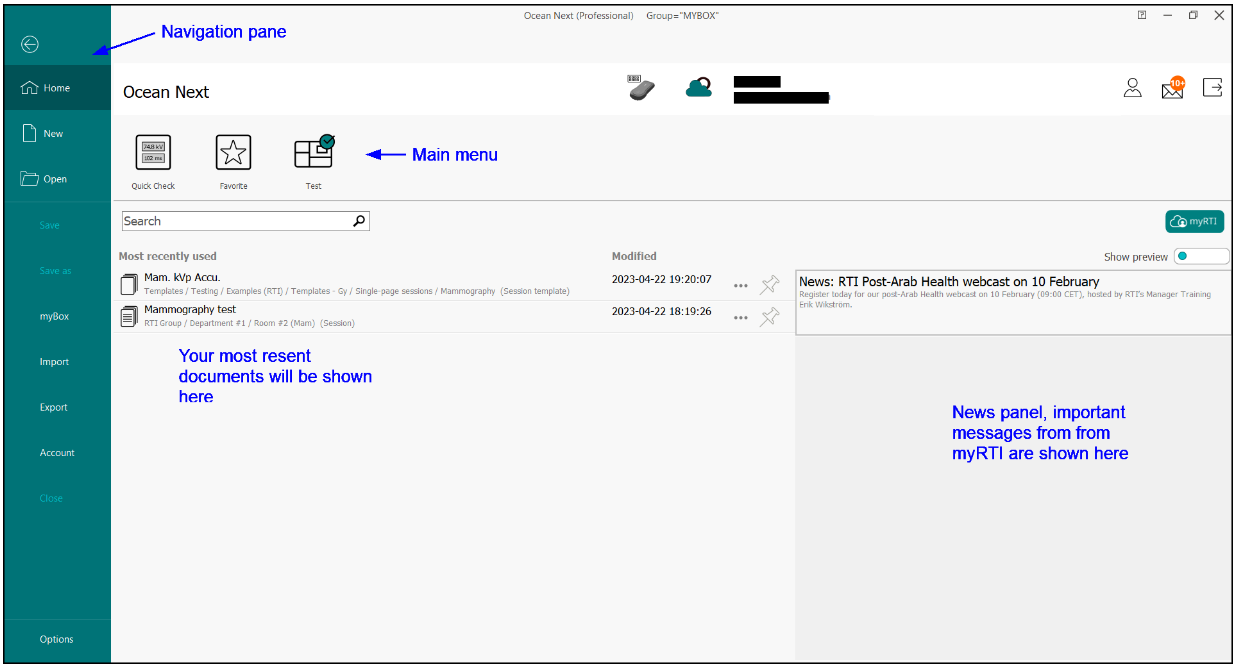
Backstage View

5 Backstage View

When you start Ocean Next, or after you click the **File** tab, you can see the Ocean Next Backstage view. If you need to create start a new measurement, create a new template, open an existing measurement or template, print, save, change options or more, Backstage is the place to do it. In short, it is everything that you do **to** a document that you don't do **in** the document.

Home

To the left you have the navigation pane with buttons to access various functions.



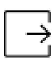
The Backstage screen shows you quite a few of the most recent files that you've worked on and some other information and buttons/indicators:

This button shows currently used meter and indicates if it is connected or not. You can click on the button to toggle between "connected" and "keyboard". If you click on the small arrow on the button a menu is shown where you can change to another meter type and, if you are connected to the meter, see the "Meter Information".

This indicator shows current cloud status, if Ocean Next is connected or not to myRTI. If you click the small arrow menu is shown where you can log out Ocean Next from myRTI. You can make a manual synchronization. You can also do this from the keyboard with Ctrl+r.

This button opens your web browser and shows your Profile page on myRTI.

This button opens the "Message Inbox" with all messages that Ocean Next has received. The counter indicates number of unread messages. The most important messages will also be high-lighted on the "News panel".



Click this button to exit Ocean Next.

New

To start a new measurement or create a new template click the **New** button and select what you want to do, see the topic New for more information.

Open
If the document you want to open isn't shown among the most recent used documents on the Home page, click the **Open** button. From the Open page, you can locate the document you want to open, see the topic Open for more information.

Save
Saves current document.

Save as
Saves a copy of current document. You can save current work with a new name and/or in a new location, see the topic Save as for more information.

myBox
Here you can find functions for myBox, organize your contacts, stop documents from sharing and block/unblock users from sharing with you, see the topic myBox for more information.

Import
Import documents from a file, see the topic Import for more information.

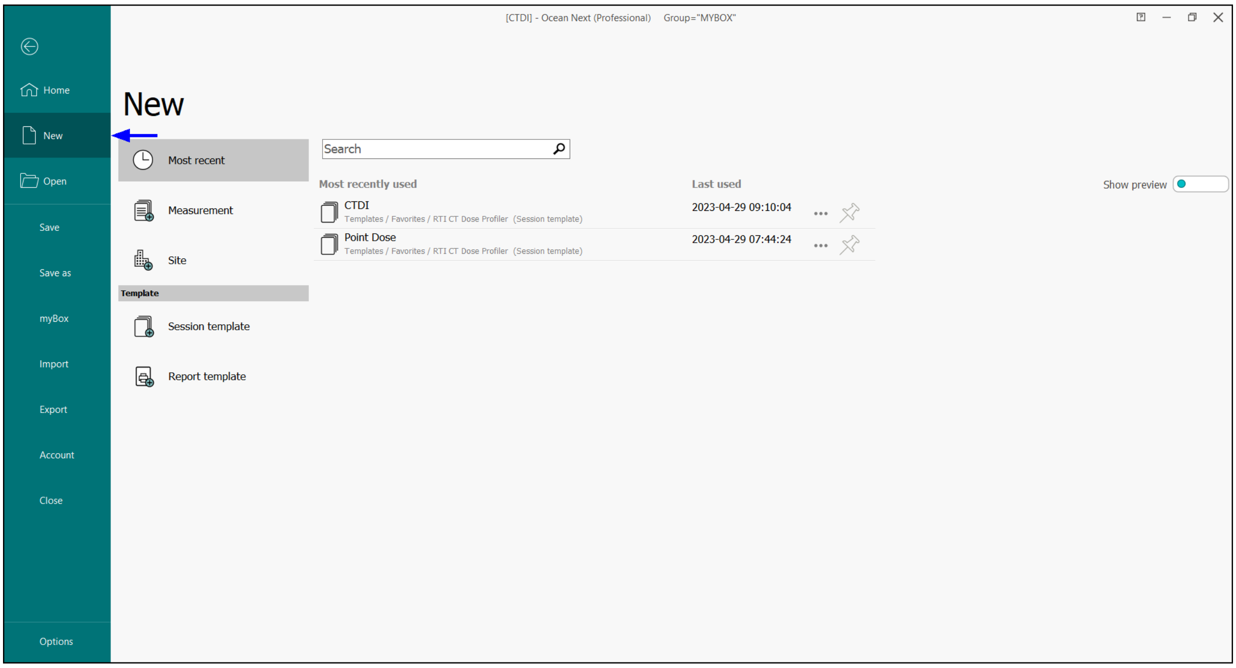
Export
Export documents from a file, see the topic Export for more information.

Account
Here you can find various functions for you administration and set up of Ocean Next, see the topic Account for more information.

Options
Click here to open Program Options and change preferences, units, defaults, etc.

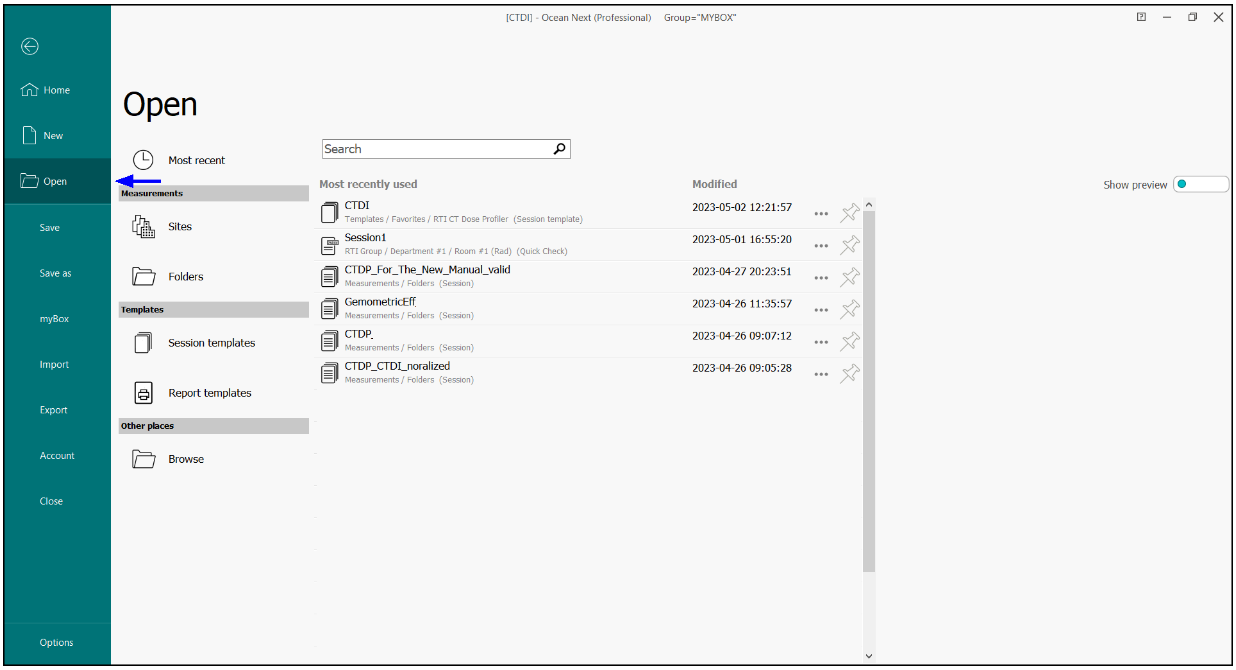
5.1 New

This page is only accessible if you have license level ADVANTAGE or PROFESSIONAL. From here you can start measurements with user-defined templates in the Test View. You can, with PROFESSIONAL, design templates that has several different pages, include analysis with pass-fail criteria, change report format and much more. With PROFESSIONAL you can also create Sites in the "Site database".



5.2 Open

This Backstage page is used to open a measurement that has been saved earlier. If you have license level QUICK or ADVANTAGE, you only have access to "Folders". If you have PROFESSIONAL, you also can open Quick Check measurements that has been saved in the Site section of the database.

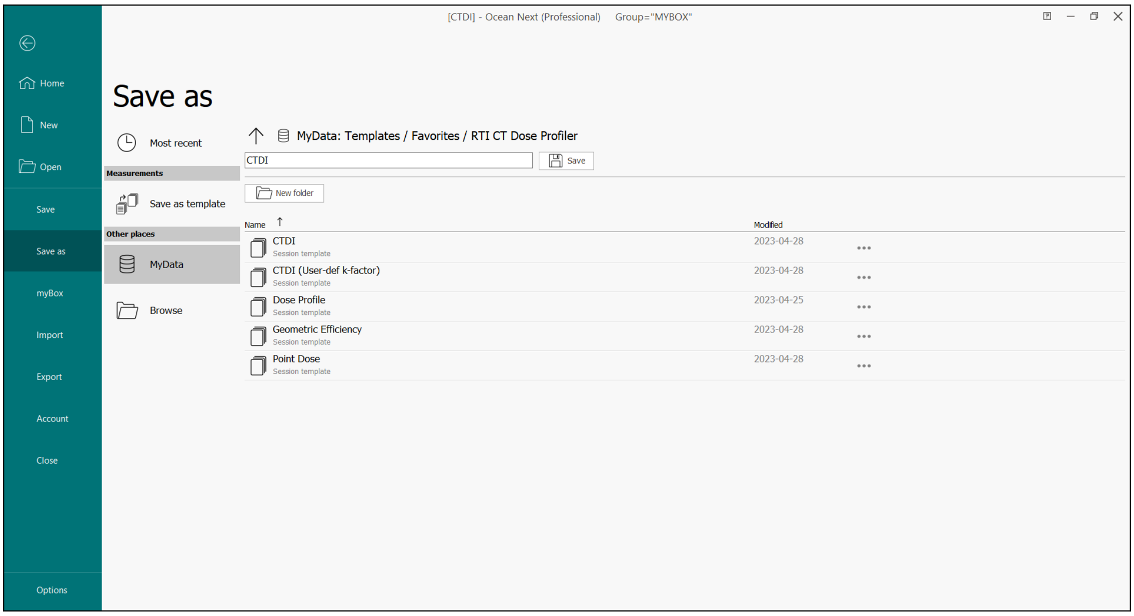


The selection Sites is not all available unless you have license level PROFESSIONAL.

If you open a Quick Check measurement and want to continue to measure, make sure to have a meter and if applicable an external probe that comply with the saved measurement connected before you open the saved measurement. Locate the Quick Check measurement you want to open and select it. Quick Check starts and the selected measurement is opened. If the required capabilities (wrong meter or external probe) a dlg will be shown allowing you to reconfigure your meter and/or external probe. If you jsut want to open it a look at it, you can do this without a meter.

5.3 Save As

This page is used if you want to rename a document and/or rename it. You will also come here when you save anew document for the first time. the first time.



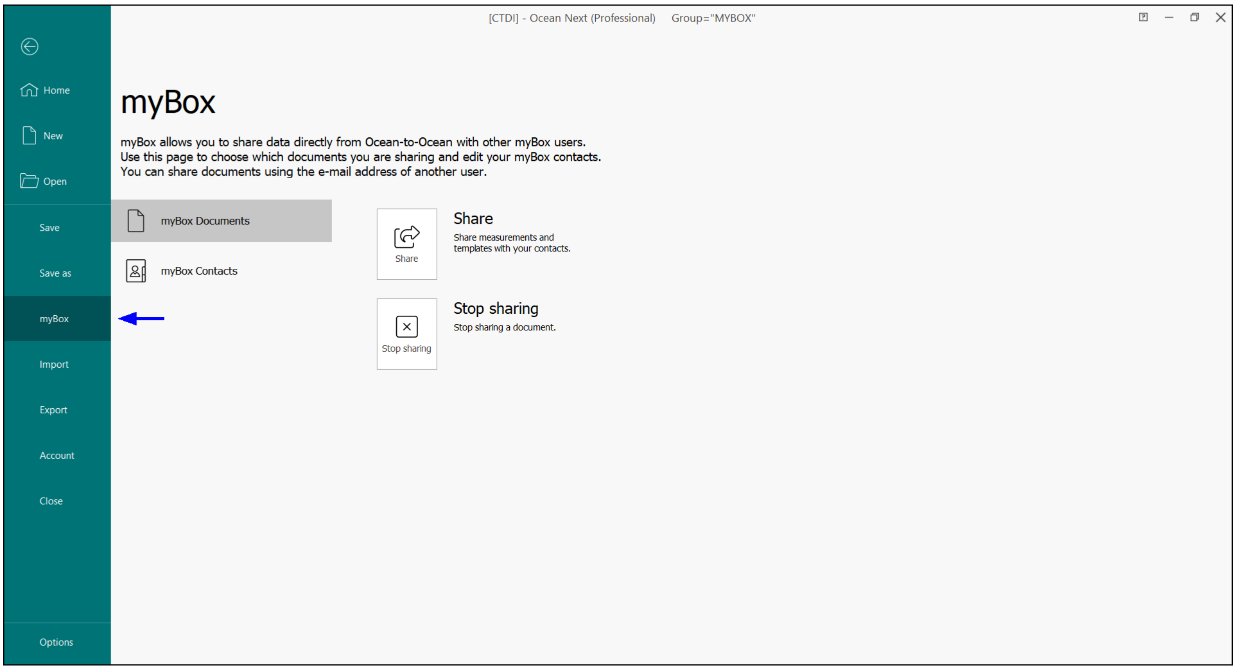
Default place to save Quick Check measurements is "Folders". This is a place where you can create sub-folders and organize your measurements in your own way. If you have license level PROFESSIONALl you can click the up-arrow and navigate further to a Site and save your measurements in a room.

The default place when you save Sessions depends if you, when you started the measurement, selected a Site or not. If you selected a Site, the default place will be the room you selected, otherwise it will be "Folder".

When you save Session templates the default place is "Testing" and for Report templates it is "Reports".

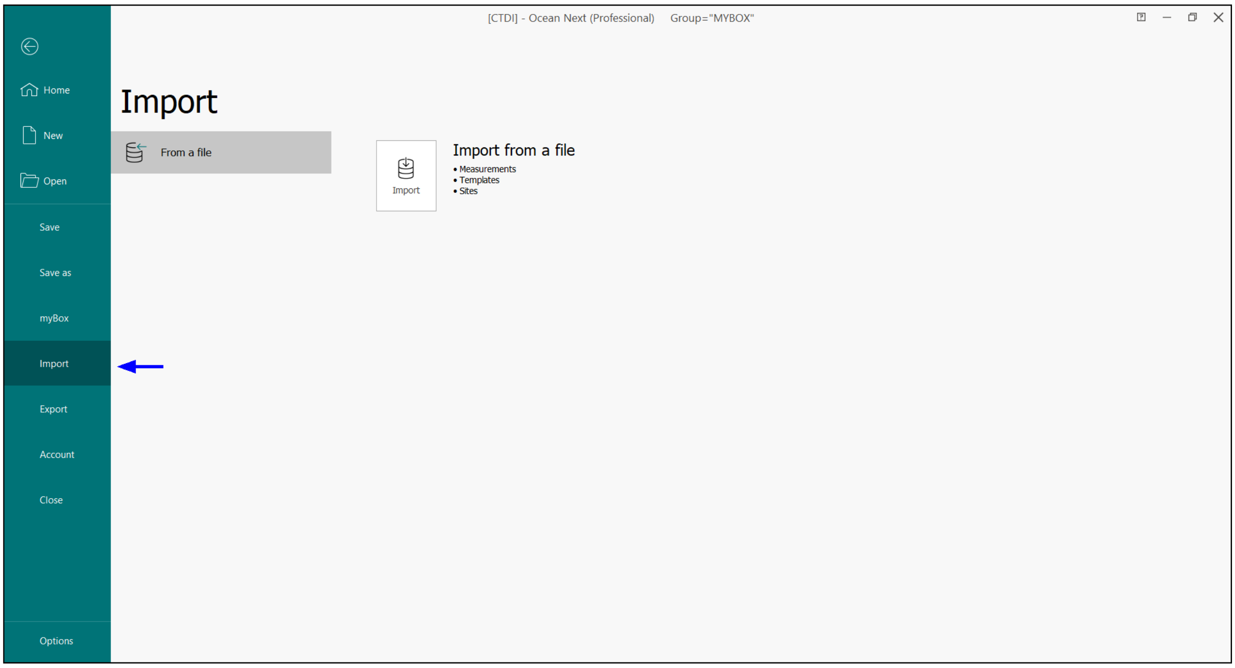
5.4 myBox

Here you find functions related to myBox, you can share, administrate your contact and cancel content you have shared. The functions here are described in the topic How to use myBox.



5.5 Import

If you want to move measured data from one computer to another, an export and import function is available to you. Click on **Import** on the navigation pane:



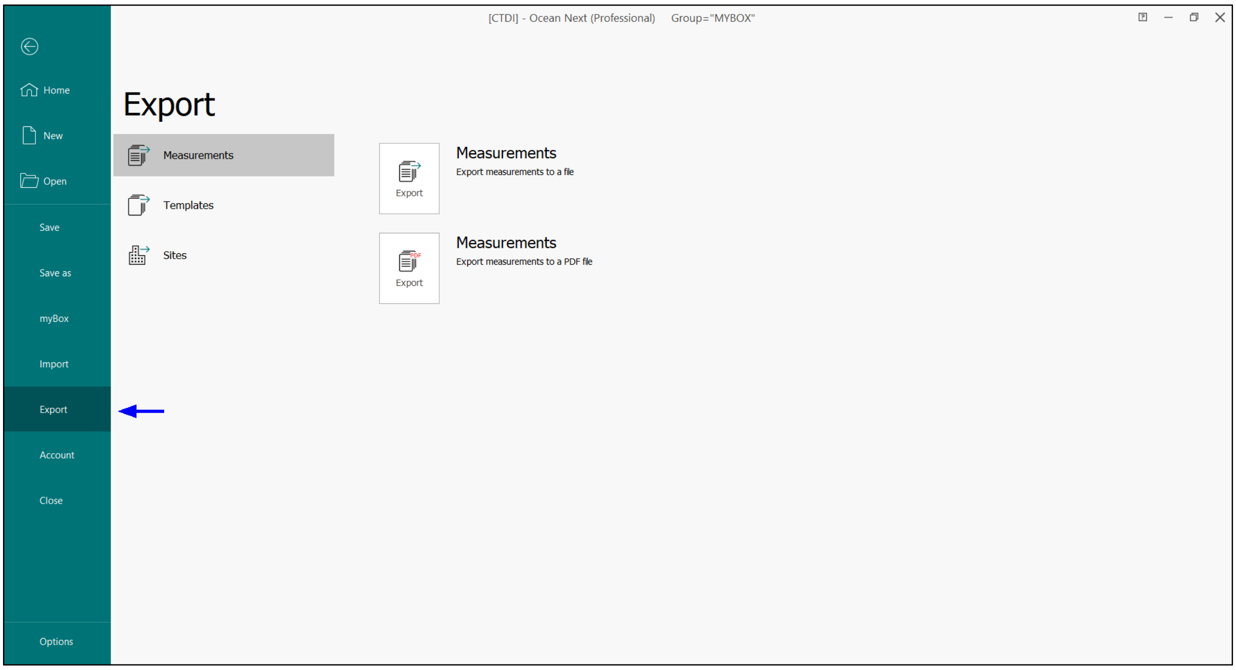
You can import a Sessions and templates in the following way:

1. Click on the **Import** button.
2. Locate the file you want to import (extension .omex for Sessions or .otex for Templates).

3. A list will be shown with the Sessions or Templates included and their destinations.
4. Click **Finish** to continue.

5.6 Export

If you want to move measured data from one computer to another, an export and import function is available to you. Click on **Export** button on the navigation pane:



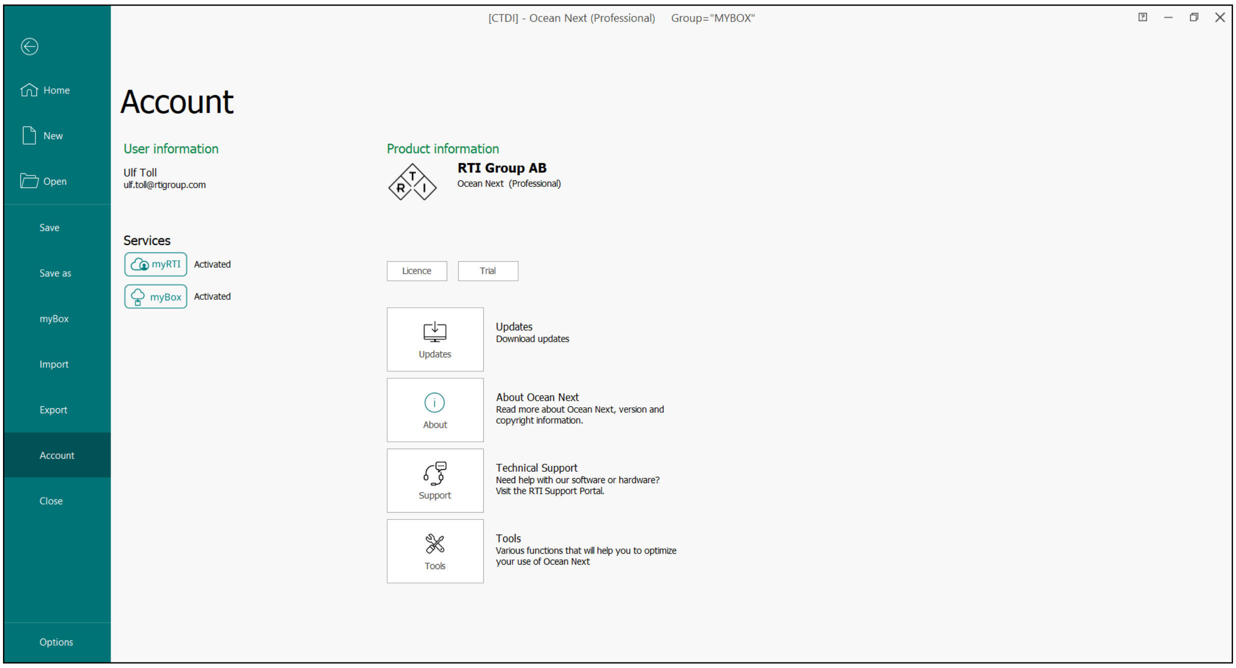
Export in the following way (if license level is QUICK, only measurements can be exported):

1. Click on the **Export** button.
2. Select the measurements you want to export, double-click or use drag the files from the left side and drop them on the right side.
3. Click on **Next** when you have selected all the measurements you want to export,
4. Select "File" or "E-mail" ("E-mail require that you have an e-mail program on your computer and internet access). If you select "File", chose a file name and the location where to save the export file.

The measurements can now be imported by any other user of Ocean Next. Mote that the receiver must use the same or higher version of Ocean Next.

5.7 Account

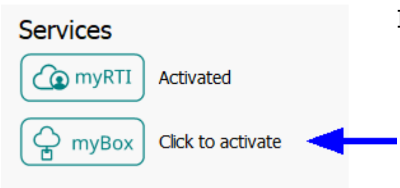
This Backstage page gives access to various functions related to administration of your software from RTI Group.



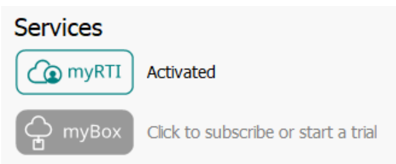
User information
Here is your user information shown that you used for your myRTI account.

Services

These buttons show the available services you can use with Ocean Next. Depending on the status, the texts to the right of the buttons tell you what the button does, for example:



In this case you can click on the myBox button to activate.



If the a button is grayed out, it means that internet isn't available.

If you click on a button with the text "Activated" to the right, a status dialogue for that service is shown.

License

Here you can change the license level. This is normally not anything you need to do, however at special occasions it may be convenient to use this function, read more in the topic License levels.

Trial

Here you can activate a 45 days Ocean Next trial with a higher license level, read more in the topic Try a higher license level.

Updates

Link to web page where you can find the latest versions of Ocean Next.

About

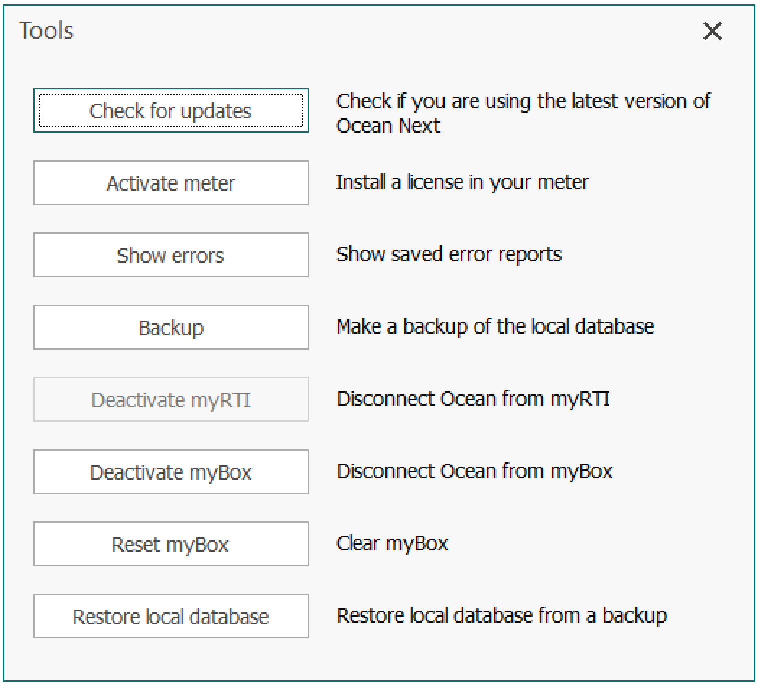
Here you can read information about Ocean Next, software versions for Ocean Next, Ocean Sync and other components.

Support

Link to RTI Support Center.

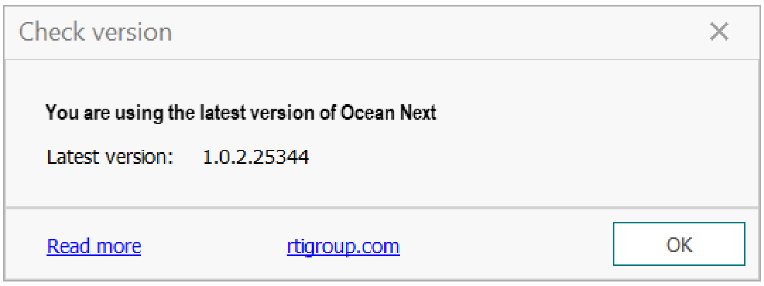
Tools

Here you can find functions for maintenance and problem solving. When you click the **Tools** button a dialogue is shown:



Below are the different buttons described:

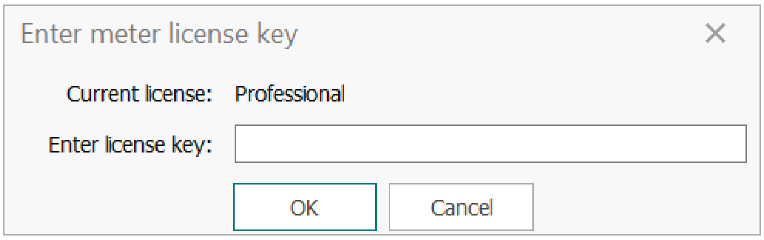
Check for updates Check if you are using the latest version pf Ocean Next. A dialogue is shown:



Activate meter

If you purchase an upgrade to a higher license level, you must be activate your meter with an activation code.

Enter the license key you received when you purchased the new license level in the dialogue shown:



Click "OK" and restart Ocean Next.

Show errors

Show all Support files that has been generated.

Backup

Create a copy of your database and select a location to store it.

Deactivate myRTI

In a situation when you want to use a computer that has been used by somebody else, then myRTI must be deactivated before you can sign in. Current computer is "disconnected" from myRTI. You can also deactivate a computer from the myRTI web site.

You can at ant time activate myBox again for this computer.

Deactivate myBox

In the same situation as above, you also might want to deactivate myBox (must be done before you can deactivate myRTI). Current computer is "disconnected" from myBox.

You can at ant time activate myBox again for this computer.

Reset myBox

Warning!
Don't use this function unless you are sure what it does and the consequences if you use it. If you are unsure, contact the RTI Support.

This clears your myBox. It erases the cloud content but your computer(s) are not affected, they keep their current content.

Restore old database

Warning!
Don't use this function unless you are sure what it does and the consequences if you use it. If you are unsure, contact the RTI Support.

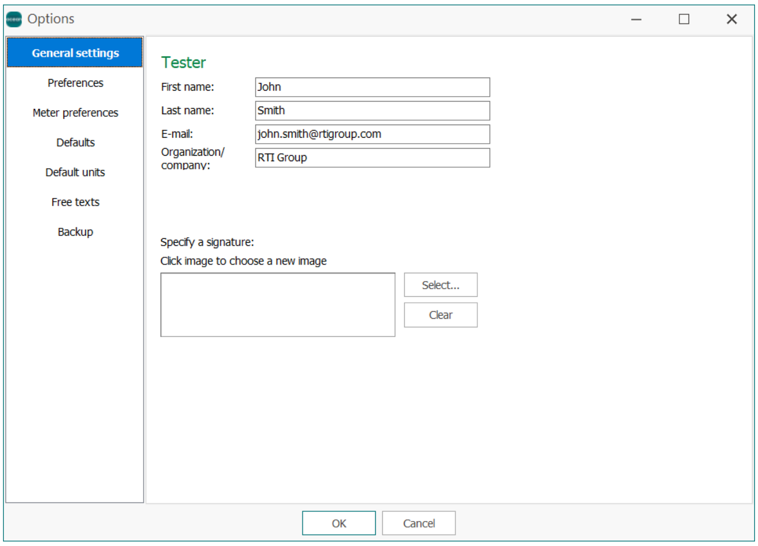
This is used to restore an old database that earlier has been saved to a file. You cannot use this command if you are activated with myRTI.

5.8 Options

Here you find setting that control how Ocean Next works. Quick Check has additional options specific for the Quick Check View, read more about this in the topic Functions in Quick Check.

Go to the Backstage (click on **File** at the top of the ribbon bar) and click on Options at the bottom of the navigation pane on the left side.

General Settings

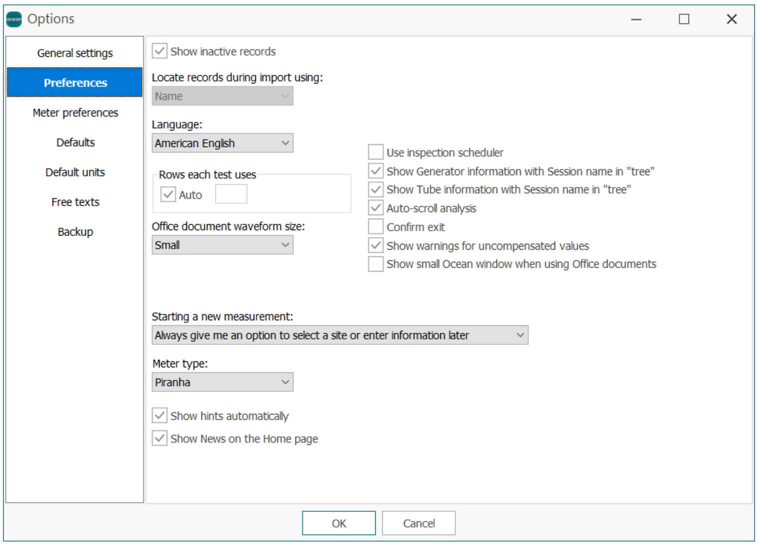


Settings on the "General Settings" page:

Tester Here you specify the name and contact information that shall be printed in reports when "Tester" is included.

Specify signature This is a image of your signature that can be added to the summary page of the report when you sign the report.

Preferences



Settings on the "Preference" page:

Show inactive records The default is checked. If unchecked, items set to "inactive" in the database are not shown.

Locate records during import using Default is that items are located by "Name", cannot be changed.

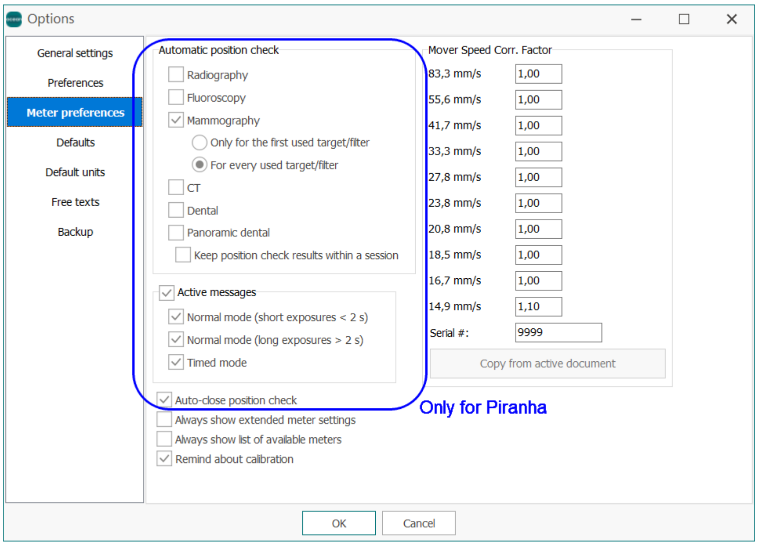
Language Select language (only American English is presently available).

Rows each test uses Space allocated for each test when a complete session is dumped to Excel.

Office document waveform size Select size for waveform pictures that are exported to Excel.

Starting a new measurement	Select how a new measurement shall start: - Show a dialogue and give an option to select to "select a site first" or "enter site data later". - Always ask for site information. - Never ask for Site information.
Meter type	When no meter is connected Ocean Next uses a "virtual" meter is assumed. Select here the meter you intend to use if you have no meter connected when you build templates. **Note**: Build the templates for Piranha if you intend to use templates for both Piranha and Cobia.
Show hints automatically	If this is checked, hints are shown automatically. **Note**: Check these boxes to use the individual checkbox that is available for each hint.
Show News on Home page	If this is unchecked, no news are shown on the right side of the Home page.
Use inspection scheduler	Enable the option to set inspection dates. You will also be reminded to set the next date when you start an inspection.
Show Generator name with session name in the "tree"	Show the generator name with the session name in the room's Measurements folder.
Show Tube information with Session names in the "tree"	Show tube information with the session name in the room's Measurements folder.
Auto-scroll analysis	When a "one row analysis" (AGD, CTDP(helical scan/in phantom), CTDP(helical scan/free-in-air) and QuickHVL) the analysis automatically scrolls to show the analysis.
Confirm exit	Show a dialogue before Ocean Next closes.
Auto start session	If checked, the session starts automatically when it is opened.
Show warnings for uncompensated values	If checked, a warning is shown if a measured value is not auto compensated. Default value is unchecked.
Show small Ocean 2014 window when using Office document	Show a minimized Ocean Next window when working with Excel workbooks.

Meter Preferences



Settings on the "Meter Preference" page:

Automatic position check Defines when user wants to be notified to do a position check.

You can select individual setting for each modality. For mammography you can also select that the position check shall be valid within a session. This assumes that you don't move the meter between different tests in the session.

Active messages If checked, active messages will be displayed for each measuring mode.

Auto-close position check If checked, position check closes automatically when it is successful.

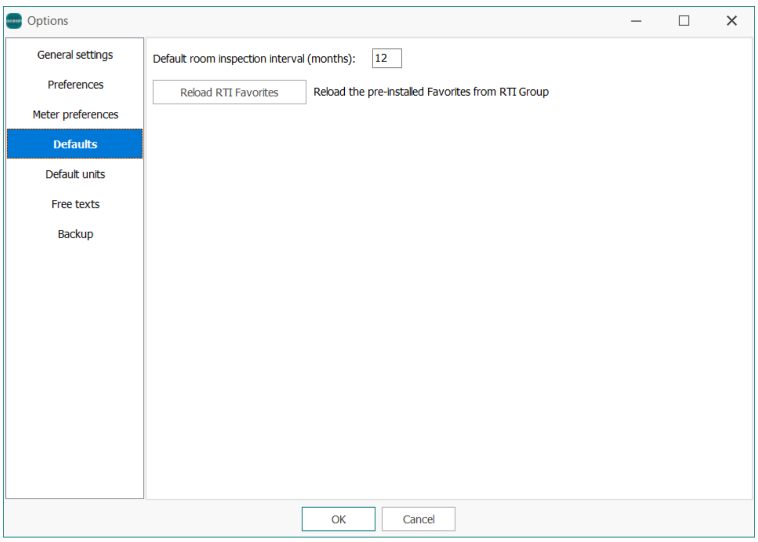
Always show extended meter settings If checked, all meter settings in Studio View are always visible on the Meter Adjust tabs and you don't need to click on the More button to see all settings.

Always show a list of available meters If checked; Ocean Next shows a list of available meters when scanning for a device to connect to via Bluetooth. If unchecked, the list is not shown if the last used meter is found. Ocean Next then directly connects with it.

Remind about calibrations Uncheck this box if you don't want to see re-calibration reminders.

Mover Speed correction factors You can here specify correction factors for the RTI Mover speed to increase accuracy when it is used. See the Mover manual for more info.

Defaults

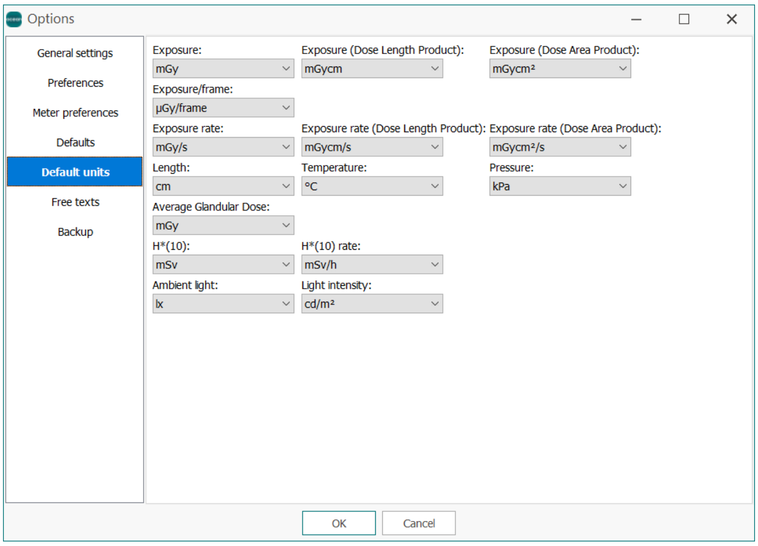


Settings on the "Defualt" page:

Default room insteaction interval (months) Not used.

Reload RTI Favorites Reloads the RTI favorites that are pre-installed.

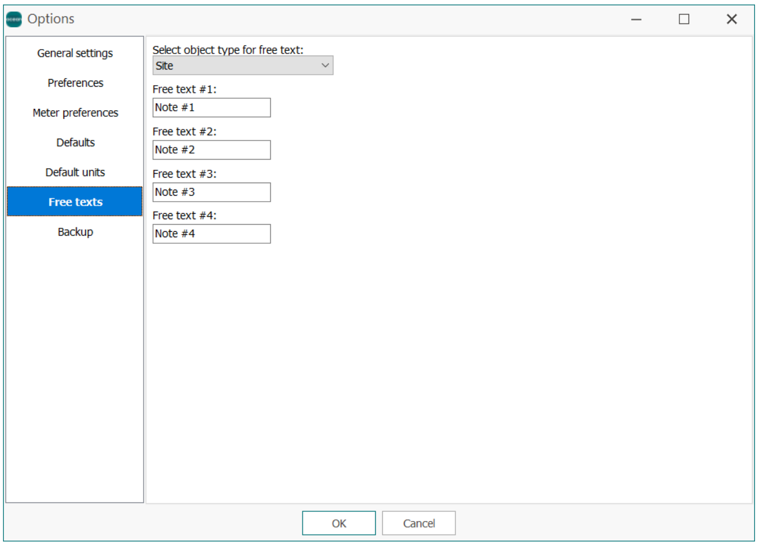
Default Units



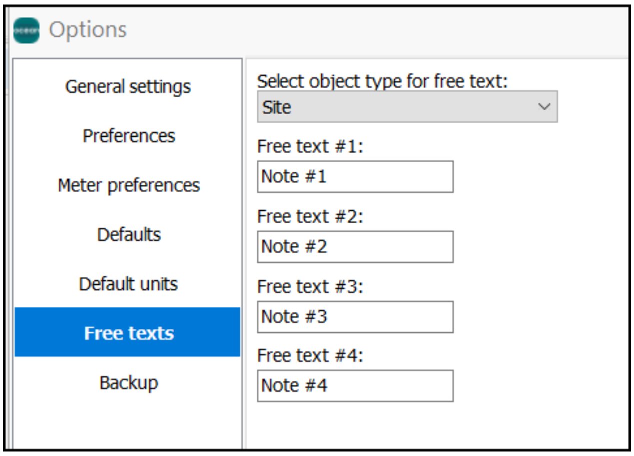
Settings on the "Default units" page:

Units This is where you can define the default units you want to work with. The choice you make here will affect all new templates you design, but you can change them locally at any time.

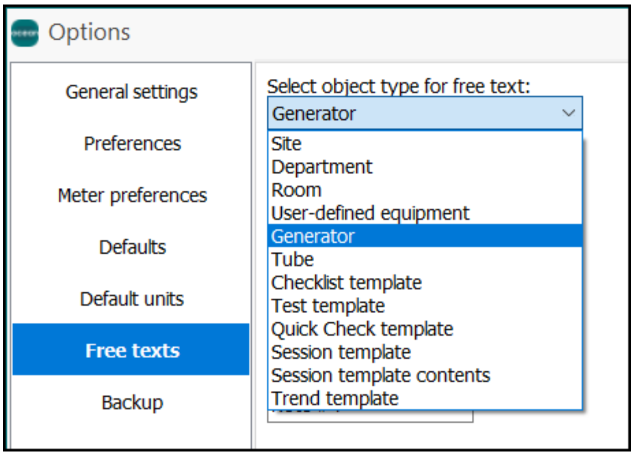
Free texts



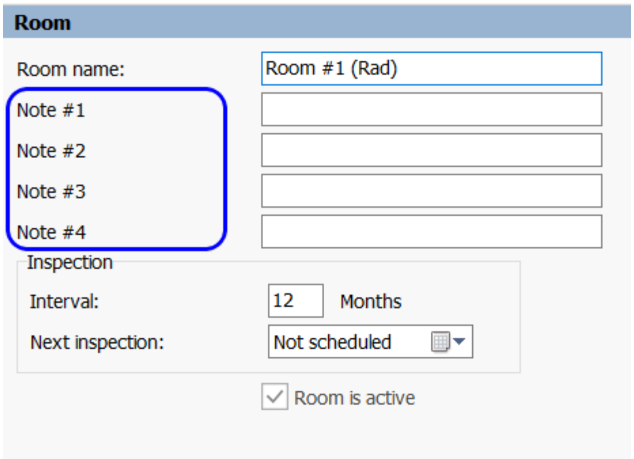
Here is it possible to specify the user-defined labels that are available for facility, department, room, generator, tube, user-defined equipment and all type of templates.



First select object type and then edit the free texts.



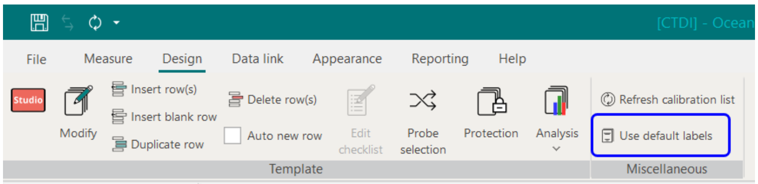
The free texts are labels for the user-defined fields that are available for all site objects:



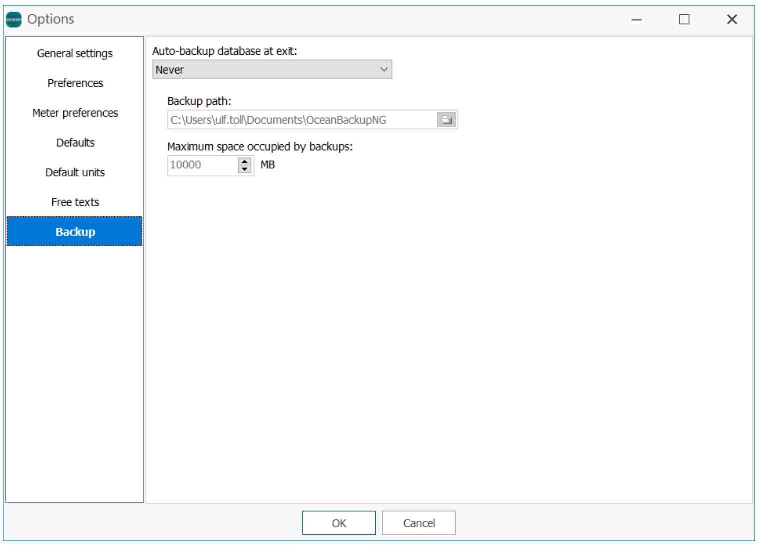
These fields are also shown in the report and can be used to specify user-defined data.

If you change the labels here it only affects the default labels that are used when you create new templates. If you want to use the new labels in already existing templates do the following:

1. Go to the design page.
2. Click on "Use default labels".



Backup



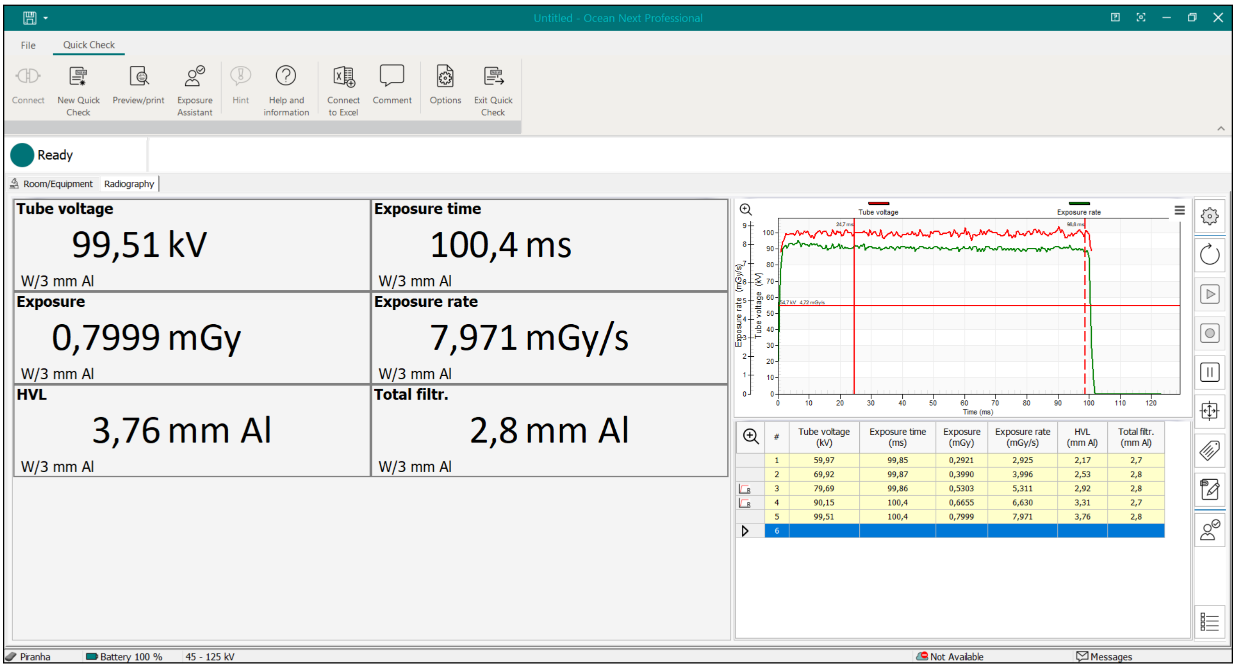
In case you don't have myBox and want a local backup you can here define how backup of your database automatically. You can decide where the backup is going to be saved.

Chapter 6

Quick Check View

6 Quick Check View

Quick Check View is the display for your meter when you just need to make a quick measurement. Quick Check uses plug-and-play and adapts to the meter you use and the probe(s) you have connected.



#	Tube voltage (kV)	Exposure time (ms)	Exposure (mGy)	Exposure rate (mGy/s)	HVL (mm Al)	Total filtr. (mm Al)
1	59,97	99,85	0,2921	2,925	2,17	2,7
2	69,92	99,87	0,3990	3,996	2,53	2,8
3	79,69	99,86	0,5303	5,311	2,92	2,8
4	90,15	100,4	0,6655	6,630	3,31	2,7
5	99,51	100,4	0,7999	7,971	3,76	2,8
6						

You can do the following with Quick Check:

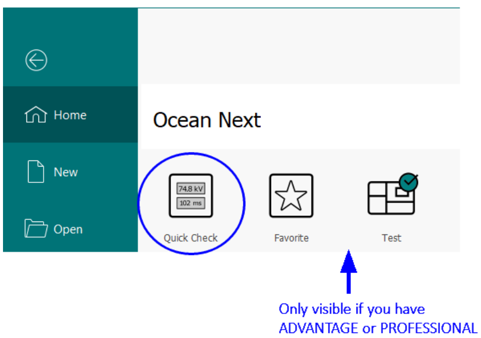
- Quick measurements
- Save your measurements
- Print a simple report
- Export to Excel

Quick Check View is available for all license levels.

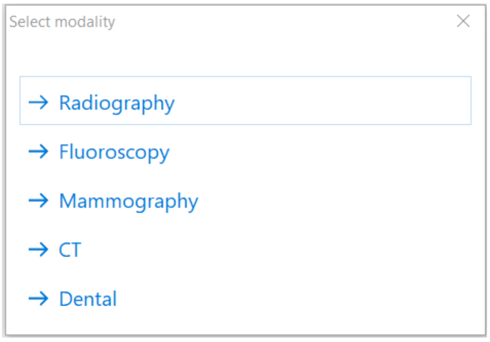
6.1 Start a Quick Check measurement

When Ocean Next is started, the Backstage show. At the top of the Home you will see the **Quick Check** button.

1. Power on your meter, disconnect any external probe. Start Quick Check by clicking on the **Quick Check** button. (In this case is a Piranha Multi used)

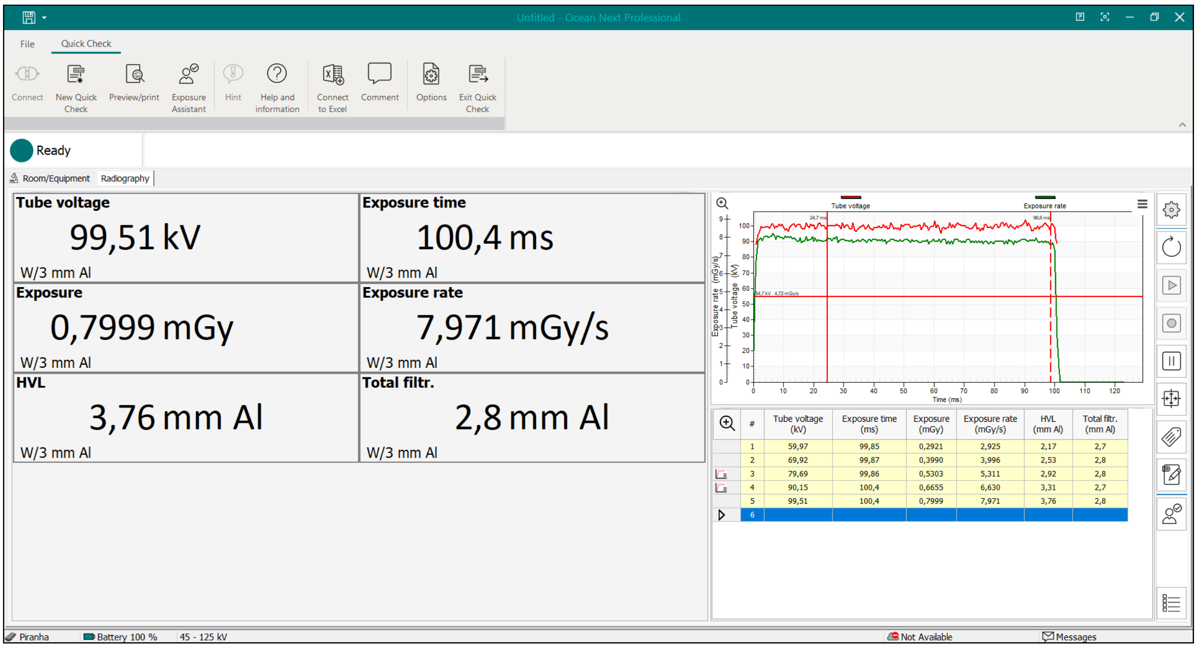


2. Ocean Next connects to the meter and depending on connected meter, next step might look different. In this case is a Piranha Multi used. The following is show:



Select for example Radiography. For other modalities from here and on; it may be several choices to make before the measurement screen appear. For example, for mammography you must chose calibration and if compression plate is used or not.

3. Ocean Next loads the predefined template for radiography:



4. Select setting on the x-ray unit and make an exposure.

5. The results appear in the displays and waveforms are shown. The grid below waveform panel shows the result from all exposures done in this session.

6. If you need to adjust meter settings, click on the **Meter/Probe settings** button on the toolbar on the right side.

7. If you want to save the session, go to the **File** menu and select **Save** or click on the save icon on the left side of Ocean Next's title bar.

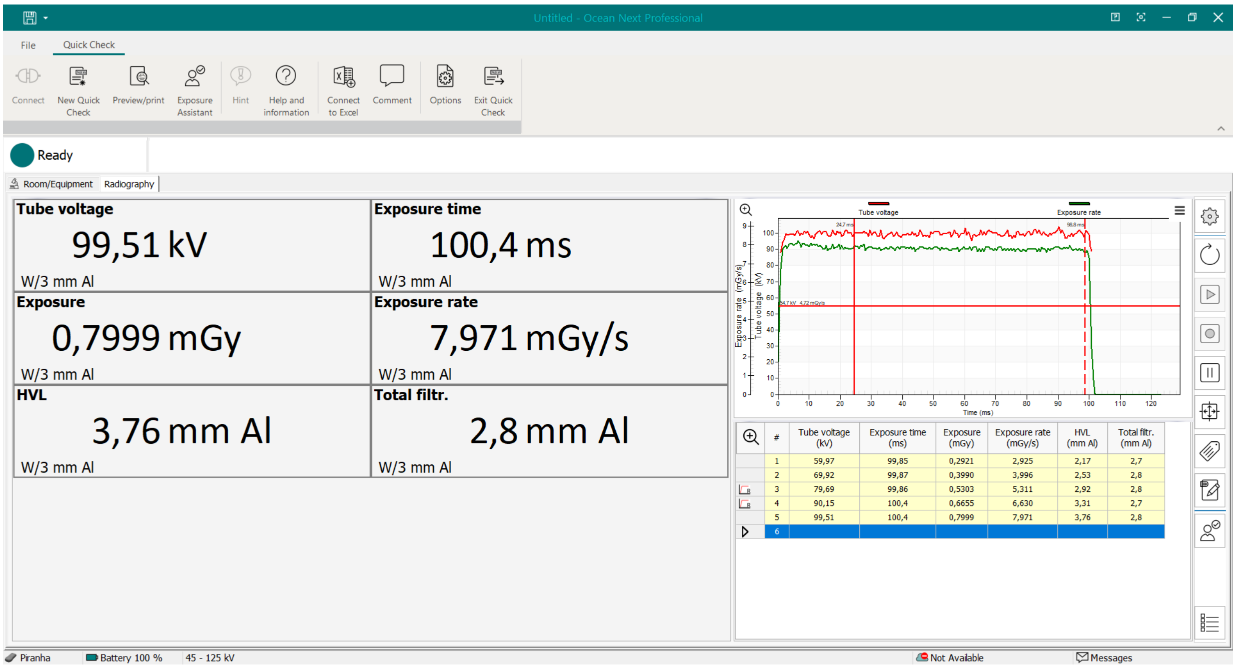
8. You can also preview or print the resulting report by clicking on the **Preview/Print** button.

9. You can start a new Quick Check measurement by clicking on the button **New Quick Check** on the ribbon bar. **Note**: By default Quick Check will not ask you to save before you exit or start a new Quick Check, you must manually save before you exit or start a new Quick Check measurement. You can change this in Quick Check Options if you click on the **Options** button on the Ribbon bar.

You can read more about the different functions in Quick Check in the topic Functions in Quick Check.

6.2 Functions in Quick Check

When you have done required selections, Quick Check connects to your meter and the Quick Check view loads. You are now ready to make an exposure:

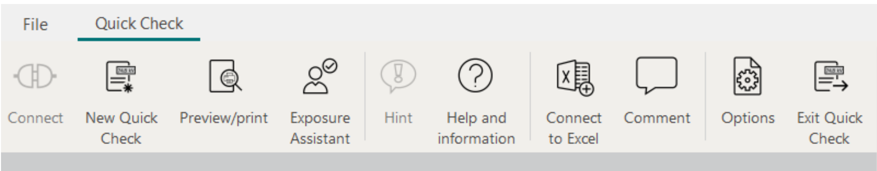


- At the top is the ribbon bar with buttons for various functions
- Measured values are shown in the displays
- Measured values are logged and saved in the grid
- Waveforms are shown in the waveform panel

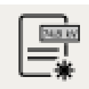
NOTE: The picture above shows how it looks for a 16:9 screen, for other screens it may look different.

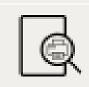
Ribbon bar

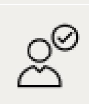
At the top is the "Ribbon bar" located; it has two tabs; "File" and "Quick Check". The "Quick Check" tab shows all major Quick Check functions and "File" takes you back to Backstage.




Click here to connect to meter.
During measurements this button is disabled since it is not pssible to use "keyboard" mode in the Quick Check View.


Start a new Quick Check measurement.


Preview and/or print the report, read more in the topic Preview and Print.


Turnoff/on the "Exposure Assistant". The "Exposure Assistant" is used to capture a value when radiation is stable during fluoroscopy exposures. Read more in the topic Exposure Assistant.

Get specific help with current measurement.

Access the help text. You can also use "F1" on your keyboard.

Transfer data to Excel, read more in the topic Transfer data to Excel.

Add a comment to the measurement, read more in the topic Comment.

Access Quick Check options, read more in the topic Quick Check Options for Piranha and Cobia... and in the topic for Scatter Probe.

Terminate Quick Check.

Note: By default Quick Check will not ask you to save before you exit or start a new Quick Check, you must manually save before you exit or start a new Quick Check measurement. You can change this in Quick Check Options if you click on the **Options** button on the Ribbon bar.

Toolbar

The toolbar on the right side give you quick access to functions often used when performing measurements.

Open Meter and probe settings, read more in the topic Meter and Probe Settings.

Reset meter, zero the meter and corresponding displays.

Start measurement. Used when it is "Timed mode" to start measurement manually.

Capture a measurement. Can be used, for example, during fluoroscopic to capture a measured value when radiation is stable.

Pause measurement. Can, for example, be used when an external probe must be moved to avoid false triggering.

Position check. Verify that the meter is correctly positioned when doing kVp measurements. Only used with Piranha.

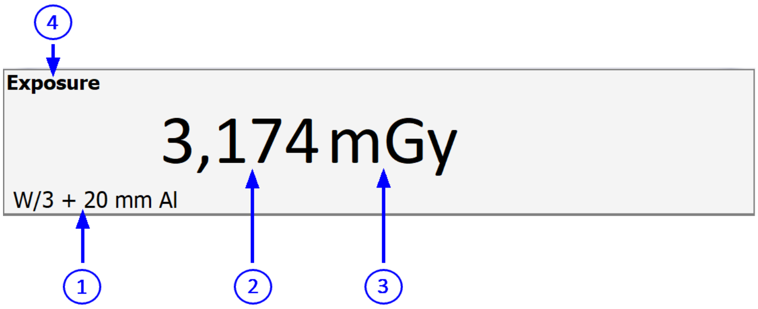
Add a tag, read more the topic Tag.

Add a note and/or an attachment to current row, read more the topic Note and Attachment.

Expand the toolbar. Shows extended information about the toolbar.

Displays

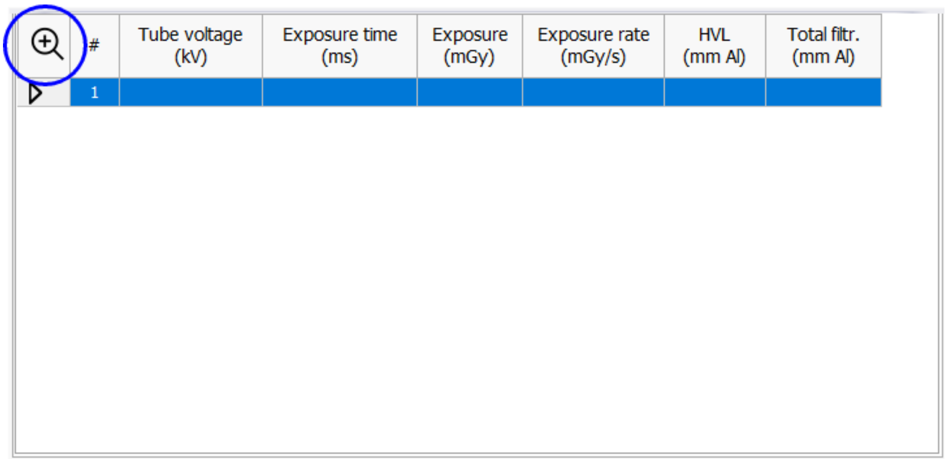
One display for each measured value is shown in the display panel. Each display can be individually configured:



1 - Click on the text to select another calibration
2 - Click on the measured value to change number of decimals
3 - Click on the unit to change to another unit
4 - Double-click on the empty space to enlarge and move this display to the top of the display panel

Grid

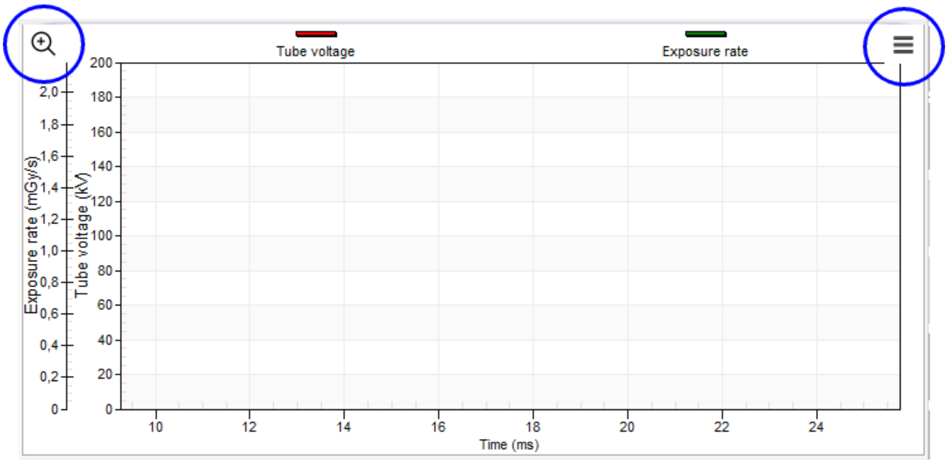
Measurements are logged and saved in the grid:



- A new row is created in the grid for each exposure.
- It is possible to repeat measurements by clicking in the first column on a previous row.
- Click on the magnifying glass to enlarge the grid

Waveform

Waveforms are shown in the waveform panel:



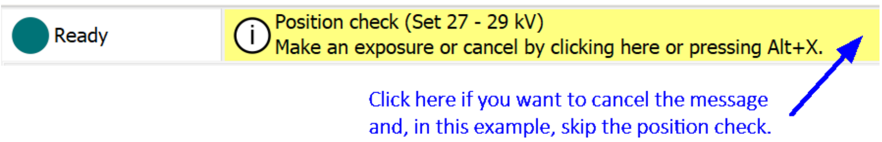
- Shows the waveforms for the current measurement.
- Click on the magnifying glass to enlarge the waveform.
- Click on the menu symbol to access smoothing and to include waveform image in the report, read more about the report here... (section "Preview and Print").
- Horizontal and vertical cursors can be moved and values are indicated close to each cursor.

Status bars

There are two status bars that shows different information related to the measurement and the program. The "upper status bar" is located under the ribbon bar and the "lower status bar" is located at the bottom of the Quick Check View.

The **upper status bar** shows meter status and different messages when you measure:

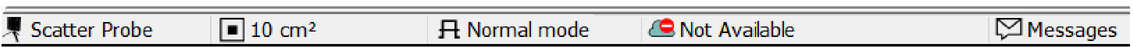
In some situations a message is shown with a yellow background; all such messages can be closed by just clicking or tapping on the yellow background:



The **lower status bar** shows for Piranha and Cobia:

- Meter used.
- Battery status.
- kV-range, click here to change kV-range (only Piranha).
- Status for myRTI (cloud).
- Messages, click here to see if any messages are available.

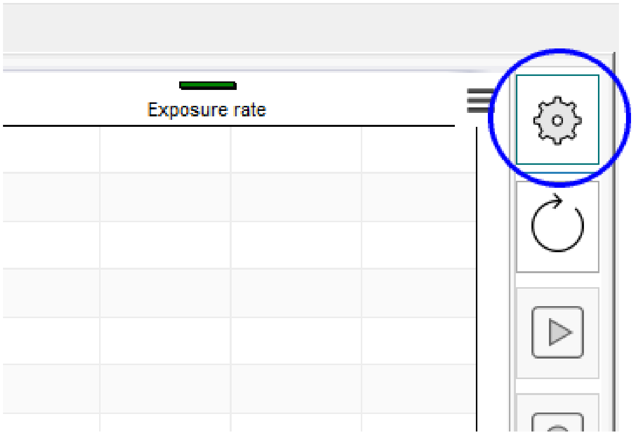
The **lower status bar** shows for the Scatter Probe:



- Meter used.
- Measuring area used, click to toggle between Large and Small.
- Measuring mode, click to toggle between Normal and Free run.
- Status for myRTI (cloud).
- Messages, click here to see if any messages are available.

Change Meter Settings

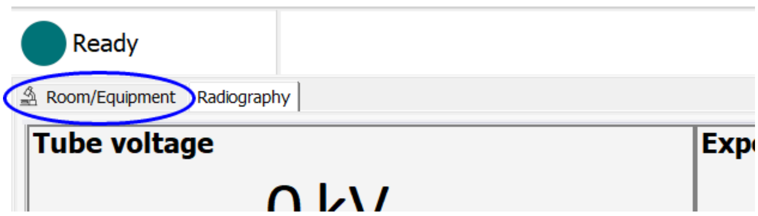
In some situation it might be necessary to change meter settings to get oiptimal conditions for a certain measurement. Click on the **Settings** button on the toolbar to the right to open "Meter and probe settings".



Read more in the topic Meter and Probe Settings.

Enter room and equipment information

It is possible to include room and equipment information in the printed report. You can enter this information on the Room/Equipment page:



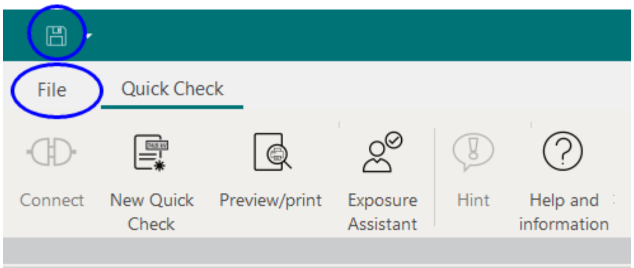
Read more in the topic Room and Equipment Information.

Preview and/or print the report

To preview or print the report, click on the **Preview/Print** button on the ribbon bar, read in the topic Preview and Print.

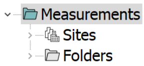
Save the measurement

Select "File" on the ribbon bar or click on the Save button on the title bar:



You will be directed to the Backstage, select **Save as...** if it is the first time, or "Save" if you already has given your measurement a name and location.

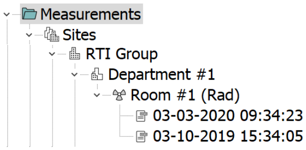
Measurements are saved in Ocean's database. Depending on the license level, measurements can be saved in two different "places":



- In a the "Folders section"
- In a room that belong to a specific site (only available if you have license level PROFESSIONAL)

<u>Folders</u>
Here you can create your own folder structure and save and organize your measurements.

<u>Sites (only license level PROFESSIONAL)</u>



Here is a fixed structure where a site has a "Facility", the facility has one or more "Departments" and each department has one or more rooms where measured data can be saved.

The symbol  shows that it is a Quick Check measurement.

Close Quick Check

To close and quit Quick Check in two different ways:

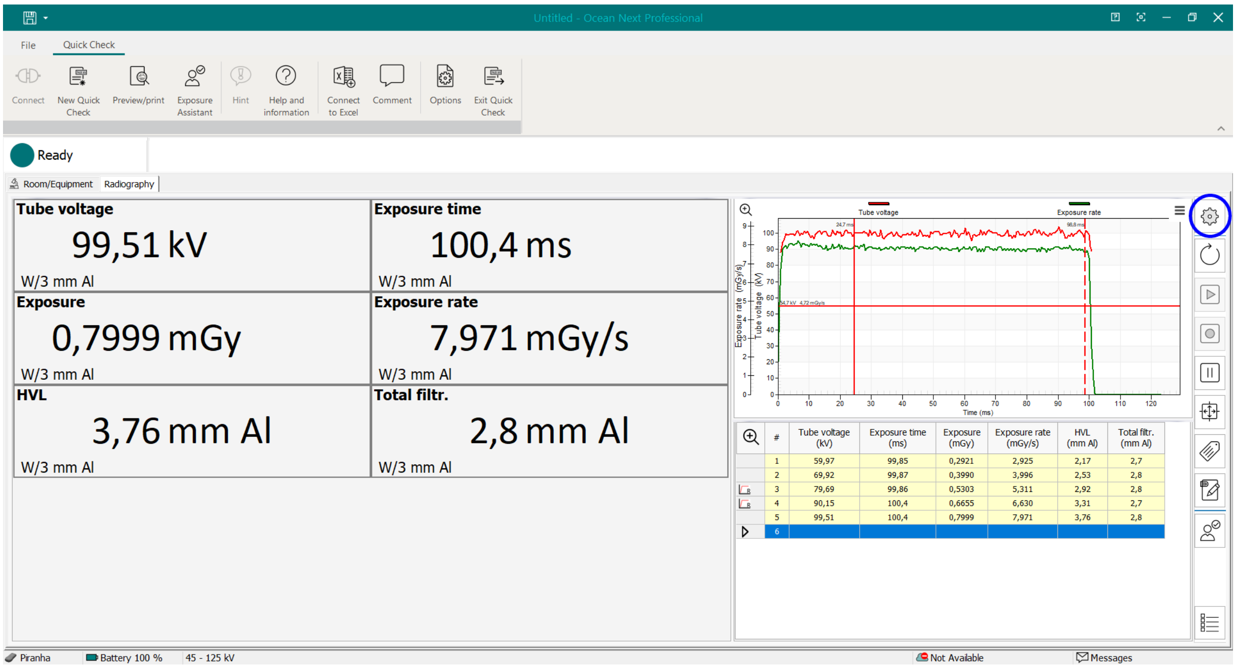
Quit the entire application by clicking in the upper right corner of the "application window".

Click on the **Exit Quick Check** button to quit and return to the Backstage.

By default, Quick Check is not asking you to save when you exit Quick Check or starts a new measurement. This can be changed in Options, read more in the topic Quick Check Options.

6.3 Meter and Probe Settings

Mako, Piranha, Cobia and the Scatter Probe have slightly different meter settings but the way you access and change them is the same. Quick Check will recognize which meter you use and automatically adapt to it. To access the meter settings, click on the **Settings** button on the toolbar on the right side:



Mako - read more in the topic Mako Settings.

Piranha - read more in the topic Piranha Settings.

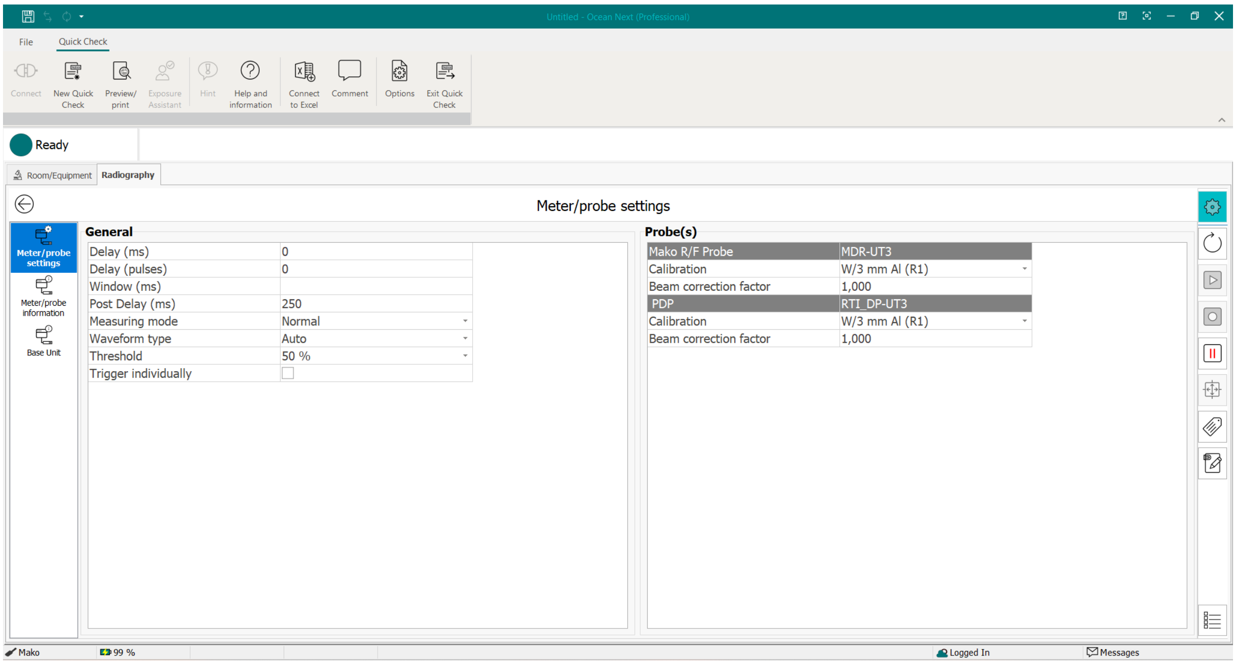
Cobia - read more in the topic Cobia Settings.

Scatter Probe - read more in the topic Scatter Probe Settings.

6.3.1 Mako Settings

When you click on the **Settings** button, the following is shown (in this example the Mako R/F Probe and a Legacy Module iwith a RTI Dose Probe are used).

On the left side is all "global" meter settings specified, on the right side are all settings that are specific for used probes:



Here you can change the meter settings. If an external probe is used, its settings are also shown here. Return to the display panel by clicking the **Back** button or the **Settings** button again.

The following meter settings are available for Mako in Quick Check and Test View:

General settings

Meter setting	Description and use
Delay (ms)	Add a delay after the detection of trig before measurement of kVp starts. This will delay measurements with Mako R/F, Mako Mammo and Mako Dental probe, it doesn't affect parameters measured with other probes. Use this if you want to specify the delay in "ms".
Delay (pulses)	Add a delay after the detection of trig before measurement of kVp starts. This will delay measurements with Mako R/F, Mako Mammo and Mako Dental probe, it doesn't affect parameters measured with other probes. Use this if you want to specify the delay in "pulses". This setting overrides the "time delay" if both are set.
Window	If a time is specified, kVp is measured during the window time (starts after the delay)
Post delay	This is the time the meter waits after trig off before it assumes that the exposure is finished. The post delay must be set to a time longer than any dead time in the radiation.
Measuring mode	You can select between Normal, Timed or Free run Normal =use this measuring mode for exposures and fluoroscopy Timed = meter measures during a time you specify Free run = meter measures continuously without use of any trig levels (for more information see table below)
Measurement time (Timed mode only)	Measuring time for Timed mode. Only shown when Timed mode is used.
Waveform type	Only available for the Mako R/F probe with a special selection for AMX-4. In all other cases, "Auto" is used.
Threshold (%)	This is the level used for the time measurement. You can use this if you want for example to avoid pre-pulses to be included in the exposure time.

Probe settings

Probe settings can look slightly different for different probes.

Probe settings	Description and use
Calibration	Calibration used for the probe
For R/F, dental: **Added filtration (External)**	The filtration used the external RTI Dose Probe to do energy compensation. **IMPORTANT**: The filtration used for energy compensation is the sum of "Total Inherent Filtration" from the Room/Equipment page plus "Added filtration".
For Mammography: **Added filtration (External)**	Added filtration used for the external RTI Dose Probe do do energy compensation **IMPORTANT**: The filtration used for energy compensation is the sum of "Compression paddle thickness" from the Room/Equipment page plus "Added filtration". .
Beam Correction factor (External)	General (user-defined) correction factor used for all exposure related parameters measured with the external detector.
Temperature (External)	If the Ion Chamber Module is used with an ion chamber, temperature and pressure can be specified to perform TP-correction.
Pressure (External)	If the Ion Chamber Module is used with an ion chamber, temperature and pressure can be specified to perform TP-correction.

How to use the different calibrations available with the Mako R/F Probe, Mako Dental Probe and the Mako Mammo Probe.

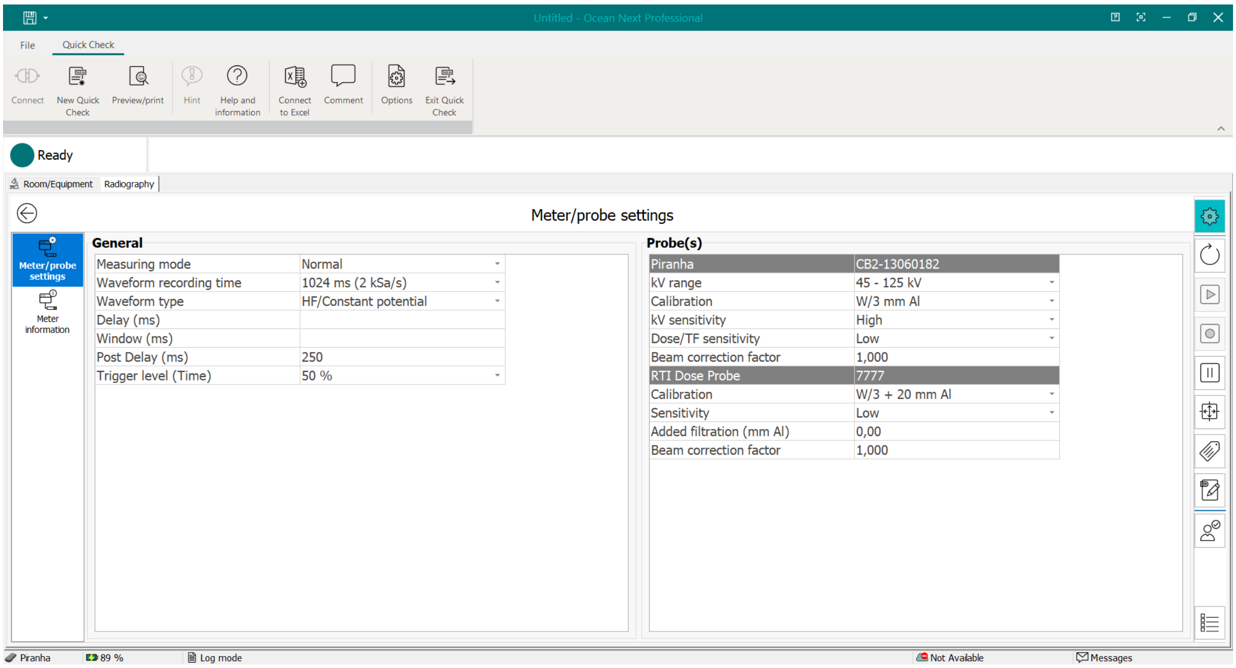
Code	Calibration	Usage
R1 C1	**W/3 mm Al**	General radiography and fluoroscopy, dental . This calibration is suitable for the following CT: General CT, GECT 7°/10°/10.5° anode angle, GE Cardiographe, Siemens (Athlon/Vectron)
C3	**Siemens (Straton)**	Suitable for Siemens CT with Straton tube
C5	**Aquillion**	Suitable for Canon/Toshiba Aquillion
M1	**Mo/30 µm Mo**	General mammography
M3	**Mo/25 µm Rh**	General mammography
M4	**Rh/25 µm Rh**	General mammography
M5	**Rh/1 mm Al**	General mammography
M6	**W/50 µm Rh**	General mammography
M8	**Mo/1 mm Al**	General mammography
M10	**W/50 µm Ag**	General mammography
M11	**W/75 µm Ag**	General mammography
M15	**W/0.70 mm Al**	General mammography
M18	**W/0.30 mm Cu**	General mammography
M22	**Rh/30 µm Ag (GE HC)**	General mammography
M24	**Mo/0.25 mm Cu (GE HC)**	General mammography
M25	**Rh/0.25 mm Cu (GE HC)**	General mammography
M30	**W/1 mm Ti**	General mammography
M31	**W/60 µm Rh**	General mammography

There are three different measuring modes available using the Piranha. They are as follows:

Measuring mode	Description and use
Normal	The Normal mode is used for short and long (fluoro) exposures. In this mode, your meter will automatically sense if there is a signal and when it is above a certain trigger level. If the exposure is long, the displays/grid will be updated with new data every 2 seconds. If the exposure is short, the results are displayed as soon as the trigger is off.
Free run	The free run mode has no trigger level. As soon as the meter is told to begin measuring, it starts to measure even if there is no signal. This measuring mode is useful when the signal you want to measure is very low. Free run is recommended for light measurements, especially when measuring "ambient" light (when no shutter is present).
Timed	The Timed mode setting measures during a pre-defined time period. Measurements in Timed mode must be started manually. This measuring mode is very useful when you want to measure a very low signal. You can use the "very high" sensitivity setting in Timed mode and it will further improve the meter's capability to measure very low signals.

6.3.2 Piranha Settings

When you click on the **Settings** button, the following is shown (in this example ia also an external dose probe used):



Here you can change the meter settings. If an external probe is used, its settings are also shown here. Return to the display panel by clicking the **Back** button or the **Settings** button again.

The following meter settings are available for Piranha in Quick Check:

Meter setting	Description and use
Delay	Add a delay after the detection of trig before measurement of kVp starts. This will delay the kVp measurement, it doesn't affect dose, mAs or time measurements.
Window	If a time is specified, kVp is measured during the window time (starts after the delay)
Post delay	This is the time the meter waits after trig off before it assumes that the exposure is finished. The post delay must be set to a time longer than any dead time in the radiation.
kV range	Current kV range. You need to change this for radiography/fluoroscopy and CT, mammography and dental have only one range.

Meter setting	Description and use
Calibration	Available calibrations for the internal (kVp and exposure) used. See table below that describes usage of the different calibrations.
kV sensitivity	Sensitivity setting for the kVp detector (internal detector). Hi = High sensitivity - for low dose rate Lo = Low sensitivity - for high dose rate
Dose/TF sensitivity	Sensitivity setting for the dose and total filtration measurement (internal detector). Hi = High sensitivity - for low dose rate Lo = Low sensitivity - for high dose rate
Beam Correction factor	General (user-defined) correction factor used for all exposure related parameters measured with the internal detector.
Measuring mode	You can select between Normal, Timed or Free run Normal =use this measuring mode for exposures and fluoroscopy Timed = meter measures during a time you specify Free run = meter measures continuously without use of any trig levels (for more information see table below)
Measurement time (Timed mode only)	Measuring time when Timed mode is used.
Waveform recording time	Select the waveform recording time. Use the shortest time to see details in the waveform. If you use a longer time, you lose details in the waveform. This setting doesn't influence on the accuracy.
Waveform type	This is the waveform type for the X-ray generator. It is normally HF/DC. Sometimes for older X-ray units and for dental you must use 1-phase. Be careful to select the correct waveform type for maximum accuracy. Note that there is a special selection for AMX-4.
For mammography: **Added filtration**	Added filtration used for the internal detector do do energy compensation and kV compensation.
Trigger level (time)	This is the level used for the time measurement. You can use this if you want for example to avoid pre-pulses to be included in the exposure time.

External probe settings	Description and use
Calibration (External)	Calibration for the external probe
Sensitivity (External)	Sensitivity setting for the external probe Hi = High sensitivity - for low signals Lo = Low sensitivity - for high signals
For R/F, dental: **Added filtration (External)**	The filtration used the external RTI Dose Probe to do energy compensation. **IMPORTANT**: The filtration used for energy compensation is the sum of "Total Inherent Filtration" from the Room/Equipment page plus "Added filtration".
For Mammography: **Added filtration (External)**	Added filtration used for the external RTI Dose Probe do do energy compensation **IMPORTANT**: The filtration used for energy compensation is the sum of "Compression paddle thickness" from the Room/Equipment page plus "Added filtration". .
Beam Correction factor (External)	General (user-defined) correction factor used for all exposure related parameters measured with the external detector.
Temperature (External)	If the Chamber Adaper is used with an ion chamber, temperature and pressure can be specified to perform TP-correction.

External probe settings	Description and use
Pressure (External)	If the Chamber Adaper is used with an ion chamber, temperature and pressure can be specified to perform TP-correction.

How to use the different calibrations:

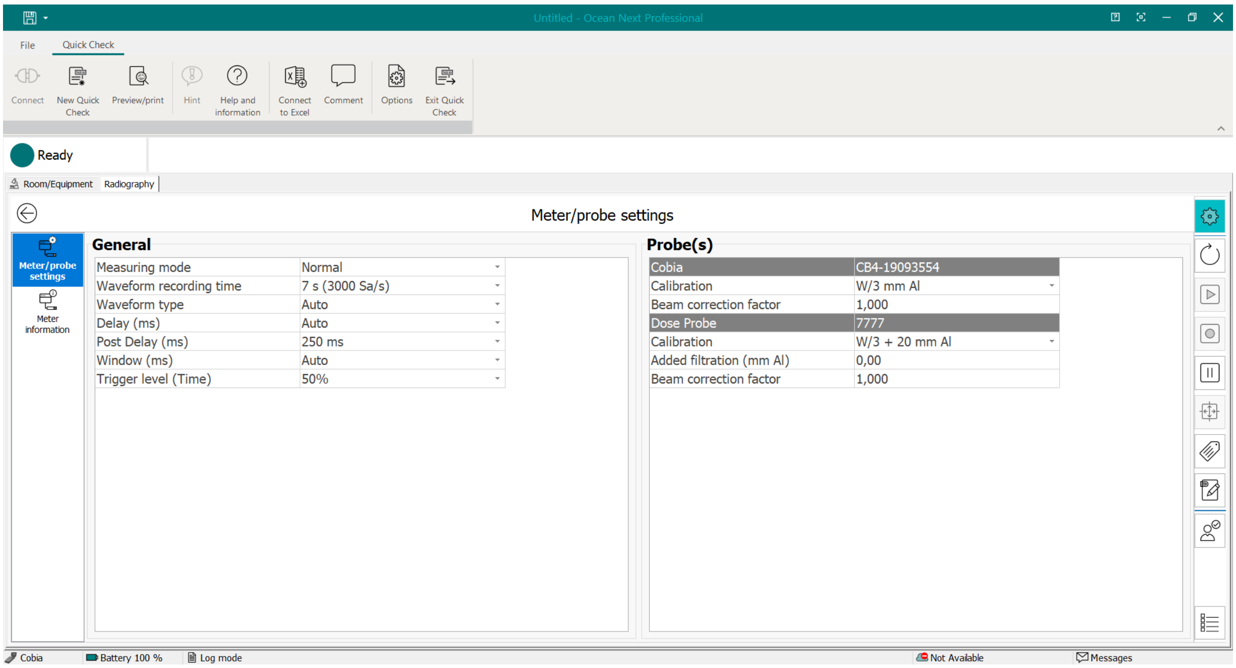
Code	Calibration	Usage
R1 C1	**W/3 mm Al**	General radiography, fluoroscopy, dental and CT
C3	**Straton (Siem1)**	Suitable for Siemens CT with Straton tube
C4	**GECT (7°)**	Suitable for GE CT tubes with a 7° anode angle as well as for other manufactures CT tubes and replacement tubes with a 7° anode angle
C5	**Aquillion 64-**	Suitable for Toshiba Aquillion 64-320 CT
C6	**GECT (10.5°)**	Suitable for GE CT tubes with a 10.5° anode angle
C7	**GECT (Cardiographe)**	Suitable for GE CT Cardiographe
M1	**Mo/30 µm Mo**	General mammography
M3	**Mo/25 µm Rh**	General mammography
M4	**Rh/25 µm Rh**	General mammography
M6	**W/50 µm Rh**	General mammography - suitable for Hologic Selenia Dimensions and Fujifilm Amulet
M7	**W/0.50 mm Al**	General mammography - suitable for Philips MicroDose (Sectra)
M8	**Mo/1 mm Al**	General mammography
M10	**W/50 µm Ag**	General mammography - suitable for Hologic Selenia Dimensions and Fujifilm Amulet
M11	**W/75 µm Ag**	General mammography
M12	**W/50 µm Rh (Gio)**	Suitable for Giotto Mammography
M15	**W/0.70 mm Al**	General mammography - suitable for Hologic Selenia Dimensions and Fujifilm Amulet
M16	**W/50 µm Ag (Sel)**	Suitable for Hologic Selenia
M17	**W/50 µm Rh (Sel)**	Suitable for Hologic Selenia
M18	**W/0.30 mm Cu**	General mammography - Suitable for Hologic Selenia Dimensions and Fujifilm Innovality/Cristalle
M19	**W/0.70 mm Al (Inno/Crist)**	Suitable for Fujifilm Innovality/Cristalle
M20	**W/50 µm Rh (Inno/Crist)**	Suitable for Fujifilm Innovality/Cristalle
M21	**Mo/25 µm Rh (Sel)**	Suitable for Hologic Selenia
M22	**Rh/30 µm Ag (GE HC)**	Suitable for GE Senographe Prestina
M23	**Rh/30 µm Ag IQST (GE HC)**	Suitable for GE Senographe Prestina
M24	**Mo/0.25 mm Cu (GE HC)**	Suitable for GE Senographe Prestina
M25	**Rh/0.25 mm Cu (GE HC)**	Suitable for GE Senographe Prestina
M26	**Mo/30 µm Mo (GE HC)**	Suitable for GE Senographe Prestina
M27	**Affirm Prone W/Ag**	Suitable for Hologic Affirm Prone
M28	**Affirm Prone W/Al**	Suitable for Hologic Affirm Prone

There are three different measuring modes available using the Piranha. They are as follows:

Measuring mode	Description and use
Normal	The Normal mode is used for short and long (fluoro) exposures. In this mode, your meter will automatically sense if there is a signal and when it is above a certain trigger level. If the exposure is long, the displays/grid will be updated with new data every 2 seconds. If the exposure is short, the results are displayed as soon as the trigger is off.
Free run	The free run mode has no trigger level. As soon as the meter is told to begin measuring, it starts to measure even if there is no signal. This measuring mode is useful when the signal you want to measure is very low. Free run is recommended for light measurements, especially when measuring "ambient" light (when no shutter is present).
Timed	The Timed mode setting measures during a pre-defined time period. Measurements in Timed mode must be started manually. This measuring mode is very useful when you want to measure a very low signal. You can use the "very high" sensitivity setting in Timed mode and it will further improve the meter's capability to measure very low signals.

6.3.3 Cobia Settings

When you click on the **Settings** button, the following is shown (in this example ia also an external dose probe used):



Here you can change the meter settings. If an external probe is used, its settings are also shown here. Return to the display panel by clicking the **Back** button or the **Settings** button again.

The following meter settings are available for Cobia in Quick Check:

Meter setting	Description and use
Delay	Add a delay after the detection of trig before measurement of kVp starts. This will delay the kVp measurement, it doesn't affect dose, mAs or time measurements.
Window	If a time is specified, kVp is measured during the window time (starts after the delay)
Post delay	This is the time the meter waits after trig off before it assumes that the exposure is finished. The post delay must be set to a time longer than any dead time in the radiation.
Calibration	Calibration for the internal probe.

Meter setting	Description and use
Beam Correction factor	General (user-defined) correction factor used for all exposure related parameters measured with the internal detector.
Measuring mode	You can select between Normal or Timed Normal =use this measuring mode for exposures and fluoroscopy Timed = meter measures during a time you specify (for more information see table below)
Measurement time (Timed mode only)	Measuring time when Timed mode is used.
Waveform type	Select "Auto" for all types except AMX-4.
Waveform recording time	Select the waveform recording time. Use the shortest time to see details in the waveform. If you use a longer time, you lose details in the waveform. This setting doesn't influence on the accuracy.
Trigger level (time)	This is the level used for the time measurement. You can use this if you want for example to avoid pre-pulses to be included in the exposure time.

External probe setting	Description and use
Calibration (External)	Calibration for the external probe.
For R/F, dental **Added filtration (External)**	The filtration used the external RTI Dose Probe to do energy compensation. **IMPORTANT**: The filtration used for energy compensation is the sum of "Total Inherent Filtration" from the Room/Equipment page plus "Added filtration".
Beam Correction factor (External)	General (user-defined) correction factor used for all exposure related parameters measured with the external detector.
Temperature (External)	If the Chamber Adaper is used with an ion chamber, temperature and pressure can be specified to perform TP-correction.
Pressure (External)	If the Chamber Adaper is used with an ion chamber, temperature and pressure can be specified to perform TP-correction.

How to use the different calibrations (only one calibration is available for Cobia):

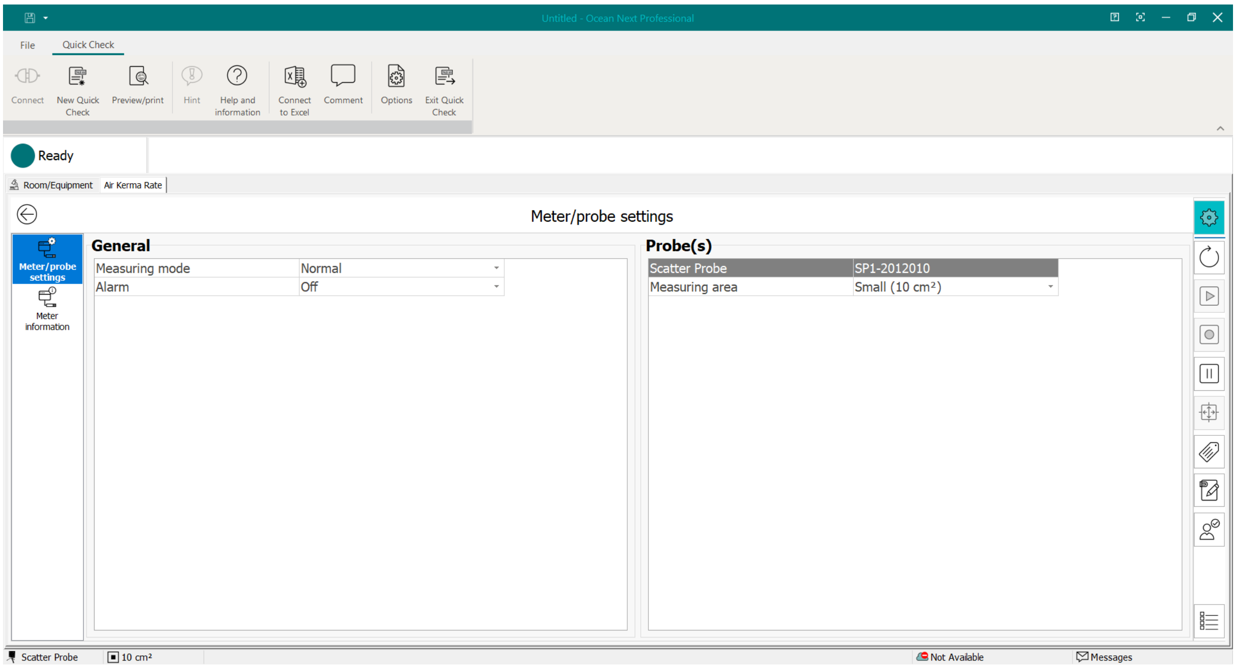
Code	Calibration	Usage
R1	**W/3 mm Al**	General radiography, fluoroscopy and dental

There are two different measuring modes available using the Cobia. They are as follows:

Measuring mode	Description and use
Normal	The Normal mode is used for short and long (fluoro) exposures. In this mode, your meter will automatically sense if there is a signal and when it is above a certain trigger level. If the exposure is long, the displays/grid will be updated with new data every 2 seconds. If the exposure is short, the results are displayed as soon as the trigger is off.
Timed	The Timed mode setting measures during a pre-defined time period. Measurements in Timed mode must be started manually. This measuring mode is very useful when you want to measure a very low signal. You can use the "very high" sensitivity setting in Timed mode and it will further improve the meter's capability to measure very low signals.

6.3.4 Scatter Probe Settings

When you click on the **Settings** button, the following is shown:



Here you can change the meter settings. Return to the display panel by clicking the **Back** button or the **Settings** button again.

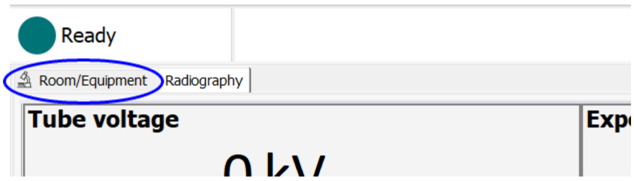
The following meter settings are available for the Scatter Probe in Quick Check:

Meter setting	Description and use
Measuring mode	You can select between Normal, Timed or Free run. Normal =use this measuring mode for exposures and fluoroscopy. Timed = meter measures during a time you specify. (for more information see table below)
Measurement time (Timed mode only)	Measuring time when Timed mode is used.
Alarm	Select OFF or an alarm level for Air Kerma or H*(10). When the alarm level is reached, an audio warning will be generated from the Scatter Probe.
Alarm level and unit (Only when Alarm is ON)	Alarm level can be set from 0.01 to 25 mGy/h or 0.02 to 50 mSv/h, respectively.

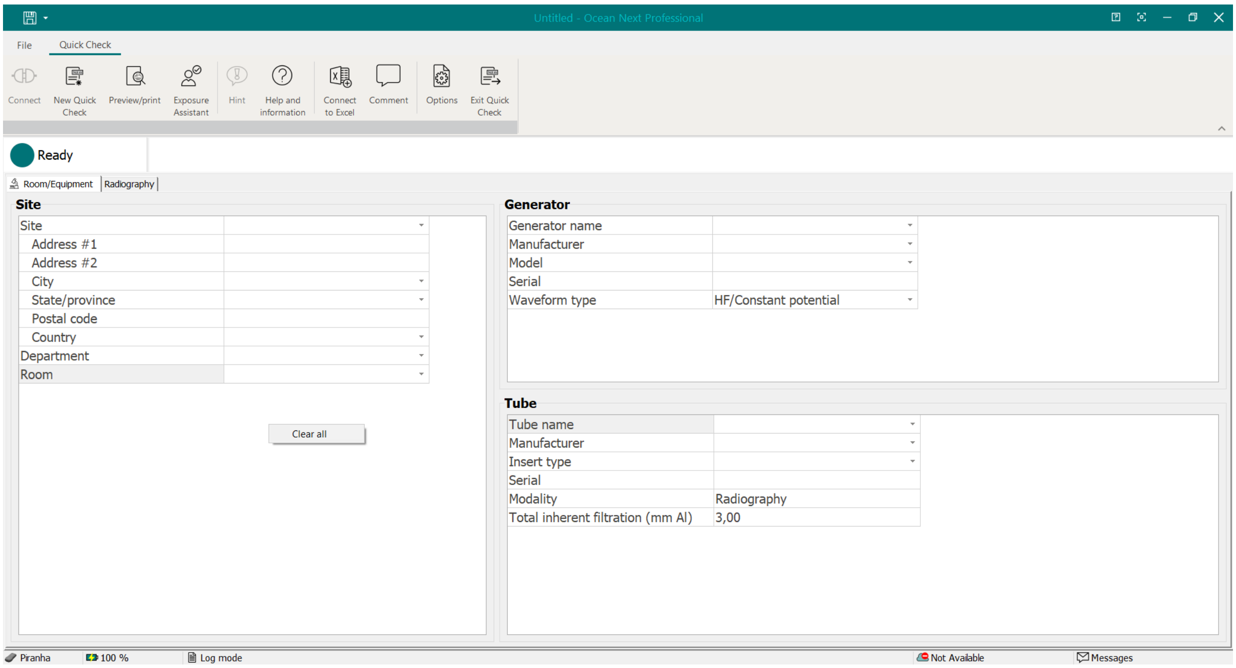
Probe setting	Description and use
Measuring area	Select Large=100 cm^2 or Small=10 cm^2

6.4 Room and equipment information

You can include information about site, generator and tube with your measurement. This is done on the **Room/Equipment** tab.



When selecting this page, the following is shown:



Here you can fill in the information. Depending on the license level this can be done i different ways:

QUICK and **ADVANTAGE** Fill in free text in the fields

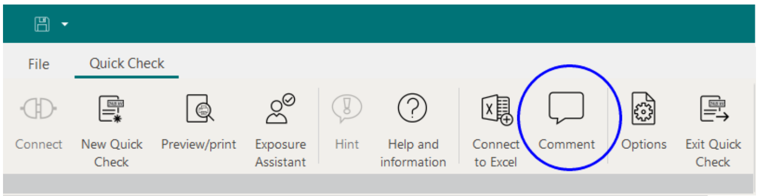
PROFESSIONAL Fill in free text in the fields or use "quick search" in the database. Example: You are in a room that you already have in your database and want to enter the information. Start to type the room name, Quick Check will suggest matching room names. Select the room and all other information is automatically filled in. If a fieled is not filled in, it depends either on missing information or there is no unique information (the room has for example two generators). Place the cursor in the blank field and the available alternatives are shown.

Note: Once you have auto-filled, you must do "clear all" to be able to auto-fill again.

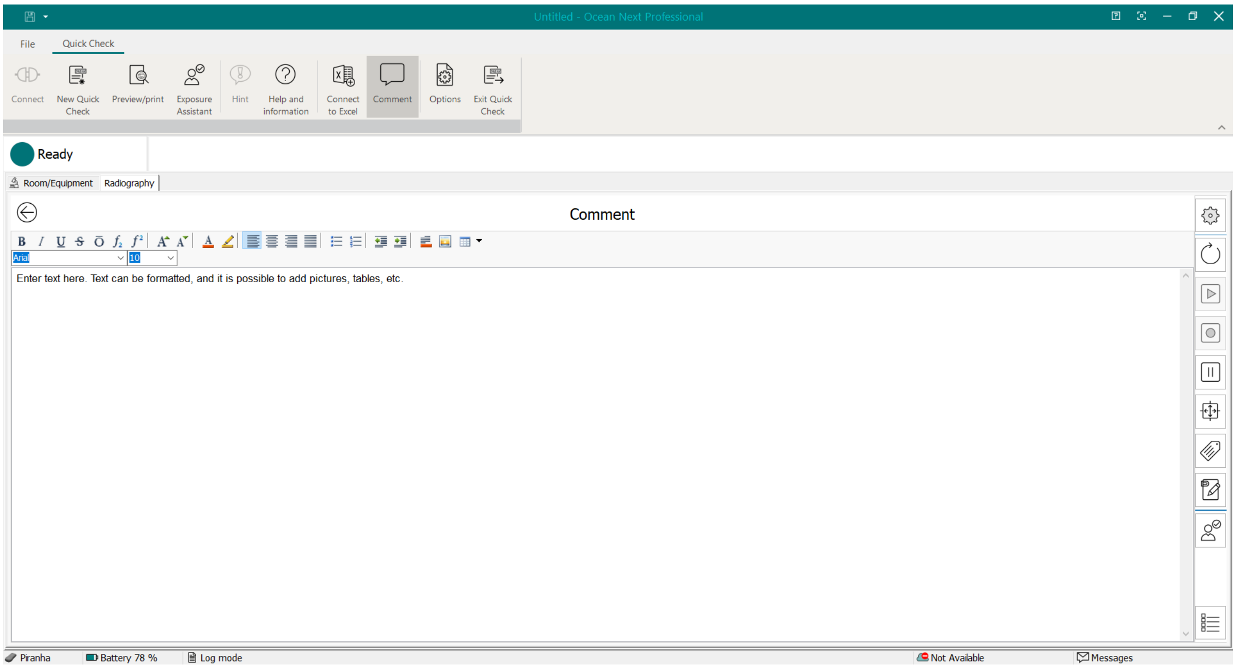
When you are ready, click on the measuring tab, in this case "Radiography", to go back to the display panel.

6.5 Comment

It is possible to add a comment that will be included in the printed report. Click on the Comment button on the ribbon bar:



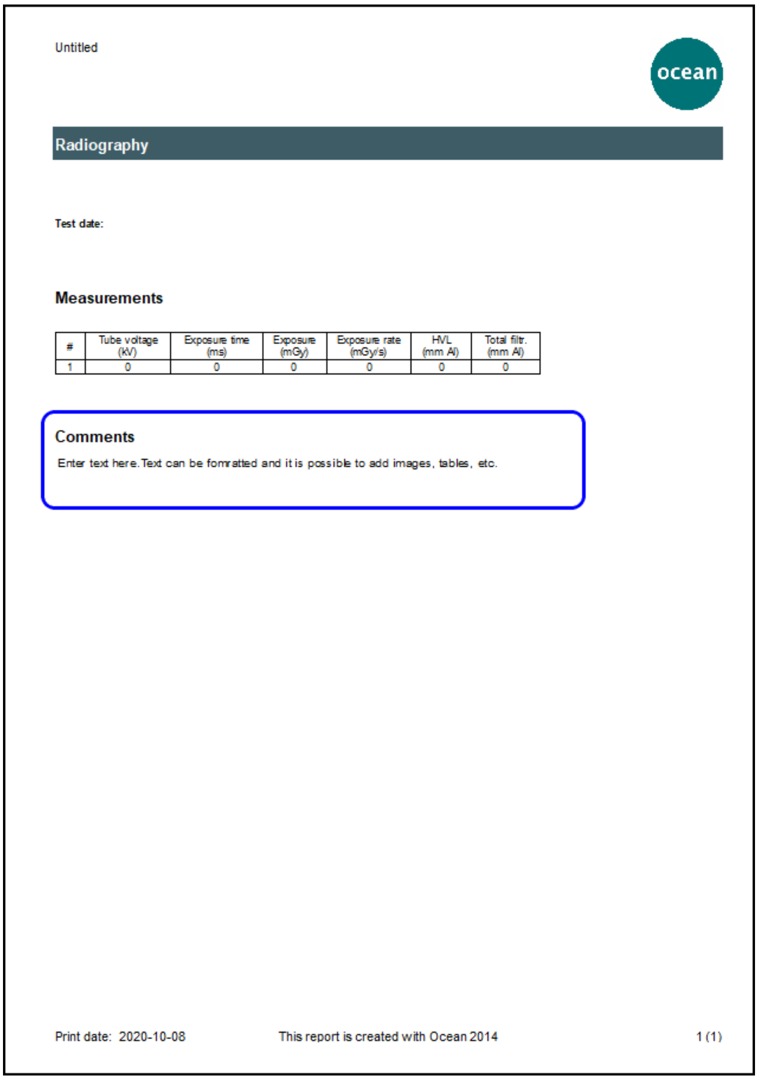
The comment page is opened:



Enter the text, all normal functions are available such as, formatting, tables, include images, fonts, etc.

To go back to the display panel, click on the **Back** button or the **Comment** button again. If you want to see or modify the comment again, click on the **Comment** button.

The comment will be automatically included in the printed report. Read more about the report in the topic Preview and Print.



Untitled

Radiography

Test date:

Measurements

#	Tube voltage (kV)	Exposure time (ms)	Exposure (mGy)	Exposure rate (mGy/s)	HVL (mm Al)	Total filtr. (mm Al)
1	0	0	0	0	0	0

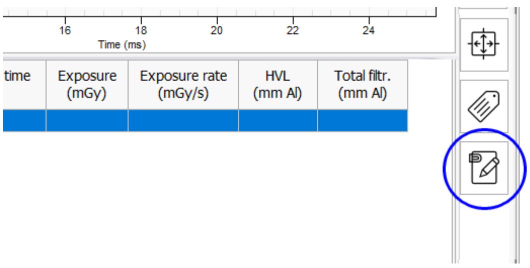
Comments

Enter text here. Text can be formatted and it is possible to add images, tables, etc.

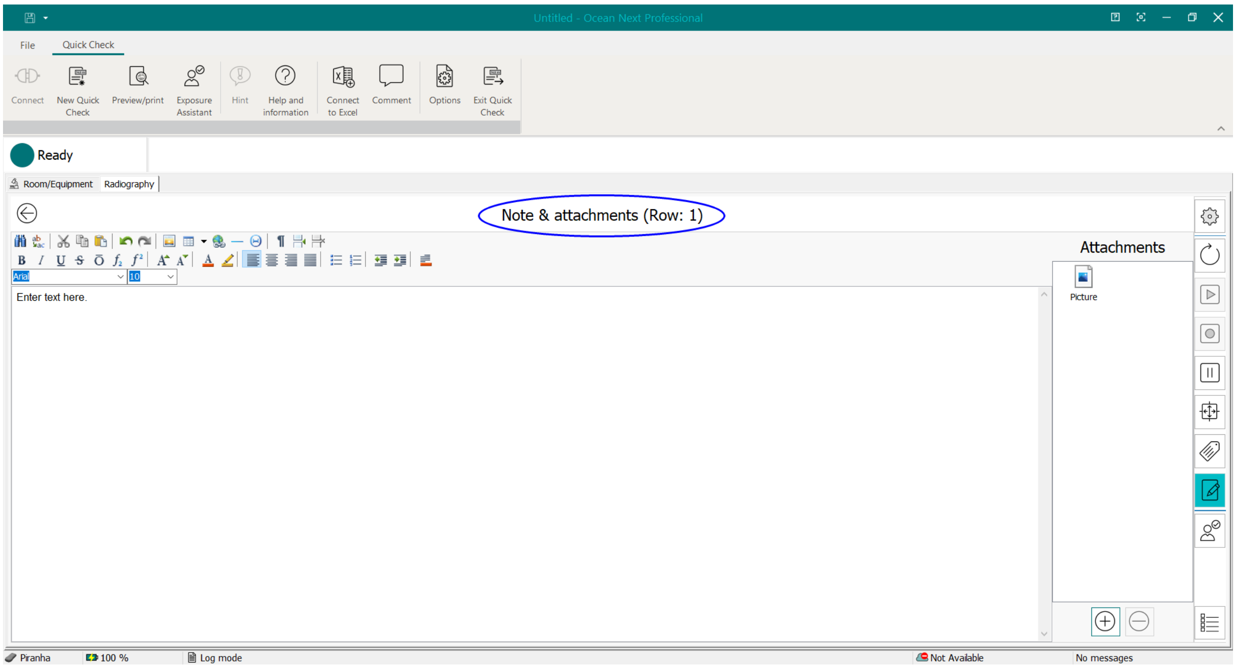
Print date: 2020-10-08 This report is created with Ocean 2014 1 (1)

6.6 Note and attachment

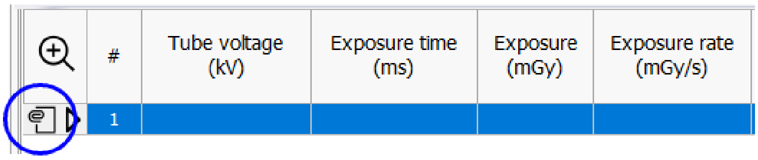
It is possible to add a note and/or an attachment to each exposure. Click on the **Note and Attachment** button on the toolbar on the right side:



The Note and Attachment page is shown:



Here you can add a note and/or attach a file realted to the row indicated at the top. It is possible to use drag-and-drop to attach files or click on the **Plus** button. It is indicated in the first column when a note and/or attachment is added to a row:



To remove an attachment, select it and click the **Minus** button.

To return to the display panel, click the **Back** button or the **Note and Attachment** button again.

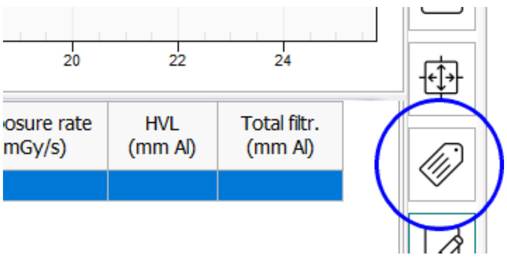
Note: The note and attachment is not included in the printed report.

6.7 Tag

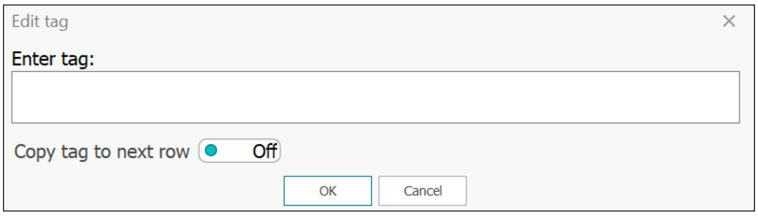
It is possible to tag measured values with an identifier to easily find an exposure in the meter log.

Note!
The meter log is a coming feature that will be available with the RTICloud. With the meter connected, all measured data will stored automatically in a "meter log".

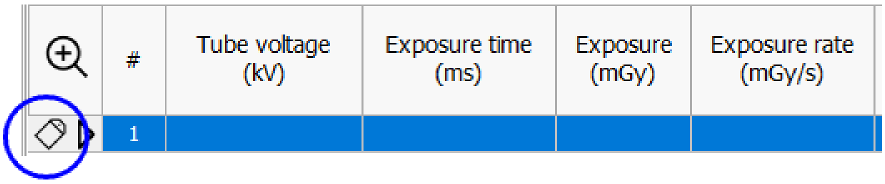
To add a tag, click on the **Tag** button on the toolbar on the right side:



Enter the tag in the text field:

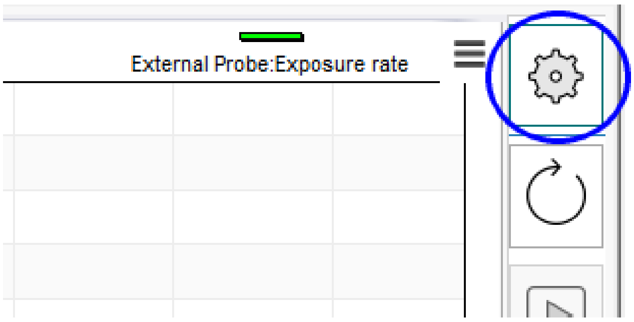


You can chose if you want the tag to be automatically copied to the next exposure or just attached to current exposure. If you turn on "copy to next row", the tag is attached to every exposure until you turn it off or until you start a new Quick Check measurement. Click **Ok** to activate the tag, or **Cancel** to skip any action. It is indicated in the first column when a tag is added to a row:



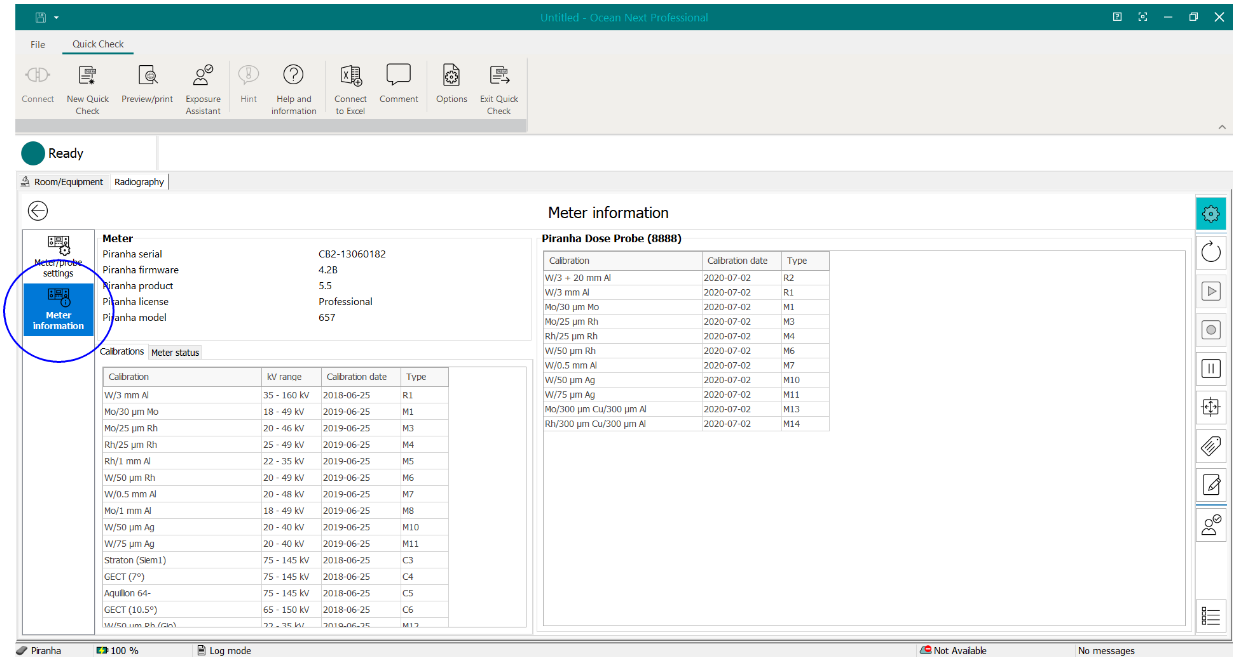
6.8 Meter information

To view the Meter information, click on the **Settings** button on the toolbar on the right side and then the **Meter Information** button on the left side:



The Meter Settings page shows information about currently used meter and external probe(if connected). The picture below shows meter information for Piranha and it is similar for Cobia and the Scatter Probe, for Mako see further down:

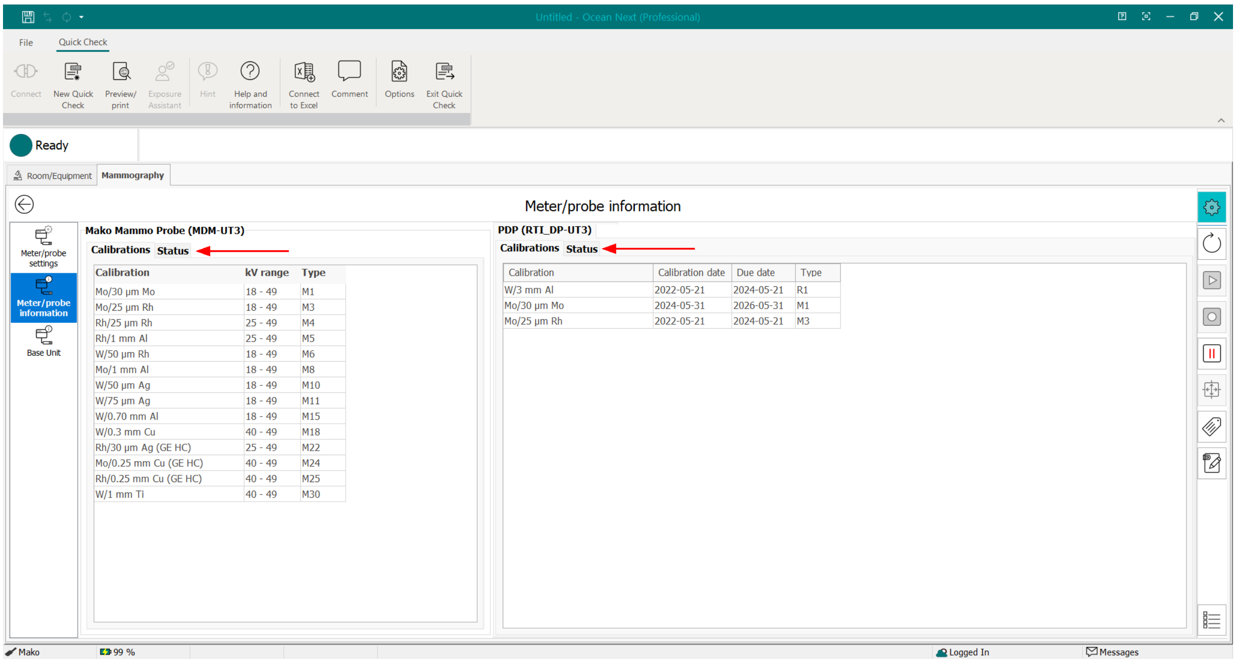
Piranha, Cobia and Scatter Probe



Close the **Meter Information** page by clicking on the **Back** button or on the **Settings** button again.

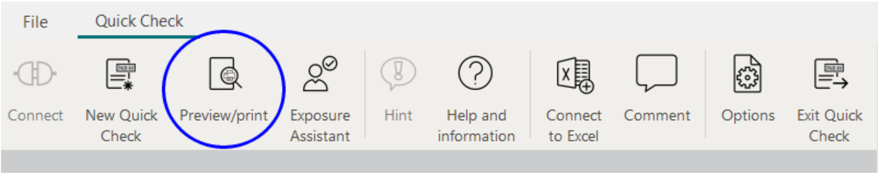
Mako

The Meter Information for Mako has a button for the Base Unit information. The Status tabs provide detailed information about probes and modules:

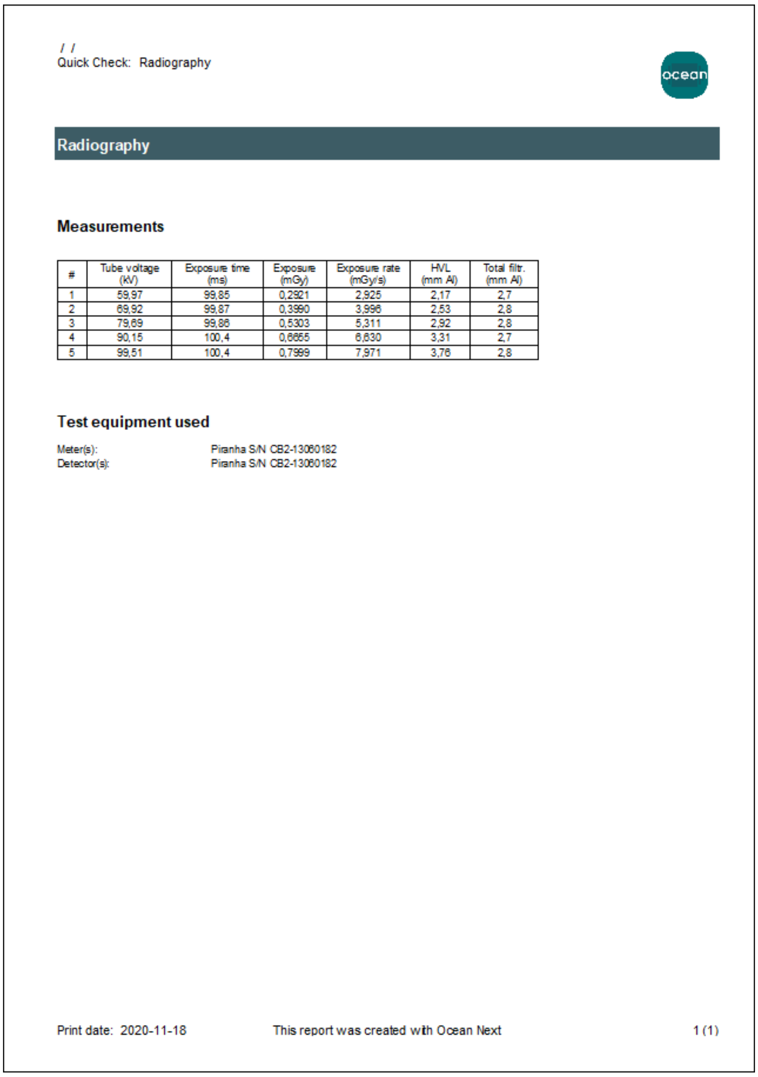


6.9 Preview and print

You can directly print your measured data (or create a PDF file) just click on the **Preview/Print** button on the Quick Check ribbon bar:



A preview of the print-out is shown on the screen:



/ /
Quick Check: Radiography

Radiography

Measurements

#	Tube voltage (kV)	Exposure time (ms)	Exposure (mGy)	Exposure rate (mGy/s)	HVL (mm Al)	Total filtr. (mm Al)
1	59,97	99,85	0,2921	2,925	2,17	2,7
2	69,92	99,87	0,3990	3,996	2,53	2,8
3	79,69	99,86	0,5303	5,311	2,92	2,8
4	90,15	100,4	0,6655	6,630	3,31	2,7
5	99,51	100,4	0,7999	7,971	3,76	2,8

Test equipment used

Meter(s): Piranha S/N CB2-13060182
Detector(s): Piranha S/N CB2-13060182

Print date: 2020-11-18 This report was created with Ocean Next 1 (1)

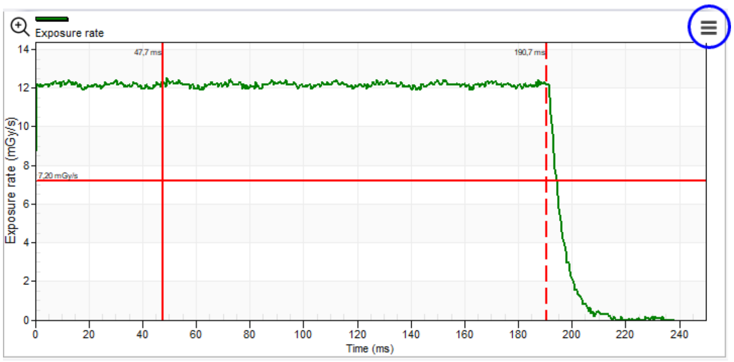
This is the basic print out. You can add more information:

- A comment, see more the topic Comment for how to add. The comment is automatically included in the report.
- Site and equipment information, read more in topic Room and Equipment Information.
- One or more waveforms.

How to add waveforms

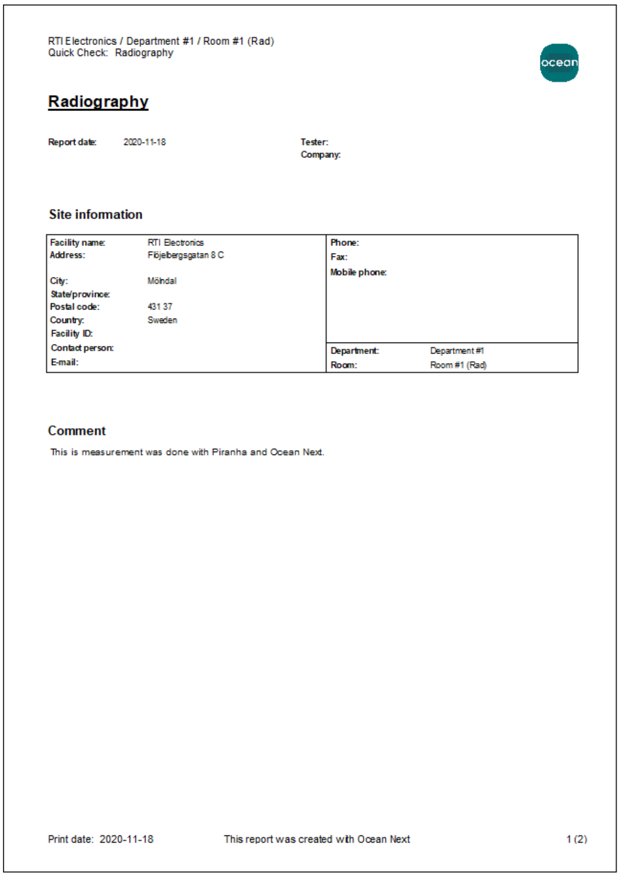
By default no waveform are included in the report. To include waveform in the report:

1. In the grid, select the row with the waveform you want to include.
2. Click on the Menu button in the upper right corner of the waveform panel.



3. Click on "Include waveform in report".
4. Repeat for more rows in the grid if you want to include more waveforms.

The picture below shows the report when also site/equipment information and a comment have been added as well. To show it, click on the **Preview/Print** button on the ribbon bar:


RTI Electronics / Department #1 / Room #1 (Rad)
Quick Check: Radiography

Radiography

Report date: 2020-11-18

Tester:
Company:

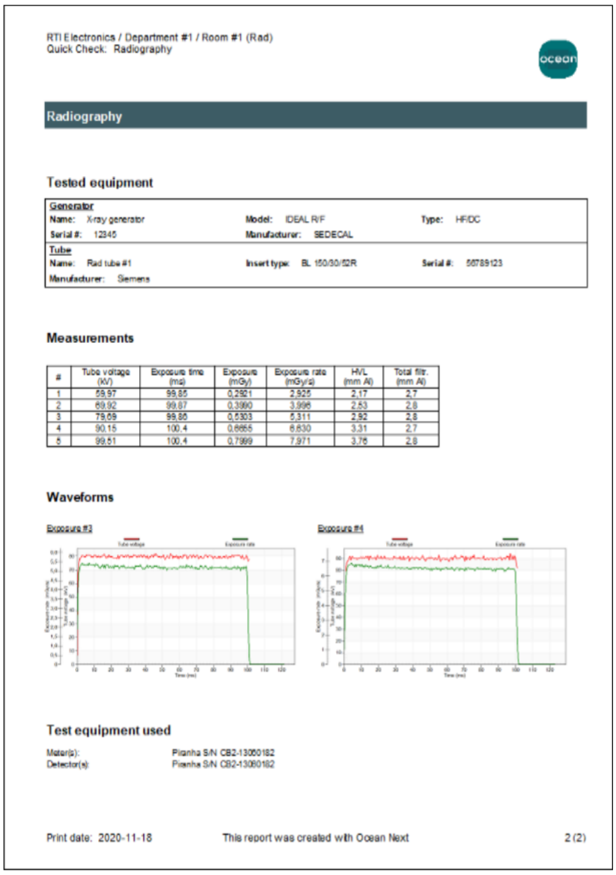
Site information

Facility name:	RTI Electronics	Phone:	
Address:	Flöjelbergsgatan 8 C	Fax:	
City:	Möhndal	Mobile phone:	
State/province:			
Postal code:	431 37		
Country:	Sweden		
Facility ID:			
Contact person:		Department:	Department #1
E-mail:		Room:	Room #1 (Rad)

Comment

This is measurement was done with Piranha and Ocean Next.

Print date: 2020-11-18 This report was created with Ocean Next 1 (2)


RTI Electronics / Department #1 / Room #1 (Rad)
Quick Check: Radiography

Radiography

Tested equipment

Generator
Name: X-ray generator Model: IDEAL R/F Type: HF/DC
Serial #: 12345 Manufacturer: SEDECAL

Tube
Name: Rad tube #1 Insert type: BL 150/30/52R Serial #: 56789123
Manufacturer: Siemens

Measurements

#	Tube voltage (kV)	Exposure time (ms)	Exposure (mGy)	Exposure rate (mGy/s)	HVL (mm Al)	Total filtr. (mm Al)
1	59,97	99,85	0,2921	2,925	2,17	2,7
2	69,92	99,87	0,3990	3,996	2,53	2,8
3	79,69	99,86	0,5303	5,311	2,92	2,8
4	90,15	100,4	0,6655	6,630	3,31	2,7
5	99,51	100,4	0,7999	7,971	3,76	2,8

Waveforms

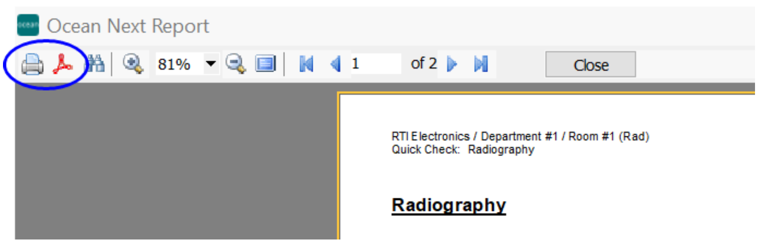
Exposure #3 Exposure #4

Test equipment used

Meter(s): Piranha S/N CB2-13060182
Detector(s): Piranha S/N CB2-13060182

Print date: 2020-11-18 This report was created with Ocean Next 2 (2)

To print on a printer or create a PDF file, click on the **Print** or **PDF** button:

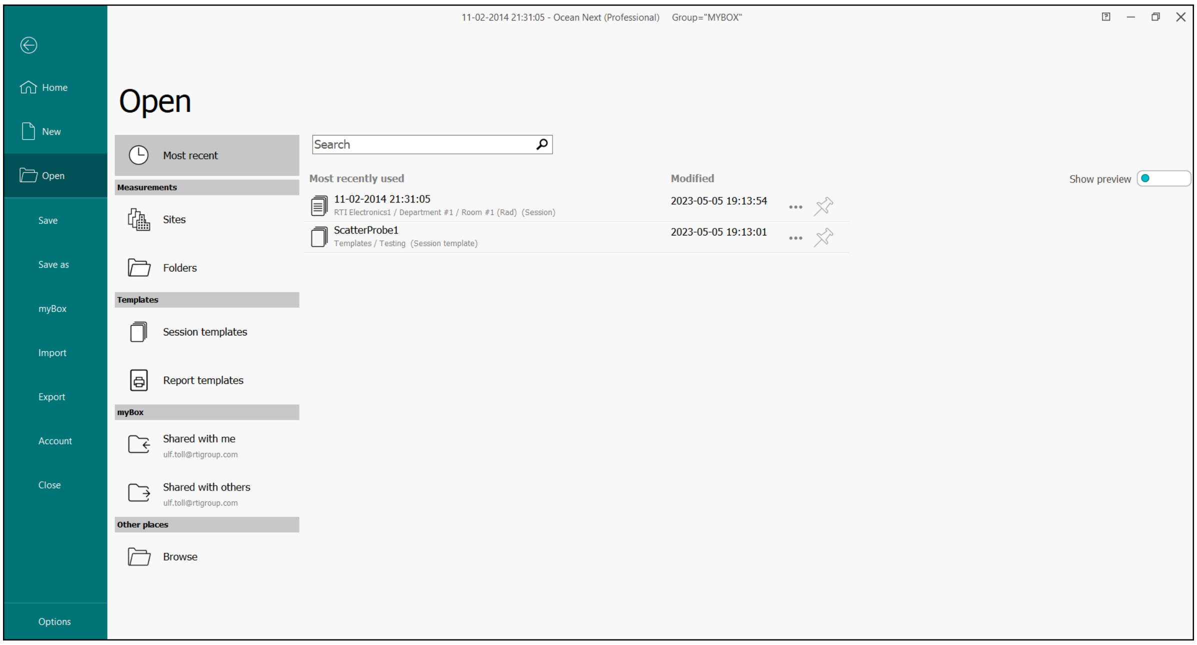


6.10 Open a saved measurement

You can re-open a Quick Check measurement that you have saved to continue to measure, to view it and/or to print it. To just open and view or print you must not have a meter connected, this can be done in off-line mode.

If you intend to continue to measure; make sure that you have the correct meter and required probe connected. To open a saved Quick Check measurement:

1. Select Open from the Backstage:



2. Select the Quick Check measurement you want to open. It is shown with the image: .
3. If not meter is connected, a dialogue is shown; select "Keyboard" here.
4. Quick Check starts and the required measurement is loaded.
5. You can now continue to measure if you have a meter connected. You can also add any other information from the keyboard, such as room/equipment information, add/edit comment and notes, and print.

To close the measurement, exit Quick Check or start a new Quick Check.

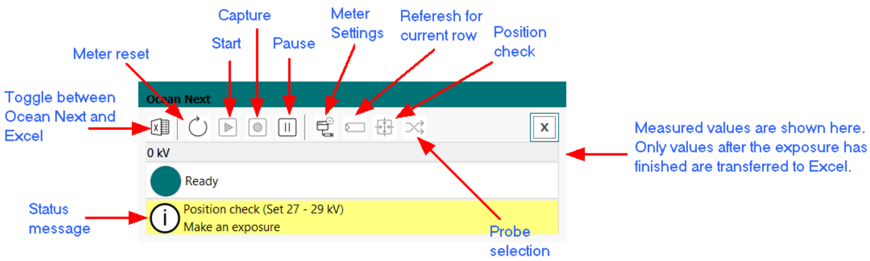
6.11 Transfer data to Excel

You can transfer data from Quick Check to Excel in three (two for the Scatter Probe) different ways:

- Send current measured data to Excel. The data dump starts in active Excel cell, read in the topic Send data to Excel.
- Connect to an Excel workbook. Measured data, are for each exposure, transferred to Excel starting in active cell, read more in topic Connect (Standard mode).
- Connect to an Excel workbook. Measured data, are for each exposure, transferred to Excel starting in active cell. A pre-defined data format is used that is compatible with Excel templates used with Xi and X2 View, read more in topic Connect (Fixed format). (not availalable for the Scatter Probe)

6.11.1 Excel control window

When an Excel workbook is used with Quick Check a small Excel control window is shown to simplify the interaction between Quick Check and Excel. The exact content in the window is depending on mode (send or connect) and/or used detectors.

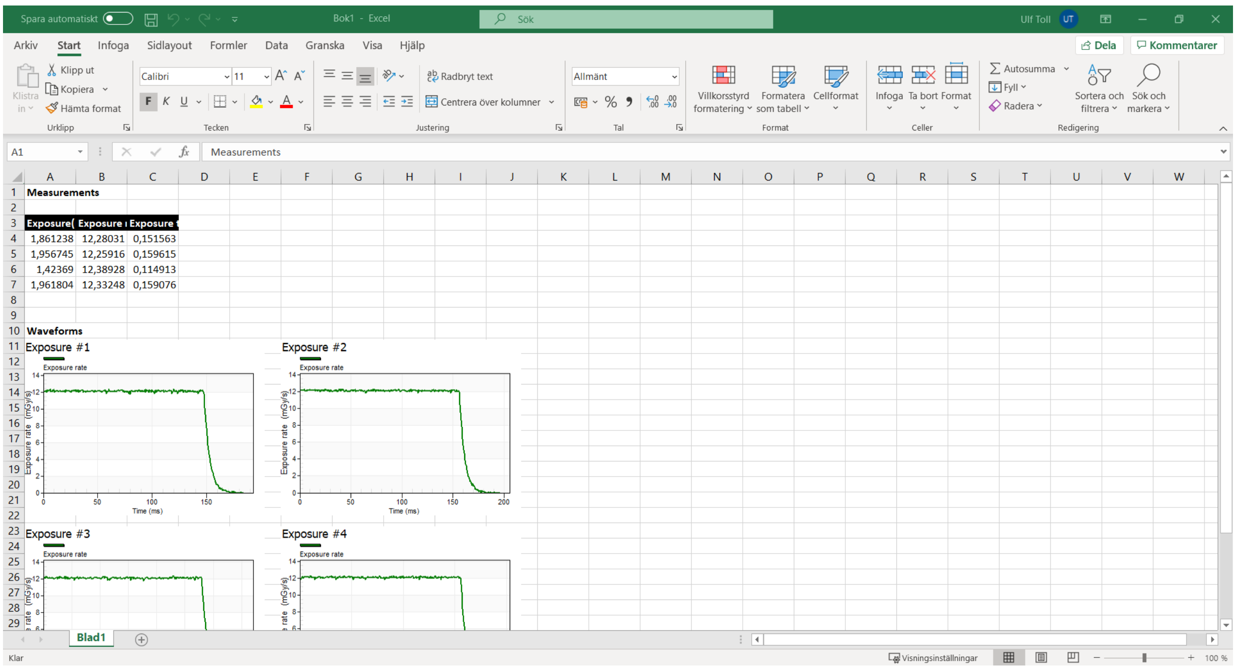


The most common meter settings are available (depending on used detector(s).

To close the Excel connection, click "x" in the upper right corner of the Excel control window. Both the window and the used Excel workbook will be closed. If necessary, you are asked to save the Excel workbook.

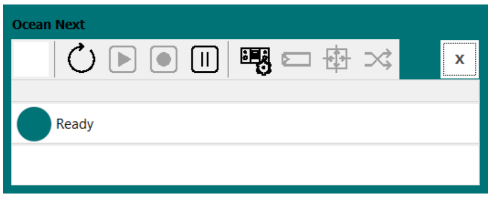
6.11.2 Send data to Excel

In this mode the entire content in the template is dumped to Excel.



This is used when you want dump your current data to Excel. You have a choice to include or exclude waveforms (waveform are exported as pictures).

1. Click on the **Connect to Excel** button: .
2. Select **Send data to workbook**.
3. Next decide if you want waveforms or not. In case you select waveforms, you will be asked about waveform size. The picture above uses "small".
4. Next step is to select which Excel workbook to use:
   - Open a new empty workbook
   - An existing workbook from file
   - A workbook already open on the computer
5. Excel starts and the selected workbook is opened and connected with Quick Check. The Excel control window is opened and shown.



You can change basic meter settings and the left most button is used to switch between Quick Check and Excel, read more in topic Excel control window.

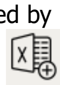
6. You can save your Excel workbook and further process your measured data.

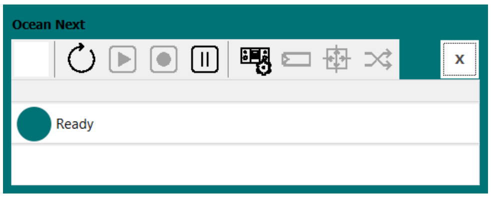
6.11.3 Connect (Standard mode)

When this mode is used, data are transferred to Excel after each exposure. The format is defined by the columns in actual Quick Check. Only numerical values are sent to Excel, no units or waveforms.

To connect to the workbook:

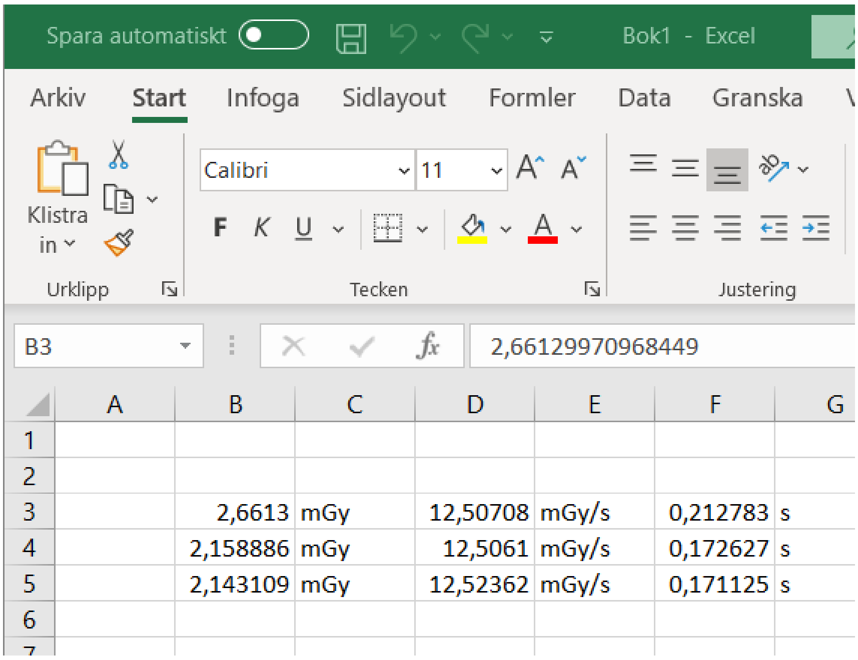
First go to Options in Quick Check and make sure that the checkbox "Fixed format (Excel connect)" is unchecked. This ensures that standard mode is used and data transferred is defined by the actual Quick Check:

1. Start Quick Check and Click on the **Connect to Excel** button: .
2. Select **Connect to workbook**.
3. Next step is to select which Excel workbook to use:
   - Open a new empty workbook
   - An existing workbook from file
   - A workbook already open on the computer
4. Excel starts and loads the workbook you chose and the Excel control window is shown.



You can change basic meter settings and the left most button is used to switch between Quick Check and Excel. Read more in the topic Excel control window.

5. Place the cursor where you want the data from the next exposure to appear, for example in C3.



6. Make some exposures, the value from the first column is put into cell C3, consecutive column values go into consecutive cells on the same workbook row as shown in the picture above.
7. You can save your Excel workbook and further process your measured data.

You can disconnect the Excel workbook by clicking in the "x" in the upper right corner of the Excel control window.

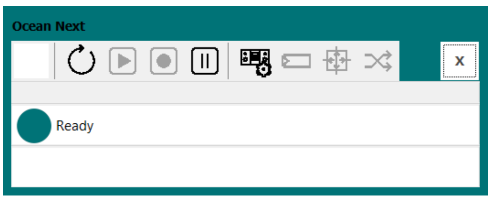
6.11.4 Connect (Fixed format)

When this mode is used, data are transferred to Excel after each exposure. The format is compatible with the format used with Xi and X2 View from RaySafe. Same Excel templates can be used with none or minimal modifications. This mode is only available in Quick Check. It is activated by checking "Fixed format (Excel connect)" on the Option page (in Quick Check). The "Fixed format" is described below. Note that fixed format is not available for the Scatter Probe.

To connect to the workbook:

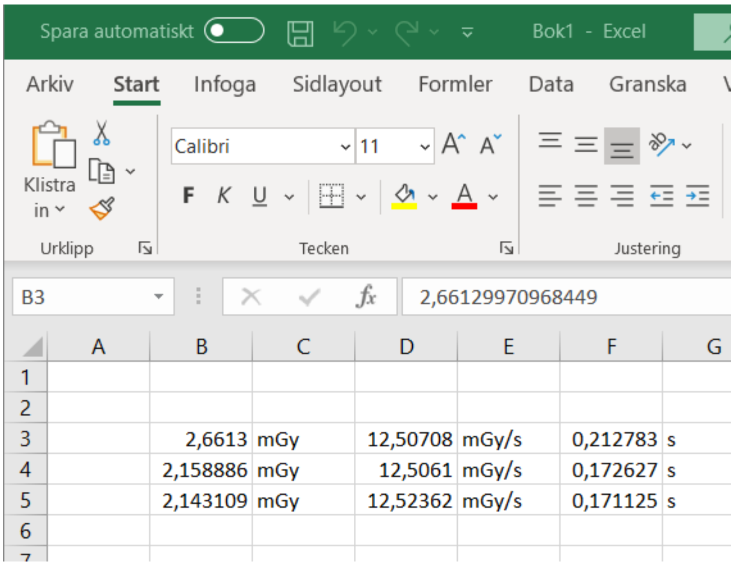
First go to Options in Quick Check and make sure that the checkbox "Fixed format (Excel connect)" is checked:

1. Start Quick Check and Click on the **Connect to Excel** button: .
2. Select **Connect to workbook**.
3. Next step is to select which Excel workbook to use:
   - Open a new empty workbook
   - An existing workbook from file
   - A workbook already open on the computer
4. Excel starts and loads the workbook you chosed and the Excel control window is shown.



You can change basic meter settings and the left most button is used to switch between Quick Check and Excel. Read more in the topic Excel control window.

5. Place the cursor where you want the data from the next exposure to appear, for example in C3.



6. Make some exposures, the value from the first column is put into cell C3, consecutive column values go into consecutive cells on the same workbook row as shown in the picture above.
7. You can save your Excel workbook and further process your measured data.

You can disconnect the Excel workbook by clicking in the "x" in the upper right corner of the Excel control window.

Definition of the fixed format

There are four different detector combinations that each has its own fixed format:

- Multi-detector (internal detector) with an optional external detector
- Only an external radiation detector (Dose Probe, CTDP, T20, Ion chamber of any type)
- Only the Light detector
- Only a mAs probe

Multi-detector (internal detector)

Tube voltage
unit
Dose
unit
Dose rate
unit
Exp. time
unit
Pulses
unit
Empty
Empty
Pulse rate
unit
Dose/pulse
unit
HVL
unit
Tube mAs
unit
Tube mA

unit
TF
unit
Dose (ext.)
unit
Dose rate (ext.)
unit

Units are defined by Default units in Program options in the Backstage (not available in Quick Check).

Only external radiation detector

Dose
unit
Dose rate
unit
Exp. time
unit
Pulses
unit
Empty
Empty
Pulse rate
unit
Dose/pulse
unit

Units are defined by "Default units" in Program options in the Backstage (not available in Quick Check).

Only light detector

Lumunance or Illuminance
unit

Units are defined by "Default units" in Program options in the Backstage (not available in Quick Check).

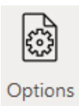
Only mAs probe

Tube mAs
unit
Tube mA
unit
Exp. time
unit

Units are defined by "Default units" set in Program options found on the Backstage Home page.

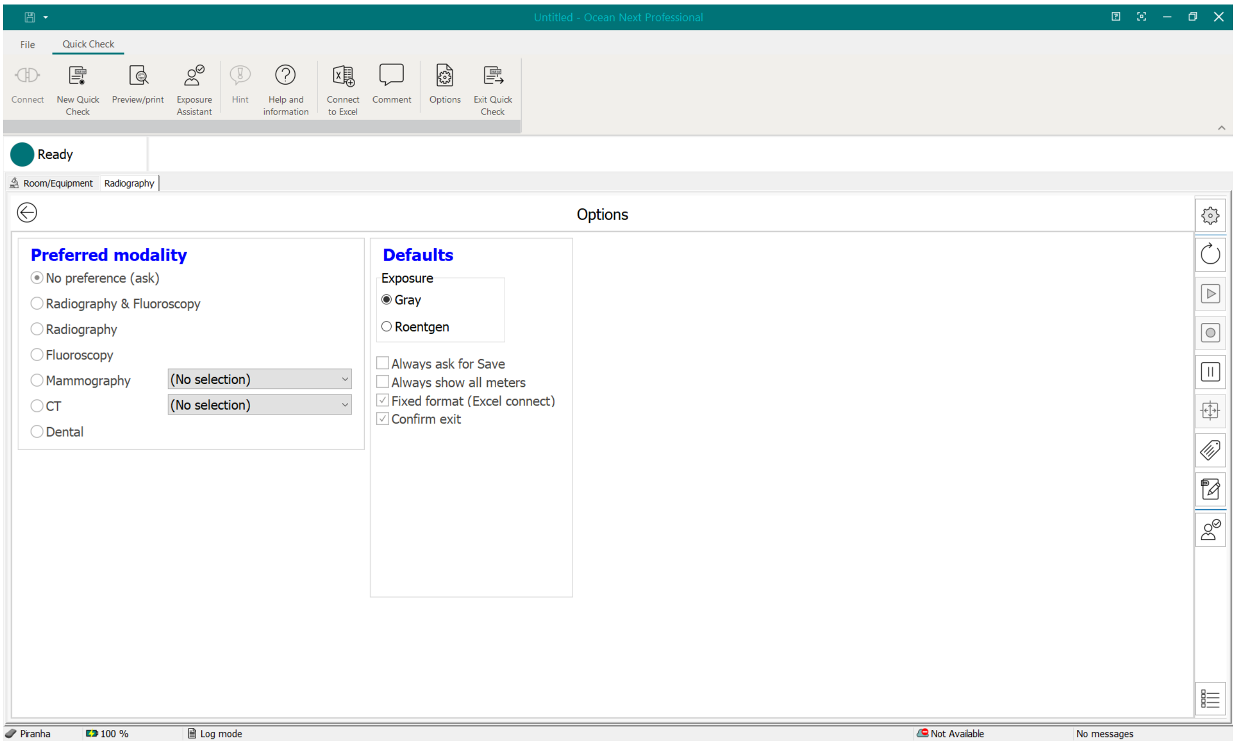
6.12 Quick Check Options

6.12.1 Piranha and Cobia Options

Click the **Options** button 

on the Quick Check ribbon bar and select "Options" from the menu shown.

The Quick Check options are shown:



There are two sections here, Preferred modality and Defaults.

Preferred modality

You can use this if you have a meter that covers many modalities but you don't want to see all choices in the Quick Check.

Defaults

Various settings that controls how Quick Check works.

Exposure unit: Select Gray or Roentgen

Always ask for Save: When this box is checked Quick Check always asks if you want to save your measurements before starting a new measurement or closing.

Always show all meters: When this box is checked a list with available meters to connect to is shown. If unchecked, Ocean Next directly tries to connect to the last used meter.

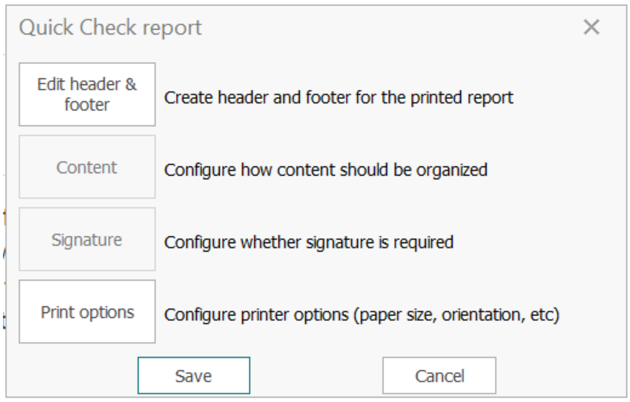
Fixed format (Excel connect): Check this box if you want to use fixed format when connecting to Excel.

Confirm exit: If you check this a dialogue is shown when you quit Ocean Next. It give you three alternatives:

- Quit Ocean Next and return to Windows
- Quit Ocean Next and turn off computer
- Resume Ocean Next

Report format

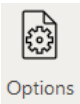
Modify and add header, footer and logo in your report. You can also modify the printer options such as paper size, orientation, etc.



Click Save when you have made your changes.

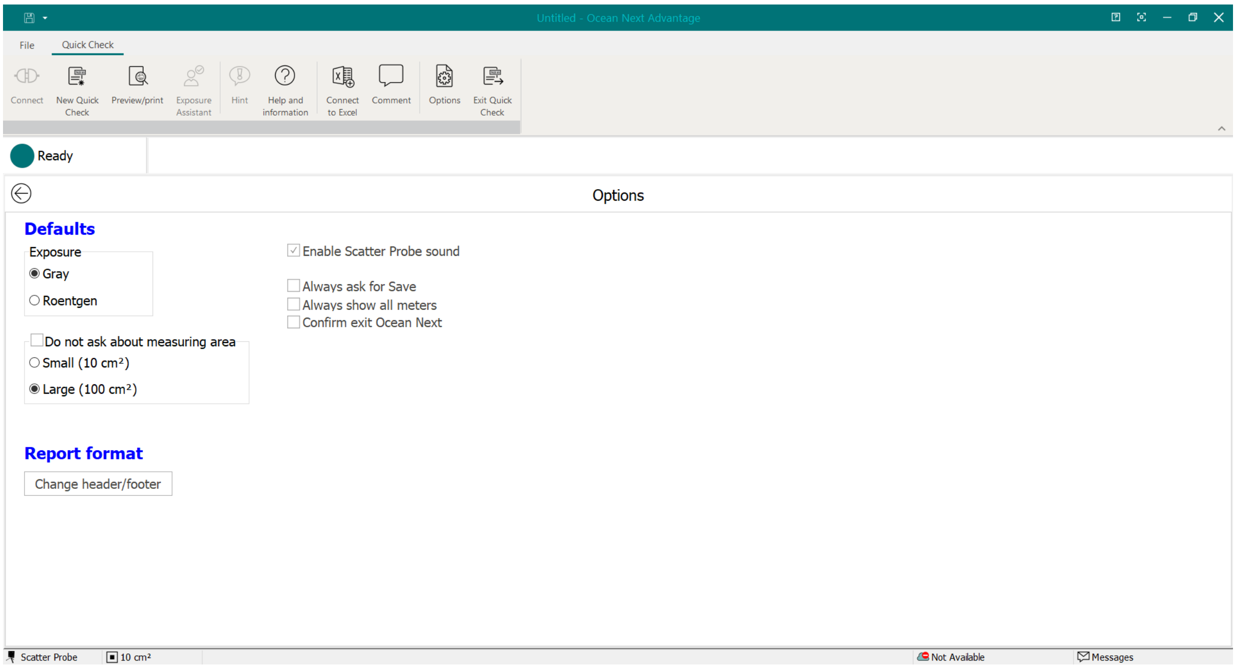
Click on the **Back** button to close Options and return to the display panel.

6.12.2 Scatter Probe Options

Click the **Options** button 

on the Quick Check ribbon bar and select "Options" from the menu shown.

The Quick Check options are shown:



Defaults

Various settings that controls how Quick Check works.

Exposure unit: Select Gray or Roentgen

Preferred measuring area: If not set, Quick Check always asks about the measuring area.

Scatter Probe sound: Uncheck to turn off sound.

Always ask for Save: When this box is checked Quick Check always asks if you want to save your measurements before starting a new measurement or closing.

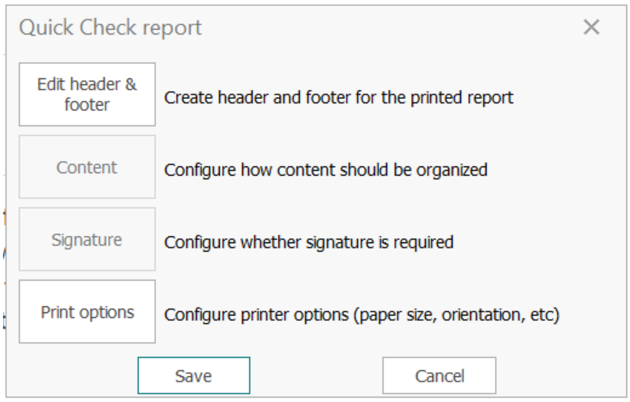
Always show all meters: When this box is checked a list with available meters to connect to is shown. If unchecked, Ocean Next directly tries to connect to the last used meter.

Confirm exit: If you check this a dialogue is shown when you quit Ocean Next. It give you three alternatives:

- Quit Ocean Next and return to Windows
- Quit Ocean Next and turn off computer
- Resume Ocean Next

Report format

Modify and add header, footer and logo in your report. You can also modify the printer options such as paper size, orientation, etc.



Click Save when you have made your changes.

Click on the **Back** button to close Options and return to the display panel.

Chapter 7

Test View

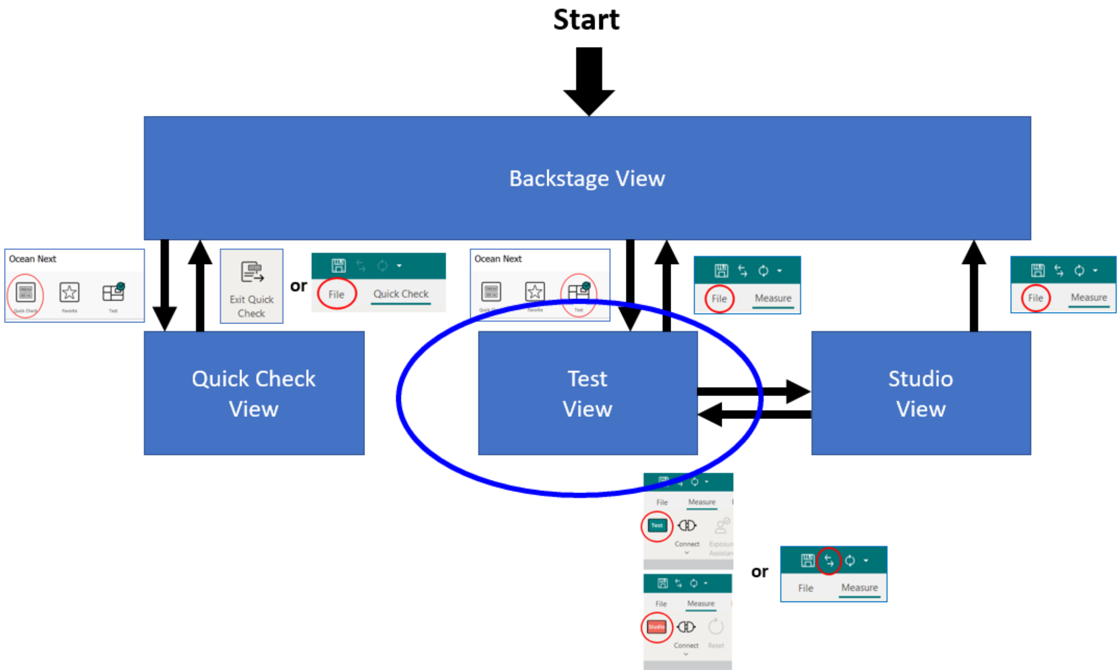
7 Test View

You use the Test View when you do your measurements using your predefined Session Templates. It involves the following steps:

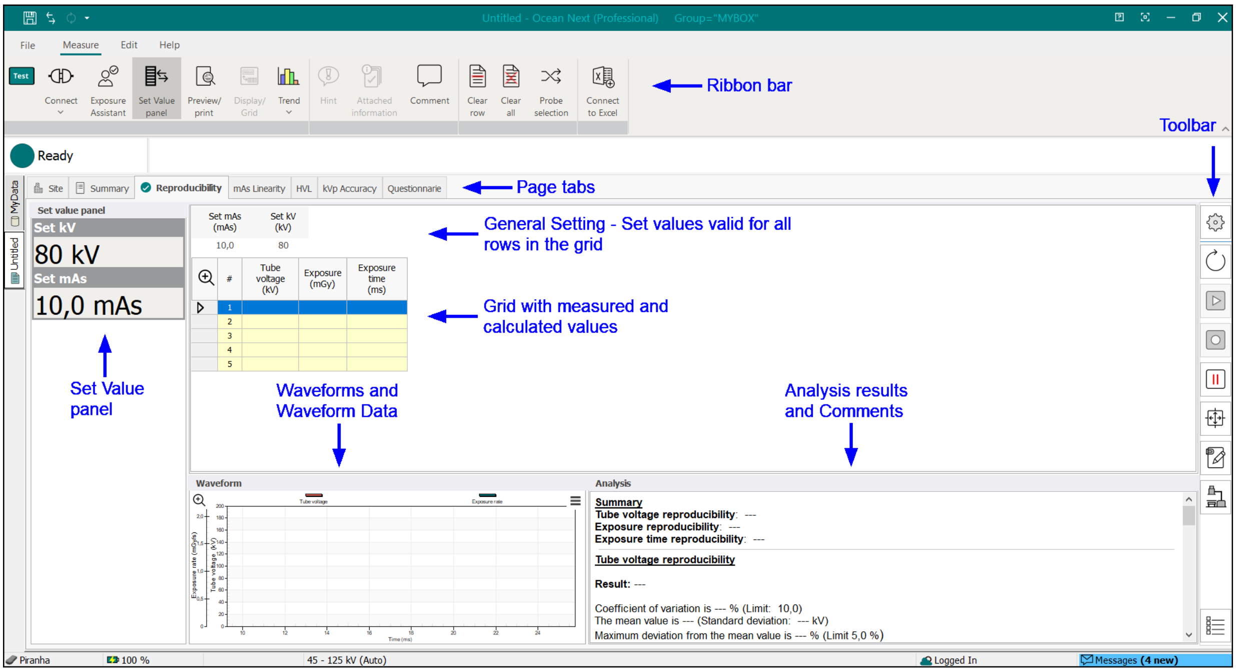
- Select the Session Template you want to use.
- Select the the site (room, department and facility) where you do your measurement and collects all you data.
- Perform the exposures and finish the Session.
- Preview the report.
- Save your Session.

The Test View is new compared to Ocean 2014 and is replacing Ocean 2014's "main window" when you do measurements. The Test View is optimized for this purpose and is recommended to be used when you do measurements even if you are used to Ocean 2014. All functions from Ocean 2014 are still present in the Studio View and and can be used.

It is assumed that you are familiar with the Quick Check View when you starting to read this.

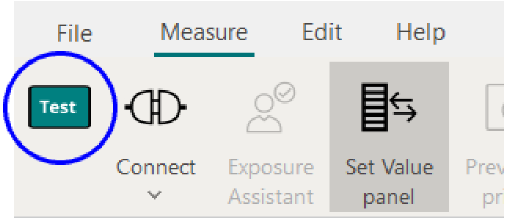


The picture below shows the Test View when a Session is loaded and activated and Ocean Next is ready for an exposure:



- At the top is the Ribbon bar with functions that are used to the measurement and view the result, these functions are described in the topic Test View Overview.
- On the right side is the Toolbar with buttons for functions that are used more frequent to control the measurement, maybe exposure by exposure. The Toolbar is described in the topic Test View Overview.
- The page tabs shows all the pages that are included in the Session. Two tabs, Site and Summary, are "fixed and predefined pages" and are present in all Sessions. The other pages, are user-defined and are either a "test page" or a "checklist page".
- To measure with a "test page" or fill in a "checklist page", the page must be activated. This means, for a "test page" that the meter is set up and "connected" to this page. After an exposure, measured data will go to this page. Activated page is indicated with a green check mark.
- To activate a page, double-click on the page tab. If you just click on a page tab, you select that page and it will be shown but **not** activated.
- The a "status indicator" is shown in the status field below the Ribbon bar. Here is indicated when the meter is ready for an exposure and when it is adjusting, connecting, etc. and not ready for an exposure.
- By default, a set value panel is shown on the left side. This makes it easy to see what you shall set the generator to and other conditions defined for each exposure.
- The grid can be enlarged by clicking the magnifying glass in its upper left corner.
- The waveform graph can be enlarged by clicking the magnifying glass in the upper left corner.
- The analysis can be enlarged by right-clicking on it and selecting "Maximize".

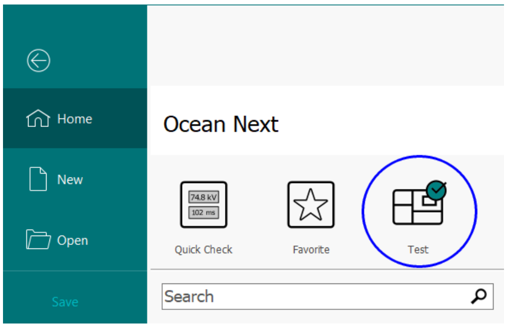
If you, during the time you do measurements, would need to modify you Session "on the fly", you can easily switch over to the Studio View by clicking the indicator shown to the left on the Ribbon bar. It indicates the view you currently use (Test or Studio):



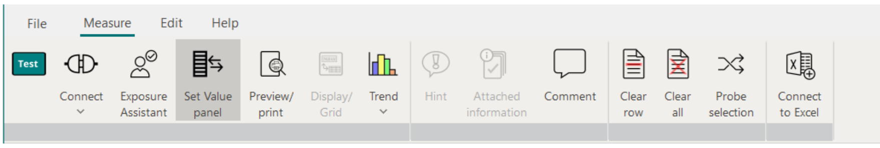
Click on it to switch over to the Studio View, go to the Design tab and make the adjustments and click on the indicator again to toggle back to the Test View. You can now continue to do exposures and collect data.

7.1 Test View Overview

When you start a measurement from a Session Template or from a Session the new measurement is started in the Test View. You can also go to the Test View by clicking on the Test button on the Home page:



When the Test View is shown, the view indicator on the Ribbon bar shows "Test":



To the right is an indicator showing current view, in this case "Studio View". You can click on it to toggle between Studio and Test View.

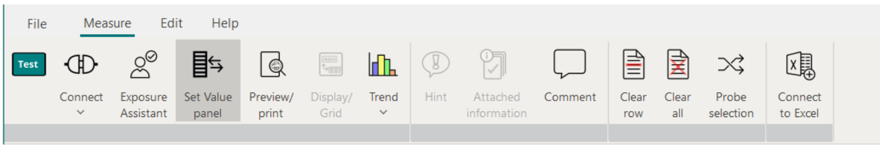
The main functions are:

Measure	Functions you need when you do measurements.
Edit	Basic function you need for modifying your session. If you need more advanced editing functions, switch over to Studio View and do the changes there. Switch back to Test View and continue to measure.
Help	Here you will find help on how to use Ocean Next and some other useful functions.
Test View Toolbar	Various functions used while you make exposures and collect data.

Many of the functions are also available via a "right-click" with your mouse. Simply right-click on an object and a menu will be shown with the functions available to you for that specific object.

7.1.1 Measure tab

Most of the functions you will need when you make measurements using the Test View are located on the Measure tab of the Ribbon bar and on the Toolbar on the right side. The Toolbar is described in the topic Test View Toolbar.



View indicator - Click here to toggle between Test and Studio View

This indicator shows which view you currently use, you can also click on it to toggle between Test and Studio View.

Connect - This function establishes communication between your instrument and Ocean

Make sure that the meter is connected to the computer (via USB cable or Bluetooth).

You can toggle between **Keyboard** and **Connected** by clicking on the upper part of the button. With *Keyboard* active you must enter all measured data manually via the keyboard. When the meter is connected the measured data is transferred automatically from the meter to the active test page.

If you click on the lower part of the button a third option, **Disconnect**, is available. Use this option only in the event you need to:

- Turn your meter off and then back on again.
- If you need to restart meter communication (for example, if you want to switch from one meter to another one).
- If you want to stop meter communication (for example if another program should use the meter while Ocean Next still is running).

Note!
It is recommended that you turn off power save mode or sleep mode on your computer while you make your measurements with a meter connected. You may experience problems with meter communication if your computer goes to sleep mode or power save mode automatically.

Exposure Assistant - Capture a value automatically when measured values are stable

Click on this button if you want to use the Exposure assistant. This is for longer exposures, for example fluoroscopy. Values are captured automatically when they are stable. If you activate the Exposure Assistant, and you have long exposures, Ocean Next will monitor the signal levels. When they are stable, the data will be acquired automatically and stored in the grid. A message will be shown in the status field under the Ribbon bar telling you that data is acquired and that you can stop the exposure.

The exposure assistant "looks" at the following measured values:

- kVp
- Exposure rate
- mA
- Pulse rate
- Light (cd/m^2 or lux)

Measured values are considered to be stable when three consecutive values differ less than:

kVp	3%
Exposure rate	3%
mA	5%
Pulse rate	0.3 pulses
Light	5%

Set Value panel - Turn the Set Value panel on and off

Click on this button if you want to use the Exposure assistant. Values are captured automatically when they are stable. This is especially useful for long fluoroscopy exposures and for light measurements.

Preview/Print - Preview and/or print the report

Click on this button to preview or print the report. You can read more about this function in the topics Preview and Print and Print Reports.

Display/Grid - Toggle between Displays and Grid

In case you have designed a test page and added displays (or if you have Real-time Display templates from Ocean 2014 with displays), the displays will be shown as default when such test page is loaded. If you instead want to see the grid, click on this button.

Trend - Make Trend analysis

Click on this button to start Trend analysis. You can compare how different parameters change over time.. Read topic Trend analysis to get more information.

Hint - Shows a hint

If a hint is included in the test page, this button is activated. Click on it to view the hint.

Attached Information - Shows any attached information

If the test page has any attached information, for example a pdf file with instructions, the button is enabled and you can view it by clicking on this button. The attached information can be a document, for example a PDF document or a web link.

Comment - Write a comment

Write a comment that will be added to your session and included in the report. Comments can be added to the Summary page and all test and Checklist pages.

Clear row - Clear current row (removes all measured data from current row)

Click on this button if you want to clear the current row. The set values will not be removed with this command.

Clear all - erase all data in the object you are working with (removes all measured data from the entire grid)

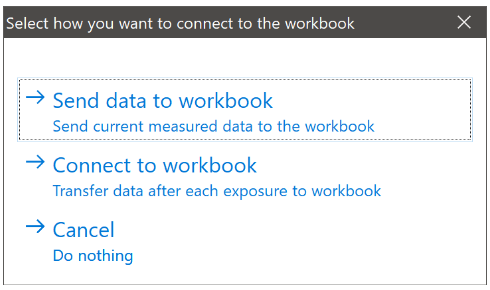
Click on this button if you want to clear all the rows. The set values will not be removed with this command.

Probe selection - Change the detector

Use this button if you want to choose another probe for your current measurement.

Connect to Excel - Send data to Excel

Use this button if you want to send data to Excel "on the fly". When you click this button a dialogue is shown:



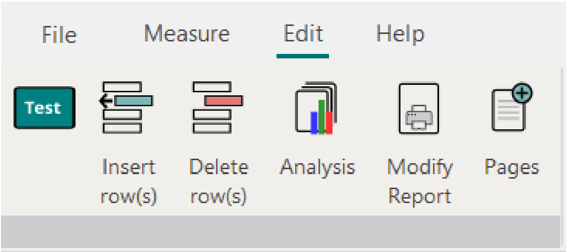
Send data to workbook - An Excel workbook is opened (you must have Excel installed on your computer) and all your current data is sent, "dumped", to Excel. You will be asked if you want to include waveforms or not, size of waveforms and if you want to open a new workbook or an existing one.

Connect to a workbook - If you select this, data after each exposure will be sent to Excel and inserted starting in active cell. A dialogue will be shown that makes it possible for you to chose between a new workbook or open an existing one.

Sending data to Excel can be done in many ways, read the topic Transfer data to Excel in the Quick Check View section for more information and Attach an Excel workbook in the Studio View section.

7.1.2 Edit tab

Here you will find some template editing functions that can be useful "in the fly" while doing measurements. If you need to do other modifications to your session, the switch over to Studio View where you have access to all template editing functions.



View indicator - Click here to toggle between Test and Studio View

This indicator shows which view you currently use, you can also click on it to toggle between Test and Studio View.

Insert row(s) - Insert row(s)

Use this if you want to insert one or more rows in the grid. Select the row where you want to insert and click the button. A dialogue appears and you can select number of rows and if you want to insert before or after the row you selected.

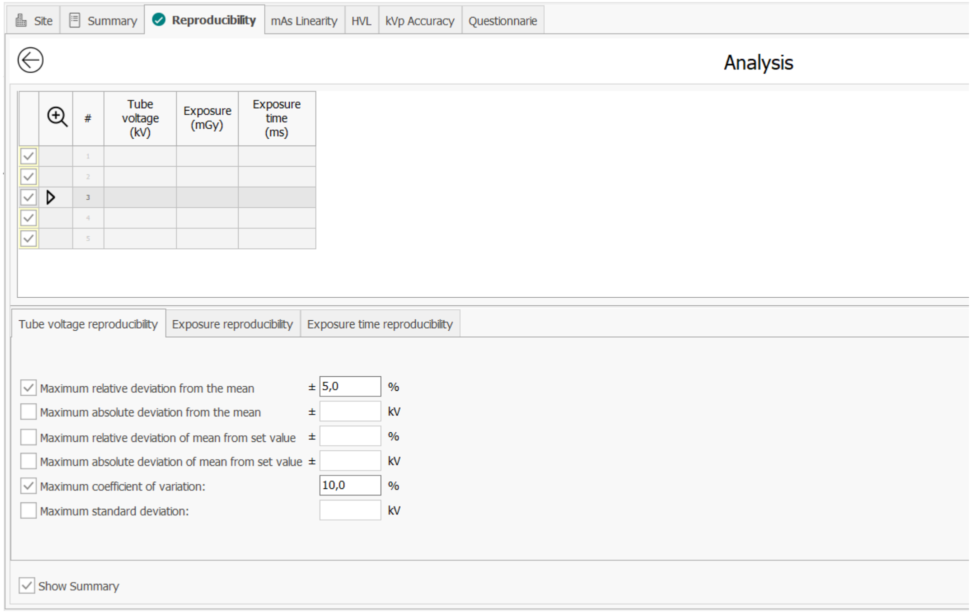
Delete row(s) - Delete row(s)

Use this when you want to delete rows in the grid. Select the rows you want to delete, you can select a range by using the Shift-key and or Ctrl-key.

- If you want to delete multiple consecutive rows:
  - Click in the first column of the first row you want to delete.
  - Hold down the Shift key.
  - Click in the first column of the last row you want to delete.
  - The rows are now selected, click **Delete row(s)**.
- If you want to delete multiple not consecutive rows:
  - Click in the first column of the first row you want to delete.
  - Hold down the Ctrl key.
  - Click on the in the first column of the next row you want to delete and so on.
  - The rows are now selected, click **Delete row(s)**.

Analysis - Click here to modify the pass/fail limits

When you click this button, the analysis setup is shown:



Here you can do basic changes to the existing analysis on current session page. Each analysis, in this case three, has their own tab. Select the analysis you want to modify:

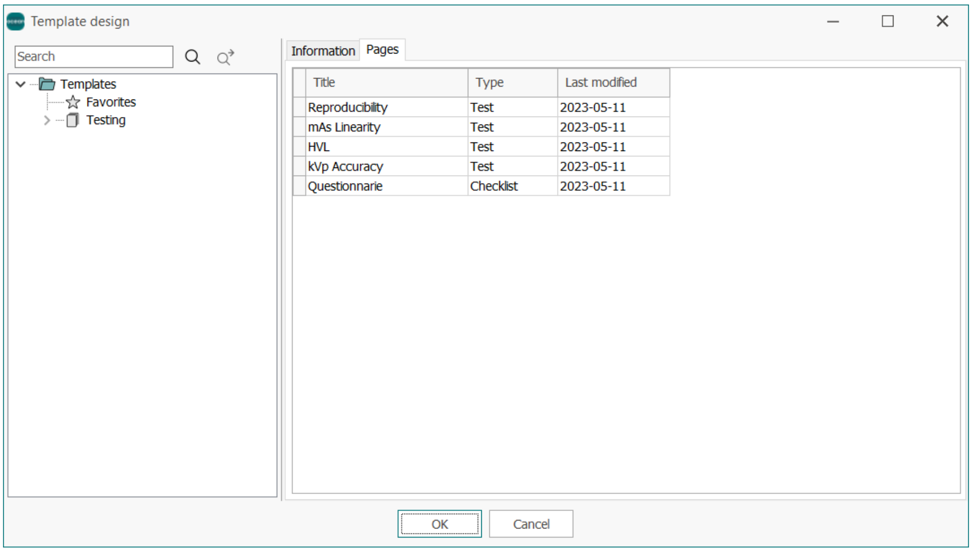
- Include or exclude rows in the grid from the analysis.
- Change the pass/fail limits.
- Hide or show the analysis Summary.

Modify report - Click here to make adjustments to the report format

Here you can make changes to the report format for the current session. When you click on the Modify Report button the Report template dialogue is shown. Read more in the topic How to create a Report Template.

Pages - Click here to add, remove, hide or change order of pages in current session

When you click this button, the Template design dialogue is shown:



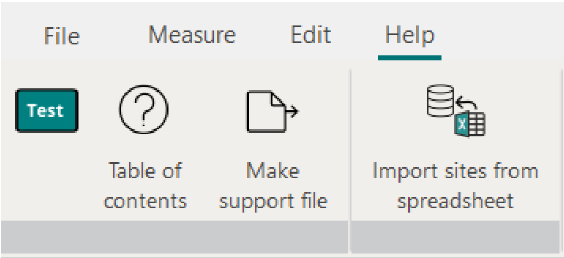
You can do the following:

- Browse for a session template on the left side and add it to your current session. All pages will be added and you can delete if there are pages added that you don't want.

- Use drag-n-drop on the right side to change page order.
- Right-click on a page (right side) and select Hide or Delete.
- Modify the Session Information by clicking on the **Information** tab.

7.1.3 Help tab

Here you will find some template editing functions that can be useful "in the fly" while doing measurements. If you need to do other modifications to your session, the switch over to Studio View where you have access to all template editing functions.



View indicator - Click here to toggle between Test and Studio View

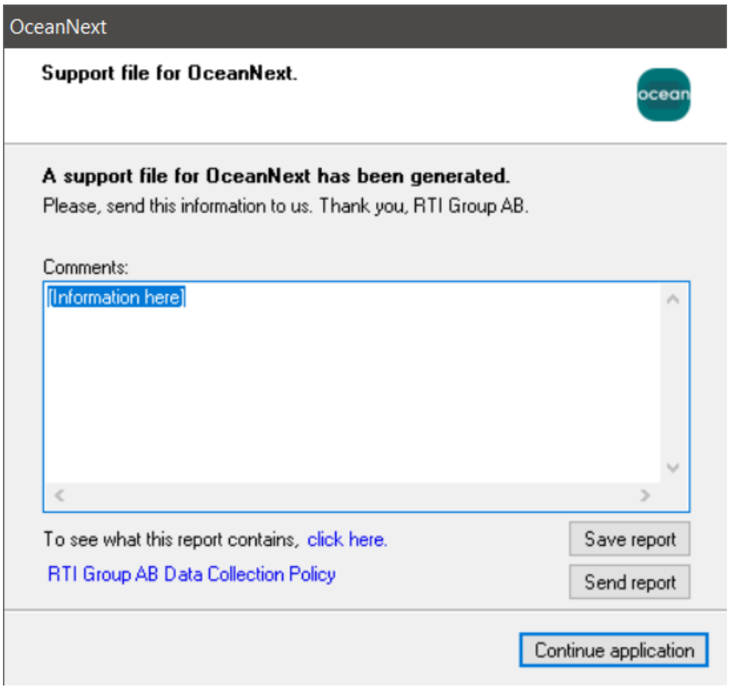
This indicator shows which view you currently use, you can also click on it to toggle between Test and Studio View.

Tabel of Contents - Opens the Help text and shows table of content

Opens the Help text and shows table of content.

Make a Support file - Create a support file with system information

When you encounter a problem, click this button and create a Support file. A dialogue is shown:



You can either send it directly if you have an e-mail program on your computer or save it to a file and send it from another computer.

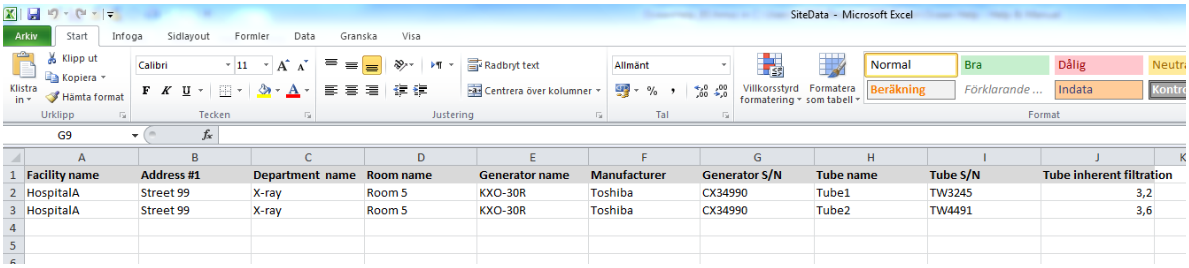
- Click on **Send report** if you have an e-mail program on the computer you are using. Describe the problem in the e-mail and send it.
- If you can't send the e-mail from the computer you are using, write a description of the problem in the "Comment" field. Click on the **Save report** button and select a place to save it. Send the file from another computer.

When you are ready click on **Continue application**.

Import sites from spreadsheet - Import new Sites from Excel

It is possible to import site information (facility, department, room, generator, tube and user-def equipment) from Excel.

The site information should be organized in a list format in an Excel workbook on your computer:

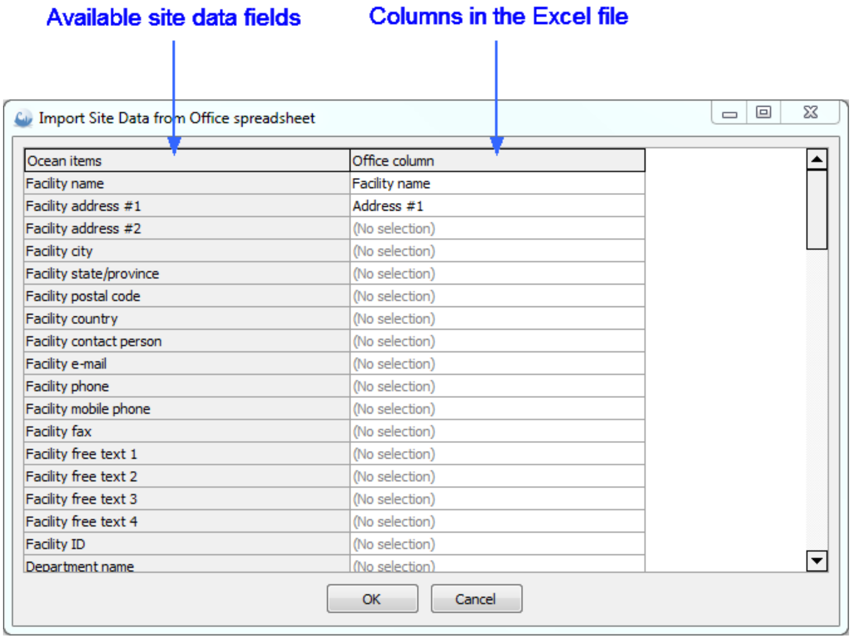


1. Click on **Import sites from spreadsheet**.

2. You are asked to do a backup of you database. It recommended to do so.

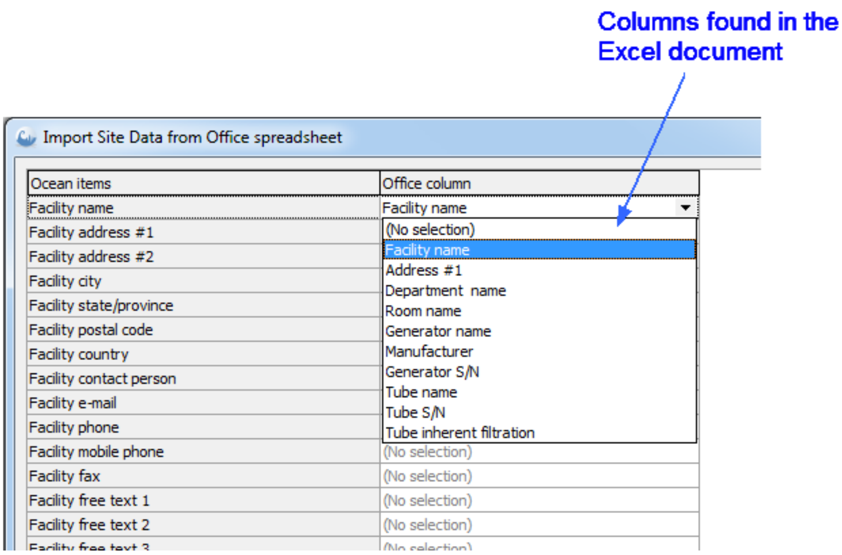
3. After the backup is completed a dialogue is shown that allows you to browse for the Excel file. Locate the Excel file and click **Open**.

4. The Excel file is loaded and a dialogue is shown.



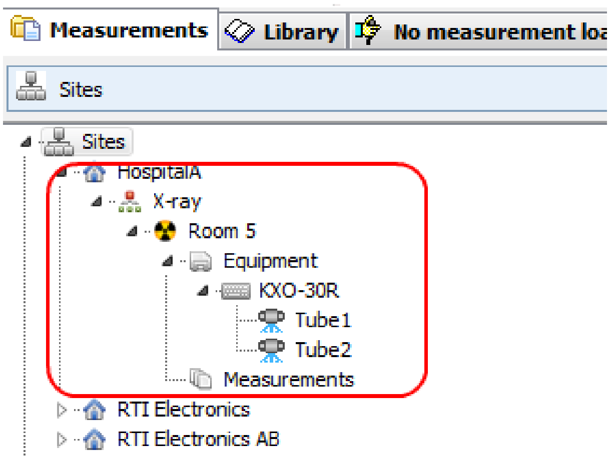
To the left are all the available Ocean Next fields to define the site information (facilities, departments, rooms, generator, tubes and user-defined equipment) shown. To the right are the columns in the Excel document shown.

5. Click in a field in the right column to select which column that should be "tied" to an Ocean field in the left column:



6. When you are ready click on OK.

7. You can now see the imported site information in the database (Measurements).



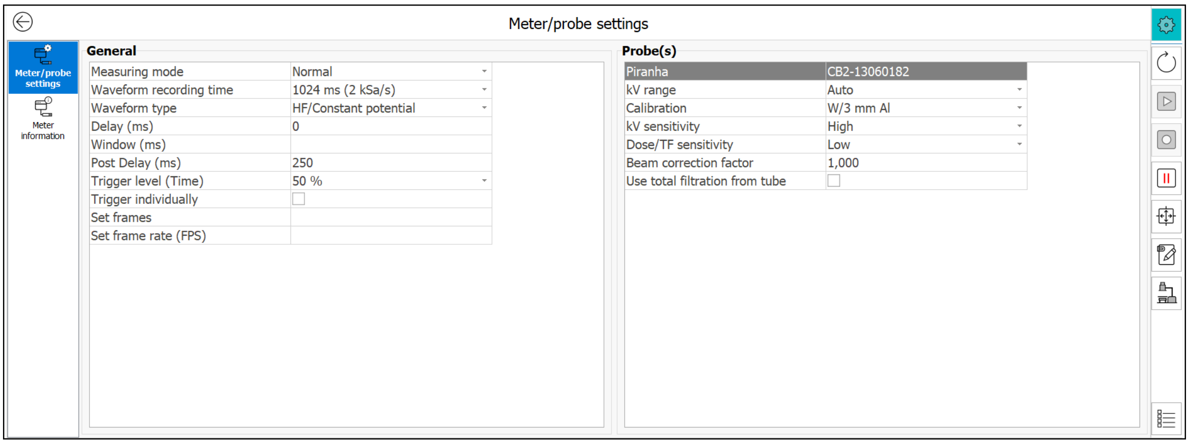
The import is done "by name", if you repeat the import existing data will be overwritten (no duplicates are created).

7.1.4 Test View Toolbar

The Toolbar is located on the left side and is the same as in the Quick Check:

Settings - Adjust Meter and Probe setting and view Meter Information

You click on this button when you need change meter and probe setting or if you want to see information about the meter and probe(s) you currently use.



On the left side there are two buttons where you can select between:

- Meter/Probe settings, all settings for currently used meter and probe(s) for the **selected row(s)**.
- Meter information, shows all information such as serial number, version, calibrations, etc. for currently used meter and probe(s).

You can read more about meter and probe setting in the topic Meter and Probe Setting.

If you need more advanced settings, switch over to Studio View and go to the Meter and Probe tabs.

Reset - Manual reset (zero-adjust)

You click on this button when you need to reset the meter. This is normally done automatically but you may have to do it manually in certain situations, for example:

- When you measure at very low signals and use "Free run" or "Timed" measuring modes.
- When you suspect that the meter, for some reason, measured an incorrect zero-level.

Start - Start measuring manually

This button is used in **Free run** and **Timed mode** to start the measuring sequence. Read more about measuring modes in the topic Measuring modes.

Capture - Click this button to capture a value manually

You can use this button during long measuring sequences (for example when testing a fluoroscopy unit) to capture the data at a time of your choose. For example, you may wish to wait until the data is stable before capturing a value. You must always use this button to capture the measured data when **Free run** mode is used. Read more about measuring modes in the topic Measuring modes.

The waveform is also captured at the same time as you click on this button (if the checkbox **Get waveform** is checked). Note - free run mode doesn't provide a waveform.

Pause - Pause measurement

This button is used if you don't want the meter to measure even if the detector gets radiation or trigger for some other reason. You can use it for example when you use fluoroscopy and the monitor to position a detector on the image intensifier or when you move a CT chamber from one phantom position to another.

Position check - Verify that your kVp detector is positioned correctly

You can use this to verify that the kVp detector is correctly positioned in the X-ray field. It is always recommended to use this function, but it is especially important in the situations described below:

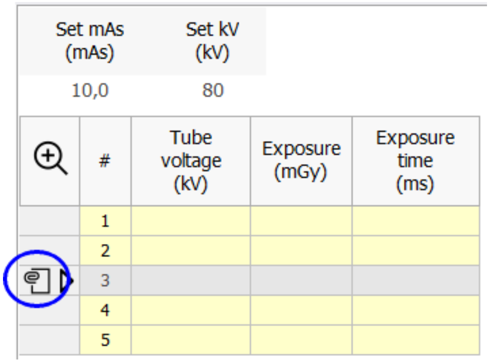
- For all small X-ray fields or when there is a risk that the entire detector may not be irradiated (for example CT and dental)
- If the detector is positioned very close to the focus point
- If the radiation field varies over the irradiated surface. I.e. strong heel effect on older mammography units.

The position check results are not stored with the measured data. If you wish to store this value, you can add a special column to your test and the position check results will be saved with the test in a column of its own.

Position check is by default initiated automatically for mammography. This function can be turned of in the Program options.

Edit Notes and Attachments - Add a note or attachment to a row

Click on this button if you want to add a note or attach something, for example a picture, to current row. The note can be printed in the report if it is enabled in the Report template. When you have added a note to a row, an icon is show in the first column of that row to indicate that a note is present:



Equipment - Show currently selected equipment (generator, tube, etc.)

Click on this button to see currently selected equipment. If you, when you started the Session, selected "Select site from database before starting to measure" the equipment has been fetched from the database.

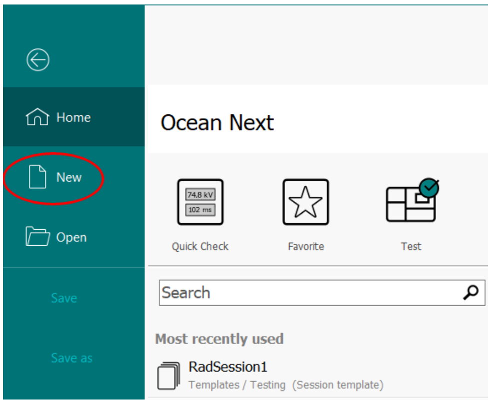
You will also see Site, Department and Room data that also has been fetched from the database.

7.2 How to do a measurement

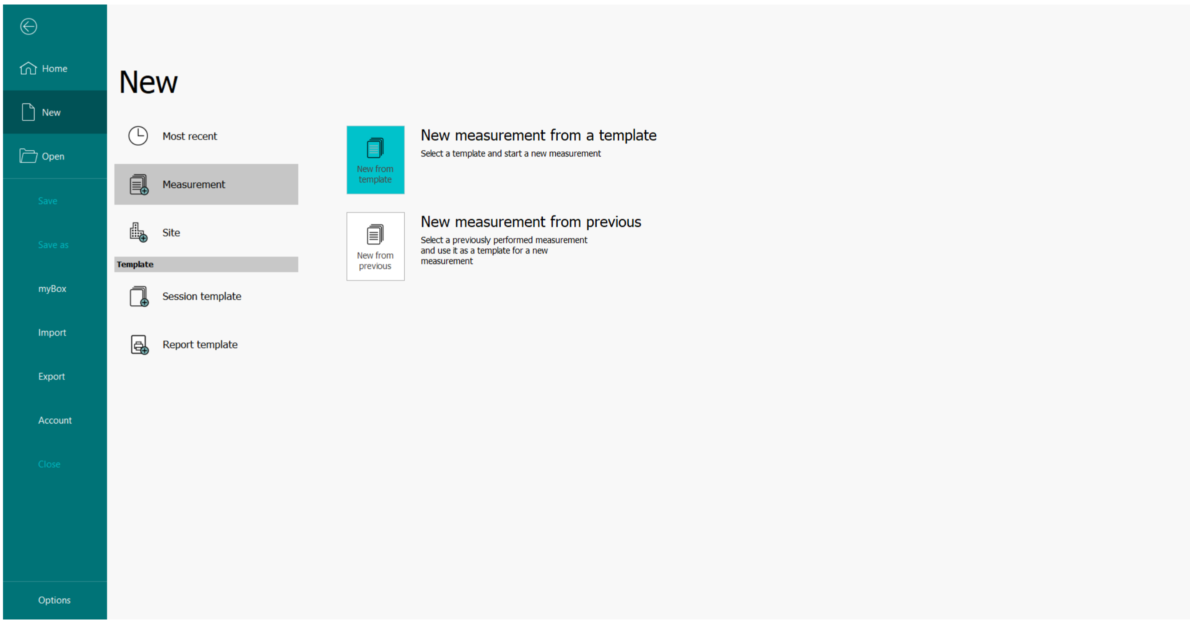
When you start a measurement the default view is the Test View. If you for any reason want to use the Studio View (this is the "main view" from Ocean 2014) to do measurements, then you must actively select the Studio View.

The description below uses as an example a predefined Session template that comes from "Examples (RTI)" that comes with Ocean Next's installation.

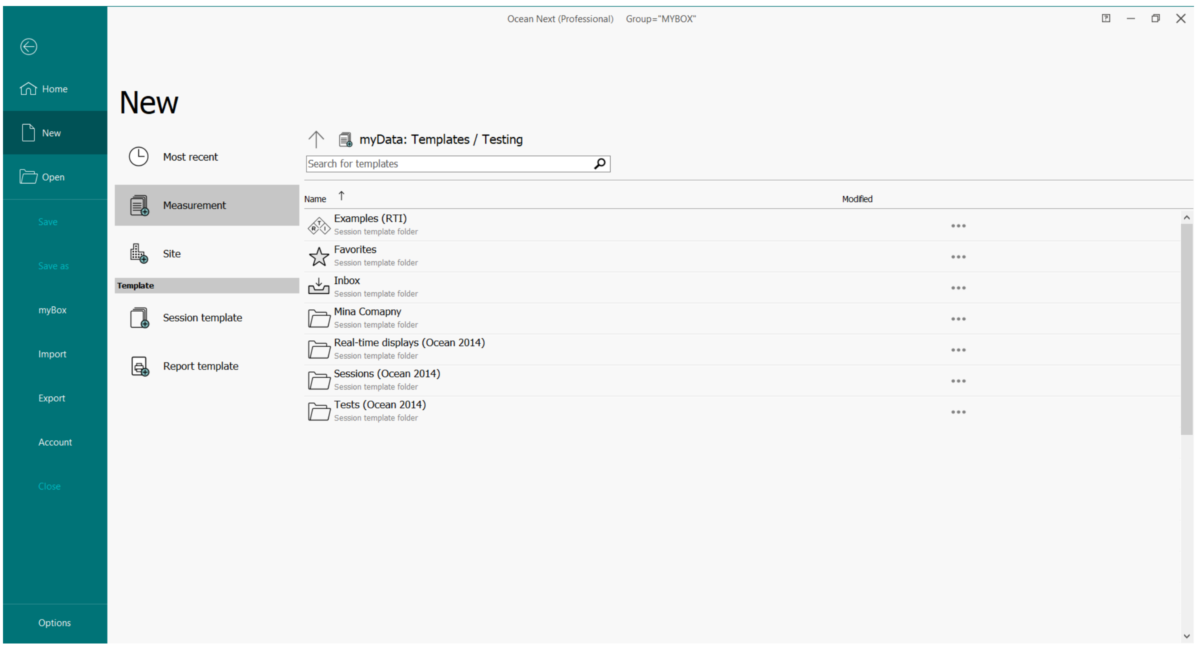
1. Power on the meter. Select **New** in the left bar.



2. Select "Measurement" in the left part of the main screen, and then select "New measurement from a template".

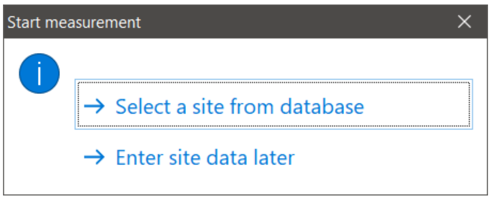


3. You can now browse for a Session Template in the "Testing" folder:



Select the folder "Examples (RTI) and locate the session template "QA (Rad room)": "Templates - Gy" -> "Multi-page sessions" -> "Radiography" -> "QA (Rad room)".

4. The template is loaded and a dialogue is shown:

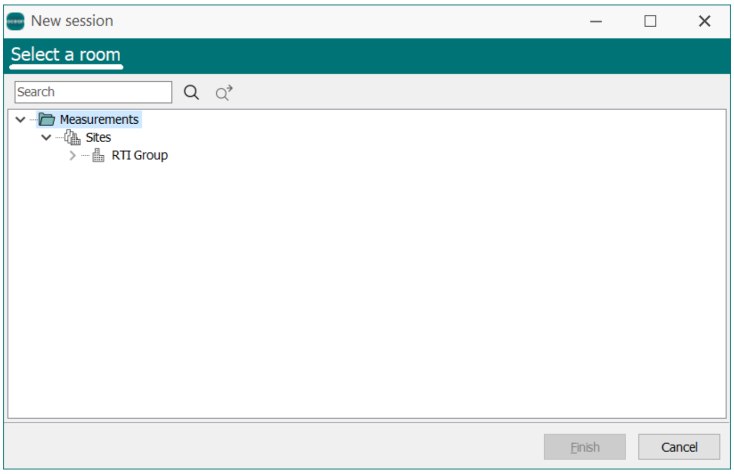


Before you start the measurement you must select if you want to pick a site from your database or enter this information later.

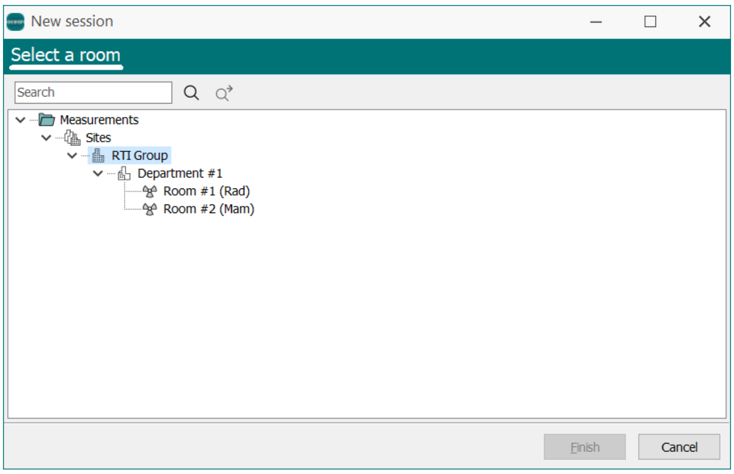
5. In this case we shall select a site before we start the measurement. The advantage of doing this is that all site information, site, addresses, contacts, department and room name, and tested equipment generator and tube are automatically added to your Session.

   Select a site.

6. Ocean now connects to the meter and after a while the a dialogue appears. Here are all your sites shown (in this case is just one site stored in the database):

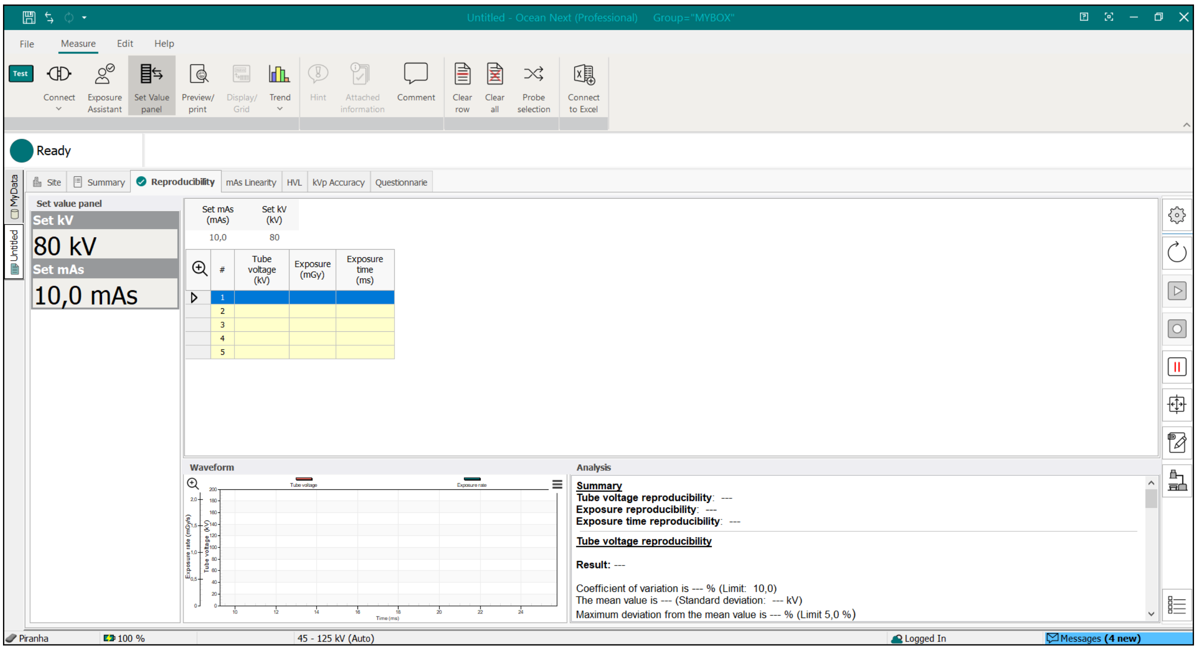


Double-click on the name or click on the ">" indicator for the site you want to use. It expands and shows the departments and rooms for that site:



Now select the room you are in, in this case select "Room #1 (Rad)" and click **Finish**.

7. The Session Template is loaded and the measurement starts in the Test View. First is the Summary page shown and the first Test page as activated automatically and the meter is set according to the requirements. If meter and/or probe capabilities doesn't match what is needed, the Probe Selection dialogue appears and allows you to make adjustments and/or connecting another probe(s).



If meter and probe(s) meet the requirement for the activated test page, the Test View appears with the first page, in this case a "Reproducibility test" appears.

When the green "Ready" sing is visible in the upper right part of the screen Ocean is ready for measurement. If you want to change a set value, just click in the Set value panel on the lefts side and change corresponding value or edit the value directly in the grid.

8. Make an exposure. Measured values will show up in the grid and corresponding waveform will show in the waveform panel (down left). Results of the analysis will be shown in the Analysis panel (down right). Yoy can enlarge the grid and waveform by clicking on the corresponding magnifying glass and the analysis panel by right-clicking on it and select "Maximize".

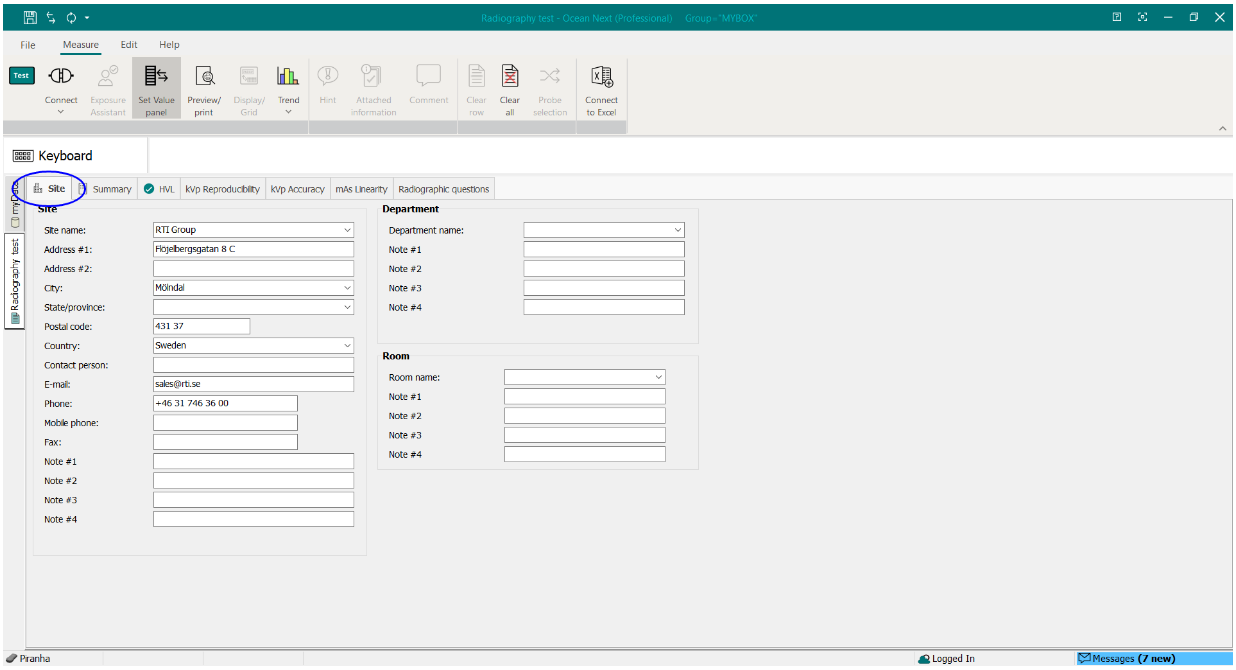
9. Various functions you may use while you measure are available via buttons on the Ribbon bar and the Toolbar to the right. These functions and their use is described in the topic Test View Overview.

10. Periodically, save your work by clicking on the **Save** button to the left on Ocean Next's title bar.

11. When you have completed all exposures on a test page, double-click on the next page tab to activate this page.

7.2.1 Enter site inormation manually

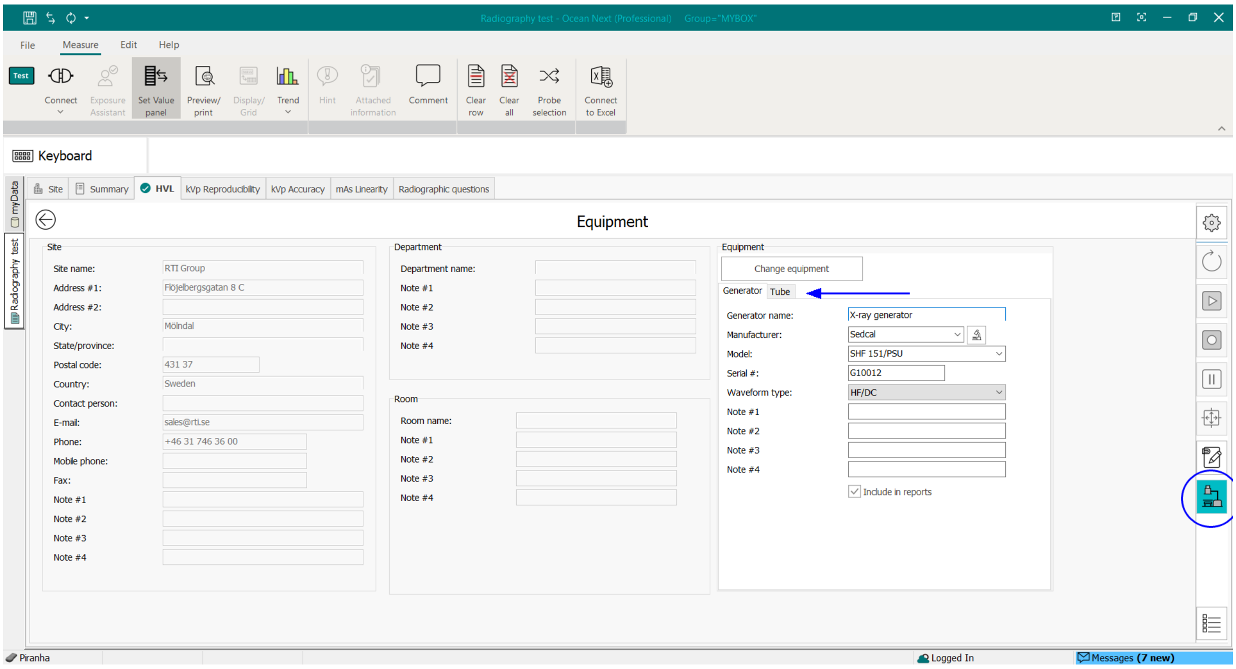
If you selected to "enter site information later" when you started the measurement, you need to fill out this information manually. Click on the **Site** tab:



You can avoid this manual work by adding your sites to you database. When you start the measurement, you select a site and all information is filled out automatically.

7.2.2 Equipment tested

If you selected to "enter site information later" when you started the measurement, you need to fill out information about the equipment you test manually. Click on the **Equipment** button on the Toolbar if you want to enter or modify the equipment information:



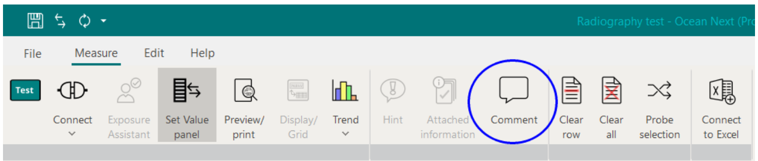
The Equipment Information can be added or modified manually in the right section. There are different tabs for different type of equipment (Generator, Tube and User-defined). If you have selected a Site from the database when you started the measurement, the information is filled out automatically. The Change equipment button makes it, in this case, possible to select a different equipment if the room has multiple generators and/or tubes.

The site information is not possible to change here, go to the Site tab to do that.

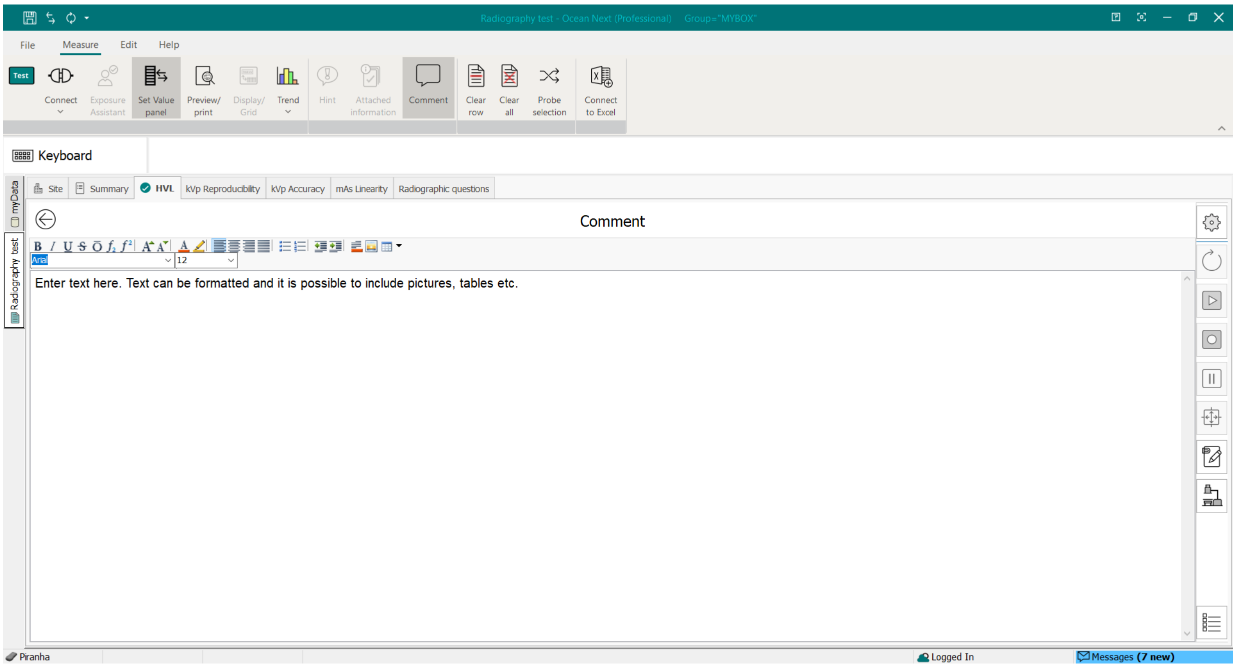
7.2.3 Comment

It is possible to add a comments that will be included in the printed report. The comment will be added to the page that is selected when you click the Comment button. Comments can be added to the Summary, Test and Checklist pages.

Click on the Comment button on the ribbon bar:



The comment page is opened:



The text you enter here, will be added as a comment with the Summary or the test/checklist page that was selected when you clicked on the **Comment** button.

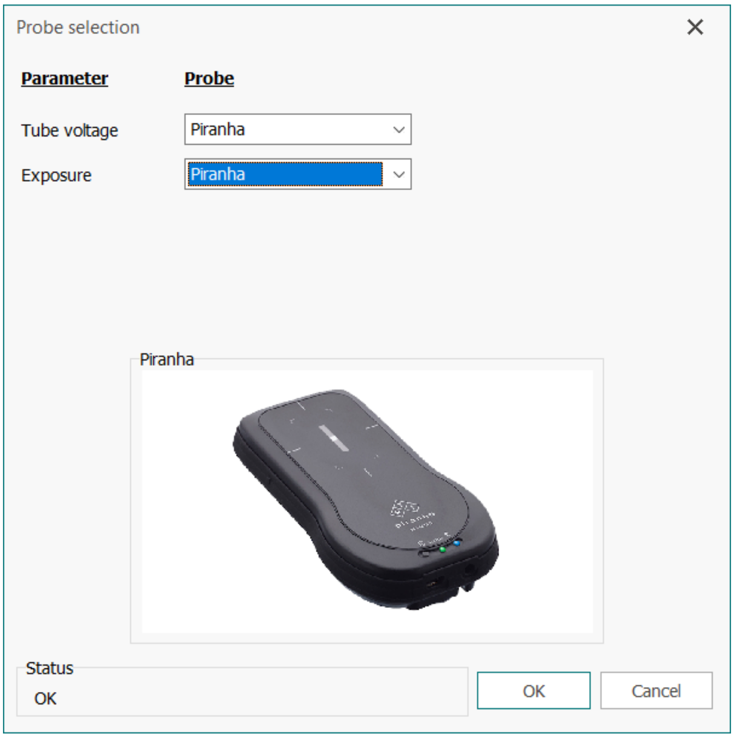
7.2.4 How to change which probe to use

If you need "on the fly" to change which probe to use, you do this by clicking on the **Probe selection** button on the Ribbon bar.

To change probe selection:

1. Click on the **Probe selection** button.

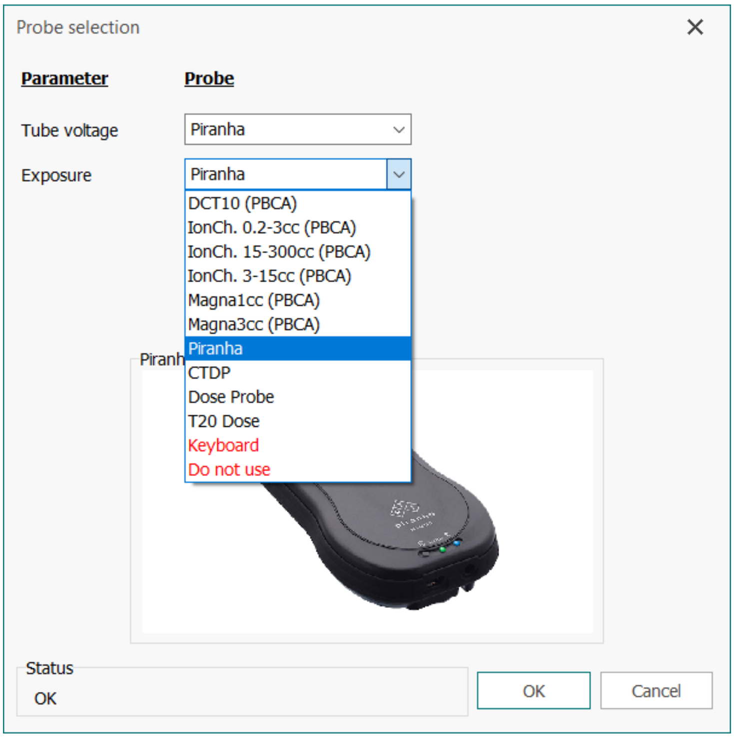
2. The "Probe selection" dialogue is opened:



It shows that current probe selection is "Piranha" for both parameters.

3. Assume that we want to use RTI Dose Probe instead for the Exposure measurement. Click on the drop-down list that corresponds to "Exposure".

4. The list shows all possible probes that can measure "Exposure", in case you have Piranha connected and "on line" with Ocean Next, only connected probe is shown.



There are also two alternatives "Keyboard" and "Do not use".

- *Keyboard* - if you select this, the parameter will not be measured instead it is expected to be typed in from the keyboard. After each exposure a dialogue will automatically pop up where you can enter a value.
- *Do not use* - if you select this, the parameter will be ignored and not measured.

5. Select the probe you want to use.

6. When you are ready click **OK**.

7.2.5 Other ways to start a new measurement

There are different ways to start a new measurement. We have already described how to start a measurement from the **New** tab in the Backstage. Other ways to start a measurement are:

- In the Test View: Double-click on a Session Template in the database tree.
- Right-click on a Session in the database tree and select "New measurement...". A new measurement will be started using the previous measurement as template. This is convenient when you want to repeat the same procedure. You will get the possibility to select site, same site, select another site, or enter site later.
- Click on Session Template in the "most recent" list on the New page in Backstage and a new measurement starts.
- Right-click or click on the "..." button in a "most recent" list in the Backstage and select "New measurement..."

7.2.6 Measring modes

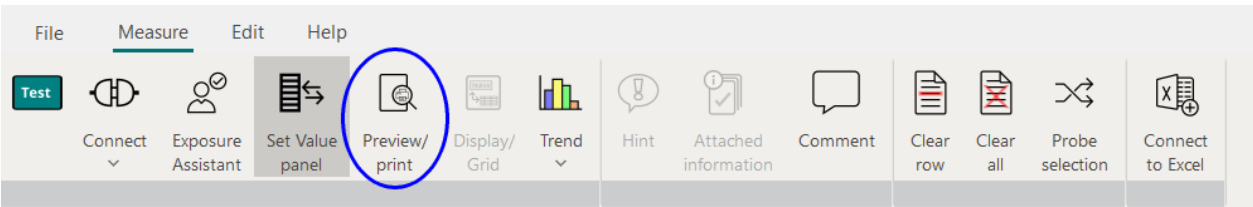
Three different measuring modes are available:

Measuring mode	Description and use
Normal	Normal mode is used for short and long (fluoro) exposures. In this mode, your meter will sense automatically if there is a signal and when it is above a certain trigger level. If the signal is long, the displays/grid will be updated with new data every 2 seconds data. If the signal is short, the results are displayed after trigger is off.
Timed	Timed mode setting measures during a predefined time period. Measurements in Timed mode must be started manually by clicking the **Start** button on the Toolbar. Measurement continues the stipulated time, you can stop by clicking on the **Capture** button on the Toolbar. This measuring mode is very useful when you want to measure a very low signal. The status bar under the Ribbon bar will guide you and tell you what to do.
Free run (not available with Cobia and Scatter Probe)	Free run mode has no trigger level. As soon as the meter is told to begin measuring, it starts to measure even if there is no signal. This measuring mode is useful when the signal you want to measure is very low. Free run is recommended for light measurements, especially when measuring "ambient" light (when no shutter is present). The status bar under the Ribbon bar will guide you and tell you what to do.

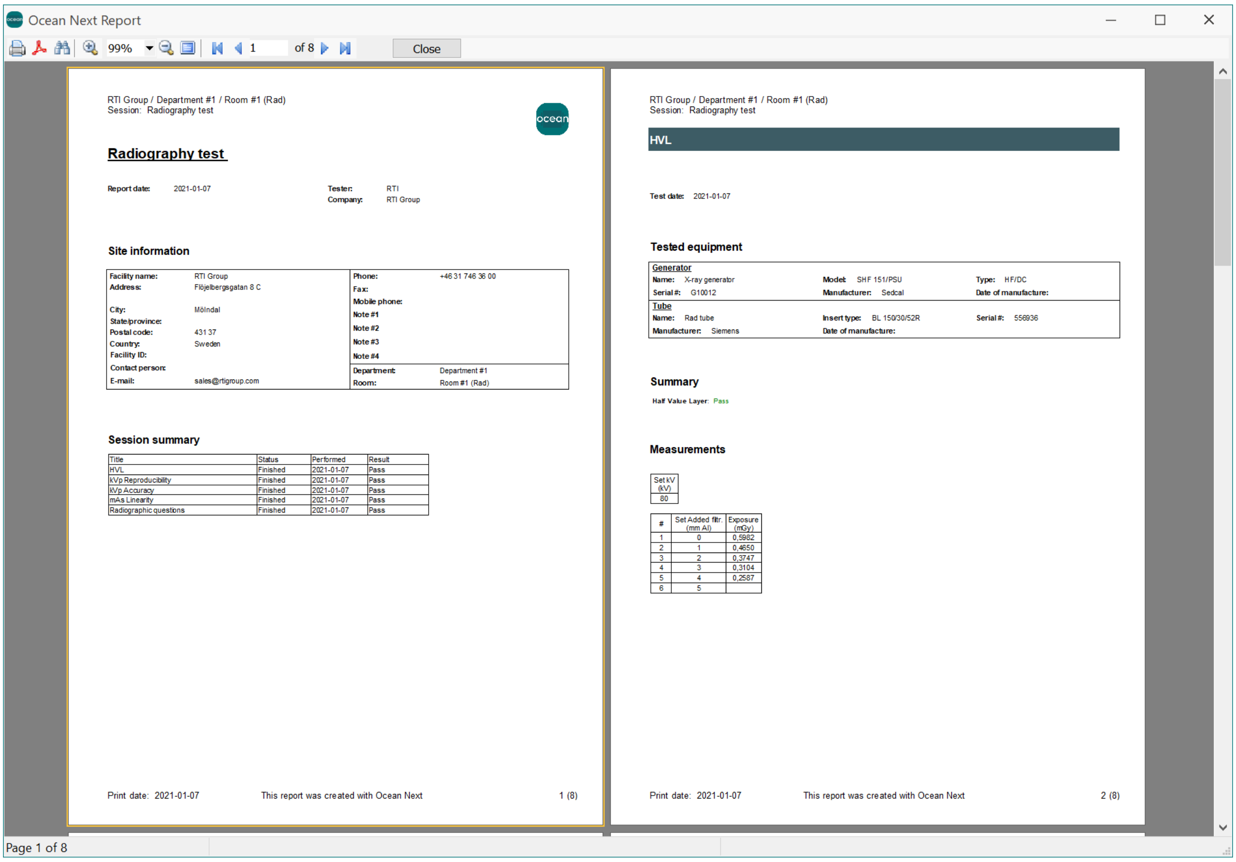
7.3 Preview/Print Reports

Direct Preview/Print during measurement

A session can be printed anytime just by clicking the Preview/Print button on the Ribbon tab.



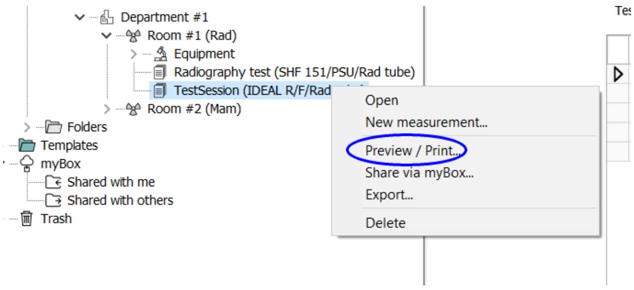
A PDF preview of the report will open. From here the entire report can be viewed. You can print or create a PDF file.



Print a Report of a session in the database

Any Session (or template) can be printed without need to open the session, by browsing the Ocean Next's database.

Right-click on the test session you want to print, and select **Print/Preview**.



Print from the Backstage

You can print any Session (or template) directly from the "most recent" lists shown in the Backstage. Click on the "..." button and select "Print/Preview...".

7.4 Create a new Site

If you need to add a new site do either from the Backstage and the New tab or directly in the database tree. We will here in this example do it directly in the database tree.

1. Go to the Test View.

2. Right-click on the myData tab and right-click on the folder "Sites" under "Measurements" and select "New Site".

3. A new site with the name "New Site" is created. On the right side is the Site information shown, give it a name and fill out the fields. There is no save button here, information is saved in the database when you type it.

4. When you are ready (you can go back at any time and change or add), right-click on the new site name and select "New Department".

5. A new department is created. Give it a name and fill out the fields on the right side.

6. When you are ready, right-click on the new department name and select "New Room".

7. A new room is created. Give it a name and fill out the fields.

8. In the Room you will find a folder called "Equipment". In this folder you define the equipment you have in the room. Right-click on the Equipment folder and select "New Generator".

9. A new generator is created. Give it a name and fill out the fields.

10. When you are ready, right click on the new generator and select "New tube".

11. A new tube is created. Give it a name and fill out the fields.

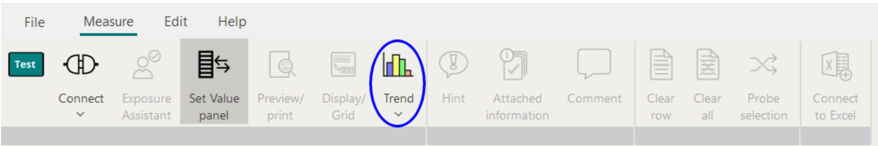
If you have more equipment add that. Maybe the generator has two tubes, then add a second tube. There are also possible to add "User-defined equipment".

7.5 Trending

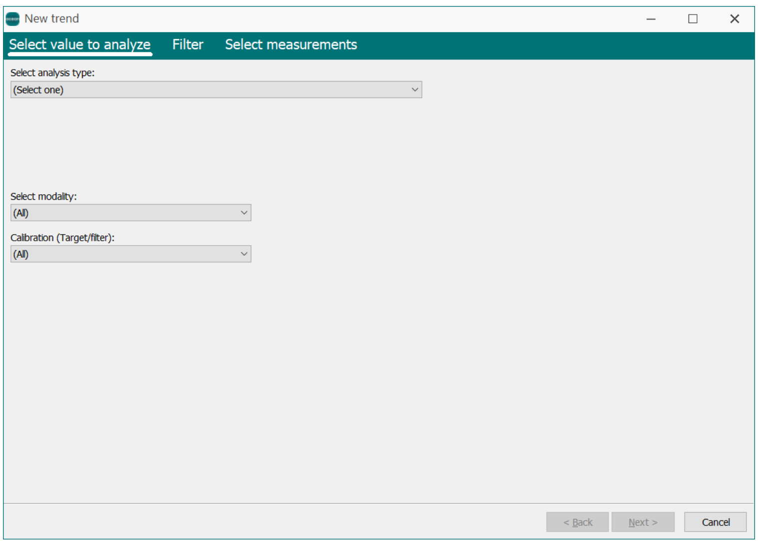
Trending is used to compare how a certain parameter change over time. You can do instant trending and view it, but not add it in the report.

To do trend analysis:

1. Go to the Ribbon bar and click the **Trend** button and select **New**.



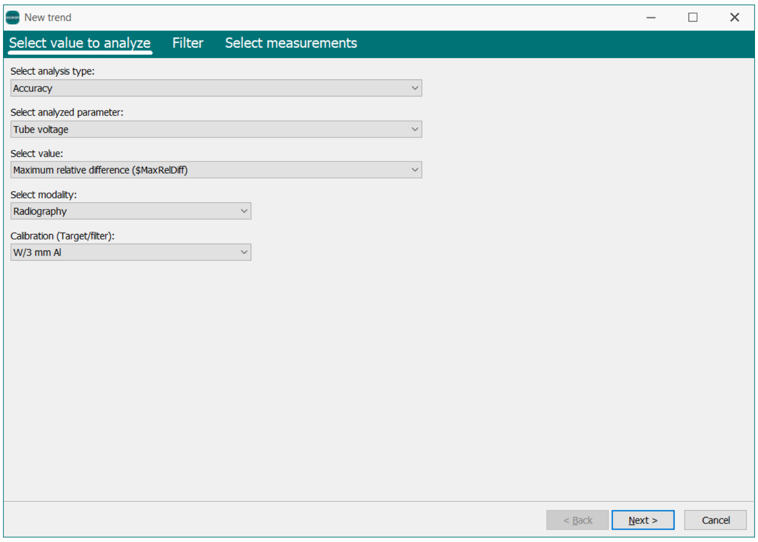
2. A wizard starts that allows you to define what you want to trend.



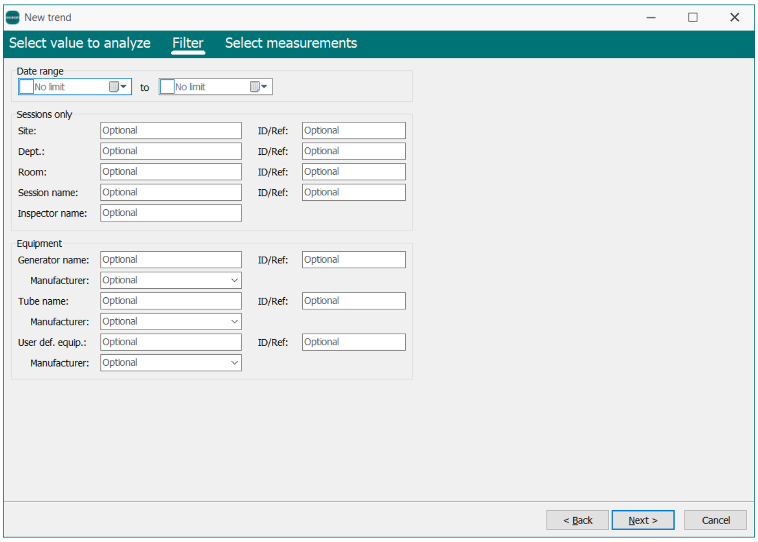
First select the type of analysis you want to trend (Accuracy, Reproducibility, etc.). Assume that we select "Accuracy". You can also trend a specific "Cell value", this is the last selection in the list. In this case, the cell must have a name.

3. Now some more fields become visible, now select:

- The parameter you want to trend (Tube voltage, Exposure, Exposure rate, mA, etc.).
- The value from the analysis. Here are the macro names listed.
- Modality (Radiography, Mammography, CT, etc.).
- Calibration.

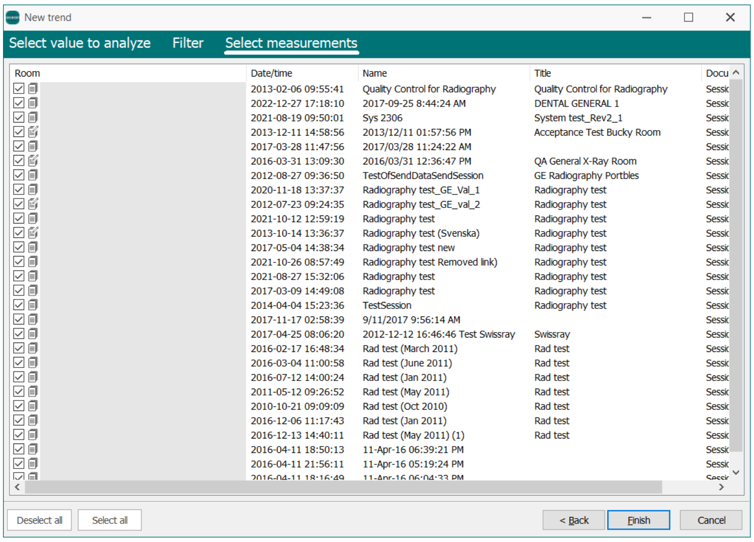


4. Click on **Next** when you are ready.



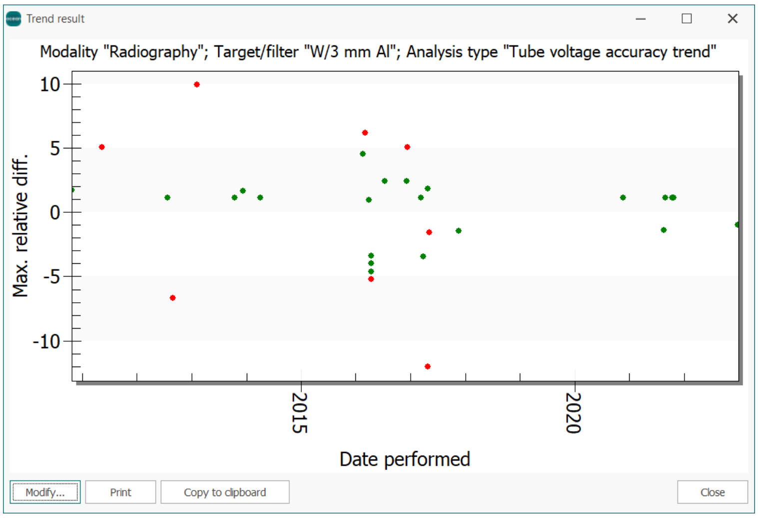
Here you have a possibility to filter what you what to see in your trend analysis. You can specify names or ID/Ref for your filtering. Note especially that you can specify ID/Ref for analysis to filter out just the analysis filter a subset of analysis of a certain type.

5. When you are ready click on **Next**. The data according to your filtering will be collected and a list will be shown with the Sessions (and Real-time displays if you have included that) that match your criteria.

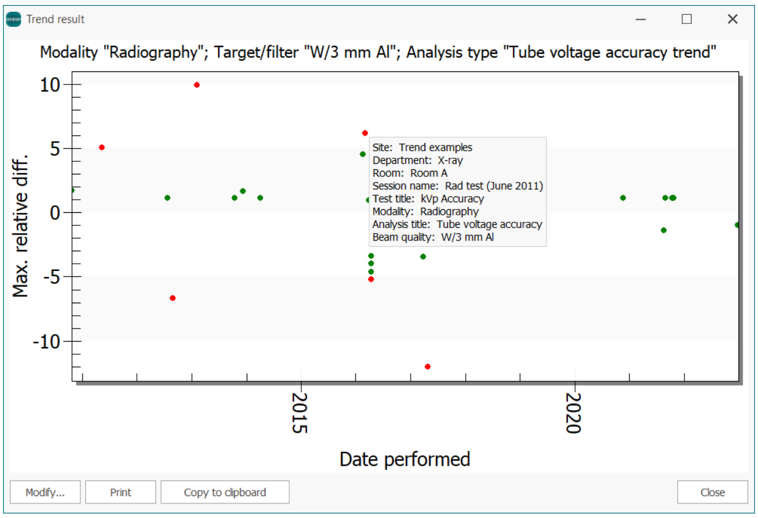


You can manually exclude items if you want by uncheck corresponding Session.

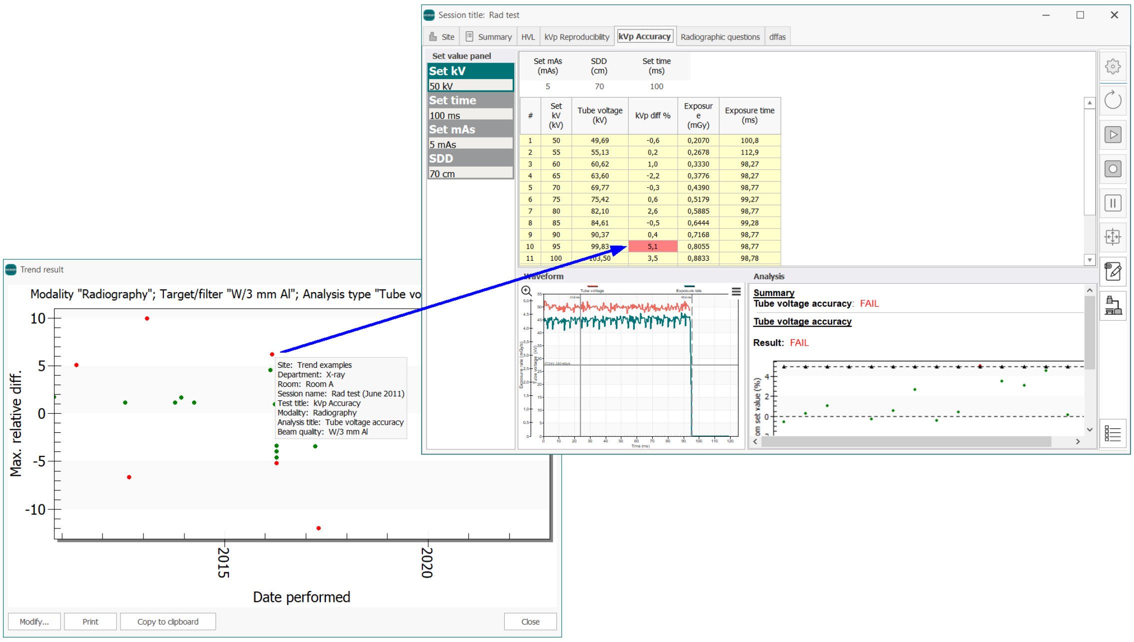
6. Click on **Finish** to see the result.



A scatter plot is shown, on the x-axis is time and on the y-axis the parameter you selected to trend. You can hover with the mouse pointer over the data points to see information about the measurement.



You can also click on a data point to open corresponding measurement. Click for example on a red dot that indicates a value out of range.



Click in the upper right corner to close the Session.

7. Click on **Modify** if you want to modify the filtering criteria in some way. You can also print the result or copy it (as a picture) to the clipboard and further into other documents.

8. Click on **Close** when you are ready. The trend result is kept and you can review it again by clicking on the **Trend** button again.

9. Click on the **New** button if you want to make a new Trend analysis.

Chapter 8

Studio View

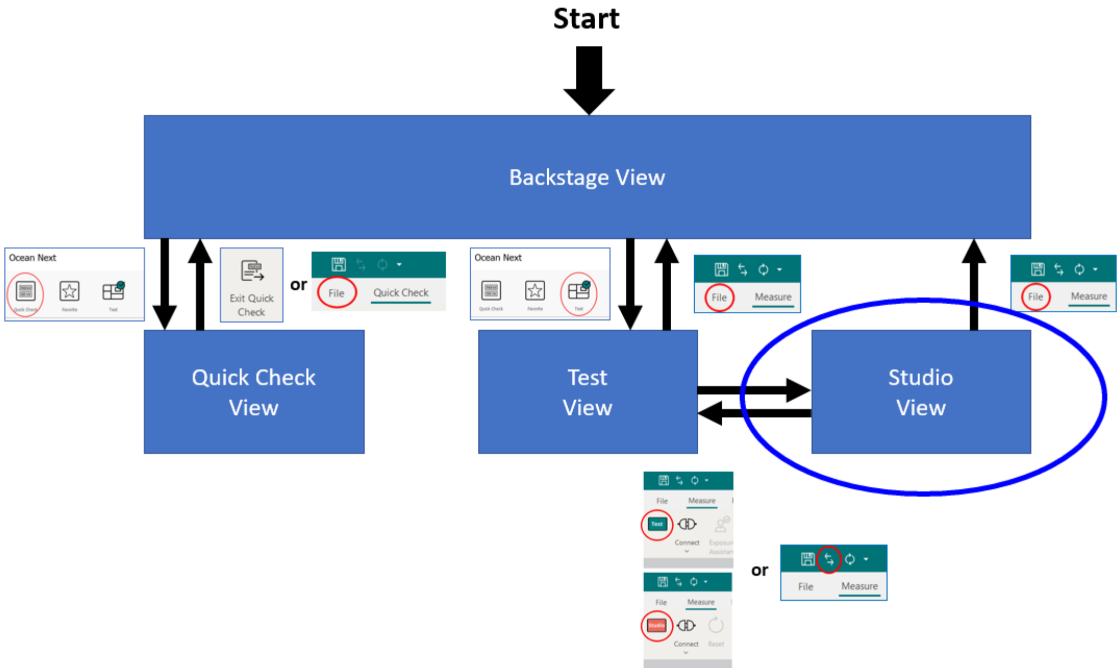
8 Studio View

You use the Studio View when you create and modify your Session Templates involving the following:

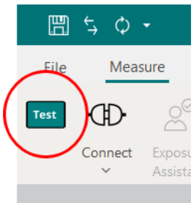
- Defining which columns you want to have (measured values, set values and user-defined values or calculations).
- Defining Set Values, for example Set kV, Set mAs, etc.
- Defining specific meter settings when required.
- Set up analysis and compare measured values against set or reference values.
- Defining pass/fail criteria.

The Studio is the same as the main view in Ocean 2014 and can, as in Ocean 2014, also be used for measurements. However, the Test View is optimized for this purpose and is recommended to be used when you do measurements. All functions from Ocean 2014 are still present in the Studio View and and can be used.

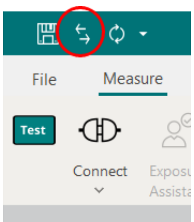
It is assumed that you are familiar with the Test View when you start to reading this.



Unless you actively select the Studio View, you will automatically come here if you open a Session Template from the database tree or from the Backstage. You may also want to go to the Studio View if you during a measurement want to modify the Session you currently work with. In that case, from the Test View, you click the indicator the left on the Ribbon bar:

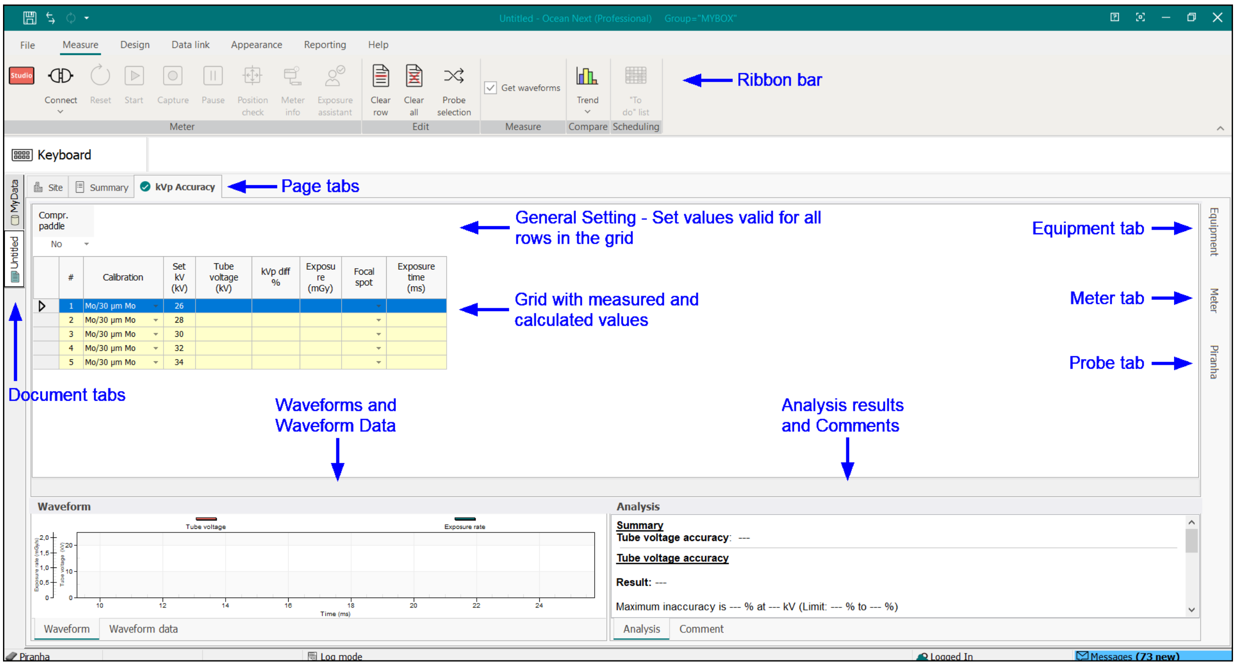


or you click on the button on the title bar that toggles between Test and Studio View:



When you have modified the Session you click the same button to return to the Test View and can continue the measurement.

If you are working creating new Session Templates or modifying existing templates, you will be using the Studio View. The picture below shows how the Studio View typically looks like when you have a Session loaded. However, note that it can look different if you open a Session or Session Template. The Studio View does not have a fixed layout, and Sessions are shown as they are designed.



Below are the different parts of the Studio View described.

Ribbon Bar

The Ribbon bar at the top provide all the main functions, see topic Studio Main Functions for more information.

Equipment tab

When a Session Template has been assigned to a Site, the equipment in selected room is shown here.

Meter Tab

Settings for used meter are available here. The most common settings are described in the topic Meter and Probe Settings.

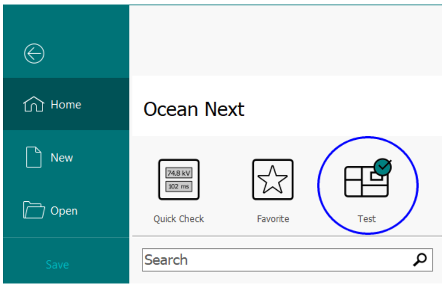
Probe Tab(s)

Settings for used probe(s) are available here. The most common settings are described in the topic Meter and Probe Settings.

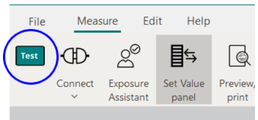
8.1 Overview of Studio View

There is no button to click on to directly go to the Studio View. The Studio View is automatically selected when you open a Session Template for editing or you can reach it from the Test View.

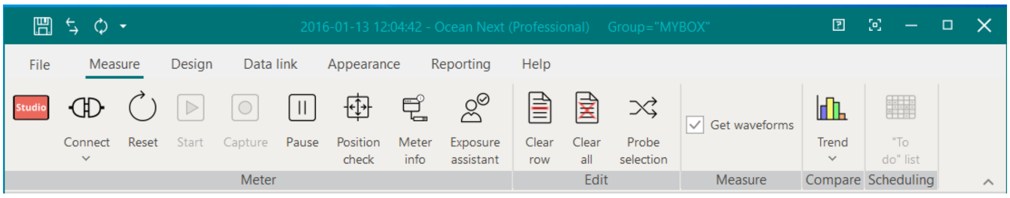
To reach the Studio View via the Test View:



Click on the **Test View** button and the on the "view indicator" on the Test View Ribbon bar:



In this topic the main functions on the Ribbon are described.



To the right is an indicator showing current view, in this case "Studio View". You can click on it to toggle between Studio and Test View.

The main functions are:

Measure	Functions you need when you do measurements.
Design	Functions you need when you create or modify templates.
Data link	Functions you need when you use Ocean Next with Microsoft Excel
Appearance	Functions you need when you want to change how things appear on the screen if you use the Studio View to measure. If you use Test View a fixed layout is used and nothing needs to be done when creating the template.
Reporting	Functions you need for reporting.
Help	Here you will find help on how to use Ocean topic by topic.

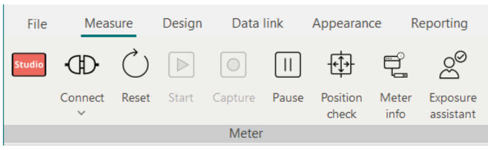
Many of the functions are also available via a "right-click" with your mouse. Simply right-click on an object and a menu will be shown with the functions available to you for that specific object.

8.1.1 Measure tab

You must actively select the Studio View if you want to do measurements here. Ocean Next will by default take you to the Test View when you load as session and starts a measurement.

Most of the functions you will need when you make measurements using the Studio View are located on the Measure tab of the Ribbon bar. The different functions are divided into separate groups.

Meter



These are functions related to controlling your instrument. The settings are also available on the Meter settings tab on the right of the Ocean Studio screen.

View indicator - Click here to toggle between Studio and Test View

This indicator shows which view you currently use, you can also click on it to toggle between Studio and Test View.

Connect - This function establishes communication between your instrument and Ocean

Make sure that the meter is connected to the computer (via USB cable or Bluetooth).

You can toggle between **Keyboard** and **Connected** by clicking on the upper part of the button. With *Keyboard* active you must enter all measured data manually via the keyboard. When the meter is connected the measured data is transferred automatically from the meter to the Main screen grid.

If you click on the lower part of the button a third option, **Disconnect**, is available. Use this option only in the event you need to:

- Turn your meter off and then back on again.
- If you need to restart meter communication (for example, if you want to switch from one meter to another one).
- If you want to stop meter communication (for example if another program should use the meter while Ocean 2014 still is running).

Note!
It is recommended that you turn off power save mode or sleep mode on your computer while you make your measurements with a meter connected. You may experience problems with meter communication if your computer goes to sleep mode or power save mode automatically.

Reset - Manual reset (zero-adjust)

You click on this button when you need to reset the meter. This is normally done automatically but you may have to do it manually in certain situations, for example:

- When you measure at very low signals and use "Free run" or "Timed" measuring modes.
- When you suspect that the meter, for some reason, measured an incorrect zero-level.

Start - Start measuring manually

This button is used in **Free run** and **Timed mode** to start the measuring sequence.

Capture - Click this button to capture a value manually

You can use this button during long measuring sequences (for example when testing a fluoroscopy unit) to capture the data at a time of your choose. For example, you may wish to wait until the data is stable before capturing a value. You must always use this button to capture the measured data when **Free run** mode is used.

The waveform is also captured at the same time as you click on this button (if the checkbox **Get waveform** is checked). Note - free run mode doesn't provide a waveform.

Pause - Pause measurement

This button is used if you don't want the meter to measure even if the detector gets radiation or trigger for some other reason. You can use it for example when you use fluoro and the monitor to position a detector on the image intensifier.

Position check - Verify that your kVp detector is positioned correctly

You can use this to verify that the kVp detector is correctly positioned in the X-ray field. It is always recommended to use this function, but it is especially important in the situations described below:

- For all small X-ray fields or when there is a risk that the entire detector may not be irradiated (for example CT and dental)
- If the detector is positioned very close to the focus point
- If the radiation field varies over the irradiated surface. I.e. strong heel effect on older mammography units.

The position check results are not stored with the measured data. If you wish to store this value, you can add a special column to your test and the position check results will be saved with the test in a column of its own.

Position check is by default initiated automatically for mammography. This function can be turned of in the Program options.

Meter info - Get meter information

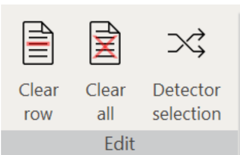
Click on this button if you want to know more about the connected meter and Ocean. The following information is provided:

- Meter DLL location and version
- Ocean Next version
- Meter serial number
- Hardware versions
- Model
- Calibrations

Exposure Assistant - Capture a value automatically when measured values are stable

Click on this button if you want to use the Exposure assistant. Values are captured automatically when they are stable. This is especially useful for long fluoroscopy exposures and for light measurements.

Edit



These functions are used for editing the measured data.

Clear row - Clear current row (removes all measured data from current row)

Click on this button if you want to clear the current row. The set values will not be removed with this command.

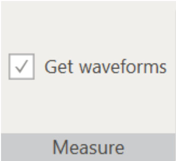
Clear all - erase all data in the object you are working with (removes all measured data from the entire grid)

Click on this button if you want to clear all the rows. The set values will not be removed with this command.

Detector selection - Change the detector

Use this button if you want to choose another detector for your current measurement.

Measure



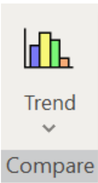
These functions are used when doing measurements.

Get waveform - Enable waveform acquisition for every exposure

The default for this function is CHECKED. This means that a waveform will be acquired for every exposure. Uncheck this box if you don't want waveforms to be acquired for each exposure.

If you prefer to acquire waveforms sometimes but not all the time, you can specify in the test template whether or not you want to acquire the waveform. For example, if your test template contains four measurements, and you only want to acquire two waveforms, you can choose which two of the four measurements will acquire the waveform and which two will not. If you use this option it will override the **Get waveform** checkbox.

Compare

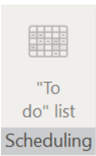


From here you can do trend analysis and easily look up previous measurements done earlier in the same room.

Trend - Trend analysis

Click on this button to start Trend analysis. You can compare how different parameters change over time.

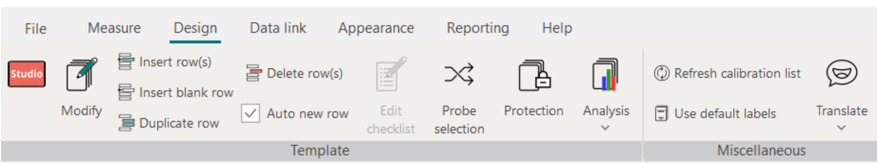
Scheduling



This is not used in Ocean Next.

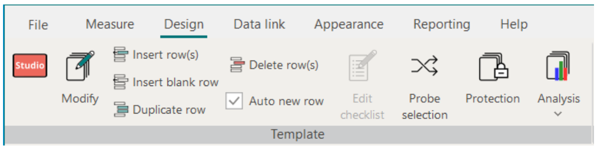
8.1.2 Design tab

The functions you will need when you modify tests and templates are located on the Design tab of the Ribbon bar.



You can use the same templates for both Piranha and Cobia, a template built for Piranha can be used with Cobia and vice verse. It is recommended, if you intend to use your templates with both Piranha and Cobia, that you build your templates for Piranha. The reason for this is that Piranha has more settings and you can in this way setup the templates to work in the best way with Piranha. If you do the opposite, Ocean will select default settings for the Piranha when a value is missing (due to it doesn't exist for the Cobia). If you build templates without a meter connected; go to program options and select default "Meter type" in the Preference section.

Template



These functions you use when you want to modify a test or template.

Modify - Modify Template

When you click this button, the template design mode is enabled. You can go back to working mode again by closing the window or clicking the Cancel button.

Insert row(s) - Add more rows to current test or checklist

With this function you can do the following:

- Number of rows to insert
- Insert first, last or before/after active row

Inserted rows will not be assigned to any analysis.

Insert blank row - Add a blank row to the grid

Add a blank row in the grid. This row has no function, it is just used to increase readability.

Duplicate row - Duplicates selected row

Selected row is duplicated, the new row(s) will be a copy of the selected row, including any analysis, cell formulas, background and font color.

Delete row(s) - Delete selected rows

Delete the selected row(s). By default, this function deletes the current active row. You can select a range of rows for deletion by using multi-selection.

Auto new row - Select if you want to add new rows automatically

If you have Display license level, this checkbox is always checked.

If you have Connect or Professional license level, you have the ability to create real-time display templates with a specific number of rows pre-defined. When you use a real-time display template, just make your measurements and when you wish to stop, uncheck this box and no further rows will be created.

Edit checklist - Edit questions in a checklist

Click this button if you want to edit a question is a checklist.

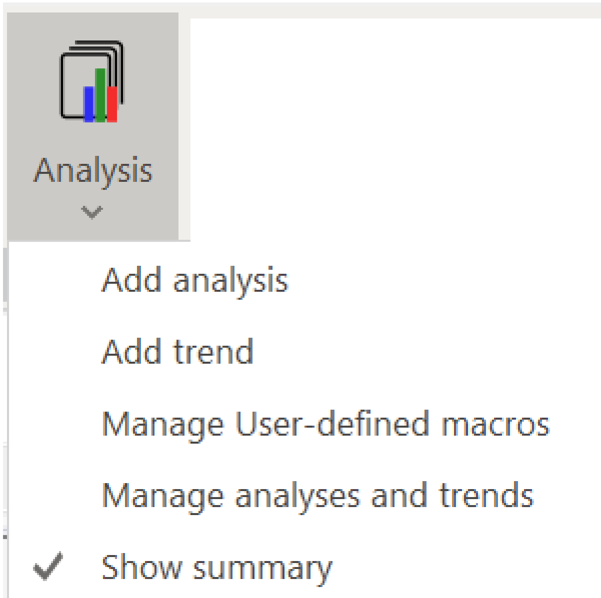
Detector selection - Select or change the detectors to be used

When you click the Detector selection button, the detector selection dialogue will be shown and you may select any detector you have in the list to be used with your template.

Protection - Add protection to templates

A template can be protected from modification.

Analysis - Modify analysis in active template



Note: The functions under the Analysis drop down icon can also be reached by right clic in the white area of the Analysis display.

Add analysis

This function is to add or change analyses into the current test template.

Add trend

This function is to add a trend analysis into the current test template.

Manage User-defined macros

This function is to add or change user-defined macros in the current test template.

Manage analysis and trends

This function is to manage the current analyses and trends in the current test template.

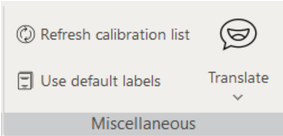
Show summary

This function is to add or change analyses in the current test template.

Add displays - Manage displays

this button if you want to add or delete displays in the template.

Miscellaneous



These functions you use when you want to modify a test or template.

Refresh calibration list - Refresh the calibration list stored in the document (only mammography)

This button is to load current (from [Program options]) calibration list for mammography into the open document.

Use default labels - Force user-defined labels into the template

When you click this button is active template updated with default labels as they are specified in [Program Options].

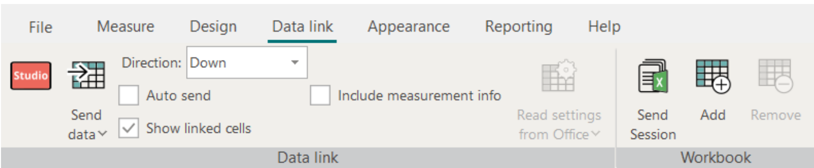
Translate - Translate standard texts (Not available, no other language is currently supported)

Used to translate standard texts to another laguage.

Note: Currently is not other language supported.

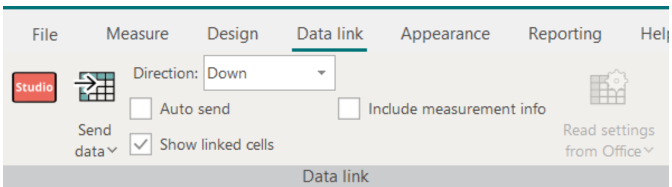
8.1.3 Data link tab

The functions you need when you want to send data to Microsoft Excel are located on the Data link tab of the Ribbon bar. Functions are divided into two different groups.



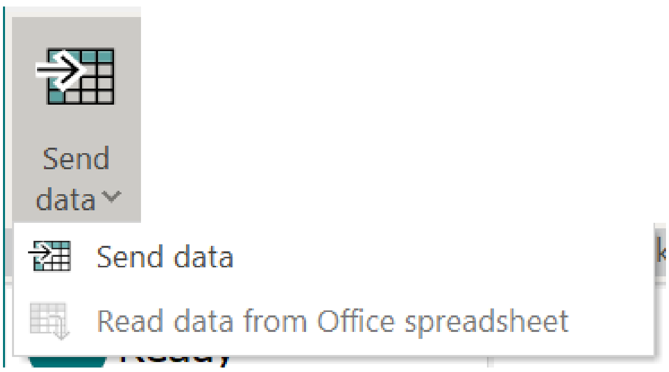
Each group are described hereunder.

Data link



These functions are related to exporting data to a spreadsheet.

Send data - Send data to Excel



Send data

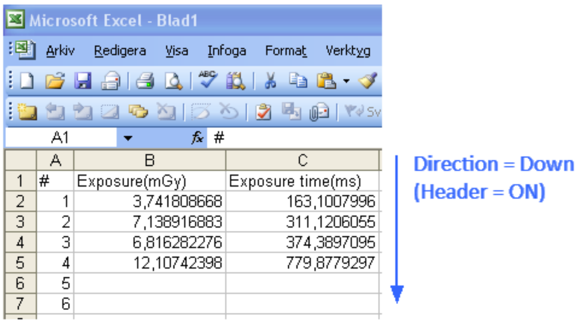
You can manually send data to a spreadsheet by using this button. The data will be sent to the spreadsheet according to the currently selected data export mode.

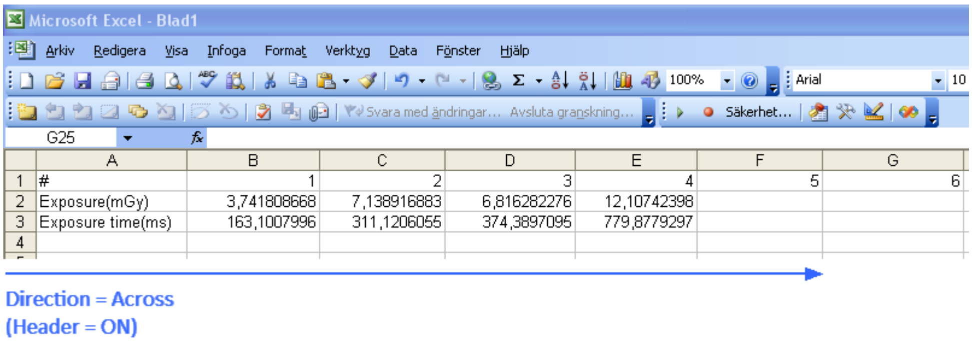
Read data from Office spreadsheet

Data can read from an Excel spreadsheet into Ocean if you use linked cells. This makes it possible to import data from other meters into Ocean.

Direction - Manually select direction to fill the spreadsheet (horizontal/vertical)

Data can be sent using the Down or Across direction. This is used only when you are not using direct linking between cells in Ocean and in Microsoft Excel.





Auto send - Enable auto send

With auto send on, data is transferred automatically from your meter to the spreadsheet after each exposure. Auto send can be used with all link modes, but it's optional since the data can always be sent by using the "Data send" button.

Show linked cells - Enable indication for linked cells

This is only used for cell-to-cell mode to indicate which Ocean cells that are linked to a spreadsheet.

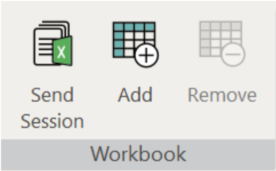
Include measurement info - Include information about the exposure

The following information is attached to each exposure:
- Date and time
- Inspector name
- Meter type and S/N
- External detector type and S/N

Read settings from Office - Read meter settings from the Excel workbook

You can define meter settings in your Excel workbook to control the meter.

Workbook



These functions are to help you quickly connect or disconnect a workbook to an Ocean template.

Send Session - Send a complete session to a workbook

You can send a complete session to a workbook.

Add - "Link" a workbook to current template

This button is used to "link" a workbook to a test. There are three ways to "link" workbooks:

Embed workbook: When you use this type of "link", a copy of the "linked" workbook is stored (embedded) inside the session or real-time display.

NOTE: In this case, Ocean works with the embedded copy of the workbook and the original file is not needed when you use the Ocean template to which the workbook was "linked". Using this function gives users the benefit of never losing the workbook by accident.

Associate workbook: When you use this type of "link", it will be established to a user-specified workbook.

NOTE: Once you "linked" a workbook to an Ocean template using the Associate function, that workbook must be available on your computer (or other media such as a CD or flash drive) so that Ocean can find it and create the link whenever you use the Ocean templateto which the workbook was linked. It is, therefore, recommended that you either store your "linked" workbooks in a clearly identified folder on the computer you usually use Ocean with or on other media (such as a CD or flash drive) that is clearly marked and readily accessible when you use Ocean.

Free workbook: Use this type "link" when you just want to create a temporary link.

NOTE: In this case the link is not saved when you save the real-time display or the session.

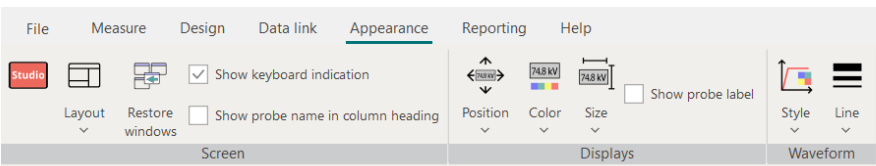
Remove - Delete the link to the workbook

Use this function to delete a link to an associated workbook or remove an embedded workbook.

8.1.4 Appearance tab

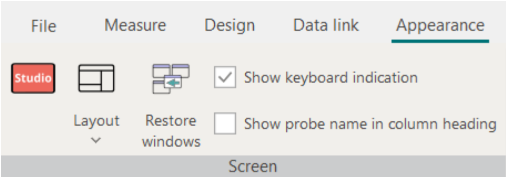
The controls that customize the Studio View layout (your workspace if you use the Studio View) are found on the Appearance tab of the Ribbon bar. There are screen layout functions, display layout functions and waveform appearance functions available on this tab.

Note: Most of the settings are not required and has normally no affect since Ocean Next uses the Test View as default for all measurements.



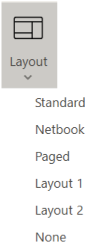
Each group of functions is described below.

Screen



These functions are related to the Main screen layout and appearance.

Layout - Change the layout for the workspace (not required for Test View)

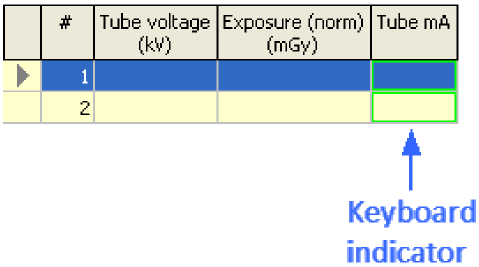


This button is used to toggle between different layouts. You can also arrange the screen layout manually.

Restore windows - Restore windows (not required for Test View)

This button is used to restore the default screen layout.

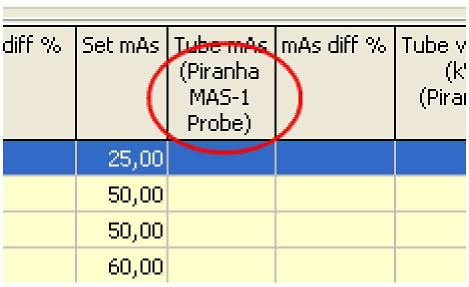
Show keyboard indicator - Indicates that a column needs manual keyboard input



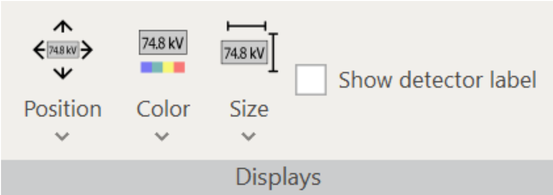
When you use Ocean without a Piranha or Cobia, or if you don't have a certain detector for the job, you have the option to use this function to mark columns that will need to have values entered into them manually. The special columns requiring input from you via the keyboard are marked with a green outline as you see on the above picture.

Show detector name in column heading - Show the detector name in the column heading (not required for Test View)

This checkbox is used to show or hide the detector name in the column heading:

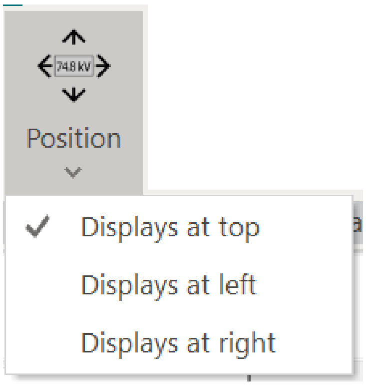


Displays

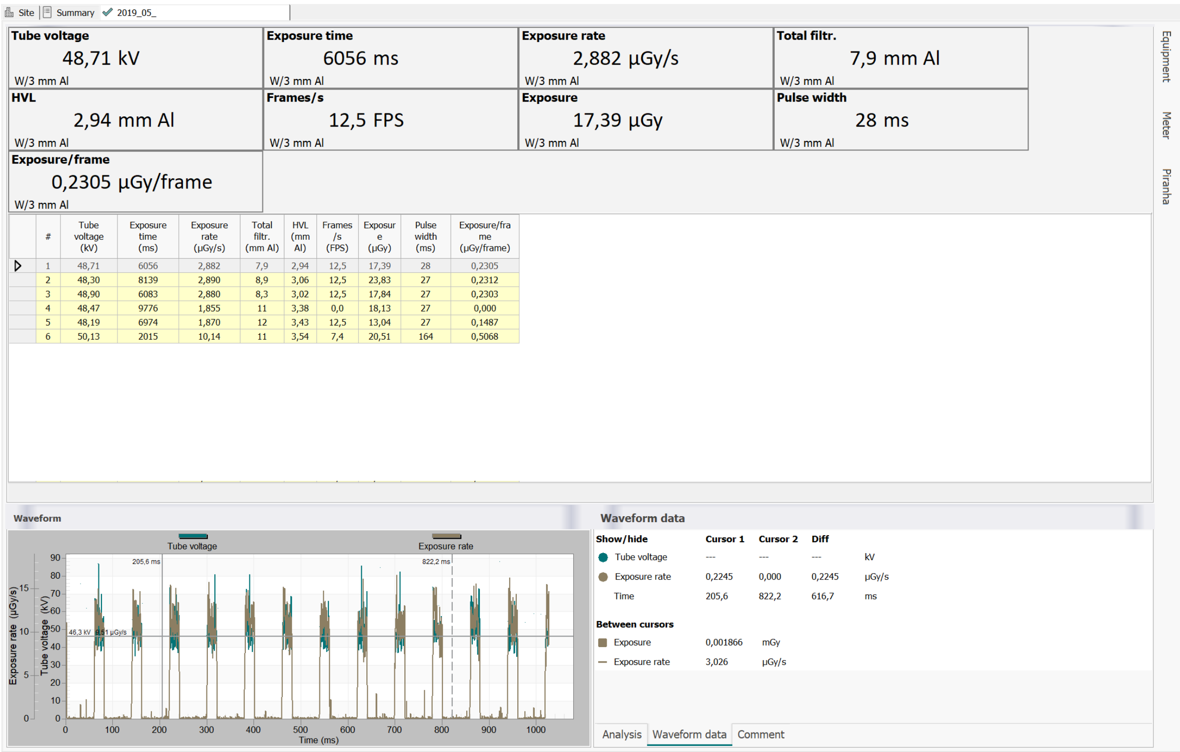


These are the functions you will use to manage the look of your screen and displays.

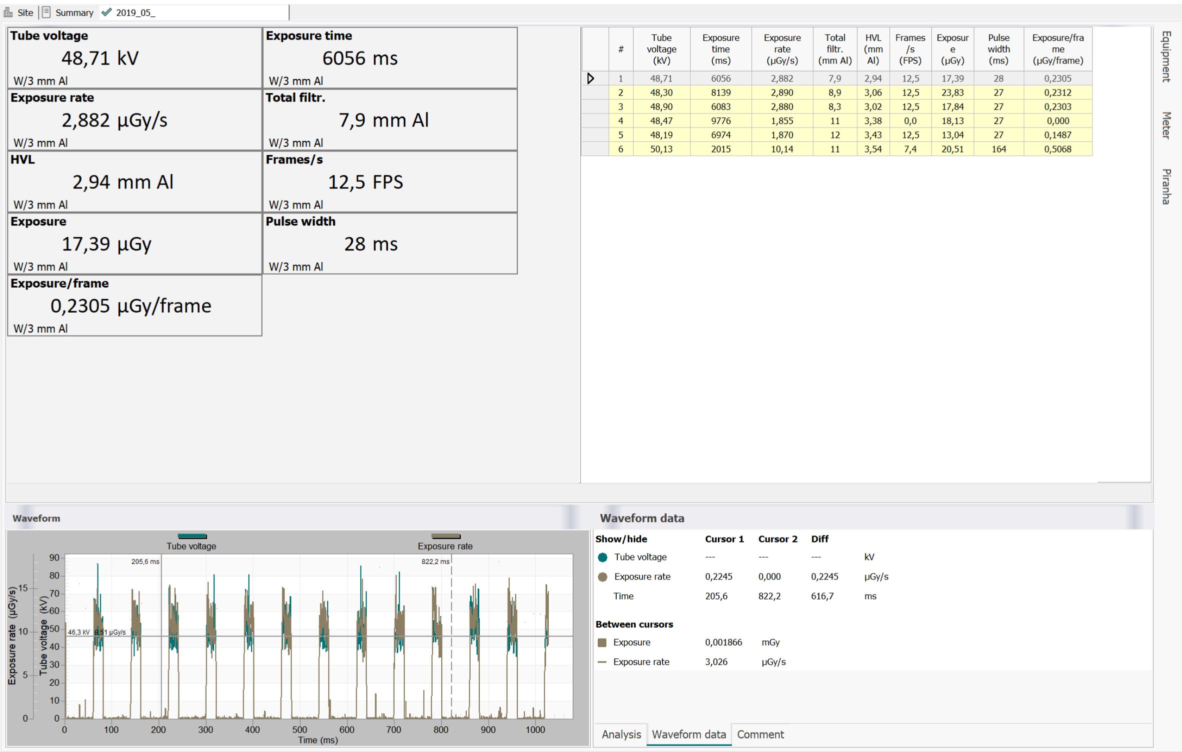
Position - Select position for the displays (not required for Test View)



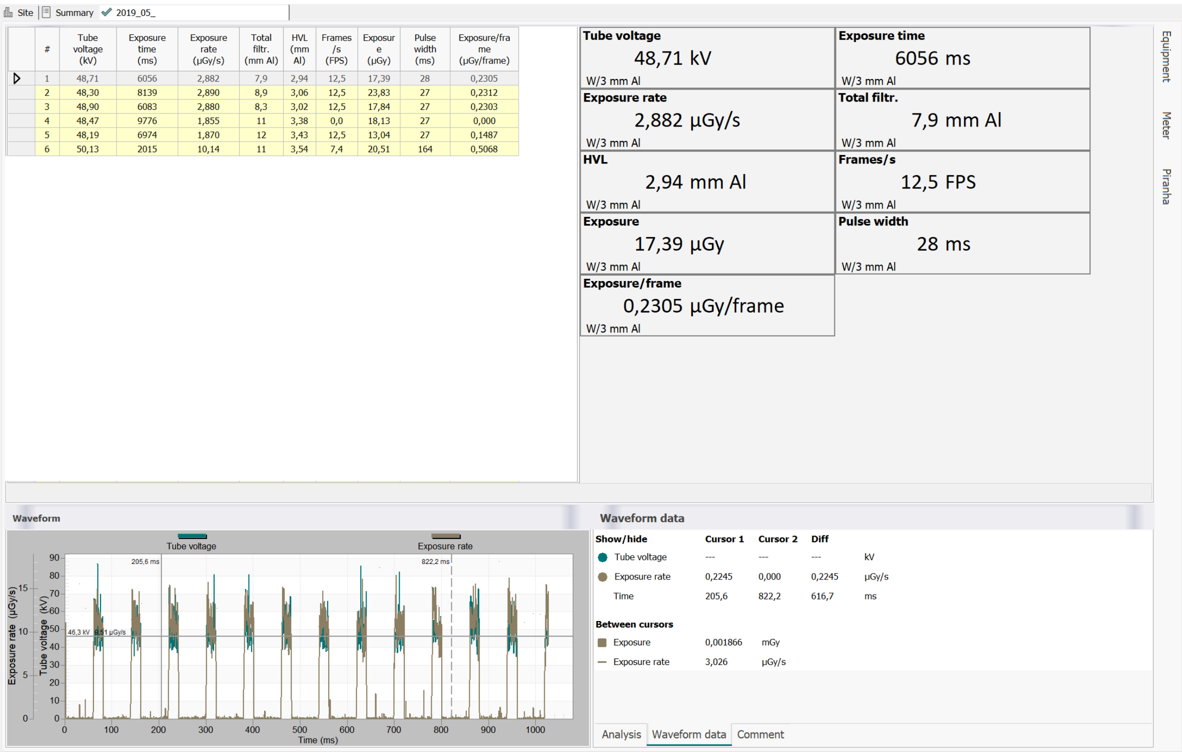
Ocean provides three options, Left, Right or Center for display positioning.



Top

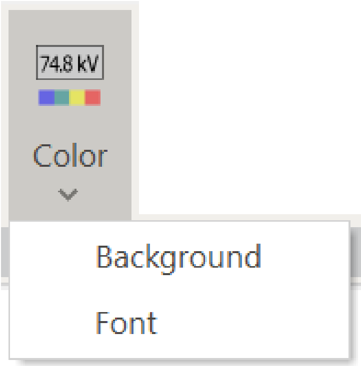


Left

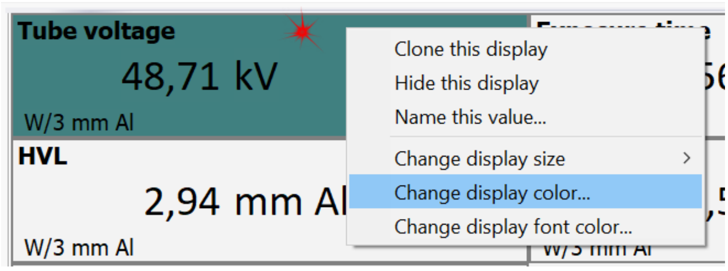


Right

Color - Select color for the displays (not required for Test View)

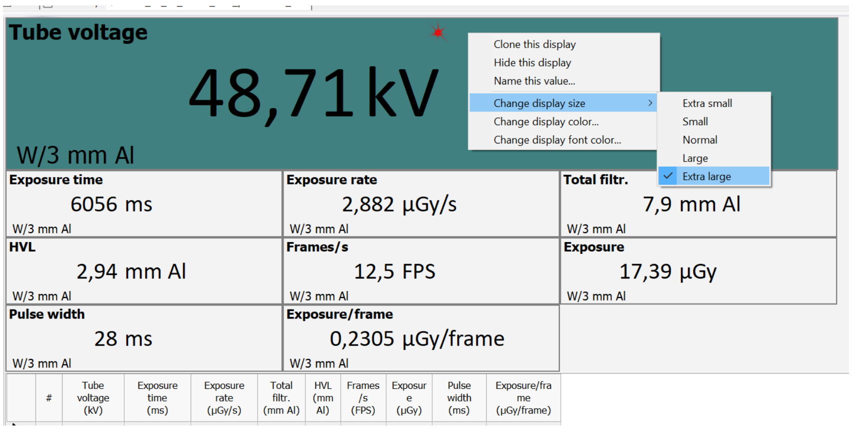


You can change background and font color of the displays by clicking on this button. Any changes you make here will affect every display.
If you want each of your displays to have a different font color, you can do that by right-clicking on each display (upper part of the display area) and choose the Change display color... or Change display font color...



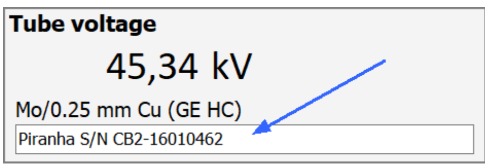
Size - Select size for the displays (not required for Test View)

You can change the font size of the displays by clicking on this button. Any changes you make here will affect every display.
If you want each of your displays to have a customized font size, you can do that by right-clicking on each display and choose the change display (upper part of the display area) and choose the font size option.



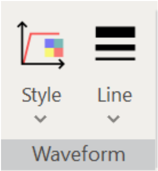
The sizes will scale and adjust to the screen size.

Show detector label - Show detector name/serial number (not required for Test View)



When you are using several detectors at the same time, it would be very useful in some cases to see which display is showing readings from which detector. If you check this box, the detector information will be shown in the displays.

Waveform



These functions are related to the appearance of the waveform display.

Style - Change the style of the waveform graph (not required for Test View)

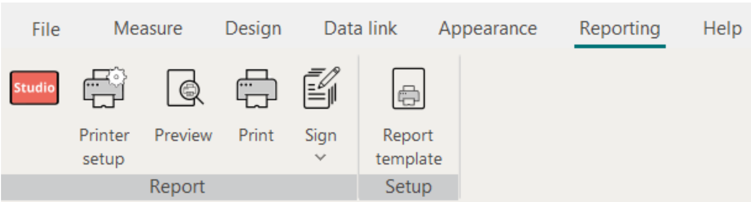
There are three pre-defined styles of waveform graphs to choose from: Normal, Paper and Scientific.

Line - Select the line width for the waveform plot (not required for Test View)

There are three possible line widths for waveform plotting: "Thin", "Normal" and "Thick".

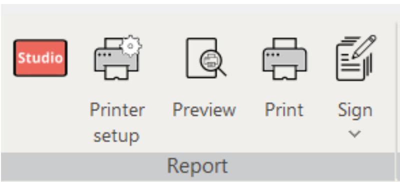
8.1.5 Reporting tab

The functions for creating and editing reports as well as print the reports are found on the Reporting tab of the Ribbon Bar.



The report control functions are divided into Report functions and Setup functions and each group is described below:

Report



These are the functions you will use to generate a printed report.

Printer setup - Opens the printer setup dialogue

Click here to open the printer set up dialogue.

Preview - Preview the report on the screen

This is a print preview function that allows you to see what is in your report and how it will appear on the pages when it is printed.

Print - Print the report

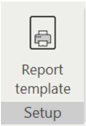
Use this button when you want to print your reports.

Sign - Click here to sign the report

You can specify a signature that can be used to digitally sign the report. A signed report is locked from further modification.

If you click on this button and the report is already signed, you will be asked if you want to remove the signature.

Setup

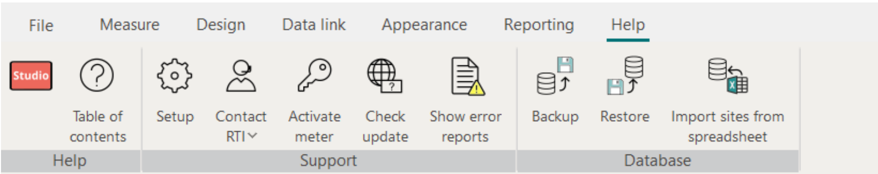


Here you can modify the report template that defines the layout for the report.

You can select report template or modify current report.

8.1.6 Help tab

The help system contains topic by topic detailed information on Ocean Next's many features and functions to help you get the most out of Ocean. You can easily access the help system by clicking on the Help tab on the Ribbon bar if you are not sure how to use a certain function or feature.



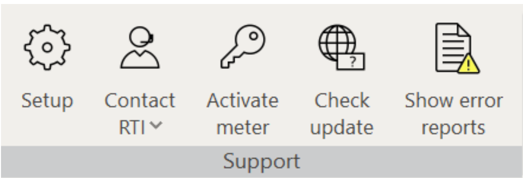
Each group of functions is described below.

Help

Table of contents

This buttons give you quick access to the help system table of contents and the FAQ section.

Support



This section is used for various support tasks.

Setup

Click on this button to activate the Setup procedure. This will allow to reload default templates, and restore default units of measure etc...

Contact RTI

Use this button if you want to contact RTI or report a problem or suggest an improvement. There are two choices:

- **Review** - Send comments, suggest improvements and new functions.
- **Make support file** - Create a support file to report a problem or suggest an improvement.

Activate meter

Use this button to install a new license into your meter.

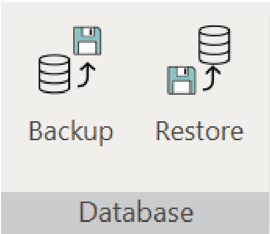
Check update

This function will check if you are running the latest Ocean software and meter firmware. Note that the meter firmware is only checked when your meter is connected to Ocean. To use this feature your computer must have an internet connection.

Show error reports

All error reports that are generated are saved in a folder on your computer. Directly when one is generated, you are always asked if you want to send it to RTI. You may not be able to do that and it will be available in this folder. Click on this button to open the folder.

Database



With these features backup and restore of the Ocean database is handled.

Backup

Click on this button when you want to make a backup of your database. A dialogue will be shown asking you to choose where you want to store the back-up file. It is highly recommended that you back up your data on regular basis.

Notice: You can also activate automatic backup evey time you exit Ocean. This is done form Program options.

Restore

Click on this button when you want to restore a backup of your database.

Location of the database file

You may want to search for the database file manually. Depending on the operating system, the database file can be found at various locations:

C:\Users\your username\AppData\Local\RTI Group\Ocean Next\ProgramData

8.2 How to create a Session Template

This printed **Ocean Next User's Manual** gives an overview of Ocean Next an our cloud services, myRTI. For a complete description including how to create and modify session templates, read the **Ocean Next Reference Manual**.

It is available in PDF format from RTIGroup web page. Go to **Resource Center**, scroll down and click on **Documentation** and select the **Manuals** tab.

8.3 How to create a Session Template

The Studio View is used when you create and modify your Session Templates. To create a new Session Template involves the following steps:

- Defining which columns you want to have (measured values, set values and user-defined values or calculations).
- Defining Set Values, for example Set kV, Set mAs, etc.
- Defining specific meter settings when required.
- Set up analysis and compare measured values against set or reference values.
- Defining pass/fail criteria.

The Studio is the same as the main view in Ocean 2014 and can, as in Ocean 2014, also be used for measurements. However, the Test View is optimized for this purpose and is recommended to be used when you do measurements. All functions from Ocean 2014 are still present in the Studio View and and can be used.

It is assumed that you are familiar with the Test View when you start to read this.

A Session template can be created either from an existing template or measurement, or it can be created from scratch.

To make it from an existing Session template or measurement the **Save as** function is used. Save as a template with a new name and modify it.

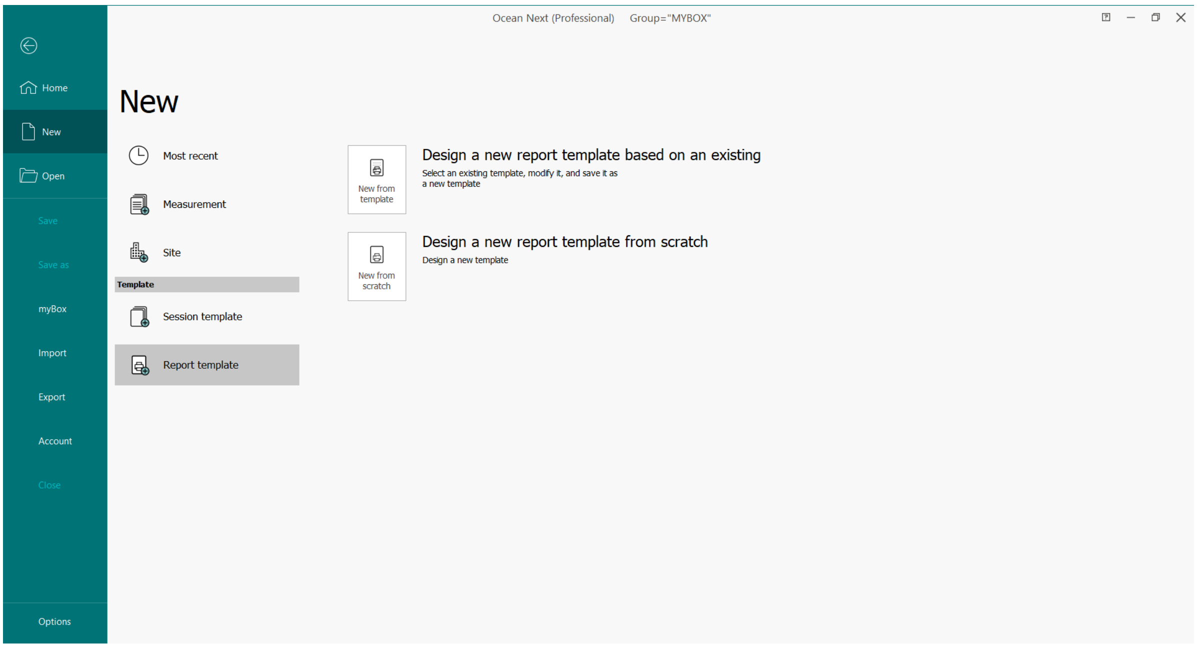
Steps to create a new Session Template

The description below and in the following topics serve as an example on how to create a new Session template from scratch. When you create/modify templates, you don't need to have a meter connected until you may want to "test" your templates. In case you intend to use your templates with both Piranha and Cobia, it is recommended to have Piranha selected as "Default meter" in Program Options when you create or modify your templates.

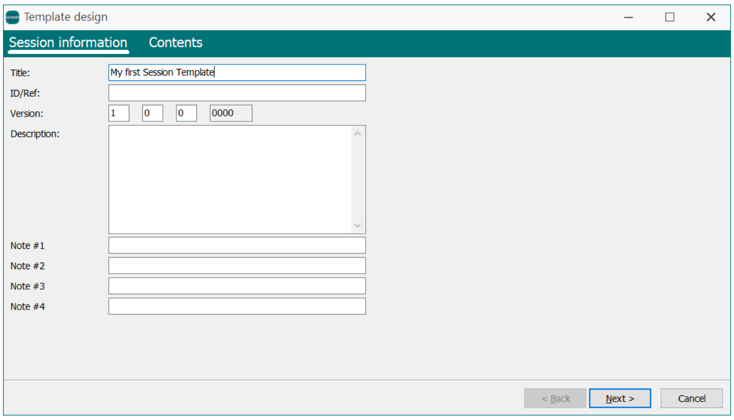
1. Create a new empty Session template, the "shell" for your Session template.
2. Add a test or checklist page.
3. Add content to the page:
   - Test page: Add the grid with columns and rows, define set values, meter settings, calculations, analysis and pass/fail criteria.
   - Checklist page: Add grid with columns and rows, define questions with pass/fail criteria.
4. If you have license level PROFESSIONAL, you can add more test or checklist pages. If you have ADVANTAGE, you are limited to one test or checklist page.
5. Define settings for the report; header/footer, printer settings, etc.
6. Save your Session Template in your own location where you have your templates organized.

Create a Session template

1. From the Backstage/New, select **Session template** in the left part of the main screen, and then select **Design a new session template from scratch.**



2. The Studio View is activated and the the "Template design" wizard is started. The first information to enter is "Session information". You must at least specify a "Title". The version number is created automatically and the last four digits will increase automatically every time you change the template. The other fields may remain empty, but may be valuable to use in certain situations when such information is required.



Press **Next**.

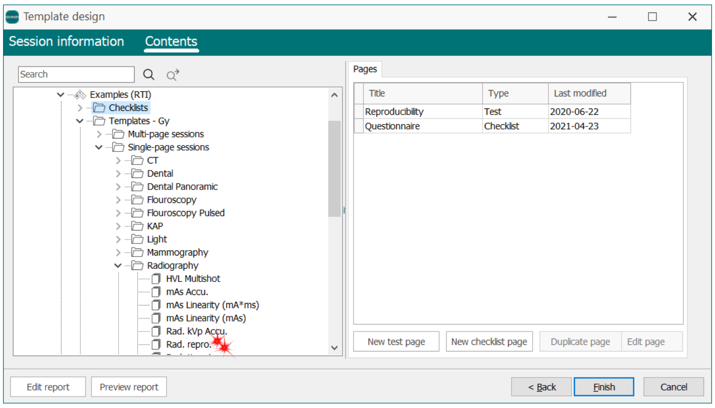
Add test and checklist pages from existing Session templates

3. Now add pages, you can add tests and/or checklists. Let us start by adding a test page from another Session Template.

4. In the left area you can browse amongst existing Session templates. Select a template by double-click. All included pages will appear on the right side and you can delete pages you don't want.

5. In this example locate the RTI Examples -> Templates - Gy -> Single-page sessions -> Radiography and select "Rad repro" by double-clicking on it. In this case, the Session template you selected only had one test page, it is shown on the right side.

6. In the same way, add a checklist from Examples (RTI).



The order of the pages on the right side can be changed by drag-and-drop. A page can be removed from the list either by using the delete button on the computer keyboard, or by right-clicking over the template title and select delete.

It is also possible to Hide a page, this means that it is still present in the Session Template but not used for the moment. It might be that you have a Session template for a specific purpose and you have different pages you use for different Rooms, depending on the equipment and use for the Room. You can the easily, when you use the Session template to measure, "hide" and "show" different templates depending on what you shall do in current room.

Save your new Session template

7. The first thing to do is to save it and give the Session template a new. You can see on the document tab to the left, that it "untitled". The brackets around the name is indicating that it is a Session template. Click on the **Save** button on Ocean Next's title bar or on the **File** tab and select Save as from the Backstage.

8. Find the location where you want to save your Session template and give it a name, in this example we call it "RadSession1".

Change page order

9. If you want to change page order. Lets assume we want our new test page "kVp Accuracy" first and the checklist last, you can do this in two different ways:

   - Use drag-n-drop in the page list on the Summary tab.
   - Drag-n-drop the pages by grabbing a page tab. You cannot move Site and Summary page.

10. The "kVp Accuracy" test you created is not finished yet.

The two topics Create a Test page and Create a Checklist page describe how new test and checklist pages are created from scratch.

8.3.1 Supporting documentation

You can attach supporting documentation to a session template, to a test/checklist template and to an real-time display template.

We define supporting documentation as:

- Attached PDF files, MS Word files or any other file that can be opened on the computer, or
- Links to web pages

Attached documents are embedded into the object (template) it is attached to. Be careful if you attach large documents since many copies may occur in the Ocean database if you use the template frequently.

You can attach information to your session two ways:

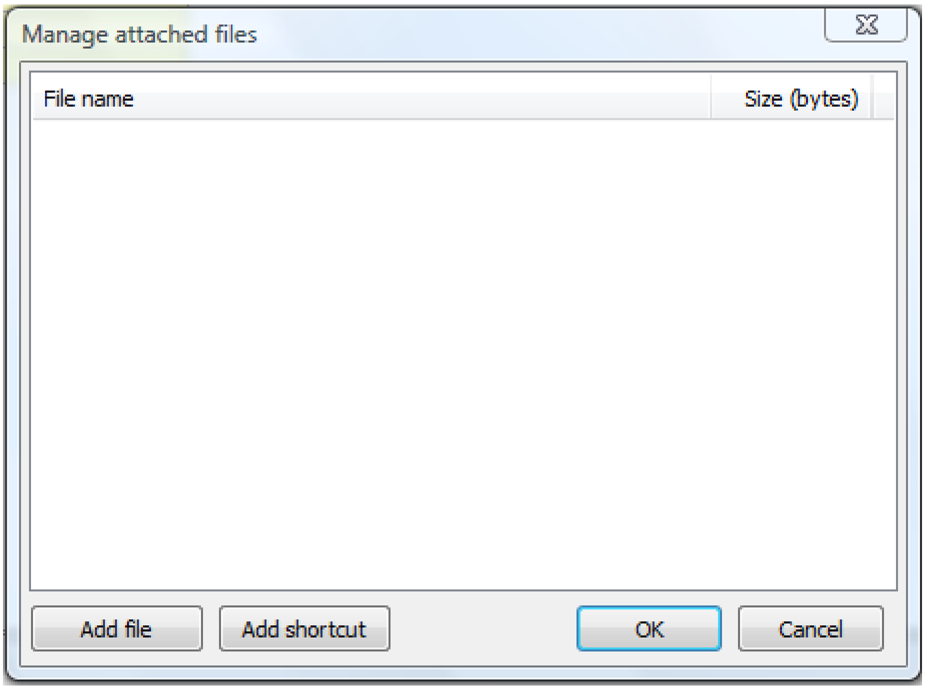
- To the session (summary page)
- To individual tests/checklists

When you attach something to the session on the summary page, the information is accessible from all tests/checklists in the session. If you attach information to one of the tests/checklists, this information is only accessible when using the test/checklist to which the information was attached.

To add a supporting document to a session or a test/checklist, follow the instructions below:

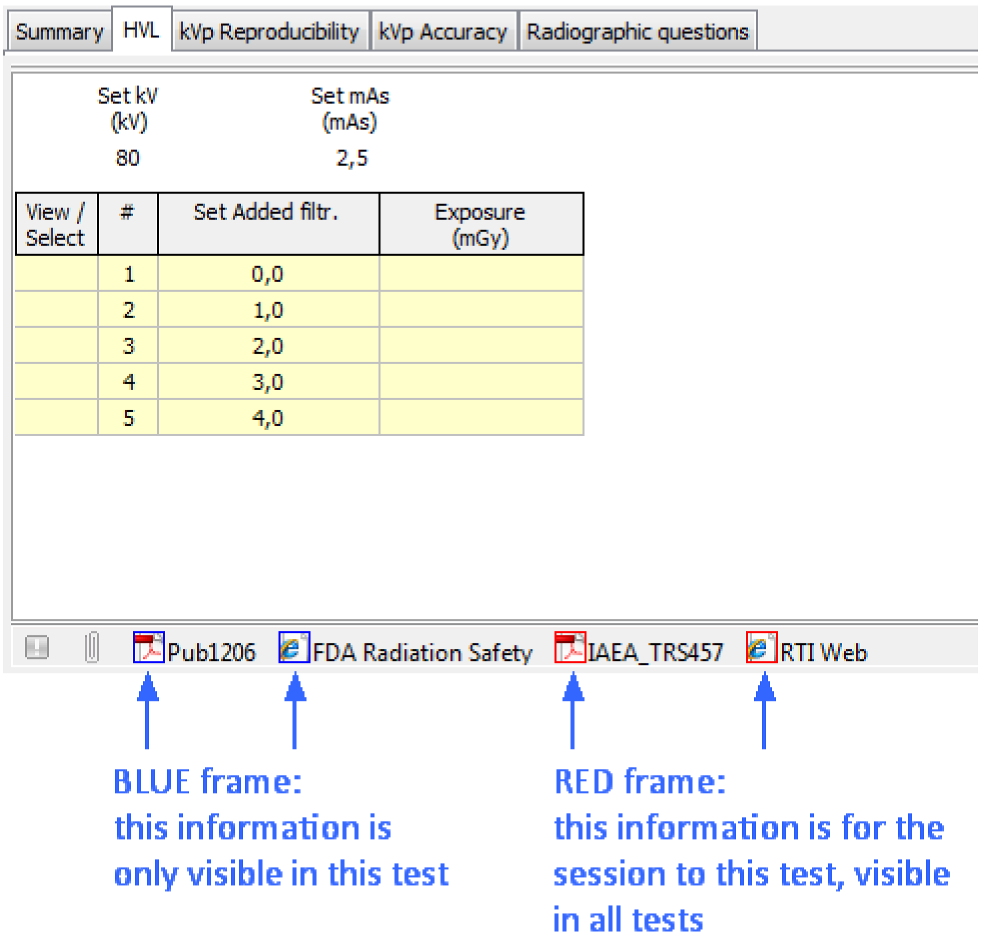
1. If you are in design mode, click on the paper clip.

2. A dialogue such as the picture below will appear.



You can choose to add a file or add a shortcut. If you wish to add a supporting document to a session or test, click the "Add file" button, if you just want to refer to a website, click the "Add shortcut" button.

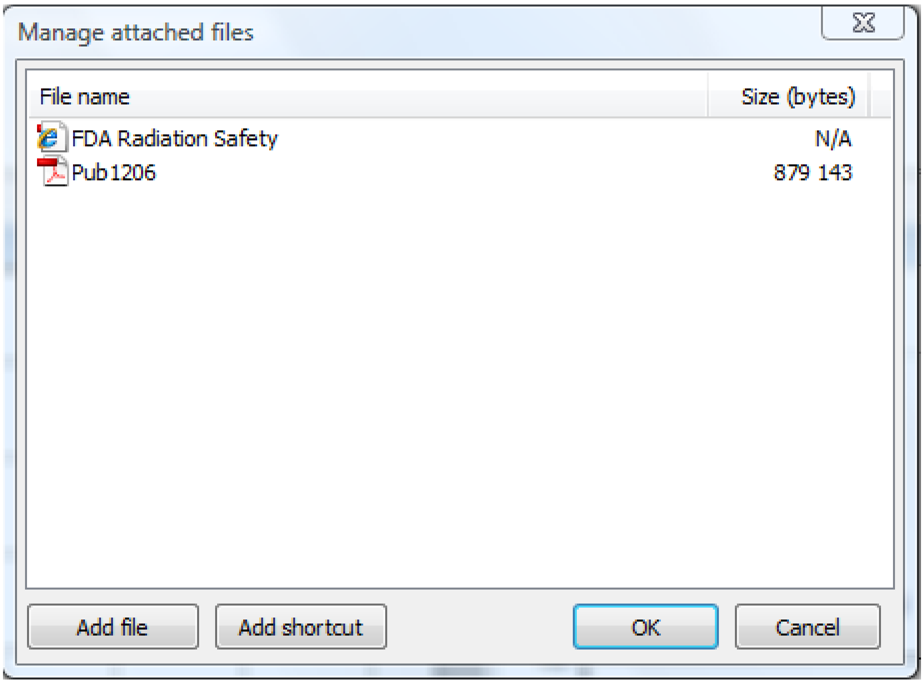
The attached information is shown the following way:



To delete attached information:

1. Click on the paper clip.

2. A dialogue will appear, showing all the attached information. Select the item you want to delete.



3. Press the "Delete" key on your keyboard.

8.3.2 Protection

It is possible to protect a session template from editing. The following things can be protected:

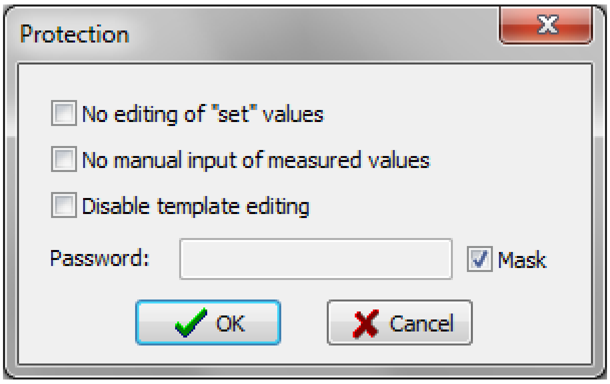
- Set values
- Measured values
- Template editing

If protected, a password is required to unlock to allow modification.

To protect a session or real-time display template:

1. Click on the Protection button on the ribbon bar.

2. A dialogue is shown:



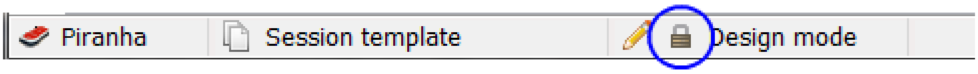
3. Select what you want to protect.

4. Specify a password.

NOTE! Make sure that you know the password. If you must have the password if you later want to modify the template.

5. Click on OK to finish.

6. The template is now protected. This is indicated on the status bar at the bottom of the screen:



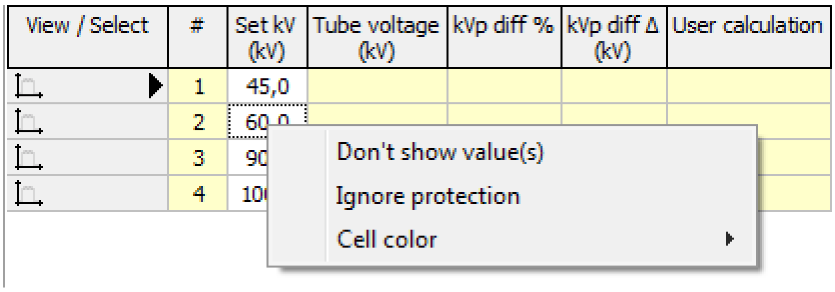
In many cases it may be useful to leave some values unprotected to make it possible for the user to adapt the template for the specific situation. Assume that you want to protect a template from modification but you want to allow the user to modify the set values for tube voltage. Assume that you have the following template:

View / Select	#	Set kV (kV)	Tube voltage (kV)	kVp diff %	kVp diff Δ (kV)	User calculation
	1	45,0				
	2	60,0				
	3	90,0				
	4	100,0				

1. Select all the Set kV cells.

View / Select	#	Set kV (kV)	Tube voltage (kV)	kVp diff %	kVp diff Δ (kV)	User calculation
	1	45,0				
	2	60,0				
	3	90,0				
	4	100,0				

2. Right-click on the selected cells.



3. Select "Ignore protection" and protect the template in the normal way.

4. The template is now protected but the user can edit the kV set values.

8.3.3 Create a Test page

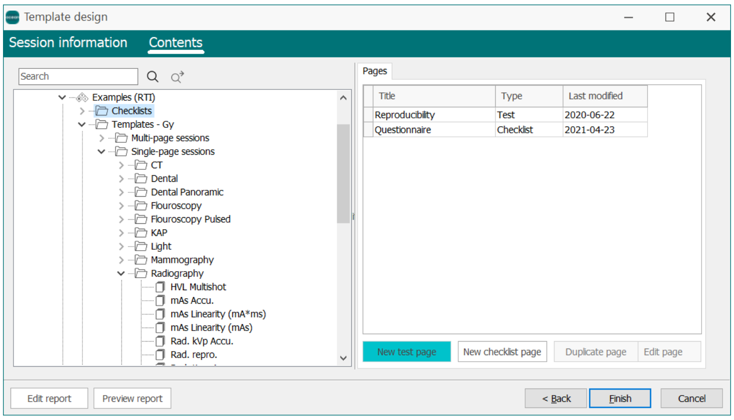
Add a new test page from scratch

Below is described how to create a Test page from scratch. It involves the following steps:

- Add columns, rows and general settings.

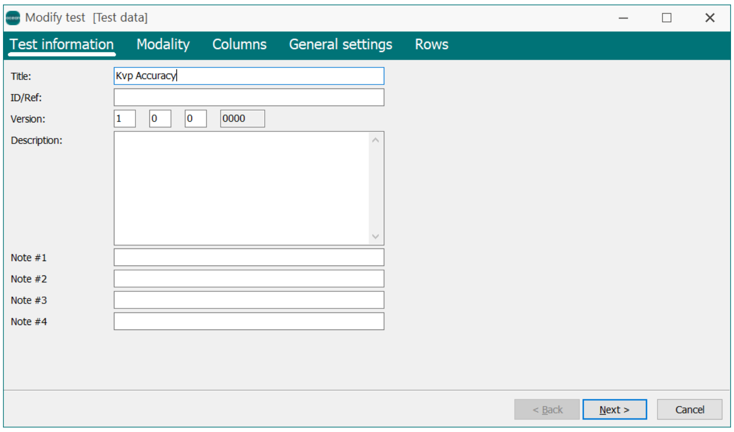
- Define set values.
- Adjust Meter and Probe settings.
- Add an analysis with pass and fail limits.

1. To create a test page from scratch, select **New test page**.



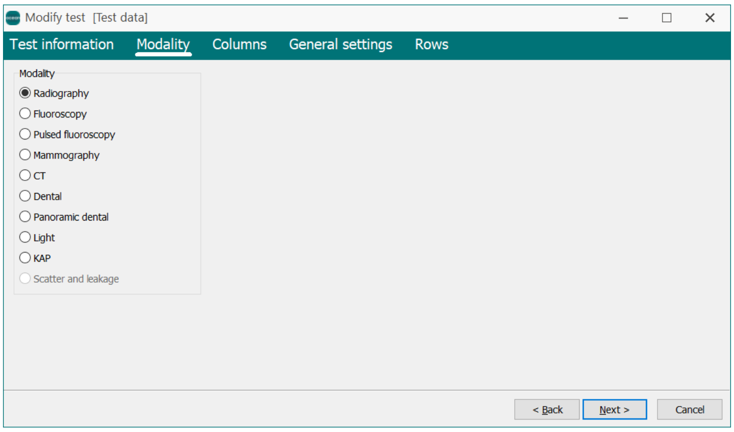
2. A wizard starts that will help you to create the test page. The first step is adding Test page information, type a title of the test template. You must at least specify a "Title". The version number is created automatically and the last four digits will increase automatically every time you change the template. The other fields may remain empty, but may be valuable to use in certain situations when such information is required.

   Assume that we want to create a page with a "kVp Accuracy" test.



   Press **Next**.

3. Select modality (what you shall use the test for), in this example Radiography.

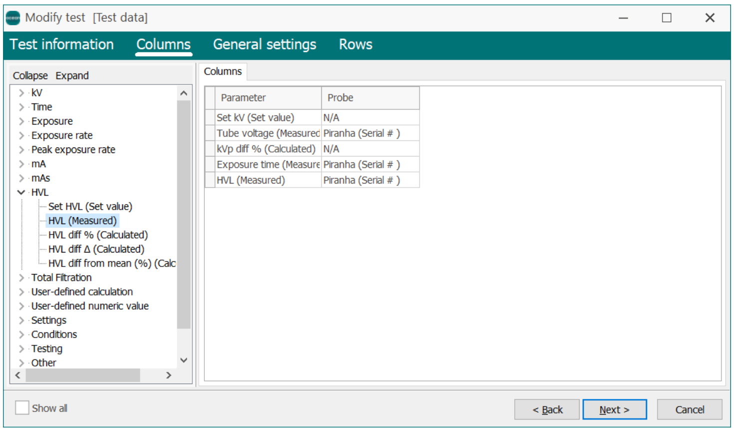


   Press **Next**.

4. Next step is to add the columns we want to include in our test. In this case we must have, "measured kVp", a "set kV" to compare with and a calculated deviation between measure value and set value. We also want to see the measured Exposure time and HVL as information (no analysis will be done on these values.

5. From the left area, select the columns you want to use. In this example set kV, measured tube voltage, measured time, measured HVL and calculated deviation between set kV and measure tube voltage.

   Start with kV. Click on kV on the left side to open the folder. Locate the other parameters. For some parameters, you also must select the meter or probe you intend to use. In this example we will use the Piranha without any external probe for all measurements.

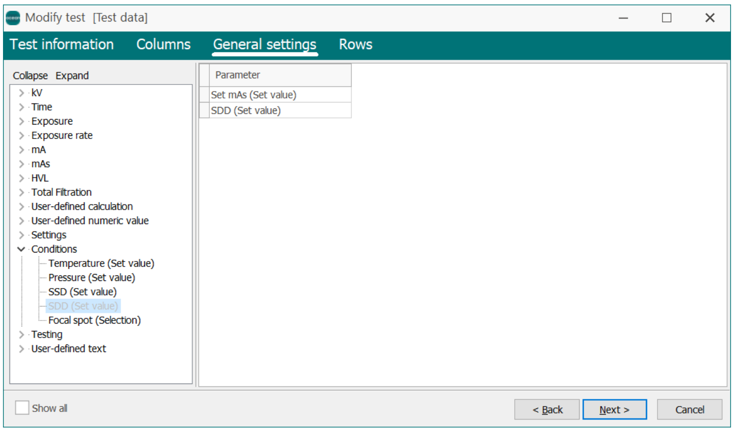
   

   You can change order of the columns by using drag-n-drop in the list on the right side. It is also possible to change column order later.

   By checking the check-box **Show all** in the lower left corner a range of more uncommonly used columns will become available. This is not necessary in the example.

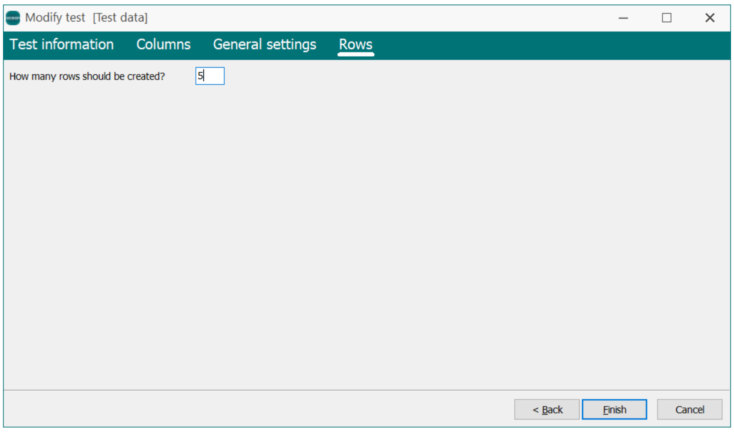
   Press **Next**.

6. Next step is to specify "General Setting", this is set values that applies for all rows in the test page. General settings will be shown above the grid (columns and rows). In this case we just want "mAs" and the source-detector distance "SDD".

   Press **Next**.

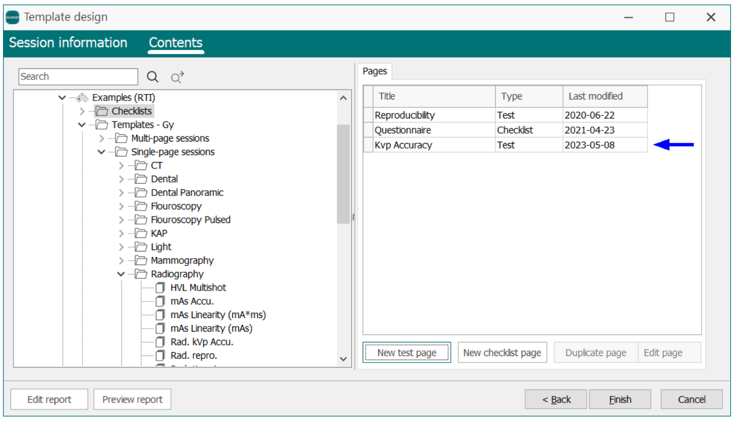
7. Now you specify how many rows you want, in this case how many set kV values do you want to test? Select number of rows you want in the grid, in this example 5.



Rows can be added or removed in a later stage.

Press **Finish**.

8. You have now defined which columns and how many rows you want in your test for your "kVp Accuracy" test. The test is added as a new page in your new Session template.

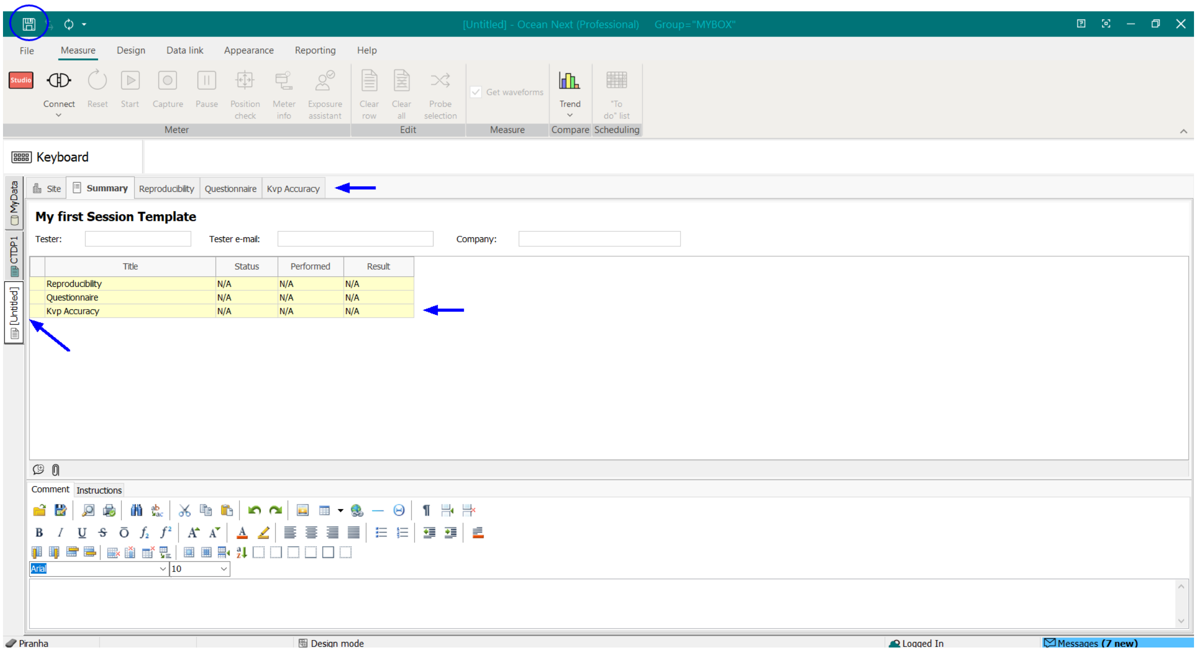


9. Next thing to do is to add a Report template in case you don't want to use the default one. In that case click **Edit report** button. You can read more about the report format in the topic [How to create a Report template](#).

10. You can preview and see how your Session will look like. However, be aware that you have not finished the design yet. You can also add more test or checklist pages, but we stop here in this example.

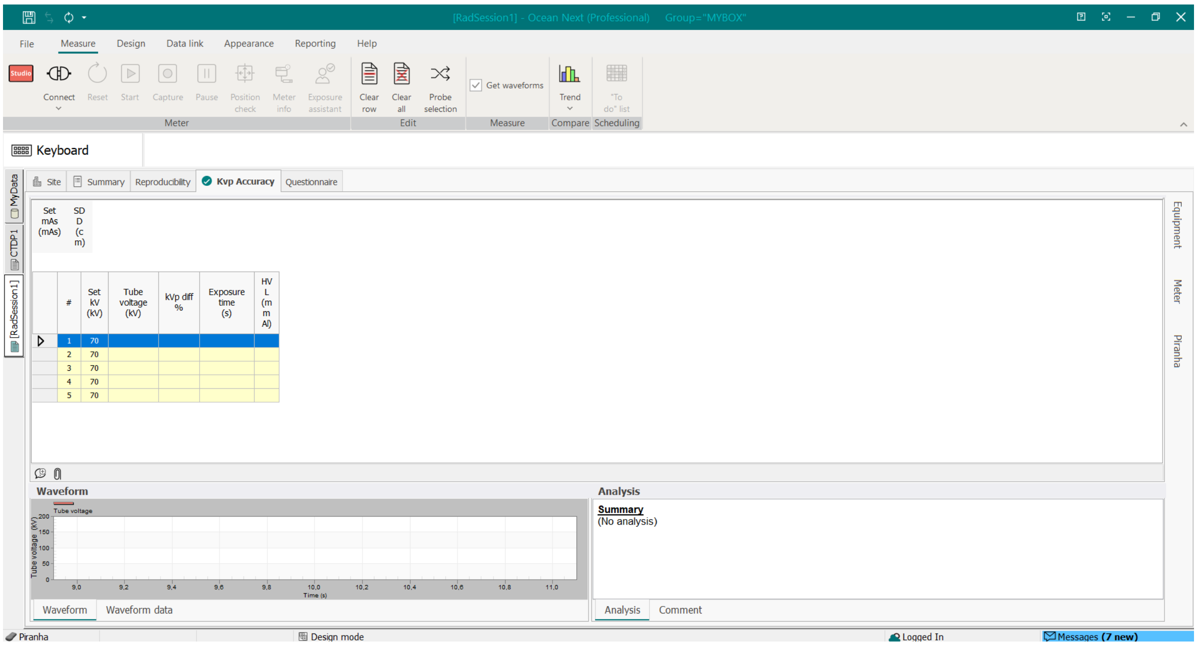
    Press **Finish**.

11. You will now come back to the Studio View and you will now see your Session template you just created:



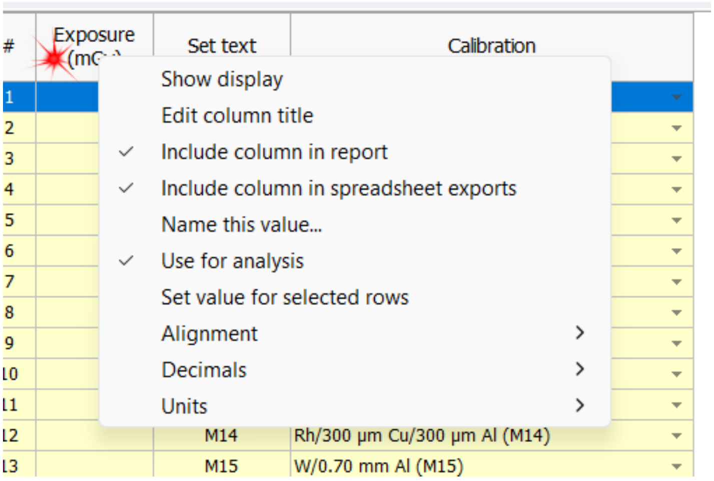
Adjust the page and enter Set values

1. Activate the "kVp Accuracy" test by double-clicking on the page tab. The page is shown:



Adjust columns widths if that is required to fit texts, grab the grid line and adjust.

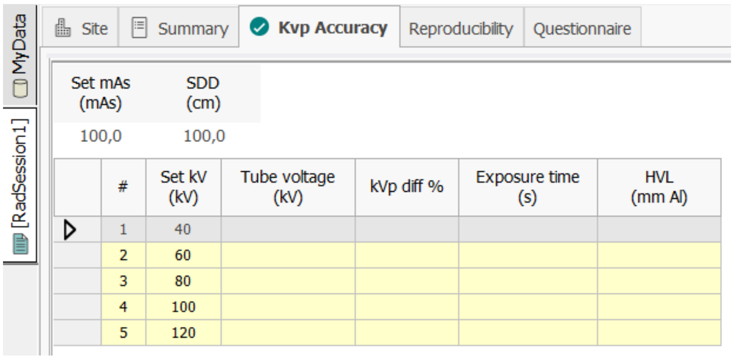
2. You can right click on a column and there find several useful functions:



Show display	Click here to show a display for this column.
Edit column title	Change the column heading text that is shown in the grid.
Include column in report	Include or exclude this column in the printed report.
Include column in spreadsheet export	Include or exclude this column in the export to Excel.
Name this value...	Give this column (or cell) a name to be used in caclulations or trending.
User for analysis	If there are more than one column of the same type present in the grid, this indicates which one shall be used when the accuracy analysis is used.
Set value for selected rows	Set the same value to all cells in this column.
Alignment	Align content in the cells
Decimals	Set number of decimals for numeric values in the column.
Units	Set unit for values in the column.

3. Specify Set mAs and SDD, assume that we will use 100 mAs and 100 cm. Click in the cell below the General Settings and type the values.

4. The Set kV column has the same kV, assume that we want to test kVp accuracy as 40, 60, 80, 100 and 120 kV. Enter these values. It now looks like this:



Page tabs are now in a new order with the test page you just created first. General Setting and Set values are defined.

5. Click on **Save** to save your Session Template.

Modify Meter and Probe Settings

Ocean Next selects the best possible meter and probes settings based on the content on your test page when you create it. In some situations and depending on the meter type it my be needed to manually select meter and/or probe settings. To change probe and/or meter settings.

6. First make sure that the test page you want to work with is activated.

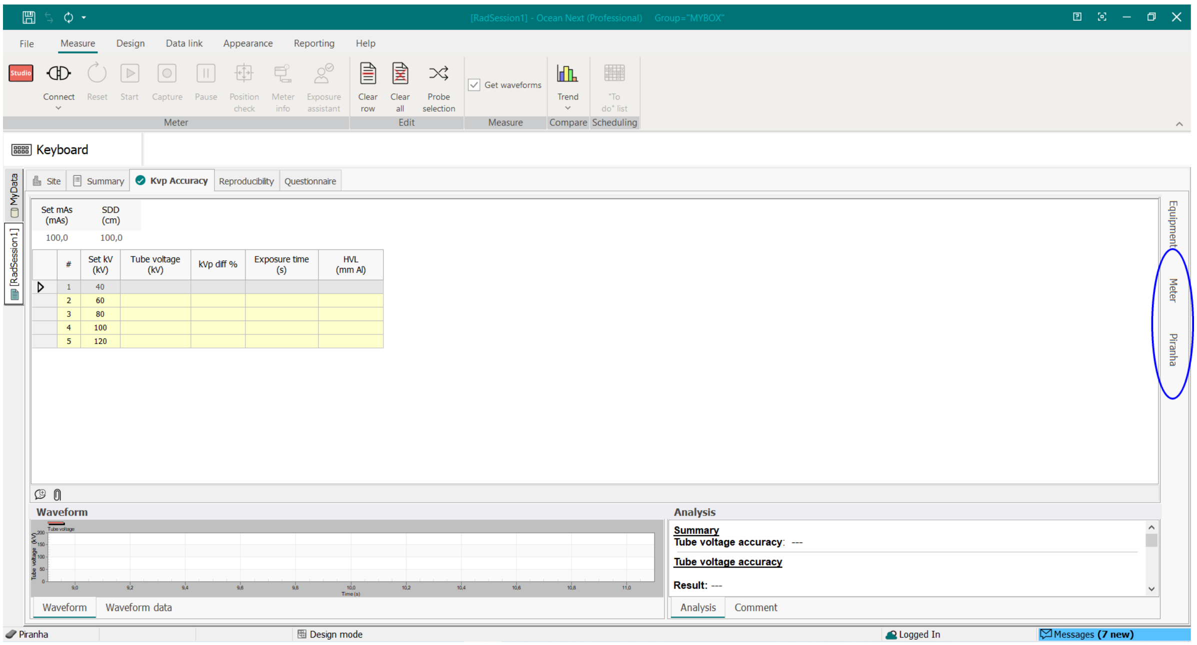
7. Secondly select the rows you want to change meter and/or probe settings for:

   - If you want to change for all rows, you don't need to do anything, there is a button for this.

   - Assume you want to change meter and/or probe settings for the three first rows:
     - Click in the first column on the first row.
     - Hold down the Shift key.
     - Click in the first column of the third row.
     - The first three rows are selected.

   - Assume you want change meter and/or probe settings for the second and fifth row:
     - Click in the first column on the second row.
     - Hold down the Ctrl key.
     - Click on the in the first column on the fifth row.
     - The second and fifth row are selected.

8. From the Studio View, on the right side, you have access to the Meter Adjust and Probe Adjust tabs:



You can click on a tab to open it. The tab auto closes, you can "pin" it if you want it to stay open. The tab names and number of tabs depend on which meter you use and connected probes, in this case we have only the Piranha and no external probes connected.

9. On the meter and probe tabs you will see the most common settings you can click on the **More** button to show all settings. The various settings for the different meters and probes are described in the topic Meter and Probe Settings.

10. Make any changes that are required directly in the Meter Adjust and/or Probe Adjust panels. Changes are applied directly.

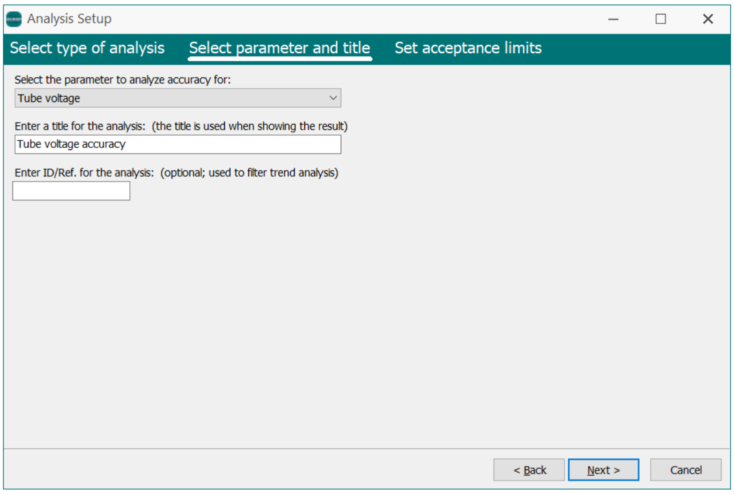
11. Click on **Save** to save your Session Template.

Add an analysis to your test page

12. Now it is time to add the analysis with pass and fail criteria.

13. Select the **Design** tab on the Ribbon bar, click on **Analysis** and select "Add analysis".

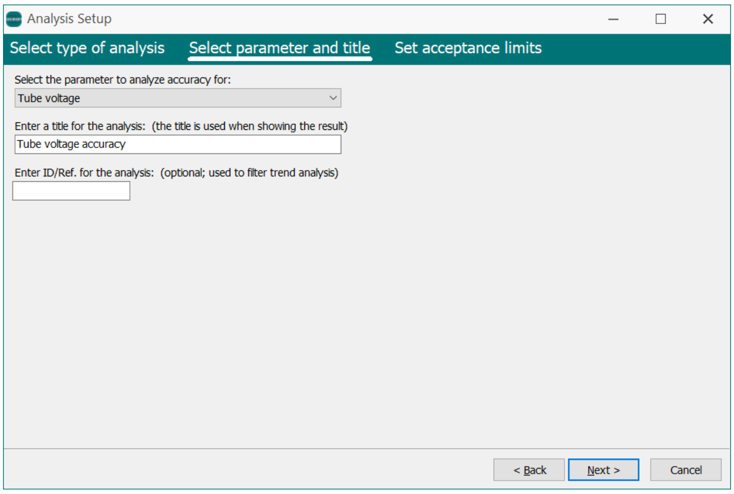
14. The "Analysis Setup" wizard is started, the first step is to select which type of analysis you want:



15. The drop-down list shows possible analysis based on the columns and general settings included on the test page. In our example, you shall select "Accuracy".

    Click **Next**.

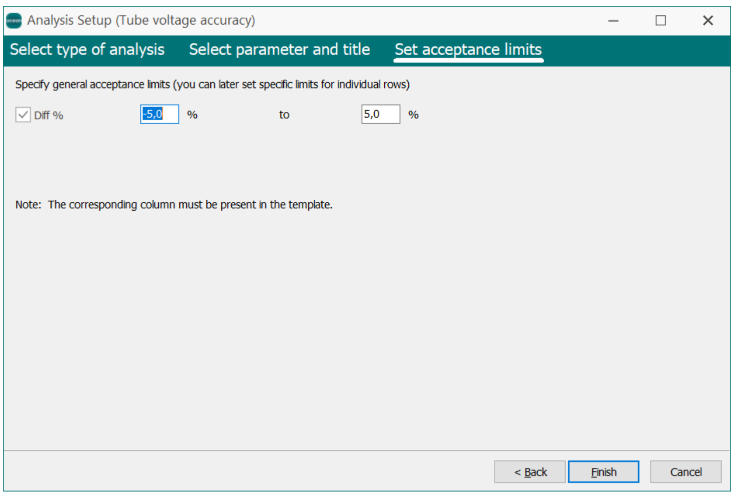
16. In the next step, select parameter for the accuracy analysis and give your analysis a title.



    Select "Tube voltage" and we can keep the suggested title. The ID/Ref is a value you can add to use in filters when you do Trend analysis, see topic Trend analysis for more information.

    Click **Next**.

17. In the next step you define the pass/fail limits for the analysis:



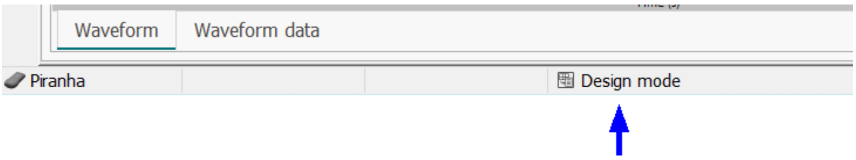
The default limits are -5% to +5%, we keep these limits.

Click **Finish**.

18. You will now see the analysis appear the in the analysis panel in the lower right side.

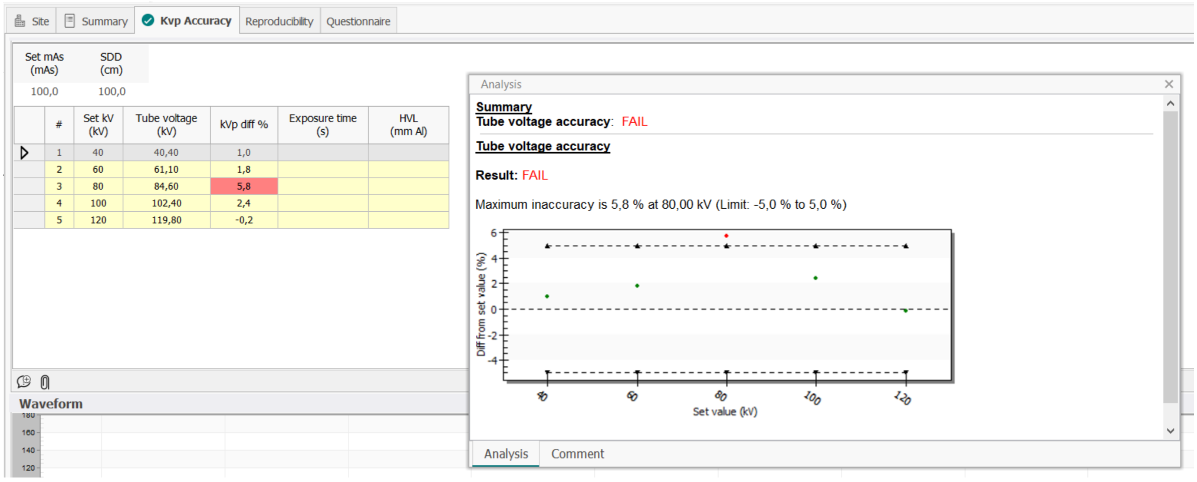
19. Save your Session Template.

20. When you are editing a Session template ("Design mode") you can't save any measured values. You can measure or type "fake" measured values to see that your analysis works as you expect. Design mode is indicated on the lower status bar:



21. Enter some values on the column for measured kVp. The measured values you enter in Design mode, will never be saved in the template.

22. You can grab the Analysis panel title bar and move it by drag-n-drop. It can look like this:



The analysis shows the result.

If you double click on the Analysis panel title bar, the panel "pops back" to it's original position.

23. Make any further adjustments to current page or other pages and save your template for the last time.

24. Close the Session template by right-clicking the document page tab on the left side and select "Close" or click the **File** tab and select **Close** from the Backstage.

8.3.3.1 Modify the analysis

If you need to modify an existing analysis you might want to do the following:

- Change the pass/fail limits.
- Change the actual analysis text and maybe add some other information.

The procedure describe here uses a Session Template, but the same procedure can be used with a Session if you need to make a modification to it "on the fly" at any time when you have started a measurement.

Open the analysis for modification

1. Open the Session Template you want to modify.

2. Make sure to activate the page with the analysis you want to modify and the row(s) you want to change pass/fail limits for are selected.

3. First select the rows you want to change pass/fail settings for:

   - If you want to change all rows, you don't need to do anything, there is a button for this.

   - Assume you want to change pass/fail limits for the three first rows:
     - Click in the first column on the first row.
     - Hold down the Shift key.
     - Click in the first column of the third row.
     - The first three rows are selected.

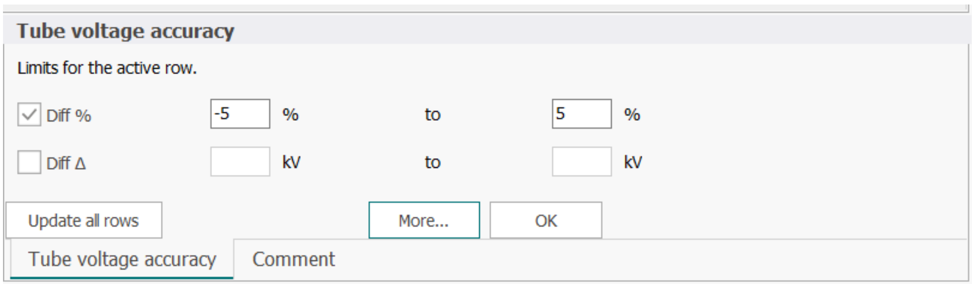
   - Assume you want change for the second and fifth row:
     - Click in the first column on the second row.
     - Hold down the Ctrl key.
     - Click on the in the first column on the fifth row.
     - The second and fifth row are selected.

4. Now open the analysis. You can do this in two ways:

   - Click on the Analysis button on the Design page on the Ribbon bar and select the analysis you want to modify, in our example "Tube voltage accuracy".
   - Right-click on the analysis panel and select "Modify pass/fail criteria...." and the analysis you want to modify, in our example "Tube voltage accuracy".

   When you open an analysis, the modification of pass/fail limits only affect current row. If you want to make changes for more than one row at the same time, select those rows before you open the analysis.

5. The Analysis panel shows now the pass/fail limits:



Modify the pass/fail limits

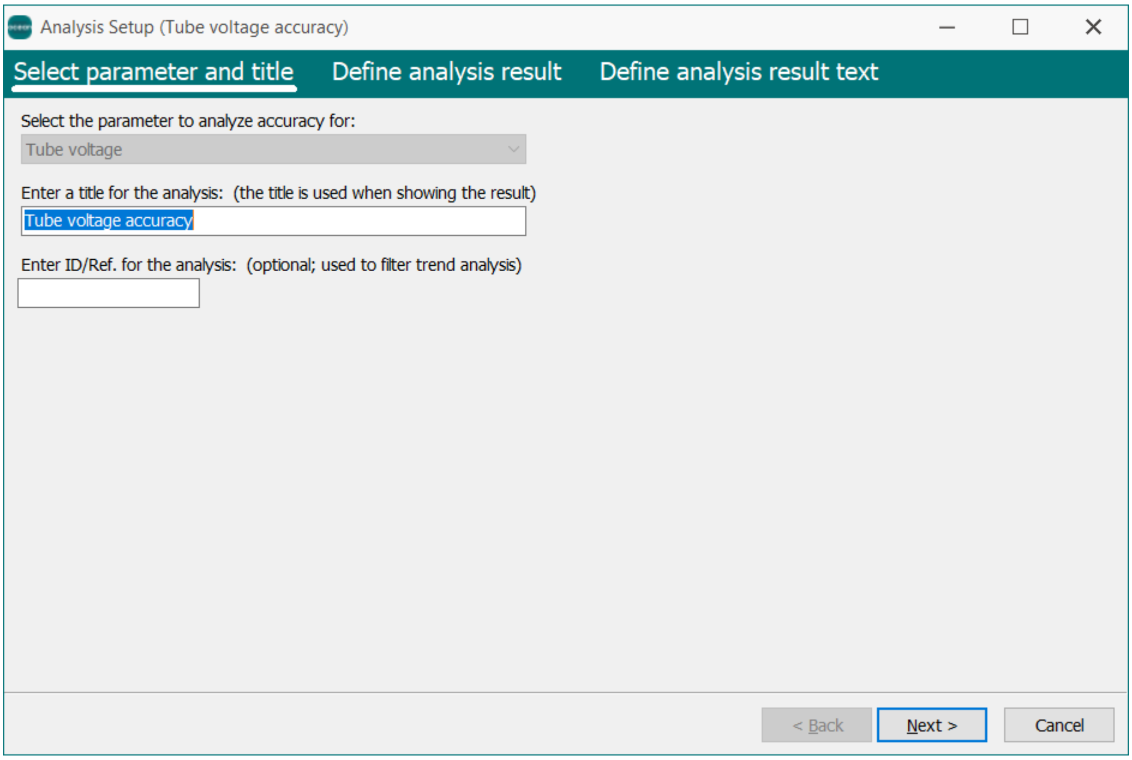
6. You can modify the pass/fail limits and depending on what type of analysis, select other settings that control how the analysis is done. If you have not selected a specific range of rows and want the current change to apply for all rows, click the **Update all rows** button.

7. If you don't want to do more changes to the analysis, click the **OK** button.

Modify the analysis text

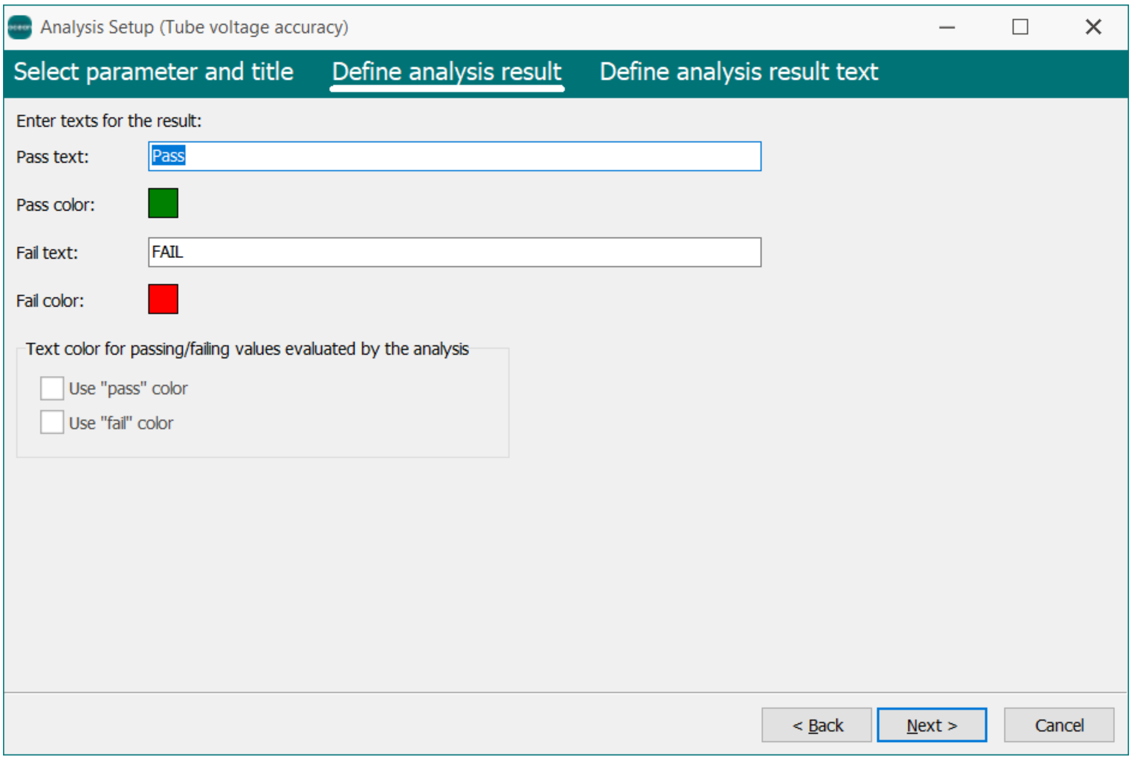
If you want to do more changes to the analysis, click the **More...** button. The first step of the "Analysis Setup" wizard is opened:

8. Here you can modify change the analysis title and modify/edit the "ID/Ref" that is used for filtering this analysis when using the Trend function.



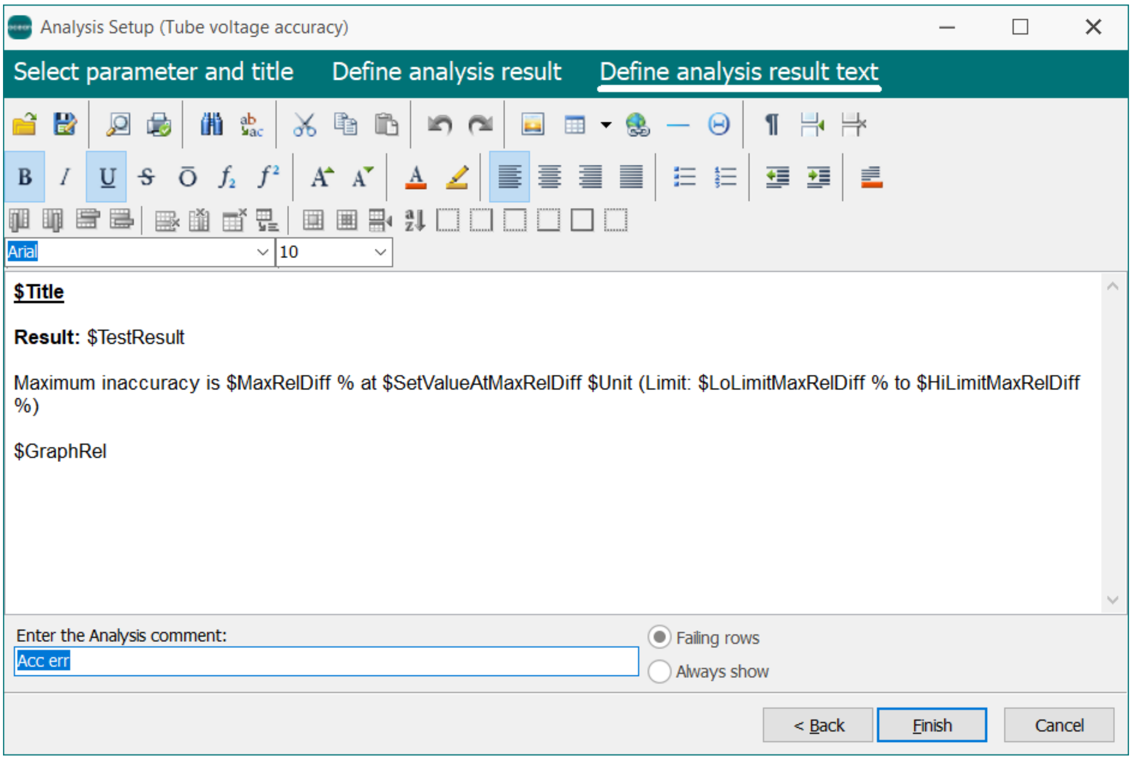
Click **Next**.

9. Here you can modify the text and color used to indicate "Pass" and "Fail".



Modify the analysis text

10. Here you can modify the actual text shown for the analysis.



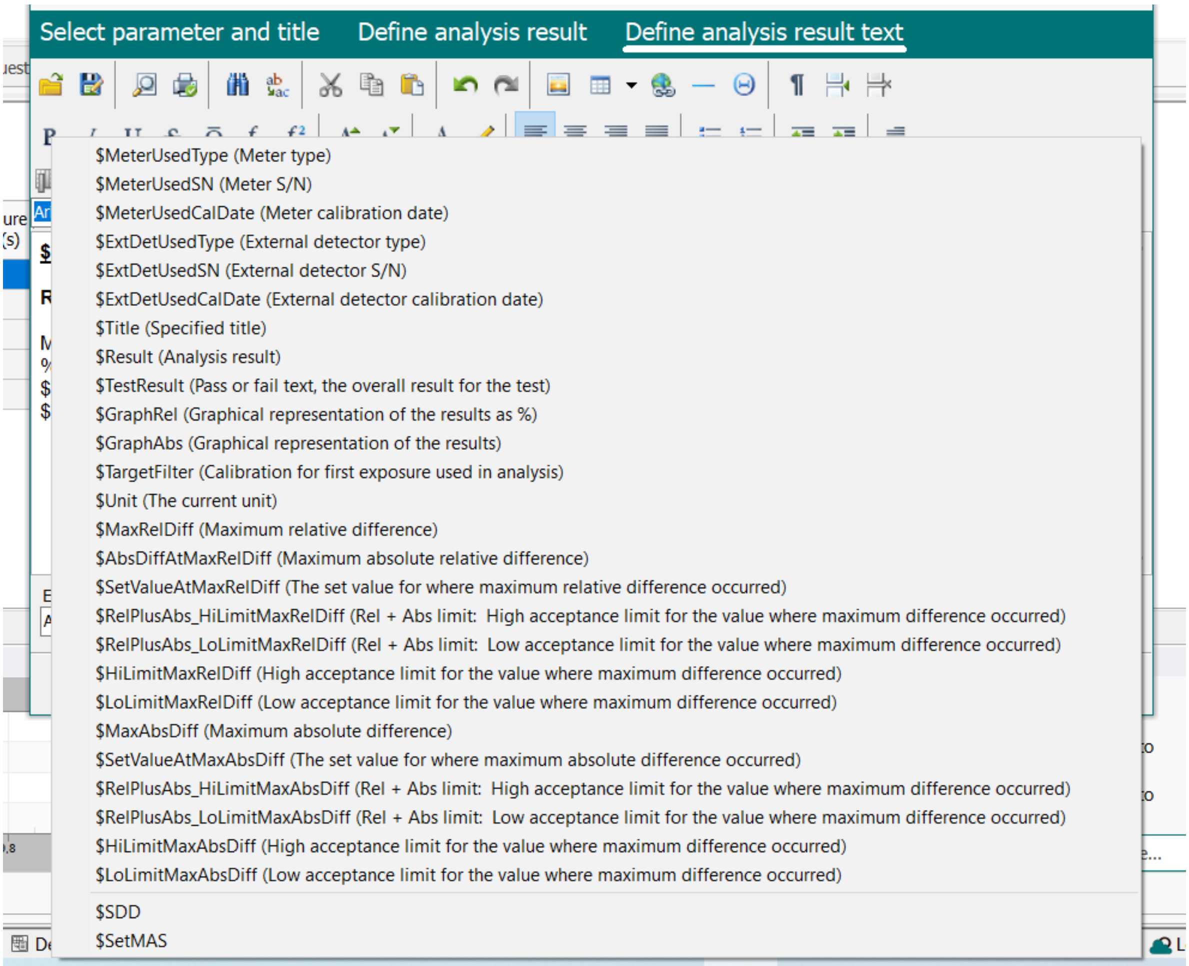
The text shown is defining the layout for, in this case, the "Tube voltage accuracy" analysis. You can see "plain text" and text strings the start with "$" character, these strings are "macros" that will be replaced with values when the analysis is executed.

11. If you want to change the plan text, just edit the text.

Add or modify a macro

12. Place the cursor where you want to add value that comes from a macro.

13. Type the "$" character. A list with all currently available macros appear.



14. Select the macro you want to use and it will be added to your analysis layout text.

15. When you are ready, click the **Finish** button.

16. On the Analysis panel click on the **OK** button.

17. The analysis is now modified, click on the **Save** button on Ocean Next's title bar to save the Session Template (or Session).

8.3.3.2 Advanced analysis

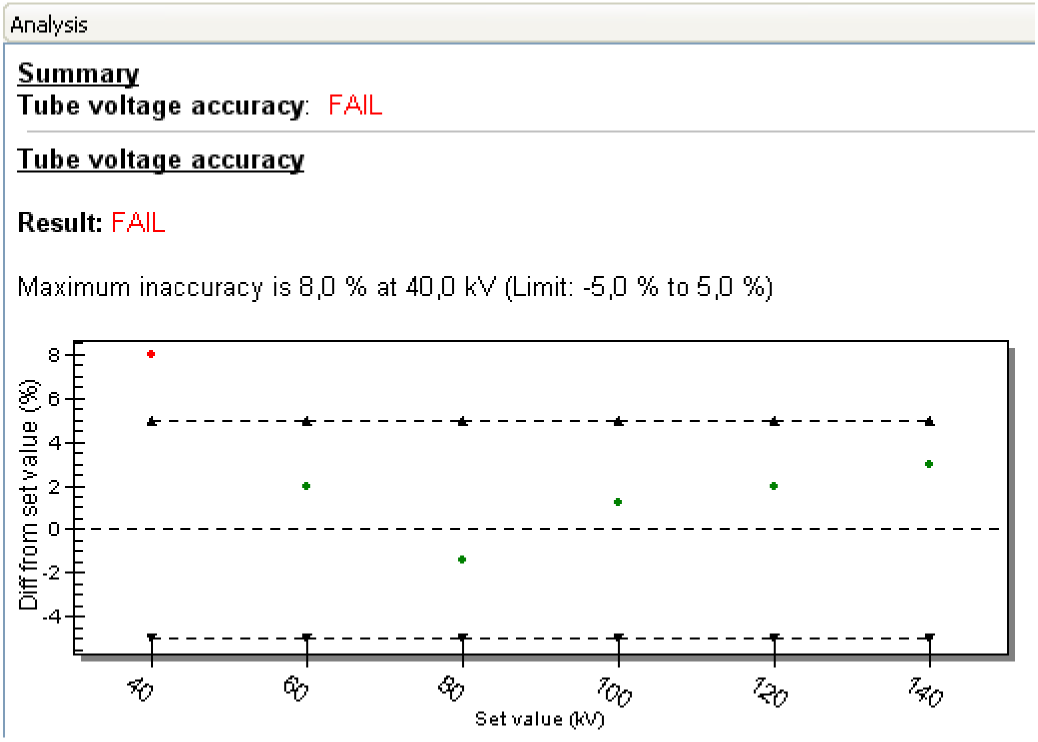
To further customize your analysis you can change the title, the result text (defaults are "Pass" and "FAIL") and the result text layout. We'll show you how to do these customizations in this page.

Let's assume we have a template like the picture below. This is a pretty standard kV measurement template with an accuracy analysis that you would use in your field of work.

View / Select	#	Set kV (kV)	Tube voltage (kV)	kVp diff %	Exposure time (ms)	Exposure (mGy)
	1	40	43,2	8,0		
	2	60	61,2	2,0		
	3	80	78,9	-1,4		
	4	100	101,2	1,2		
	5	120	122,3	1,9		
	6	140	144,2	3,0		

NOTE: The above is a template that has already been used, as it contains measurements and analysis calculations. A test template is normally empty (contains no measurements or analysis calculations).

The picture below shows the details of what the accuracy analysis looks like with the default settings. We are going to use Ocean's advanced analysis customization ability to make this analysis look more like what we want.



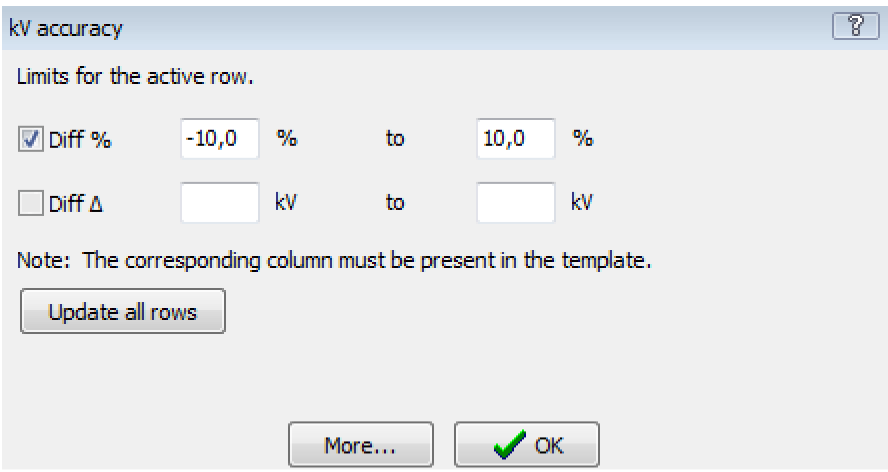
We'll show you how to do the following:

- Change the title to "kV accuracy".
- We will make the title a little bit larger and change the color to a light blue so it stands out more from the rest of the text.
- Change the "pass text" to "Ok" and change "fail text" to "Test failed".
- Add the absolute deviation to the text just above the graph. Our new text will read: "Maximum inaccuracy is X.X % (X.X kV) at XX kV (Limit: -XX % to XX %)" where the red text is new.

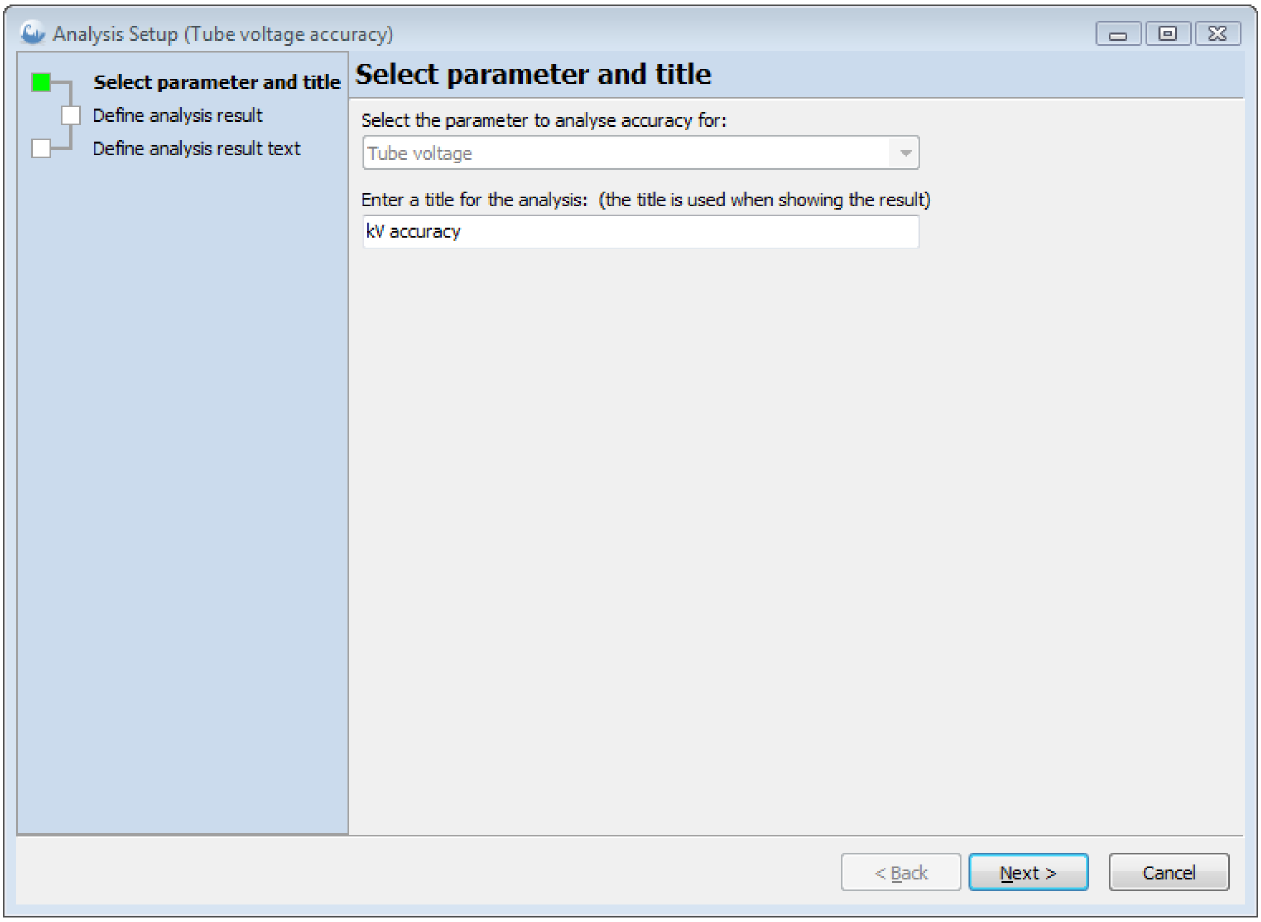
If you follow along with our example here, you'll find that Ocean is a lot of fun to use as you can do just about anything you like with it. Let's follow the steps below to customize the analysis layout:

1. To access the analysis setup functions, we'll go to the Design page on the ribbon and click analysis Setup (the last item on the ribbon bar). Another way to access the same functions is if you right-click anywhere in the Analysis window and select Modify analysis from the drop-down list.

2. The first change on our list of things to do is to change the title from "Tube voltage accuracy" to "kV accuracy". To do this, we'll select the current title (in our example, it is the default "Tube voltage accuracy") and change it to what we want. When we clicked on the analysis setup function, the window that will pop first is the acceptance limit setup window showing the default values, that looks like the picture below.

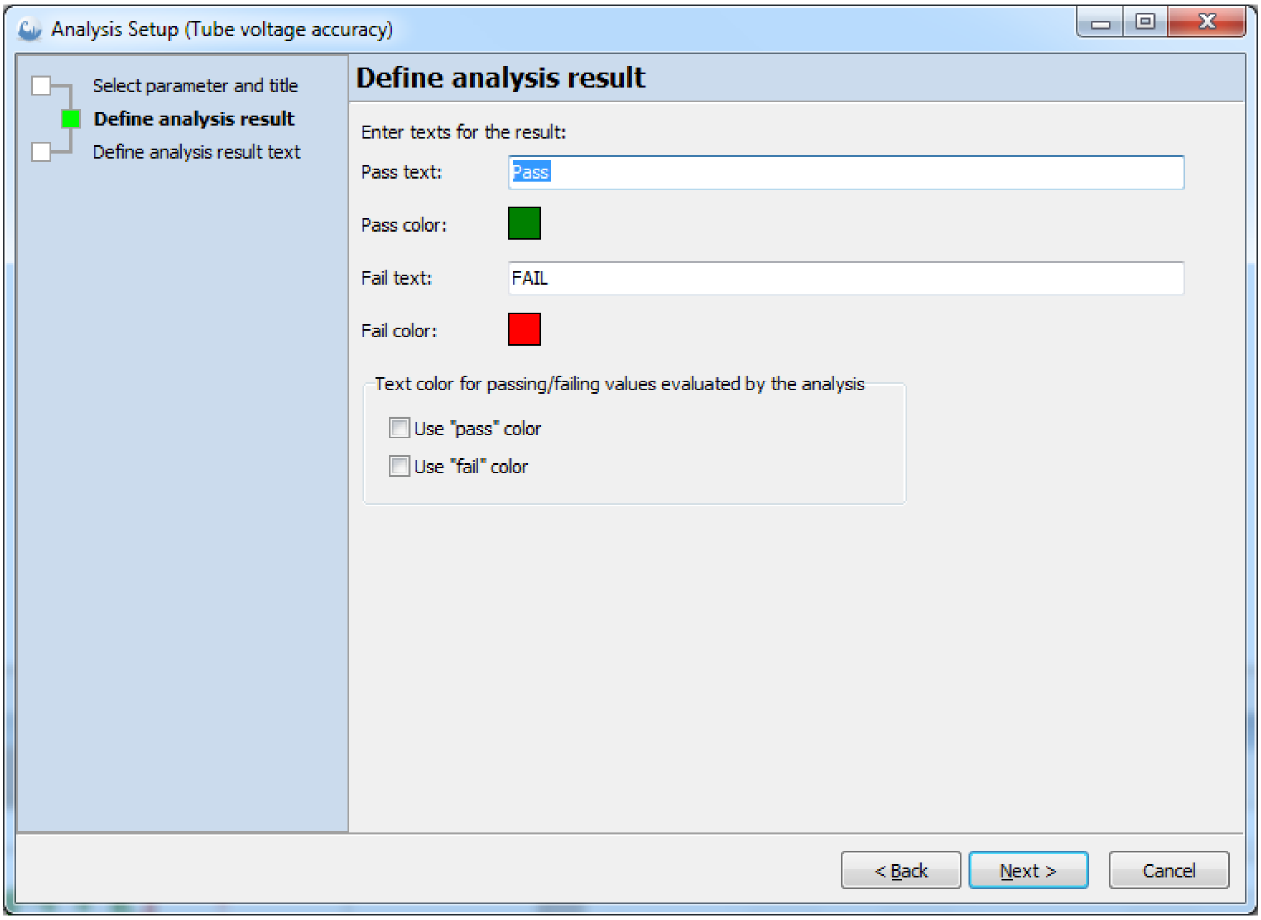


Since we don't want to change anything here right now (we'll get to this window further down our example), we'll click the More button to access the wizard that would allow us to change the title. The first window of the wizard looks like this:



3. The second line is where we'll change the title. Let's click in the text box and enter our new title "kV accuracy", then click next to continue with the wizard.

4. The next window of the wizard looks like the picture below. This is where we'll change the pass/fail text and color. Let's change it to what we want (in our example, we wanted the pass text to be "OK" and the fail text to be "Test failed"). Let's make these changes here, then click next to continue with the wizard.



There are also two check boxes, "Use pass color" and "Use fail color". If checked, the corresponding color is used when showing the analyzed parameter.

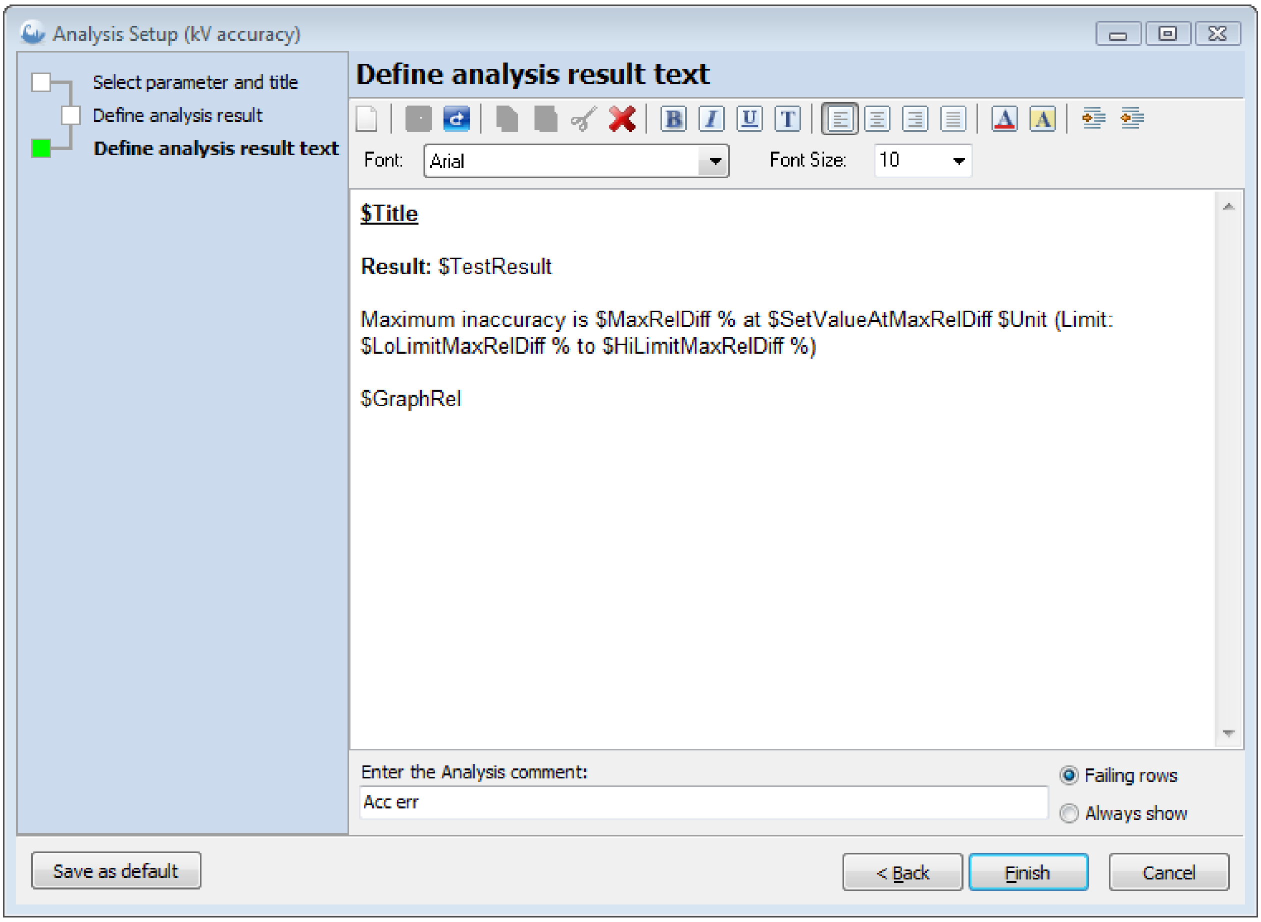
Here is an example how it looks like when the pass and fail color isn't used:

Maximum inaccuracy is 1,1 % at 80,00 kV (Limit: -5,0 % to 5,0 %)

and here how it looks like when pass and fail color is used:

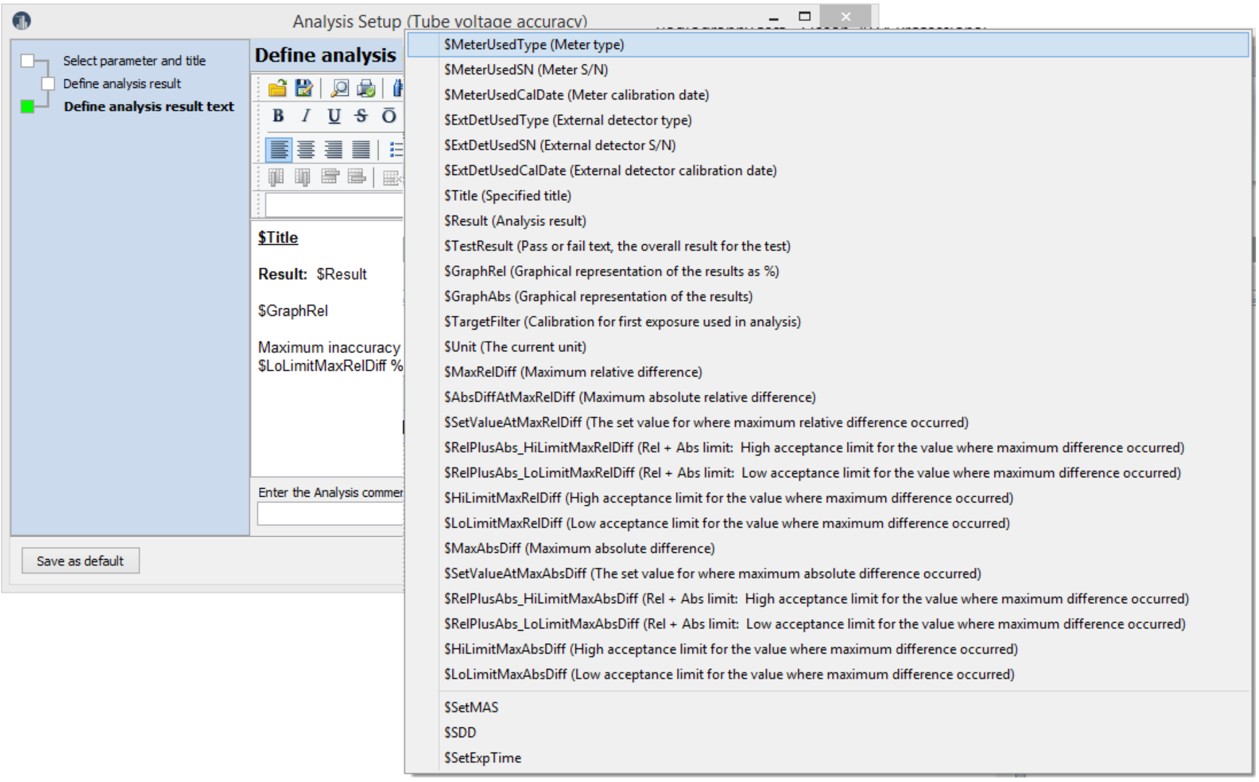
5. The last page of the wizard looks like the picture below. This is where we can change the style and color of the text that appears in the analysis window. In our example, we wanted to do two things to the appearance of our analysis window text.

- We wanted to change the absolute deviation text to read like this: "Maximum inaccuracy is X.X % (X.X kV) at XX kV (Limit: -XX % to XX %)" where the red text is new, and
- We also wanted to increase the font size of the title text and make it light blue so it stands out from the rest of the text, and



The layout is built up of text and macros (a name preceded by a $) that will be exchanged with values from Ocean when the analysis result is shown. For example the macro $GraphRel will be exchanged with a graph showing the relative deviation.

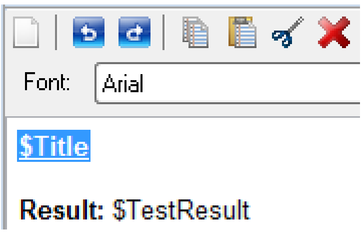
Let's change the absolute deviation text now. We do this by placing our cursor after "$MaxRelDiff %" and type the dollar sign ($). As soon as we do that, a drop-down list appears with the available macros to choose from (see picture below).



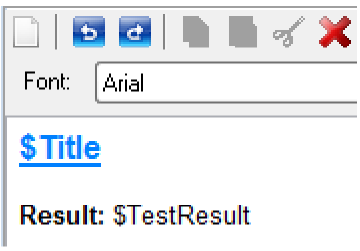
We'll select "$AbsDiffAtMaxRelDiff" from the list, add a space and select "$Unit" to get the text we wanted. By using the macro $Unit instead of writing "kV" we made sure that our text will read correctly even if we change the units.

Note: There are always shown six macros in the beginning of the list that are related to detectors, serial numbers and calibration dates. See section Meter and Detector macros.

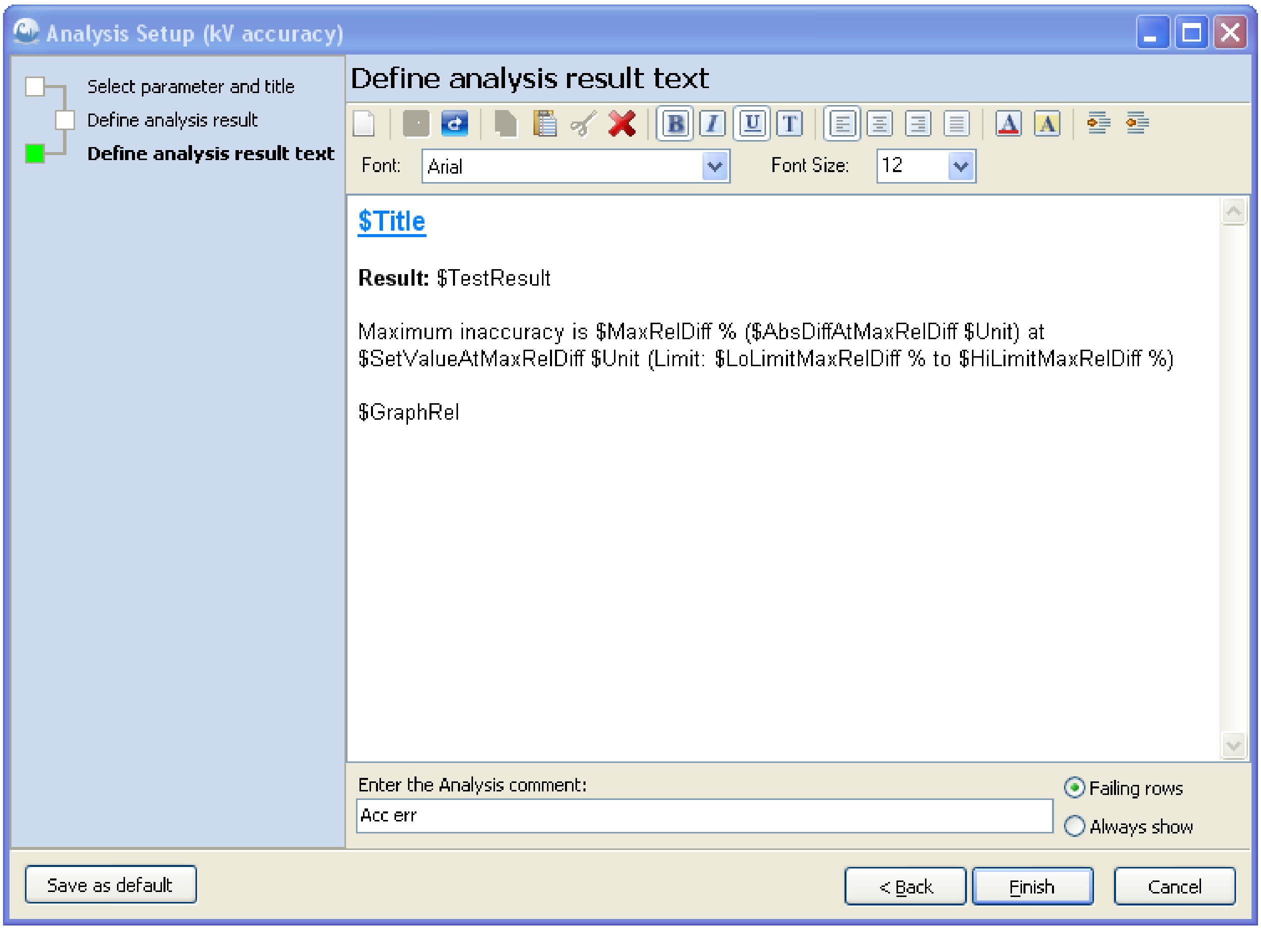
Before we finish with this page, we'll need to do one more thing and that is to change the font and color of the title text. To do this, we'll select the text "$Title".



then change the font size to 12p and change color to a light blue:



The new analysis result text window should look like this after we finished making all the changes we wanted.

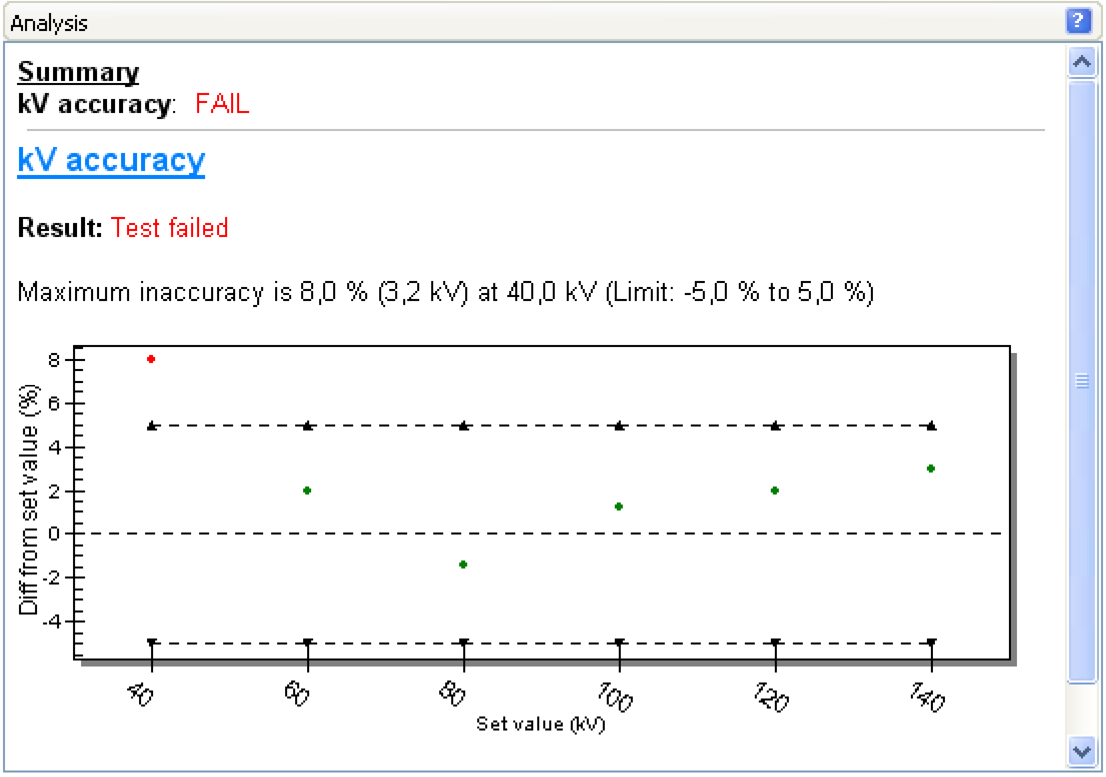


NOTE: The layout for kV accuracy analysis we just finished designing will affect the appearance of the current template only. The next time you add a kV accuracy analysis, the appearance will revert back to the default values (the ones we started with before all the modifications).

Let's say we really like the appearance of the one we just designed. We can make this the default appearance by clicking on the "Save as default" button on the bottom left of this last page of the wizard. This way the new appearance will be the default appearance for the kVp accuracy analysis.

The function of the field "Enter the Analysis comment" is described in the Analysis comment topic.

Since we made all the changes we wanted, we can click Finish to end the wizard. When the wizard ends, it will drop us back to the acceptance limits window. To exit the analysis setup, press OK, and you will be able to see the new appearance of the analysis texts appear in the window. If you followed along with us, your analysis window with all the changes we made should look like this:



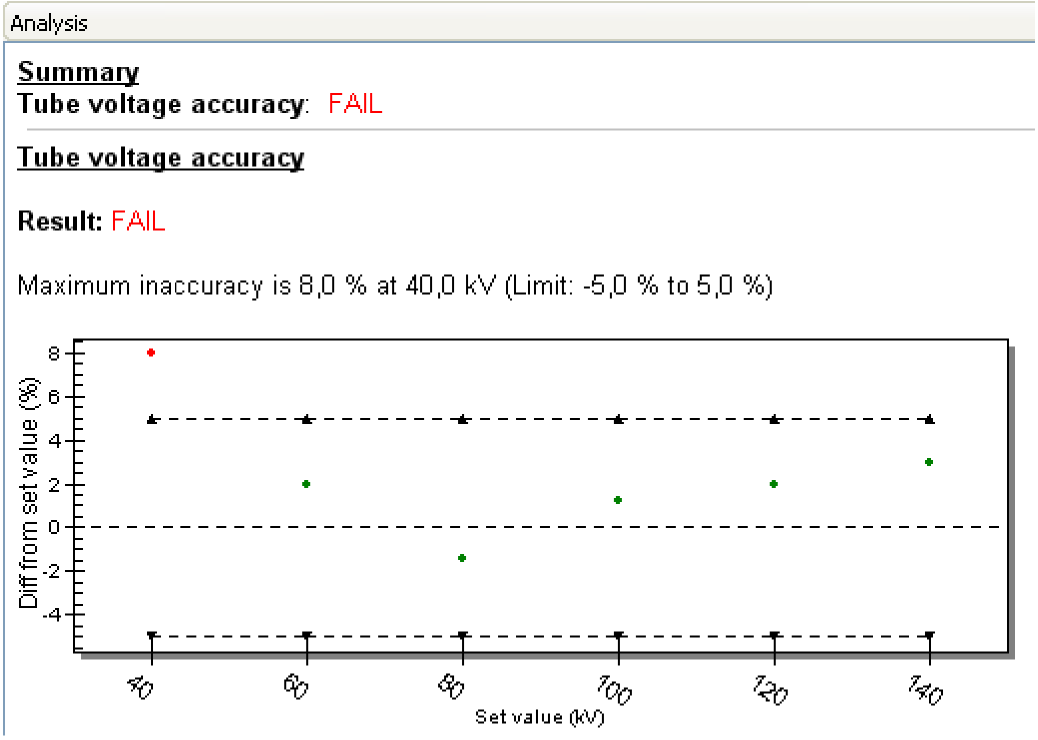
8.3.3.2.1 Acceptance limits

The acceptance limits shown when you add an analysis are the ones used in the default layout for the analysis. There may be other calculations you can ask Ocean to perform by modifying/expanding the default analysis. The topic Analysis (Definitions) describes each analysis and what they can do with the available acceptance limits.

In the following example, we will cover how to expand a default analysis to perform calculations not present in the default analysis. Let's assume, that we added a kV Accuracy analysis to a test template. The default analysis calculates the relative difference between your measured values and the set values (reference values), but this is not all you have available to you.

View / Select	#	Set kV (kV)	Tube voltage (kV)	kVp diff %	Exposure time (ms)	Exposure (mGy)
▶	1	40	43,2	8,0		
	2	60	61,2	2,0		
	3	80	78,9	-1,4		
	4	100	101,2	1,2		
	5	120	122,3	1,9		
	6	140	144,2	3,0		

The picture below is what a default analysis looks like.



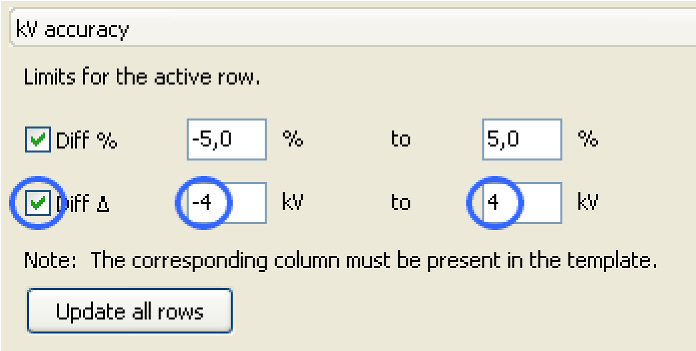
The following steps will show you how expand the above criteria and verify that the measure kV is within +/- 5 % or +/- 4 kV from the set value you specified. This is a fairly simple example commonly used in X-ray compliance testing all over the world.

1. The first thing we need to do is add a new column that will show shows the difference between the measured values and the set values. This is the "Diff Δ" column. How to add a column is discussed in detail in the Add/delete column topic. The template will look like the picture below after we added the column we needed.

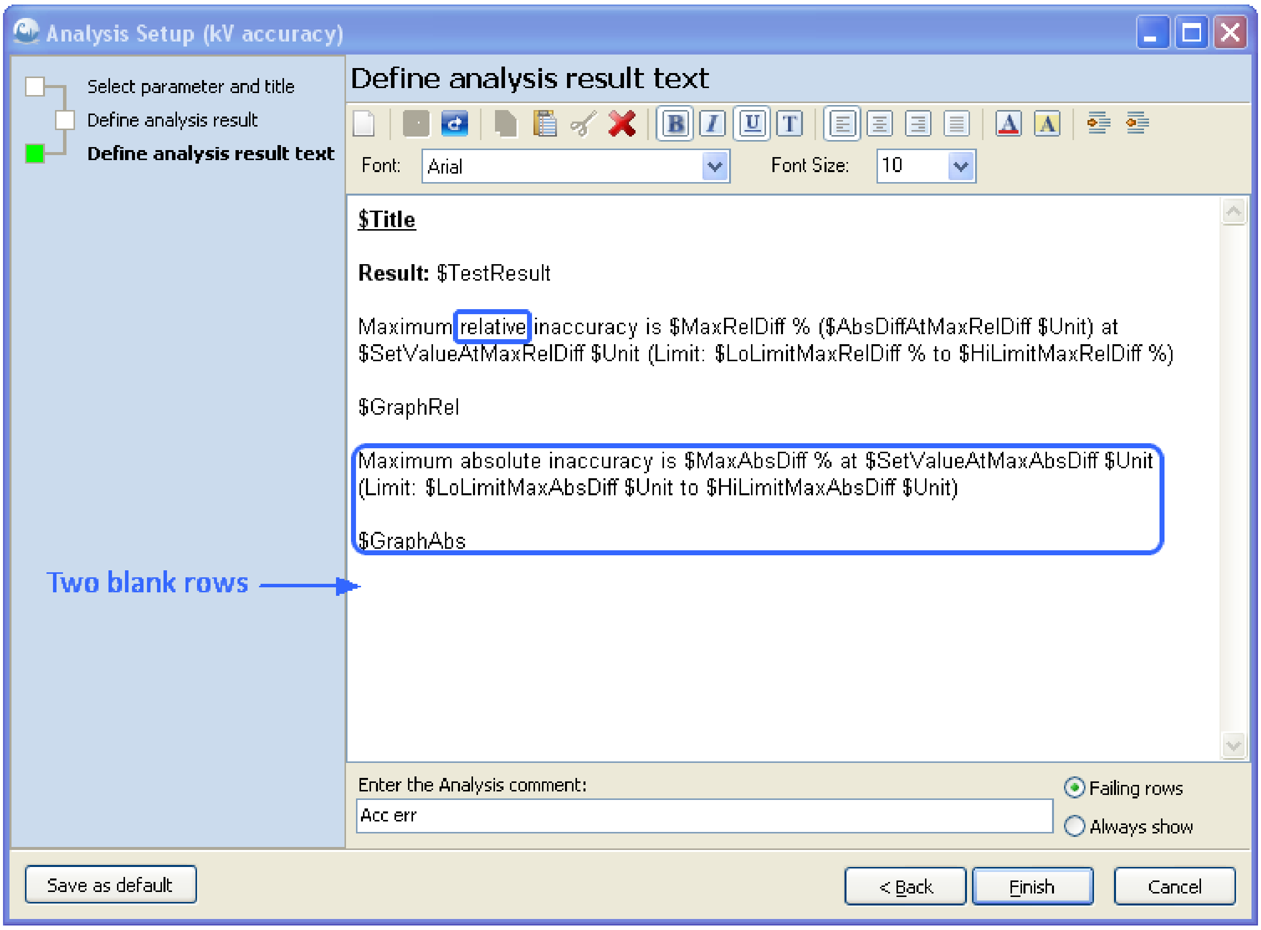
View / Select	#	Set kV (kV)	Tube voltage (kV)	kVp diff %	kVp diff Δ (kV)	Exposure time (ms)	Exposure (mGy)
▶	1	40	43,2	8,0			
	2	60	61,2	2,0			
	3	80	78,9	-1,4			
	4	100	101,2	1,2			
	5	120	122,3	1,9			
	6	140	144,2	3,0			

2. The next thing we need to do is modify the default analysis so it will know to evaluate the new parameter. We do this by right-clicking on the Analysis window and selecting "Modify analysis" from the drop-down list, and choose the "kV accuracy" (or the name you have given this analysis) choice. You can also go to the ribbon bar and click on the Analysis setup button to select the analysis you want to modify.

3. The window you'll see next will look like the picture below, showing the section where we can set the acceptance limits. For our example, we'll check off the "Diff %" and specify the +/- 5 % limit we want in our example, and then check off the "Diff Δ" and specify the +/- 4 kV as shown in our example. To finish this part of the analysis modification, we'll click the "Update all rows" button (you could also select all rows with multi-select if you want) so our grid is updated with the new columns and specifications we just entered.



4. Now we want to modify the layout to show the results of the new calculation. Click on the "More..." button to start the analysis setup wizard, then click the Next button twice to come to the "Define analysis result text" selection. You will see a window like the one below, showing what is in the blue band, which is the default text, but we now need to modify it to talk about the new calculation we just added. The paragraph above the default text is an example text you may want to use to describe your modified analysis results. What we did was change one word... "absolute" to "relative" in the paragraph and all of a sudden we are now talking about something else. When we are done we'll just click Finish to end the setup wizard and save our changes.



Normally, we advise that you leave two blank rows after each analysis to separate them from each other in the report, if you use more than one analysis in the same test template.

5. Once the wizard is done, you will be dropped back to the Analysis window. Click OK now to save your work. Once you did that, the Analysis window should show the new results, like the window below.

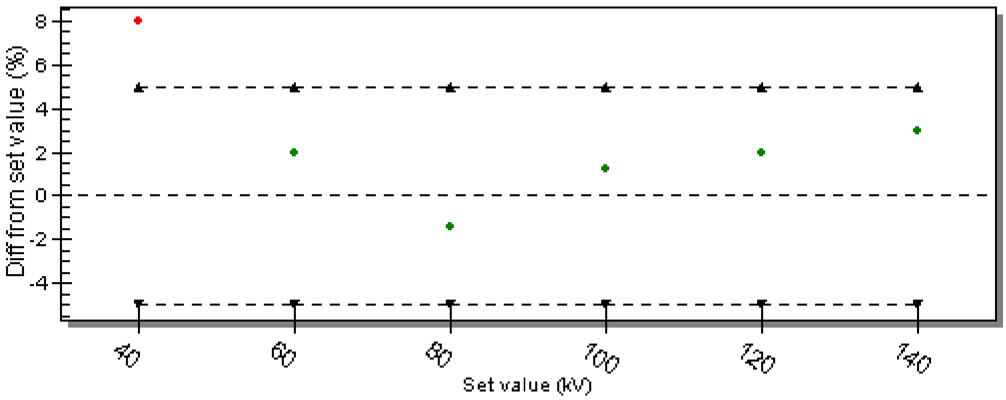
Analysis

Summary
kV accuracy: FAIL

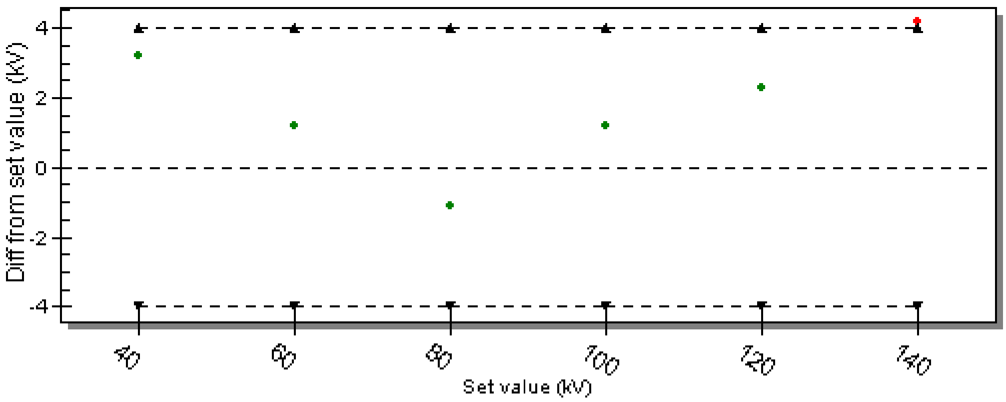
kV accuracy

Result: FAIL

Maximum relative inaccuracy is 8,0 % (3,2 kV) at 40,0 kV (Limit: -5,0 % to 5,0 %)



Maximum absolute inaccuracy is 4,2 % at 140,0 kV (Limit: -4,0 kV to 4,0 kV)



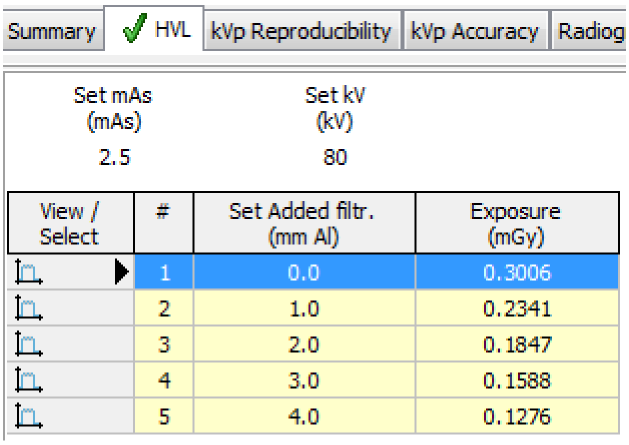
The modified template should look like this now:

View / Select	#	Set kV (kV)	Tube voltage (kV)	kVp diff %	kVp diff Δ (kV)	Exposure time (ms)	Exposure (mGy)
	1	40	43,2	8,0	3,20		
▶	2	60	61,2	2,0	1,20		
	3	80	78,9	-1,4	-1,10		
	4	100	101,2	1,2	1,20		
	5	120	122,3	1,9	2,30		
	6	140	144,2	3,0	4,20		

It shows that the first exposure failed because the result is outside +/- 5% range, and the last exposure failed because the result is outside +/- 4 kV range.

8.3.3.2.2 Reference a value from the grid

In some cases you may want to reference a measured value in the grid in your analysis text. Assume that you are measuring HVL using the following test:


Summary | HVL | kVp Reproducibility | kVp Accuracy | Radiog

Set mAs (mAs)	Set kV (kV)
2.5	80

View / Select	#	Set Added filtr. (mm Al)	Exposure (mGy)
	1	0.0	0.3006
	2	1.0	0.2341
	3	2.0	0.1847
	4	3.0	0.1588
	5	4.0	0.1276

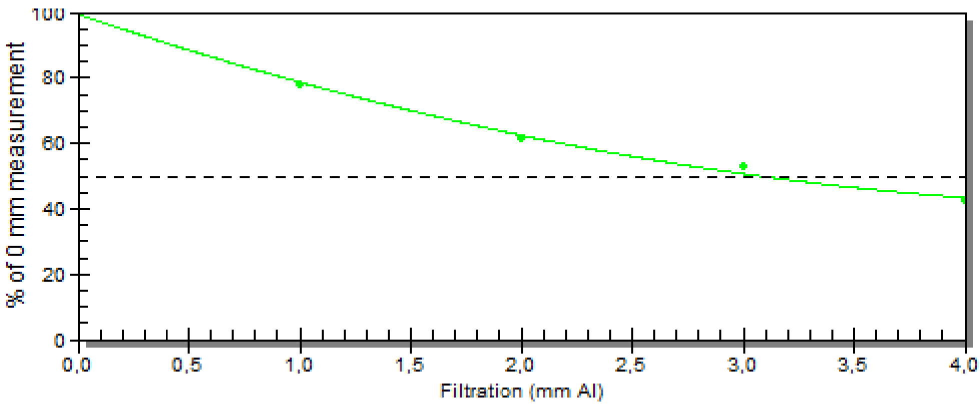
The analysis text looks like this:

Half Value Layer

Result: Pass

HVL is 3.190 mm Al
HVL limit: minimum 2.300 mm Al

Estimated total filtration: 3.219 mm Al



Assume that we want to add the following text to the analysis. It should be placed below the graph:

"Measured exposure with 0 mm Al was: X.XXX mGy"

Do the following:

1. Right-click on the first cell in the Exposure column.

2. Select "Edit cell name" from the menu.

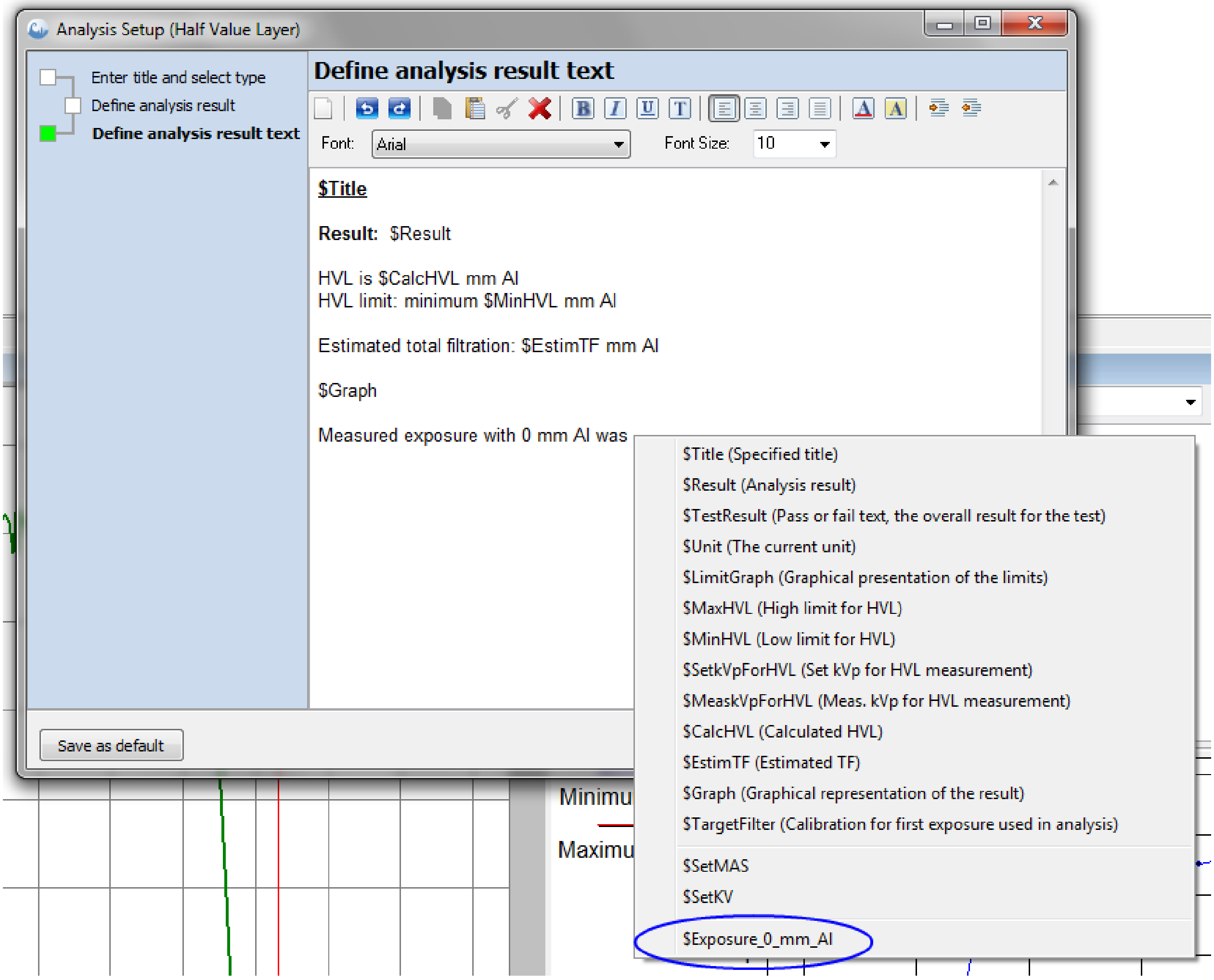
3. Give the cell the name "Exposure_0_mm_Al" and click OK.

4. Now right-click on the analysis.

5. From the menu select "Modify analysis or trend" and select the Half Value Layer analysis.

6. Click on the More... button.

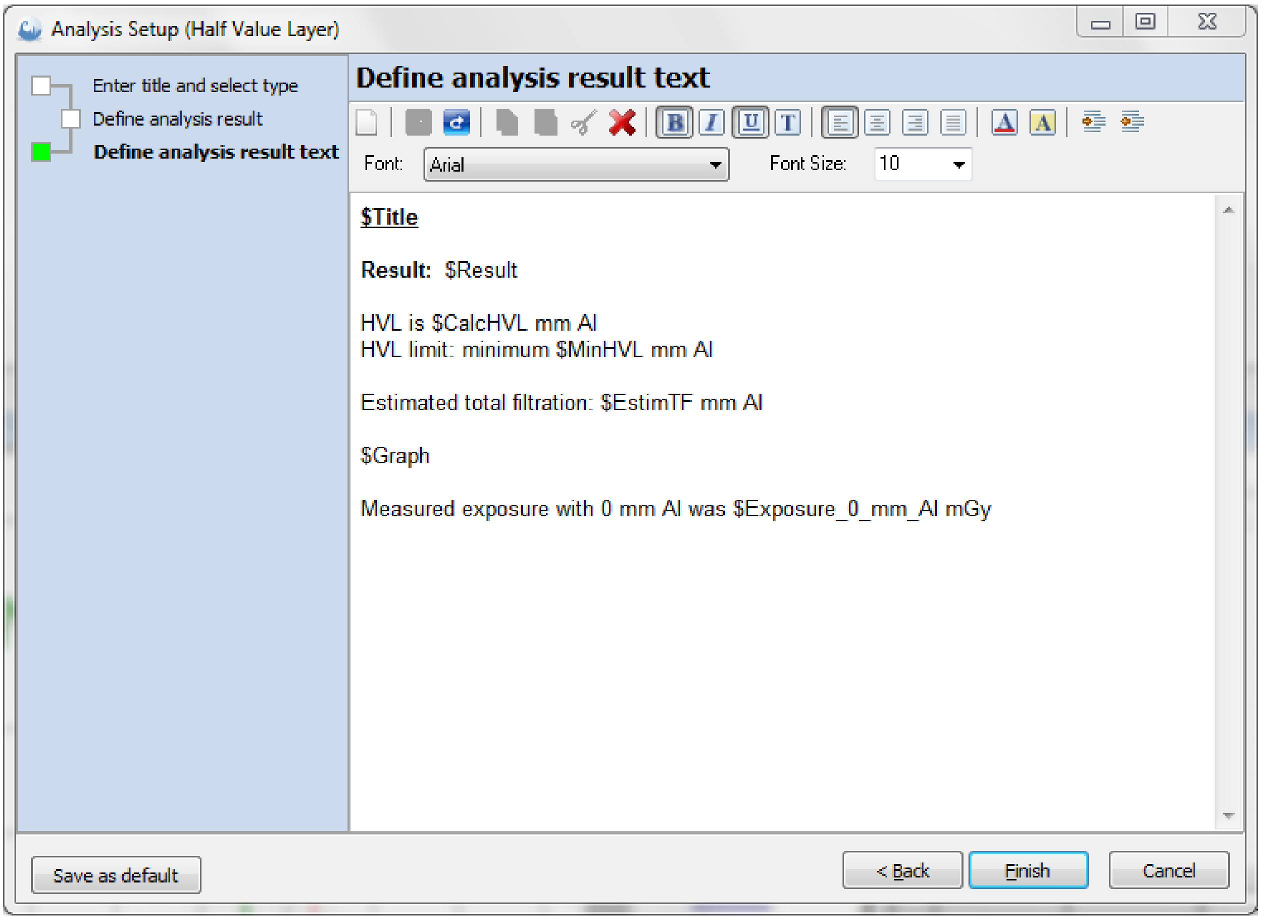
7. A wizard starts; click on next until you come to the "Define analysis result text" page.



8. Type the new text below the graph macro. To insert the exposure value type "$". The list with all macros will automatically pop up. Your cell name will be shown and you can select it.

9. Type a space followed by "mGy".

10. Your analysis text should now look like this:



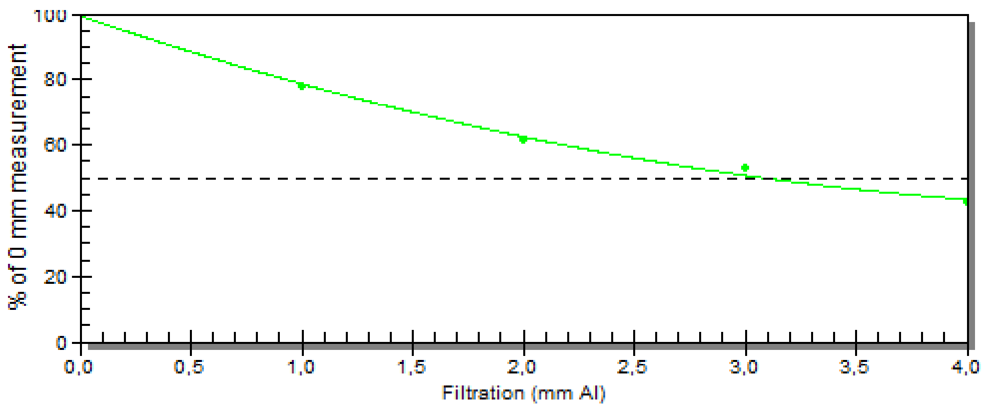
11. Click on Finish and then OK. The result should now look like this:

Half Value Layer

Result: Pass

HVL is 3.190 mm Al
HVL limit: minimum 2.300 mm Al

Estimated total filtration: 3.219 mm Al



Measured exposure with 0 mm Al was 0.3006 mGy

8.3.3.2.3 Show a value from analysis in the grid

In some situation it is convenient to be able to automatically put values from the analysis into a cell in the grid. One example is the AGD analysis:

Set kV (kV)	Compr. paddle
26	Yes

View / Select	#	Calibration	HVL(AGD) (mm Al)	Exposure (norm) (mGy)	Set Added filtr. (mm Al)	AGD (mGy)
	1	Mo/30 µm Mo		3.240	0.00	
	2	Mo/30 µm Mo		2.820	0.10	
	3	Mo/30 µm Mo		2.290	0.20	
	4	Mo/30 µm Mo		1.640	0.30	
	5	Mo/30 µm Mo		1.340	0.40	
	6	Mo/30 µm Mo			0.50	
	7	Mo/30 µm Mo	0.323	5.300		0.9948

When measuring AGD you start with an HVL measurement. This is row 1 to 6, the calculated HVL value is shown in the HVL analysis. Row 7 is the measurement of ESAK. To calculate the AGD, the HVL value is required in the marked cell in the picture above.

Analysis

Summary
Half Value Layer: ---
AGD (ACR): Pass

Half Value Layer

HVL is 0.323 mm Al

AGD (ACR)

Result: Pass

AGD for Mo/30 µm Mo at 26.0 kV is 0.9948 mGy (Max allowed is 3.000 mGy)

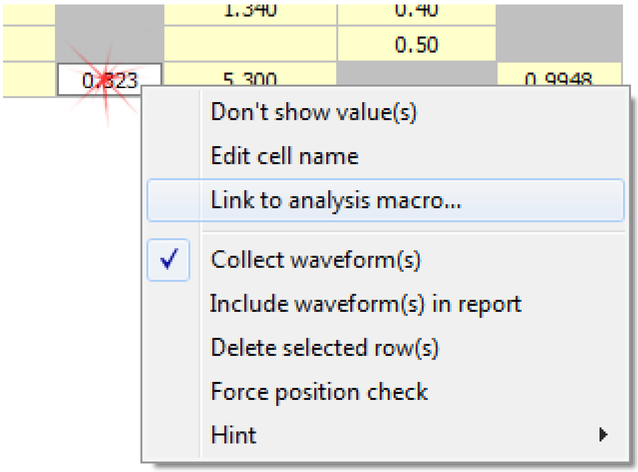
Half value layer: 0.323 mm Al
Entrance surface air kerma (ESAK): 5.300 mGy

You can enter the calculated HVL value manually or create a link from the analysis to the cell where you want the HVL value. If you create a link, the HVL value will automatically appear in the cell as soon as it is available.

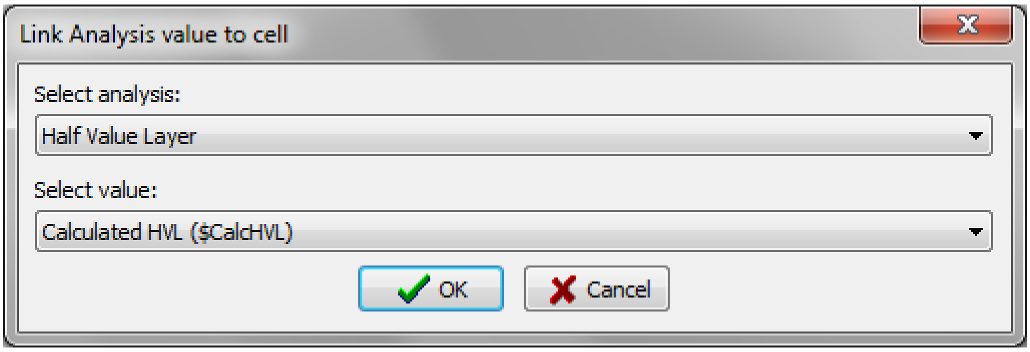
Links from analysis to cells can be created for two column types, to the column "HVL (AGD) (Measured)" and the user-defined column "Numeric value (Measured)".

To create a link from an analysis to a cell (AGD example):

1. In the AGD test right-click on the cell where you want the HVL value to appear.



2. Select "Link to analysis macro..." from the menu. A dialogue is shown:



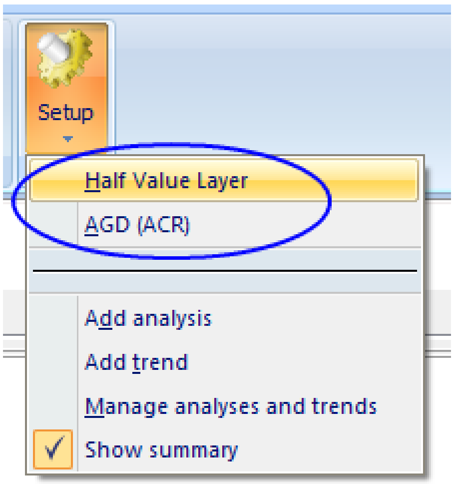
3. Select the analysis and which value you want to show up in the cell. In this case we select the HVL analysis and the calculated HVL value.

4. Click OK.

The cell will now be updated with exactly the same value that is calculated by the HVL analysis.

See also the topic User-defined calculation. You can also use analysis results in the grid by using a user-defined calculation.

Note!
In this case must HVL be shown before the AGD analysis in the list of analysis.



8.3.3.2.4 Use for analysis

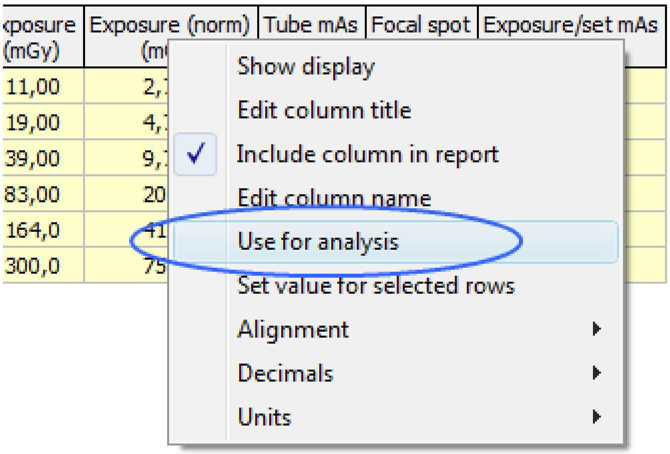
Each type of analysis in Ocean can be used on only one column in a test. The example below will illustrate this and how you define which column to use:

Let's assume you are measuring exposure and you have one column with measured and one with normalized exposure values. You are going to evaluate the mA linearity and you want to use the normalized exposure values to do this. Your template looks like this:

SSD (cm)	SDD (cm)	Set kV (kV)
100,0	50,00	80,0

View / Select	#	Set mAs (mAs)	Exposure (mGy)	Exposure (norm) (mGy)	Tube mAs	Focal spot	Exposure/set mAs (mGy/mAs)
	1	20,00	11,00	2,750	20,00	Small	0,5500
	2	40,00	19,00	4,750	40,00	Small	0,4750
	3	80,00	39,00	9,750	80,00	Small	0,4875
	4	160,0	83,00	20,75	160,0	Small	0,5188
	5	320,0	164,0	41,00	320,0	Small	0,5125
	6	640,0	300,0	75,00	640,0	Small	0,4688

1. The mA linearity analysis is calculating the linearity on the Exposure/mAs column, using the measured values and not on the normalized values as you want. To get the results you want, you need to change which column is used for the linearity analysis. To do this, right-click on the "Exposure(norm)" column:



2. Now click on "Use for analysis". As you can see, the values in the "Exposure/mAs" column are recalculated and the normalized exposure is used instead.

SSD (cm)	SDD (cm)	Set kV (kV)
100,0	50,00	80,0

View / Select	#	Set mAs (mAs)	Exposure (mGy)	Exposure (norm) (mGy)	Tube mAs	Focal spot	Exposure/set mAs (mGy/mAs)
	1	20,00	11,00	2,750	20,00	Small	0,1375
	2	40,00	19,00	4,750	40,00	Small	0,1188
	3	80,00	39,00	9,750	80,00	Small	0,1219
	4	160,0	83,00	20,75	160,0	Small	0,1297
	5	320,0	164,0	41,00	320,0	Small	0,1281
	6	640,0	300,0	75,00	640,0	Small	0,1172

8.3.3.2.5 Analysis comment

The analysis comment is a special feature that can be used to:

- show a text on failing rows to indicate which analysis that failed
- show a text on each row that can contain also the macros (names proceeded by "$")

To display analysis comments, you need to add an "Analysis comment" column. Take a look at the before (first picture) and the after (second picture) the analysis comment is added.

View / Select	#	Set kV (kV)	Tube voltage (kV)	kVp diff %	Exposure time (ms)	Exposure (mGy)
	1	40	43,2	8,0		
▶	2	60	61,2	2,0		
	3	80	78,9	-1,4		
	4	100	101,2	1,2		
	5	120	122,3	1,9		
	6	140	144,2	3,0		

In this picture, you can see the extra column titled "Analysis comment" with some text in it (you can see how to add a column here).

View / Select	#	Set kV (kV)	Tube voltage (kV)	kVp diff %	Exposure time (ms)	Exposure (mGy)	Analysis comment
	1	40	43,2	8,0			Acc err
▶	2	60	61,2	2,0			
	3	80	78,9	-1,4			
	4	100	101,2	1,2			
	5	120	122,3	1,9			
	6	140	144,2	3,0			

You can see that in this example, the new column indicates that the Accuracy analysis failed. If you are performing more than one analysis on one row of data and they both fail, both analyses will put their respective errors in the Analysis Comment column in the first row and it will be listed as first error, second error. For example, let's assume that we were analyzing Accuracy and Reproducibility on one row and they both failed, the Analysis comment column will record the errors as "Acc err, Repro err".

The above way of showing the errors is the default way when you use the Analysis comment column, however, it doesn't say very much, except that an analysis failed. We felt it would be great if an analysis failure can provide us with some more detail as to why it failed, so we added a new feature to Ocean to enable you to change the error text in the Analysis comment column to tell you why the analysis failed and not just that it did. This is very helpful when diagnosing an X-ray system problem.

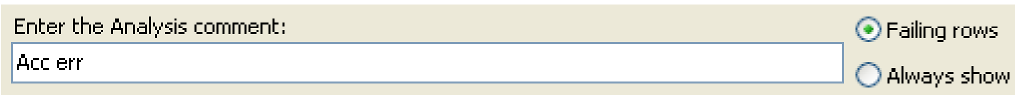
Indicate a failing result

:To change the text of the Analysis comment column, follow these simple steps:

1. Right-click on the analysis window, select modify from the menu and click the analysis you want to modify.

2. The analysis window shows the acceptance limits. Click the "More..." button and a wizard will start to show you the "Define analysis result text" choice. This is where we'll enter our new text to show instead of the default text.

3. At the bottom of the window you have the following line showing the default Analysis comment field text.



To change this, click in the text field and enter your text. For our example, we entered the following:

Enter the Analysis comment:
kV failed,max allowed difference is $LoLimitRelDiff % to $HiLimitRelDiff %
◉ Failing rows
○ Always show

The template will now look like the picture below (increase the width for the Analysis comment column). Notice the new text is now shown in the Analysis comment field.

View / Select	#	Set kV (kV)	Tube voltage (kV)	kVp diff %	Exposure time (ms)	Exposure (mGy)	Analysis comment
	1	40	43,2	8,0			kV failed,max allowed difference is -5,0 % to 5,0 %
▶	2	60	61,2	2,0			
	3	80	78,9	-1,4			
	4	100	101,2	1,2			
	5	120	122,3	1,9			
	6	140	144,2	3,0			

-End-

Show for every failed row

Let's assume that we have different acceptance limits in the test template above, for example, ±10 % for exposure #1 and #2, and ±5 % for exposure #3 and #4, and ±2 % for exposure #5 and #6. The analysis result looks like this:

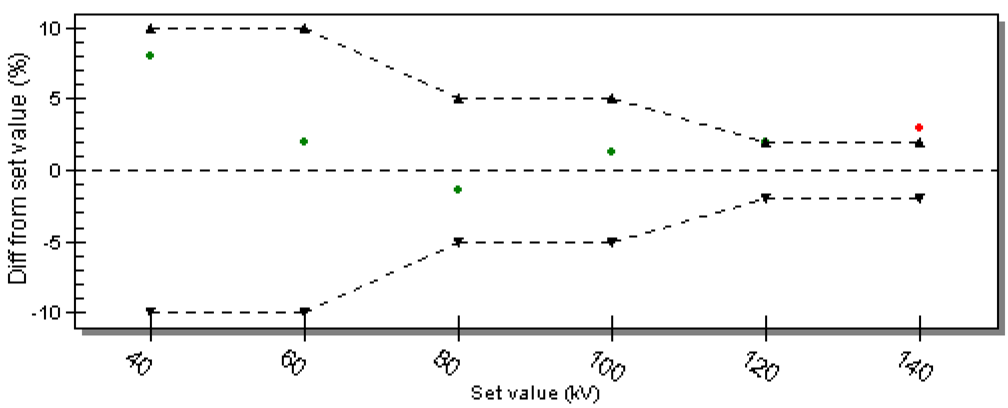
Analysis

Summary
kV accuracy: FAIL

kV accuracy

Result: Test failed

Maximum inaccuracy is 8,0 % (3,2 kV) at 40,0 kV (Limit: -10,0 % to 10,0 %)

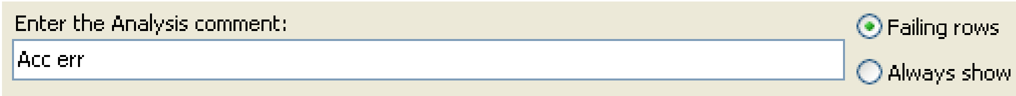


You can use the Analysis comment field if you want to see this in the grid. Here are the steps to follow to modify the analysis:

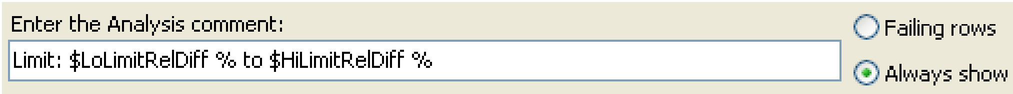
1. Right-click on the analysis window, select modify from the menu and click the analysis you want to modify.

2. The analysis window shows the acceptance limits. Click the "More..." button and a wizard will start to show you the "Define analysis result text" choice. We will enter our new text in the text field.

3. At the bottom of the window you have the following line showing the default Analysis comment field text and two radio buttons. One is "Failing rows" the other is "Always show". The default is "Failing rows".



The template will now look like the picture below (increase the width for the Analysis comment column). Notice the new text is now shown in the Analysis comment field. In addition, we will click the "Always show" radio button.



Now the radio button "Always show" is selected and the Analysis comment text will appear for all rows, not just the failing ones.

The test template now looks like this:

View / Select	#	Set kV (kV)	Tube voltage (kV)	kVp diff %	Exposure time (ms)	Exposure (mGy)	Analysis comment
	1	40	43,2	8,0			Limit: -10,0 % to 10,0 %
▶	2	60	61,2	2,0			Limit: -10,0 % to 10,0 %
	3	80	78,9	-1,4			Limit: -5,0 % to 5,0 %
	4	100	101,2	1,2			Limit: -5,0 % to 5,0 %
	5	120	122,3	1,9			Limit: -2,0 % to 2,0 %
	6	140	144,2	3,0			Limit: -2,0 % to 2,0 %

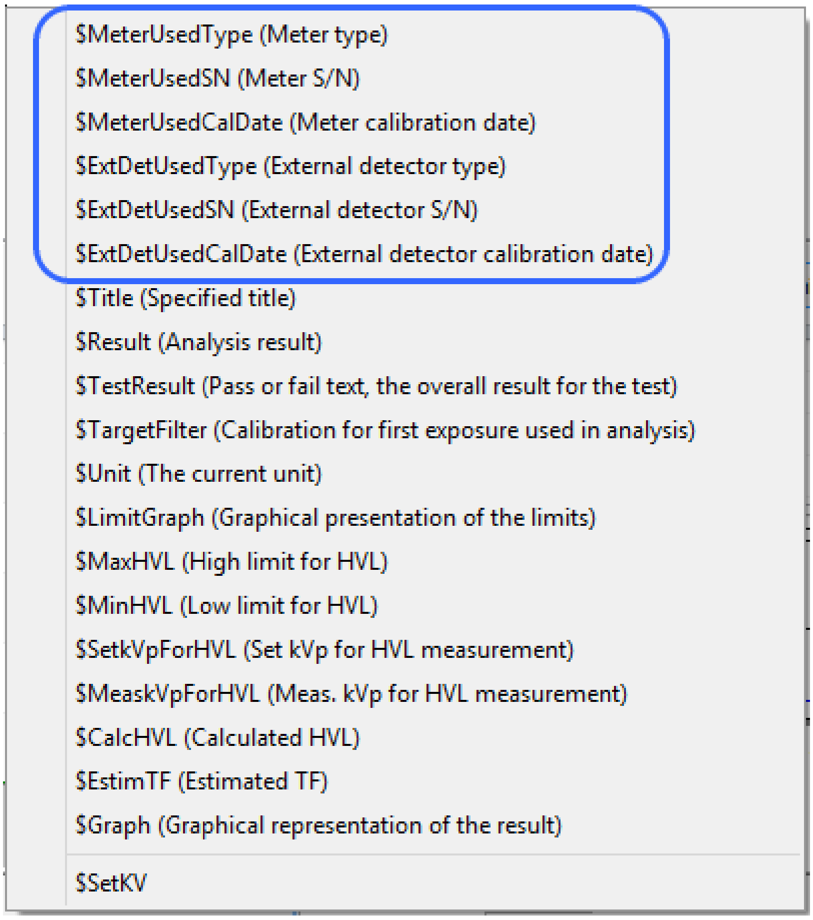
-End-

8.3.3.2.6 Meter and Detector macros

There are six macros that can be used in any test that gives information about used meter (and internal detector) and used external detector. These are

$MeterUsedType
$MeterUsedSN
$MeterUSedCalDate
$ExtDetUsedType
$ExtDetUsedSN
$ExtDetUsedCalData

These macros are always shown first in the macro list:



The macros gives information about meter/detector type, serial number and calibration date.

8.3.3.2.7 The $RowNo macro

All single row analysis (analysis that only operate on a single row) has a special macro; $RowNo. This macro can be used in the title to identify which row an analysis belong to. This macro is used by default when single row analysis are added. Assume that you have the following template:

View / Select	#	Set kV (kV)	Tube voltage (kV)	Exposure time (ms)	Exposure (mGy)	HVL (mm Al)
	1	28,00	27,69	1727	1,737	0,554
	2	30,00	29,96	1734	2,113	0,575
	3	36,00	36,18	1732	3,209	0,633

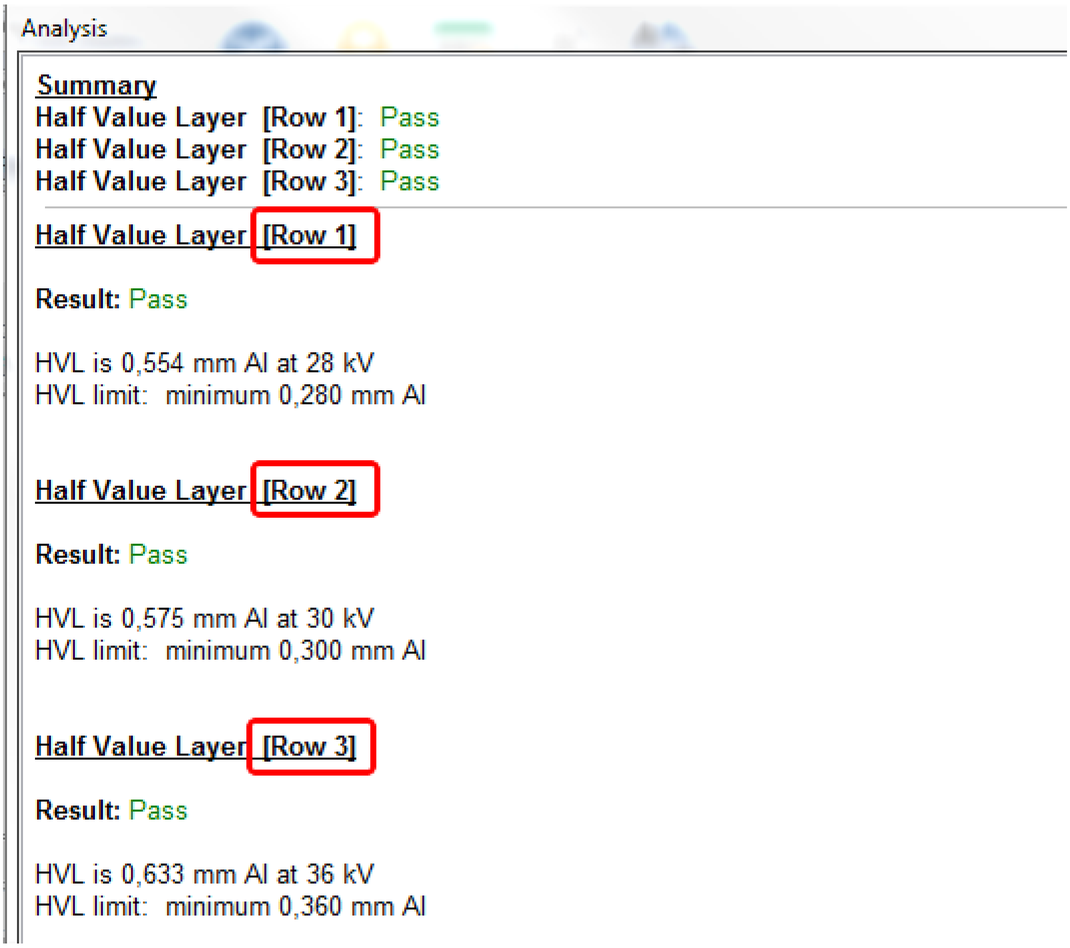
We now want to add a "Quick HVL" analysis to each row. To do this:

1. Select all three rows.

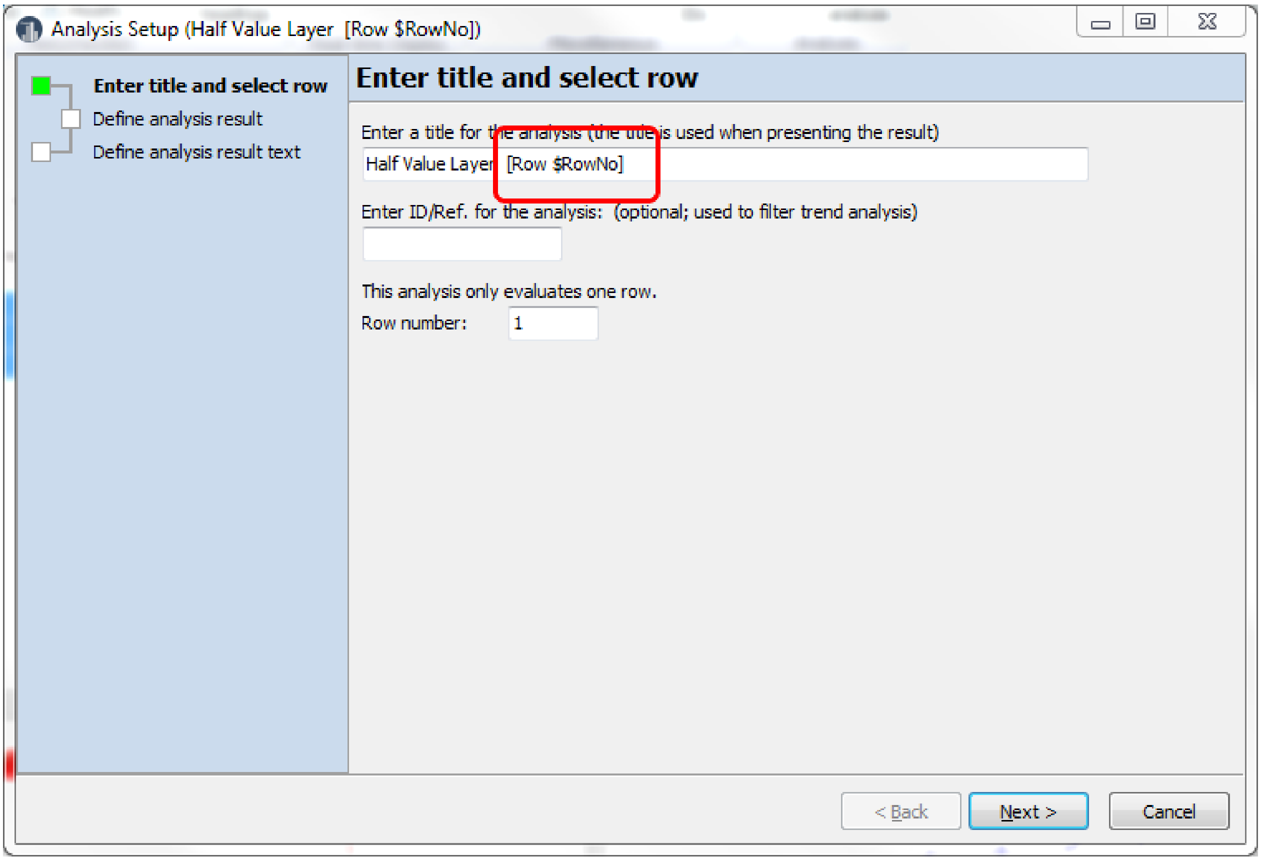
2. Select "Add analysis".

3. Add the Quick HVL analysis.

Three HVL analysis are now added, one for each selected row. It will look like this in the analysis window:



Each analysis has the row number indicated in the title. The $RowNo macro is used for this:



It is optional to use the macro; if you don't want it, just edit the analysis title.

8.3.3.2.8 User-defined macro

You can create your own macros that expands to values or texts and use the results in user-defined calculations our in analysis texts. Assume the follwoing: You want to show a text in a kVp analysis that says the following:

If maximum deviation is within accepted limits= "The tube voltage test passed"
If maximum deviation is outside accepted limits = "The tube voltage test failed"

The measured data looks like this:

Set mAs (mAs)	SDD (cm)	Set time (ms)
5	70	100

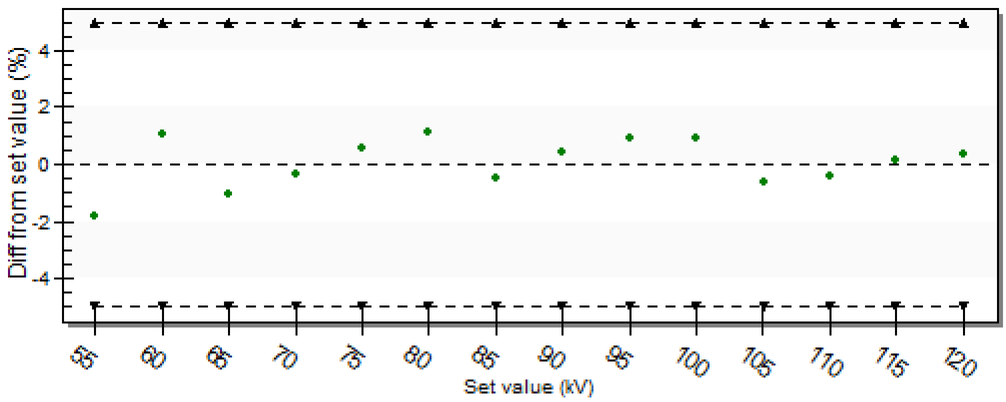
View / Select	#	Set kV (kV)	Tube voltage (kV)	kVp diff %	Exposure (mGy)	Exposure time (ms)
	1	55	55,13	0,2	0,2678	112,9
	2	60	60,62	1,0	0,3330	98,27
	3	65	64,33	-1,0	0,3776	98,27
	4	70	69,77	-0,3	0,4390	98,77
	5	75	75,42	0,6	0,5179	99,27
	6	80	80,88	1,1	0,5885	98,77
	7	85	84,61	-0,5	0,6444	99,28
	8	90	90,37	0,4	0,7168	98,77
	9	95	95,83	0,9	0,8055	98,77
	10	100	100,89	0,9	0,8833	98,78
	11	105	104,37	-0,6	0,9383	98,77
	12	110	109,57	-0,4	1,022	98,78
	13	115	115,14	0,1	1,115	98,78
	14	120	120,43	0,4	1,195	98,77

and we want the analysis to look like this:

Analysis

Tube voltage accuracy

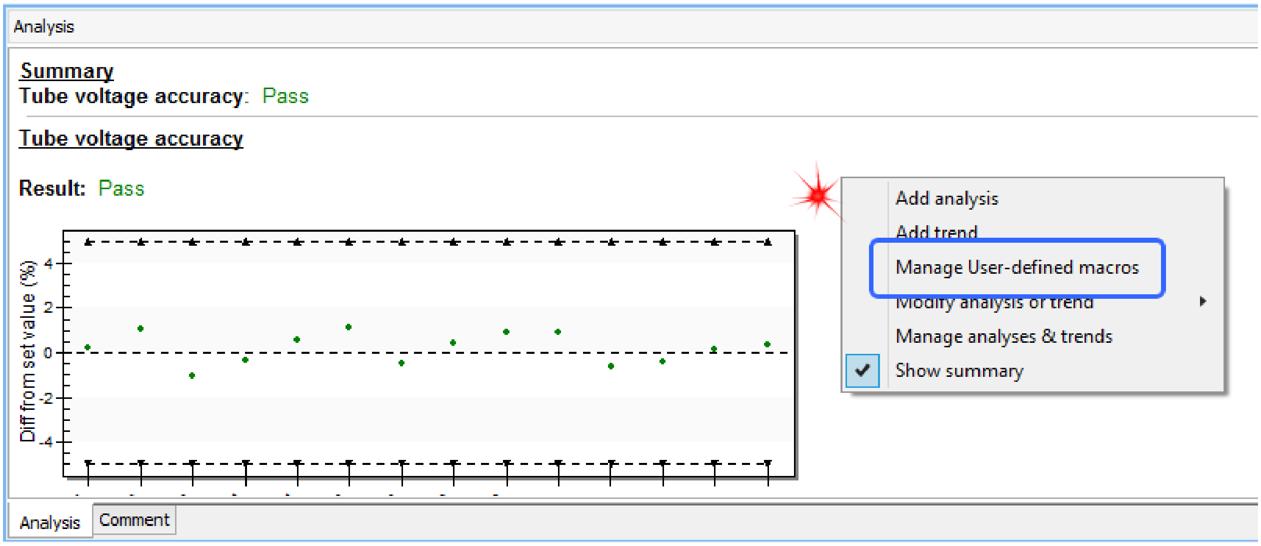
Result: Tube voltage test passed



We can use a user-defined macro to generate that text and then add it to the analysis text.

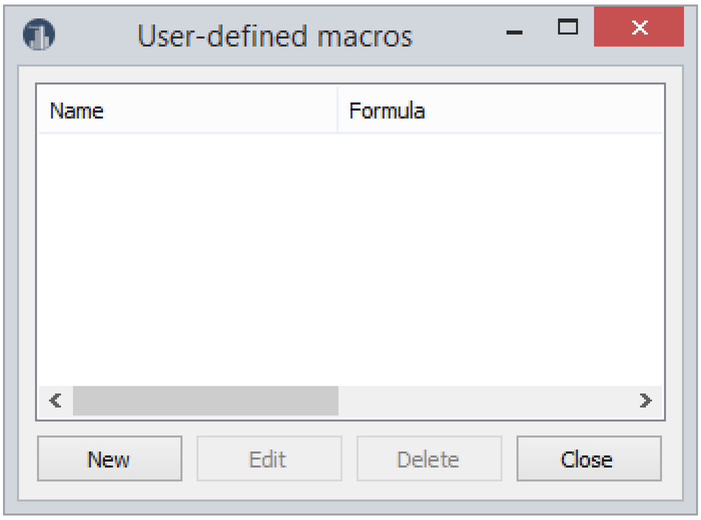
To create the user-defined macro:

1. Right-click on the analysis panel.

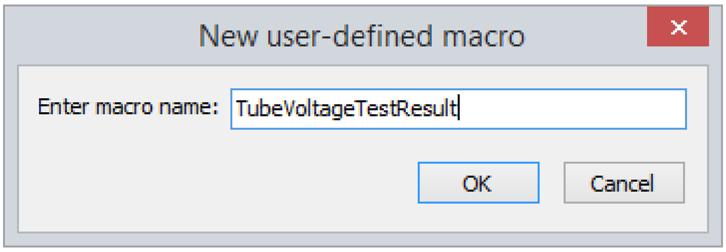


From the menu select "Manage User-defined macros".

2. A new dialogue is shown where you can manage the user-defined macros for the current test.

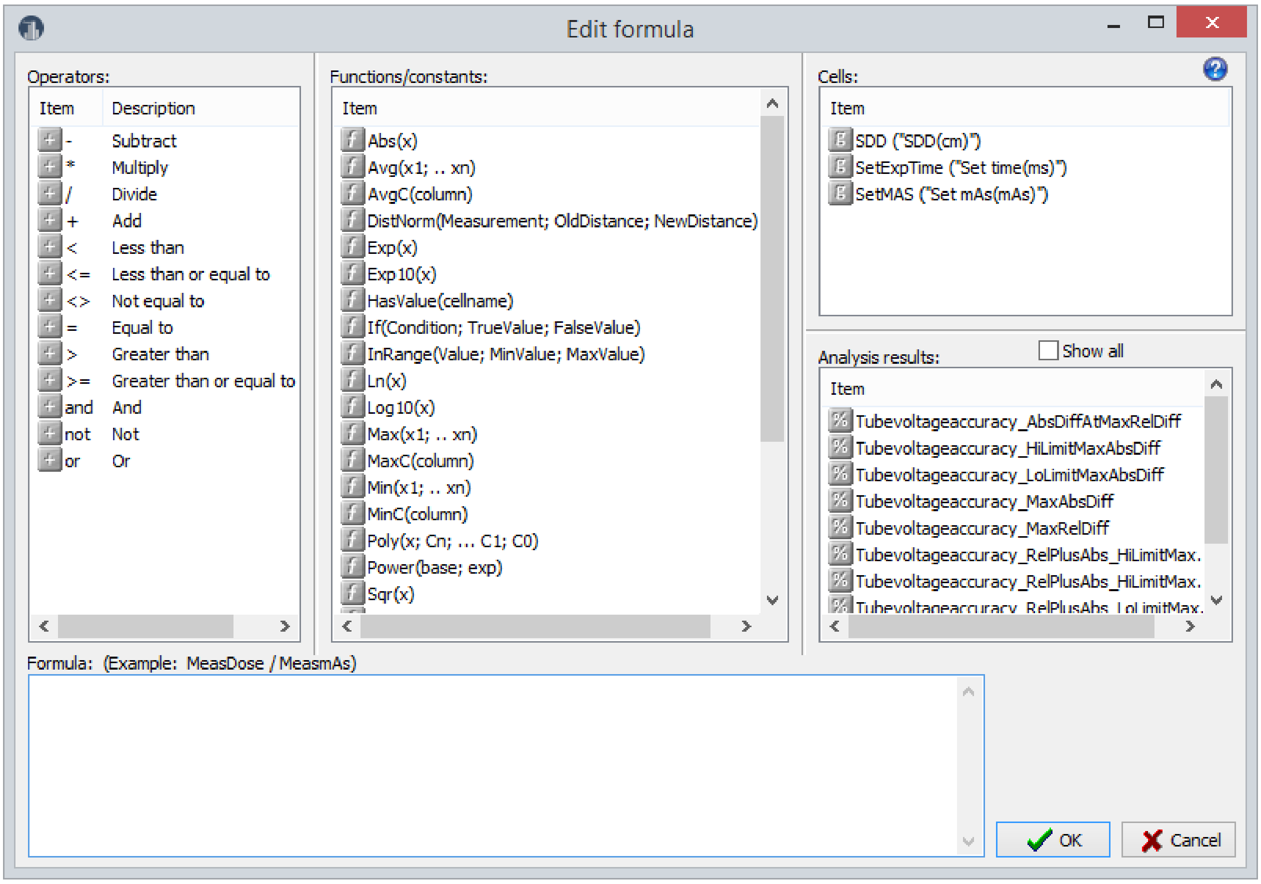


3. Click on the "New" button.



Specify a name; for example "TubeVoltageTestResult" and click OK.

4. The calculation dialogue is now shown and you can specify the macro:



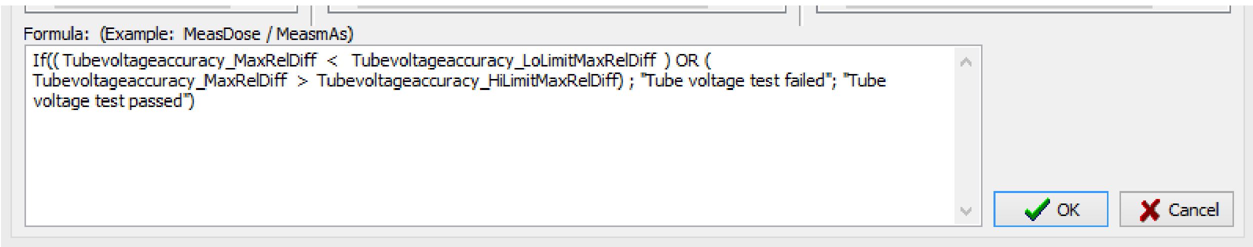
You can now in the lower left panel specify your macro. In this case we want to generate a text string depending on the calculated kV deviations in the column "kVp diff %". You need to use the IF-statement:

if(condition ; "Text1" ; "Text2")

In this case it shall look like this:

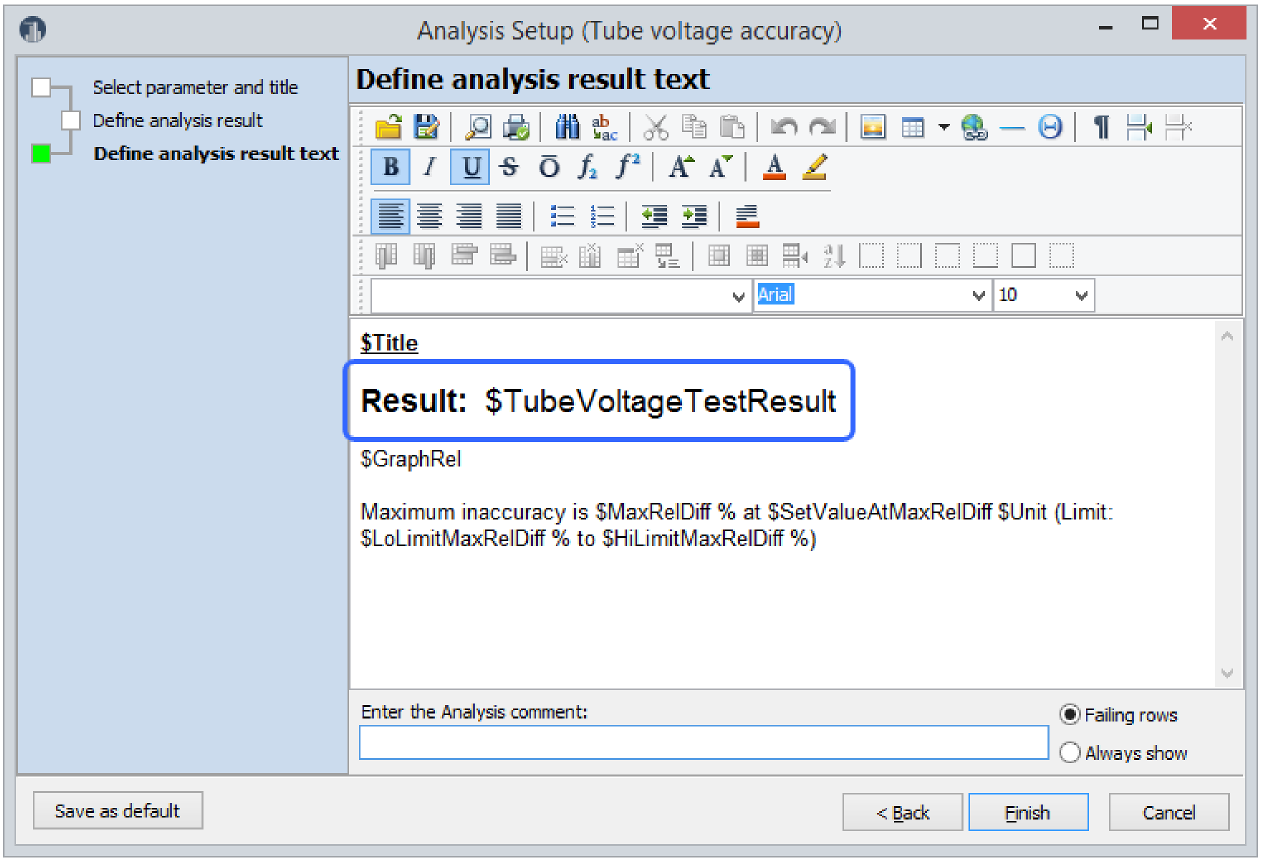
If((Tubevoltageaccuracy_MaxRelDiff < Tubevoltageaccuracy_LoLimitMaxRelDiff) OR (Tubevoltageaccuracy_MaxRelDiff > Tubevoltageaccuracy_HiLimitMaxRelDiff) ; "Tube voltage test failed"; "Tube voltage test passed")

All standard macro names are preceded by the "test name" and separated by "_". This is necessary in case a test has more than one analysis.

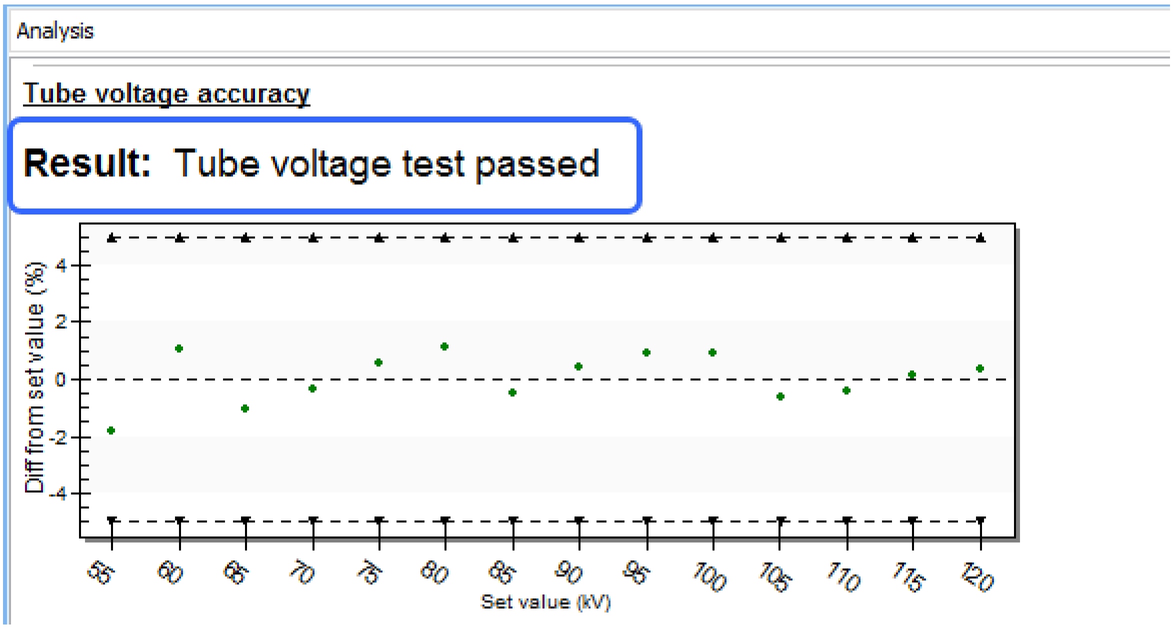


5. Click on the OK button to finish.

6. The macro is now created and you can now use it in the analysis text. Open the analysis text (you can see in the section Advanced analysis to see how you can modify the analysis text).

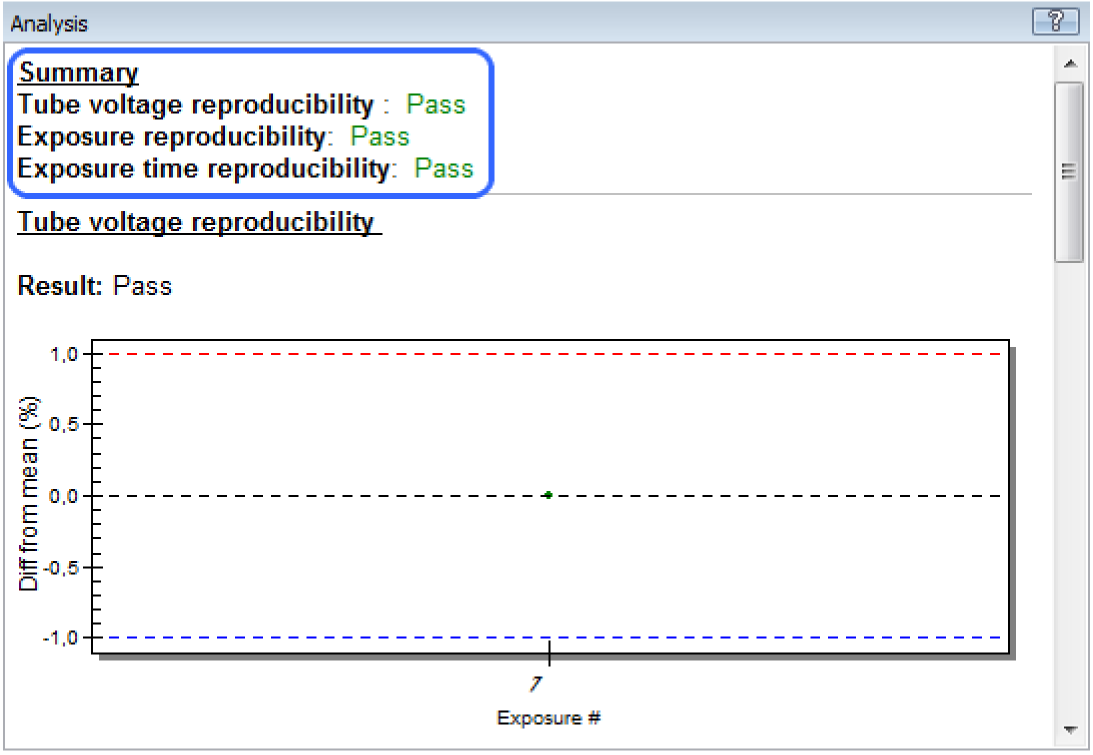


Finish and the analysis text will look like this:



8.3.3.2.9 Analysis summary

The analysis summary is shown before the detailed analysis results. It lists each analysis title and a pass or fail for each. It gives a quick overview of the total result.



You can hide the summary page if you want by right-clicking on the Analysis window and uncheck the "Show summary" option. You can do the same thing by going to the ribbon bar and clicking the "Analysis setup" button.

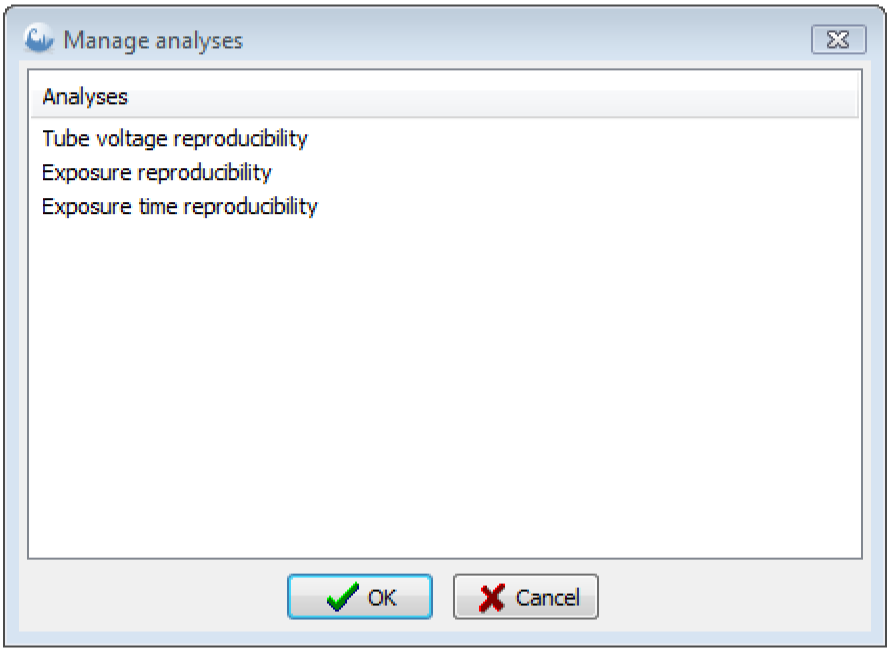
NOTE: An analysis is not shown in the summary if acceptance limits are not specified.

8.3.3.2.10 Delete analysis

This topic deals with deleting an analysis from a test or checklist template:

1. Right-click on the Analysis window and select "Manage analysis" (or go to the ribbon bar and click the Analysis Setup button and select Manage analysis).

2. A window like the one below will pop up listing all the included analyses (in our example, there are three of them):



3. Right-click on the analysis you want to remove and select Delete from the menu (you can also select an analysis and press the Delete key on your keyboard).

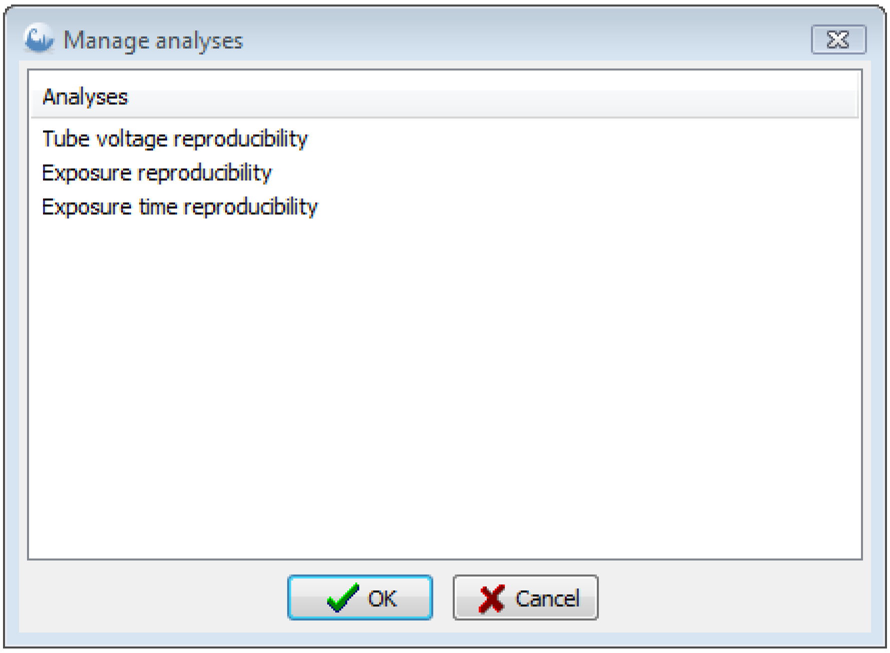
You can also change order of the analysis by using drag-and-drop.

8.3.3.2.11 Change order of analysis

This topic deals with changing the order of the analysis in a test or checklist template:

1. Right-click on the Analysis window and select "Manage analysis" (or go to the ribbon bar and click the Analysis Setup button and select Manage analysis).

2. A window like the one below will pop up listing all the included analyses (in our example, there are three of them):



3. Click on the analysis whose position you want to change and just drag it to the new desired position, then release the mouse and the analysis will be dropped to the new position.

You can also delete an analysis by right-clicking on it and select Delete from the menu.

8.3.3.3 Add/delete column or general settings

This topic deals with adding or deleting columns or general settings.

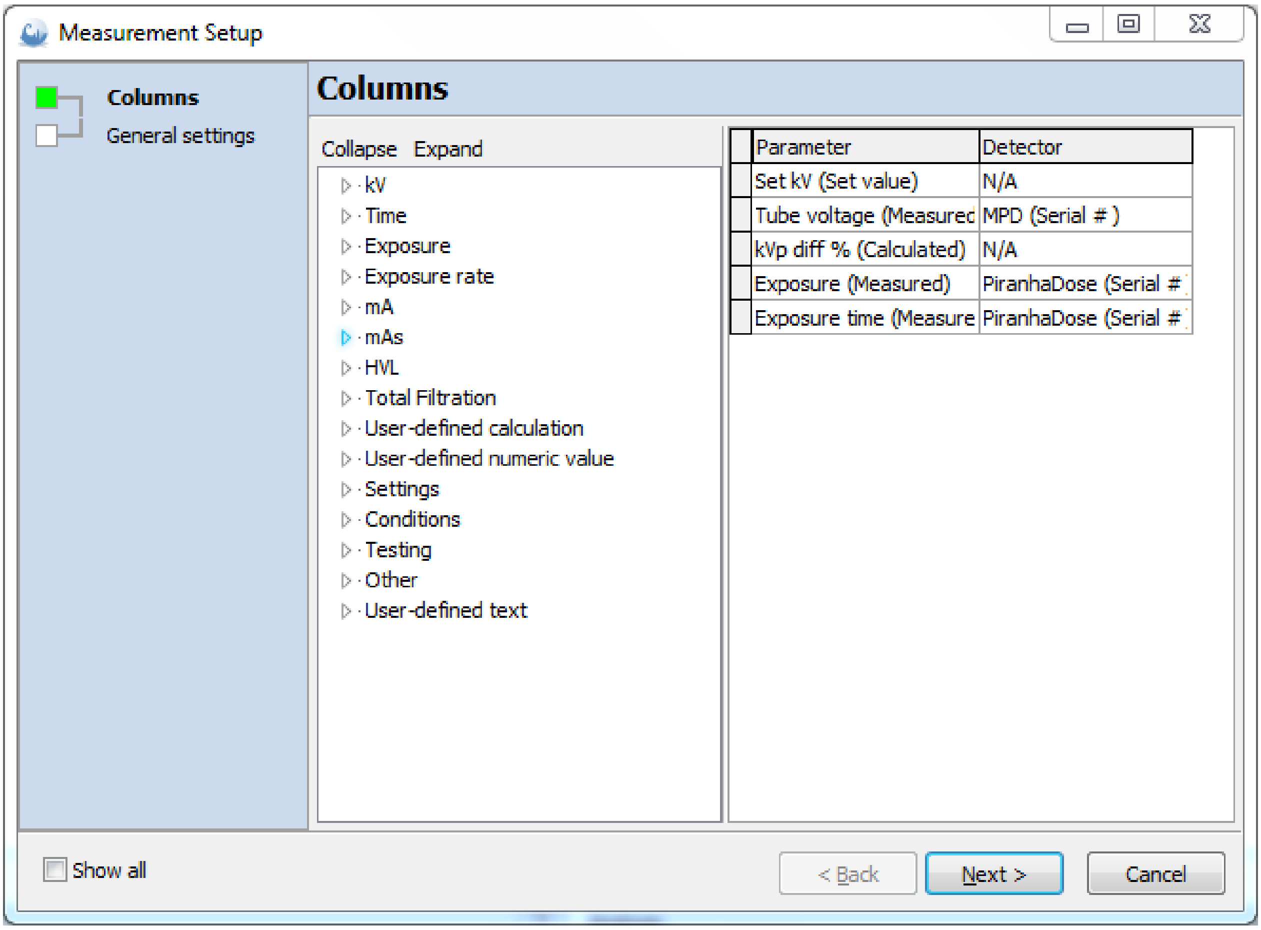
Let's assume we have the following template and we want first to change some columns around by adding some and deleting others. We would do it following the steps below:

Set mAs (mAs)	SDD (cm)	Set time (ms)
5	70	100

View / Select	#	Set kV (kV)	Tube voltage (kV)	kVp diff %	Exposure (mGy)	Exposure time (ms)
	1	60	60,62	1,0	0,3330	98,27
	2	70	69,77	-0,3	0,4390	98,77
	3	80	80,88	1,1	0,5885	98,77
	4	90	90,37	0,4	0,7168	98,77
	5	100	100,89	0,9	0,8833	98,78
	6	110	109,57	-0,4	1,022	98,78
	7	120	120,43	0,4	1,195	98,77

1. Right-click outside the grid on the empty space to the right or below the grid and select Modify Test. You can also go to the Design page on the ribbon bar and select Modify from the Test/Checklist group to achieve the same result.

2. The modify test wizard will start to guide you through the process. The first page of the wizard looks like the picture below.

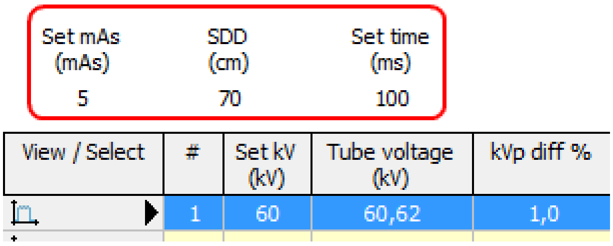


To add a column: Use drag-and-drop to select a column from the left side and drop it to the right side. You can also double-click on columns on the left side to select them. The columns on the right side will be the ones in your template.

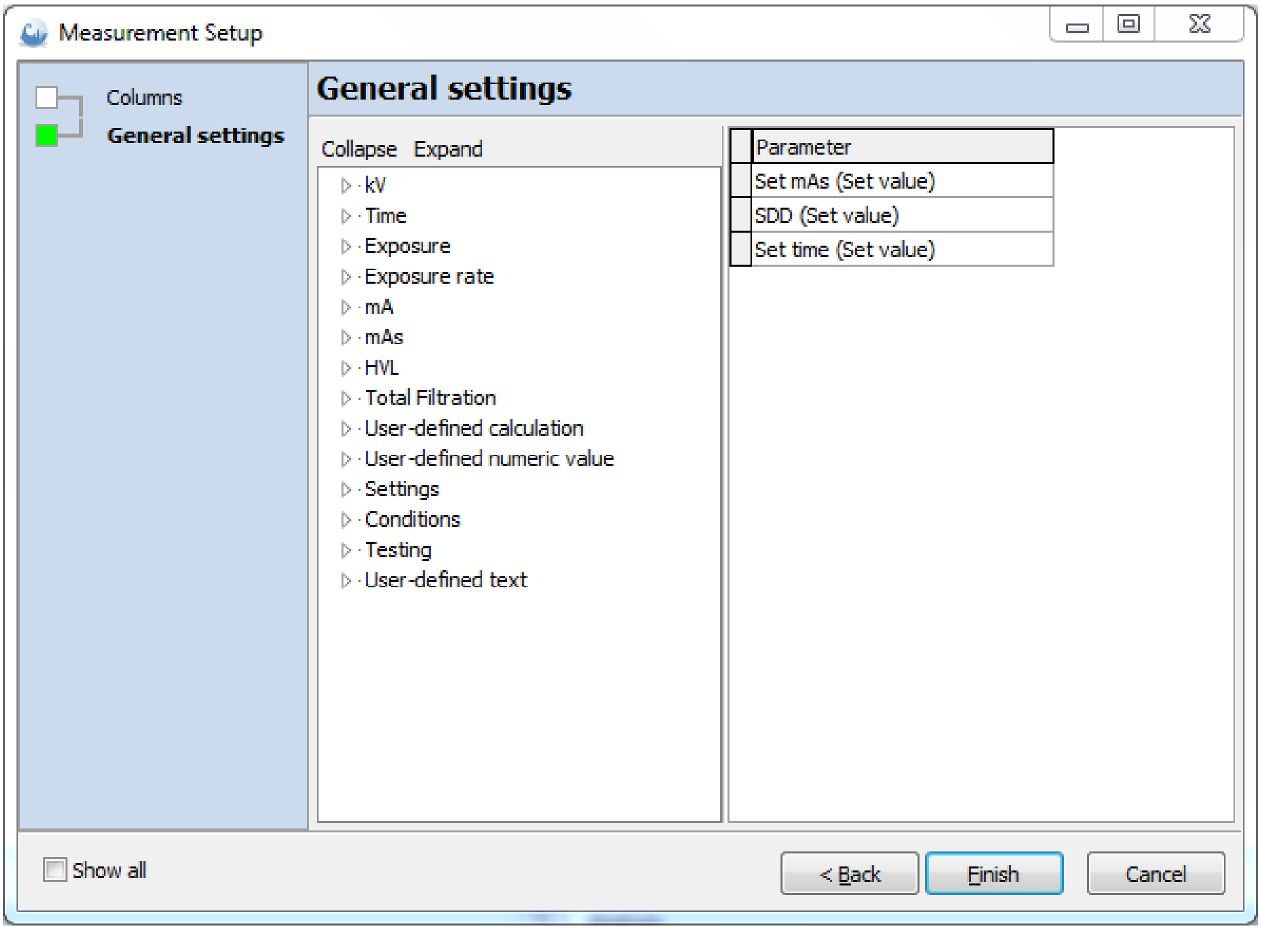
To delete a column: Right-click on a column on the right side and select Delete from the drop-down menu, or select a column on the right side and then use the Delete key on your keyboard.

3. When you are finished, click Next to continue with the wizard.

4. Now you can change the General settings:



The next page of the wizard will look very much like the one above, but it will contain general setting items instead of columns.



The add and remove general setting items procedure is the same as the one we described above to add and delete columns.

5. Click Finish when you are ready and the wizard will end. As soon as the wizard ends, the changes we made are visible in the test template.

There are other changes you can make to the order of columns and items in the general settings, as well as change the width of columns and modify set values.

8.3.3.4 Select multiple rows

When you have a template containing a lot of rows, or when you want to make the same changes to several rows in your template, the multiple row selection function is a way to speed up your work. The multiple row selection function is illustrated with the following example.

Let's assume we have the following template, and we want to change the "Set time" to 200 ms for rows 2, 3, 4, 5 and 7.

View / Select	#	Set kV (kV)	Set time (ms)	Tube voltage (kV) (Piranha)	kVp diff from mean (%)
	1	80	100,0		
	2	80	100,0		
	3	80	100,0		
	4	80	100,0		
	5	80	100,0		
	6	80	100,0		
	7	80	100,0		

We could do these changes one row at a time, but the multiple row selection is a much more efficient way to do the same thing faster. To select multiple rows, do the following:

1. Activate row #2 by clicking in the left column.

View / Select	#	Set kV (kV)	Set time (ms)	Tube voltage (kV) (Piranha)	kVp diff from mean (%)
	1	80	100,0		
	2	80	100,0		
	3	80	100,0		
	4	80	100,0		
	5	80	100,0		
	6	80	100,0		
	7	80	100,0		

2. Now hold down the Shift key and click (in the left column) on row #5. This will select all of the rows between #2 and #5 inclusively.

View / Select	#	Set kV (kV)	Set time (ms)	Tube voltage (kV) (Piranha)	kVp diff from mean (%)
	1	80	100,0		
	2	80	100,0		
	3	80	100,0		
	4	80	100,0		
	5	80	100,0		
	6	80	100,0		
	7	80	100,0		

3. To add the last row, hold down the Ctrl key and click on row #7.

View / Select	#	Set kV (kV)	Set time (ms)	Tube voltage (kV) (Piranha)	kVp diff from mean (%)
	1	80	100,0		
	2	80	100,0		
	3	80	100,0		
	4	80	100,0		
	5	80	100,0		
	6	80	100,0		
	7	80	100,0		

To finish our example, we'll change the time to 200 ms for the selected rows. We do this by:

1. right-clicking on the column heading for "Set time" and choose the "Set value for cells" option.

2. Enter 200 in the dialogue box, then click OK and you are done.

View / Select	#	Set kV (kV)	Set time (ms)	Tube voltage (kV) (Piranha)	kVp diff from mean (%)
	1	80	100,0		
	2	80	200,0		
	3	80	200,0		
	4	80	200,0		
	5	80	200,0		
	6	80	100,0		
	7	80	200,0		

As you can see in the picture above, all of our selected rows now show 200 ms instead of 100 ms

Right-click menu

You can also select multiple rows and right-click on the selection:

View / Select	#	Set kV (kV)	Tube voltage (kV)	kVp diff %	Exposure (mGy)	Exposure time (ms)
	1	50	49,69	-0,6	0,2070	100,8
	2	55	55,13	0,2	0,2678	112,9
	3	60	60,62	1,0	0,3330	98,27
	4	65	64,33	-1,0	0,377[illegible]	[illegible]
	5	70	69,77	-0,3	0,439[illegible]	[illegible]
	6	75	75,42	0,6	0,5179	99,27
	7	80	80,88	1,1	0,5885	98,77

Link selected cell(s) to spreadsheet

A menu is shown with operations you can perform on selected rows.

8.3.3.5 Select multiple cells

When you have a template containing a lot of cells, or when you want to make the same changes to several cells in your template, the multiple cell selection function is a way to speed up your work. The multiple cell selection function is illustrated with the following example.

Let's assume we have a template like the one below, and we want to link a block of cells from this template to an Excel spreadsheet. We could do this one cell at a time, but that would be time-consuming and inefficient. Instead, we'll use Ocean's multi-cell select function. To use this function, follow the steps below:

View / Select	#	Set kV (kV)	Tube voltage (kV) (Piranha)	kVp diff from mean (%)	Exposure (mGy) (Piranha)	Exposure diff from mean (%)
▶	1	80	80,59	-0,1	0,5825	-0,6
	2	80	80,69	0,0	0,5881	0,3
	3	80	80,74	0,1	0,5832	-0,5
	4	80	80,69	0,0	0,5859	-0,1
	5	80	80,77	0,1	0,5861	0,0
	6	80	80,62	-0,1	0,5904	0,7
	7	80	80,70	0,0	0,5877	0,2

First, select a cell in the spreadsheet. This will be the upper left corner of where the block will be linked. Now go back to Ocean.

In Ocean, do the following:

1. Click on the first cell you want. This will be the upper left corner of the block you want to link.

View / Select	#	Set kV (kV)	Tube voltage (kV) (Piranha)	kVp diff from mean (%)	Exposure (mGy) (Piranha)	Exposure diff from mean (%)
▶	1	80	80,59	-0,1	0,5825	-0,6
	2	80	80,69	0,0	0,5881	0,3
	3	80	80,74	0,1	0,5832	-0,5
	4	80	80,69	0,0	0,5859	-0,1
	5	80	80,77	0,1	0,5861	0,0
	6	80	80,62	-0,1	0,5904	0,7
	7	80	80,70	0,0	0,5877	0,2

2. Hold down the Shift key and click the cell that will be the right lower corner of the block you want to link. As you can see in the picture below, a block of nine cells are highlighted dark blue.

View / Select	#	Set kV (kV)	Tube voltage (kV) (Piranha)	kVp diff from mean (%)	Exposure (mGy) (Piranha)	Exposure diff from mean (%)
▶	1	80	80,59	-0,1	0,5825	-0,6
	2	80	80,69	0,0	0,5881	0,3
	3	80	80,74	0,1	0,5832	-0,5
	4	80	80,69	0,0	0,5859	-0,1
	5	80	80,77	0,1	0,5861	0,0
	6	80	80,62	-0,1	0,5904	0,7
	7	80	80,70	0,0	0,5877	0,2

3. Now right-click on the marked block.

View / Select	#	Set kV (kV)	Tube voltage (kV) (Piranha)	kVp diff from mean (%)	Exposure (mGy) (Piranha)	Exposure diff from mean (%)
	1	80	80,59	-0,1	0,5825	-0,6
	2	80	80,69	0,0	0,5881	0,3
	3	80	80,74	0,1	0,5832	-0,5
	4	80	80,69	0,0	0,5859	-0,1
	5	80	80,77	0,1		
	6	80	80,62	-0,		
	7	80	80,70	0,0	0,5877	0,2

Don't show value(s)
Link selected cell(s) to spreadsheet

4. From the drop-down menu, choose the "Link selected cell(s) to spreadsheet" option, and the nine cells will be linked to your spreadsheet, beginning at your cursor position in the spreadsheet. The cursor position in the spreadsheet will be the upper left corner of the linked block.

8.3.3.6 Change cell color

You can change color (background and font) on individual cells in the grid to increase visibility (on the computer screen):

View / Select	#	Set kV (kV)	Tube voltage (kV)	kVp diff %	Exposure (mGy)	Exposure time (ms)
	1	50				
	2	60				
	3	70				
	4	80				
	5	90				
	6	100				
	7	110				
	8	120				

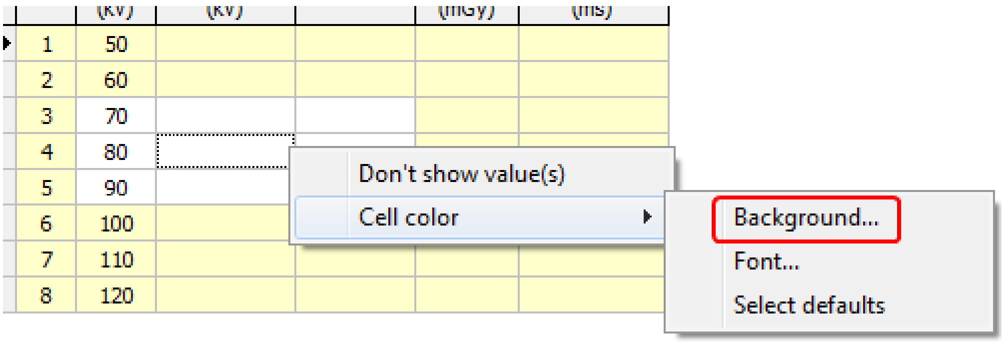
Note that the colcor indication is only shown on the computer screen, not in the report.

To change background and/or font color:

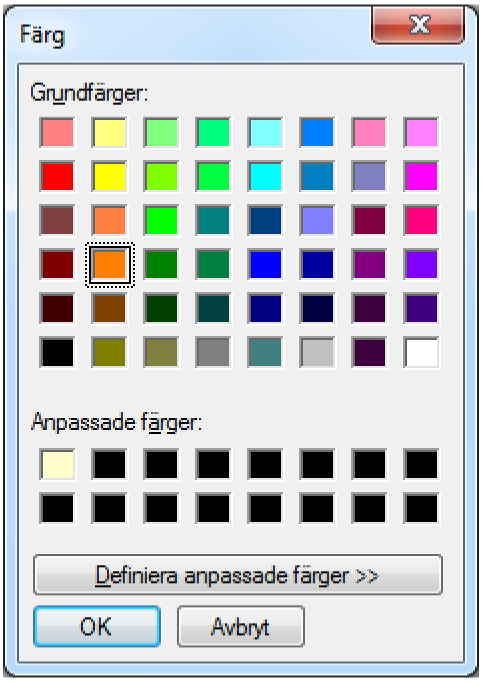
1. Select the cells you want to change color for:

View / Select	#	Set kV (kV)	Tube voltage (kV)	kVp diff %	Exposure (mGy)	Exposure time (ms)
	1	50				
	2	60				
	3	70				
	4	80				
	5	90				
	6	100				
	7	110				
	8	120				

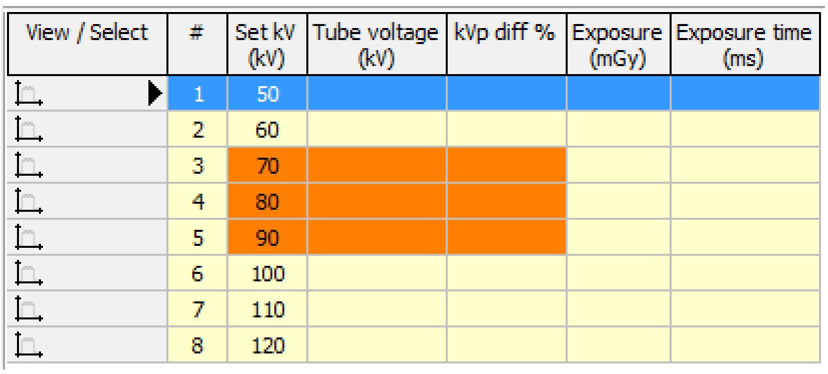
2. Right-click and select Cell color -> Background



3. Select a color and click OK



The cells get the new background color:



View / Select	#	Set kV (kV)	Tube voltage (kV)	kVp diff %	Exposure (mGy)	Exposure time (ms)
	1	50				
	2	60				
	3	70				
	4	80				
	5	90				
	6	100				
	7	110				
	8	120				

If you want to reset to standard colors, chose Select defaults from the menu.

8.3.3.7 Add/delete rows

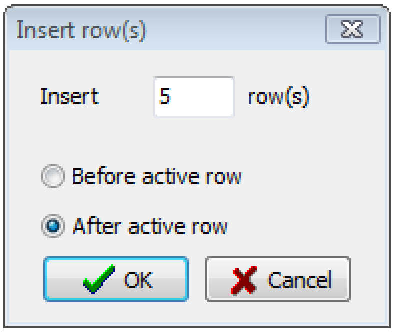
The functions needed to insert or delete rows are found on the Design page of the ribbon bar:

Add row(s)

1. Click in the left column to select where you want to insert new rows.

View / Select	#	Set kV (kV)	Tube voltage (kV)	kVp diff %
	1	50		
	2	60		
	3	70		
	4	90		
	5	110		

2. Go to the Design page on the ribbon and choose the "Insert row(s)" function.



3. A window will pop up like the one above where you can choose the number of row(s) you want to insert and if the new row(s) should be inserted before or after the selected row. Click OK when finished.

View / Select	#	Set kV (kV)	Tube voltage (kV)	kVp diff %
	1	50		
	2	60		
	3	70		
	4	70		
	5	70		
	6	70		
	7	70		
	8	70		
	9	90		
	10	110		

-End-

Delete row(s)

1. Select the row(s) you want to delete.

View / Select	#	Set kV (kV)	Tube voltage (kV)	kVp diff %
	1	50		
	2	60		
	3	70		
	4	70		
	5	70		
	6	70		
	7	70		
	8	70		
	9	90		
	10	110		

2. Go to the Design page on the ribbon and choose the "Delete row(s)" option.

View / Select	#	Set kV (kV)	Tube voltage (kV)	kVp diff %
	1	60		
	2	70		
	3	70		
	4	90		
	5	110		

-End-

8.3.3.8 Hints

Ocean has the ability to add hints to your templates to provide help for the user who will work with your templates. The hint is a message that will pop up automatically if certain situations arise, and can be turned off in the Program Options if desired. A common hint is to remind people to remove the filters from the beam after they have finished with the half-value layer test. The picture below shows this hint.

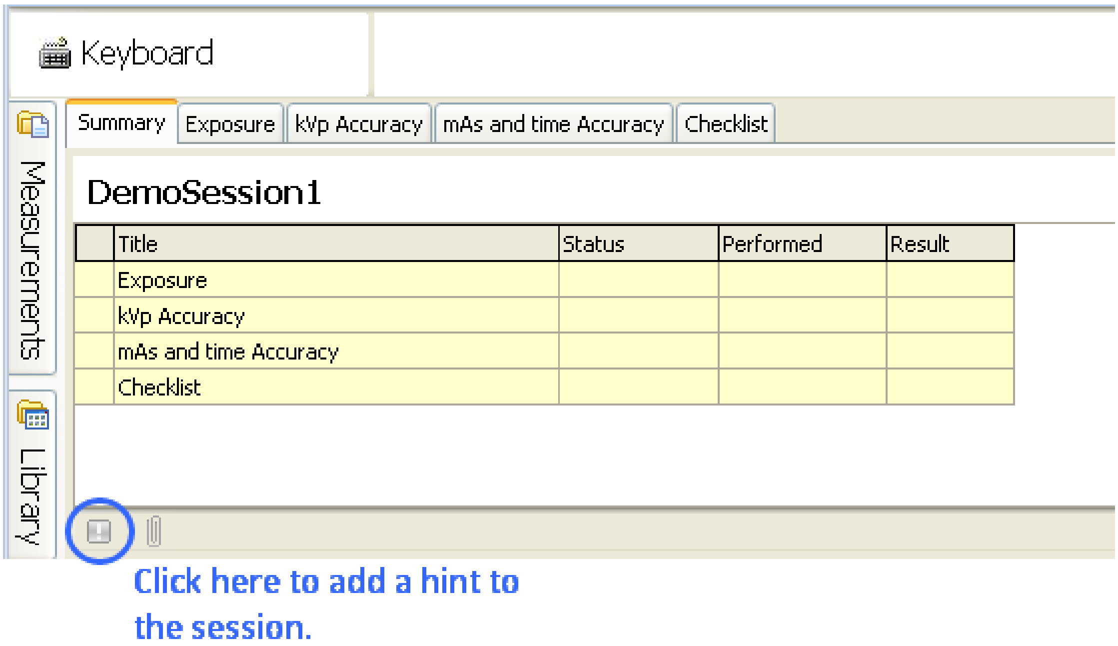
You can insert hints in the following places:

- Session - it will be shown when you start a session.
- Test or checklist - it will be shown when the test or checklist is started.
- Row - it will be shown when the row becomes active.

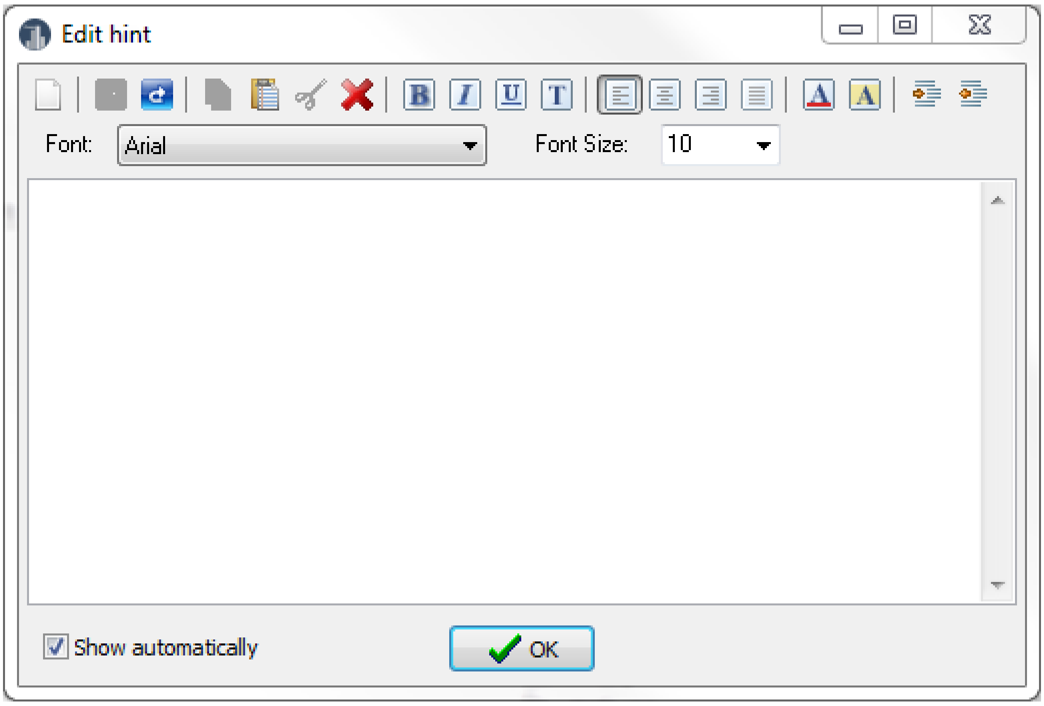
Add a session hint

1. Go to the session summary page and click on the "Add hint" icon located on the lower left part of the session summary page.

NOTE: This icon is grayed out when there is no hint present, but you can still click on it and add a hint.

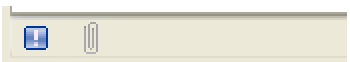


2. An edit window is shown where you can add the text you want. You can format the text and add pictures if as you like. You can also resize the window to the size you want it to have when it is shown to users in the template. You can also



There is a checkbox at the bottom of the window that defines whether you must click on the Hint button see it or it appears automatically. Note that the automatic display of hints must be checked in Program options as well. Once you are done, click OK to close the edit window.

The Hint icon now shows that a hint is present in a row (see the picture).



You can right-click on the hint and select "Show" to see what it looks like when it is displayed to the user..

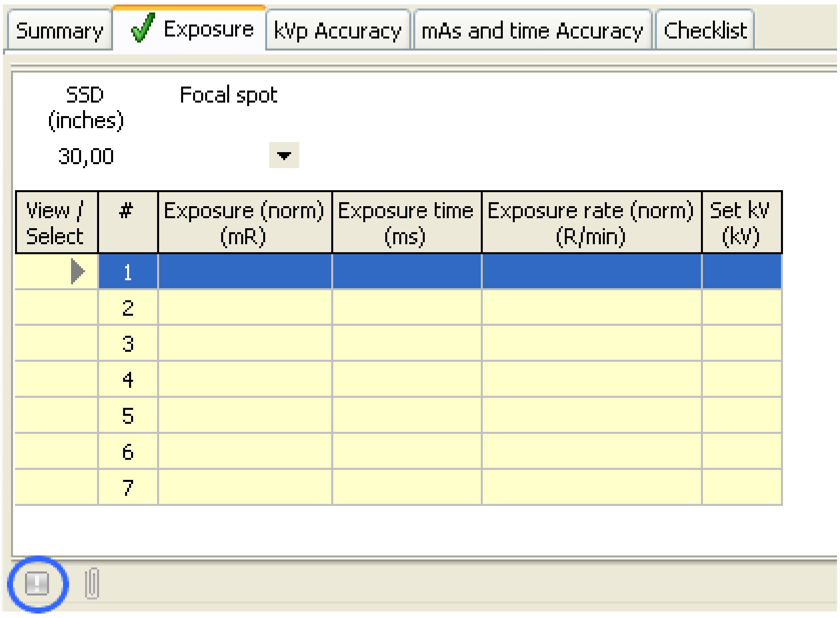
-End-

Add a test or checklist hint

1. Activate a test or checklist.

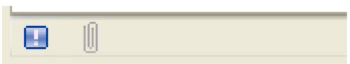
2. Click on the "Add hint" icon located in the lower left part of the screen.

NOTE: This icon is grayed out when there is no hint present, but you can still click on it and add a hint.



2. An edit window is shown where you can add the text you want. You can format the text and add pictures if as you like. You can also resize the window to the size you want it to have when it is shown to users in the template. Once you are done, click OK to close the edit window.

The Hint icon now shows that a hint is present in a row (see the picture).



You can right-click on the hint and select "Show" to see what it looks like when it is displayed to the user.

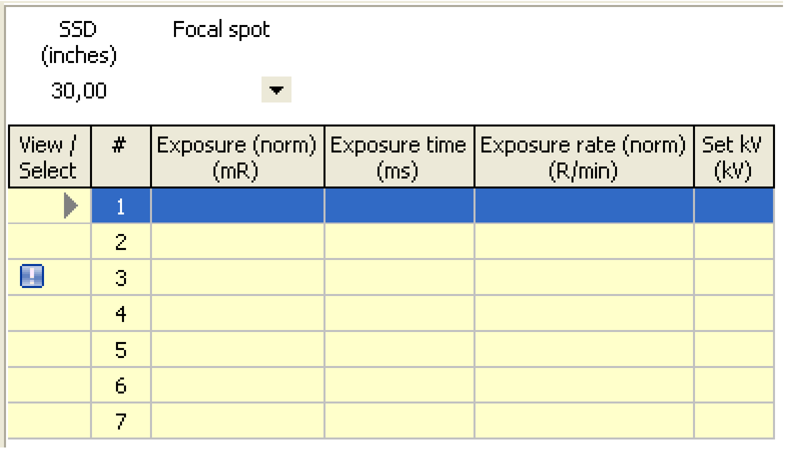
-End-

Add a row hint

1. Right-click on a row and select "Hint, then Add".

2. An edit window is shown where you can add the text you want. You can format the text and add pictures if as you like. You can also resize the window to the size you want it to have when it is shown to users in the template. Once you are done, click OK to close the edit window.

The Hint icon now shows that a hint is present in a row (see the picture)



You can right-click on the hint and select "Show" to see what it looks like when it is displayed to the user.

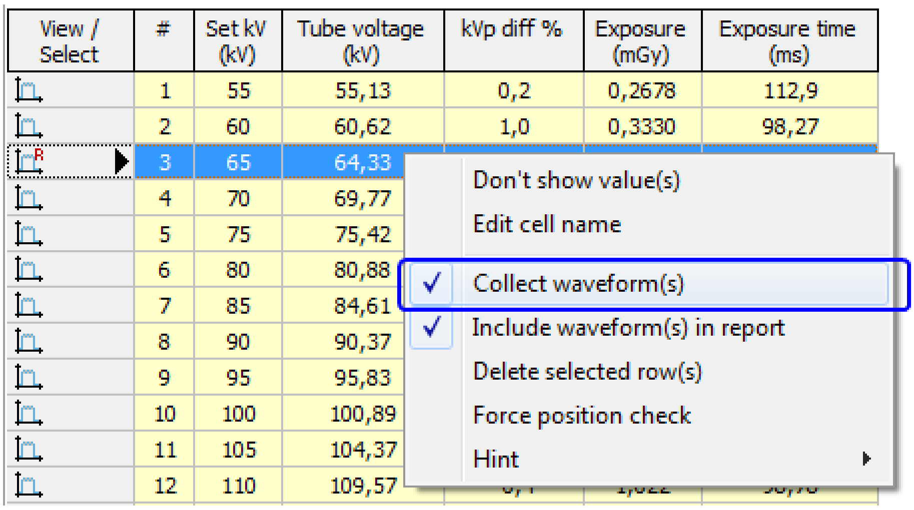
-End-

Edit or delete a hint

Right-click on the hint indicator and select "Edit" or "Delete" from the menu.

8.3.3.9 Waveforms

Waveforms are be default measured. You can turn off and on this individually for each row. This is done by right-clicking on a row and check or uncheck "Collect waveforms(s)".



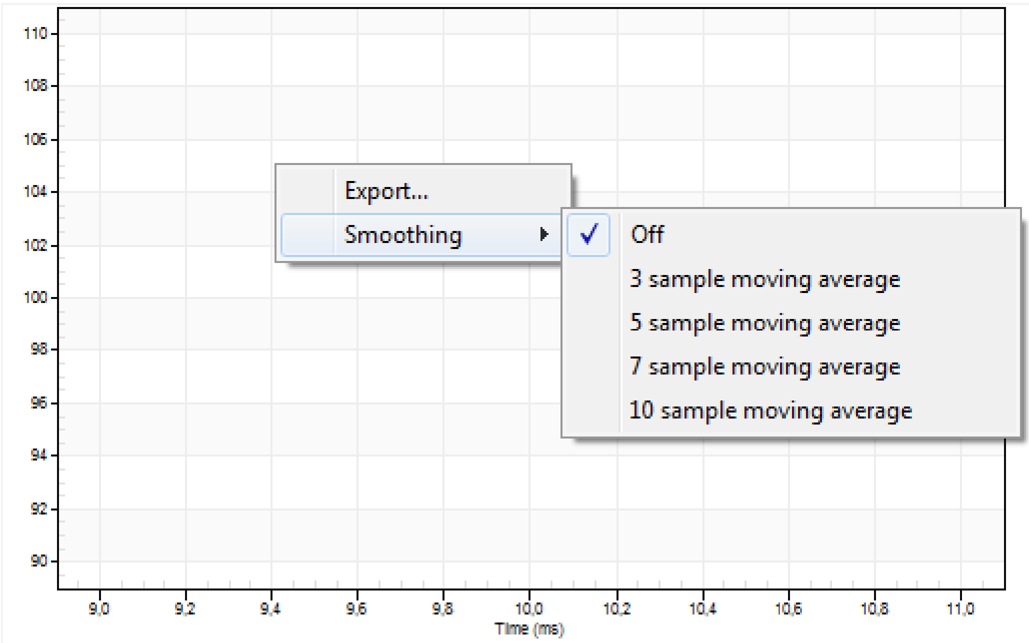
You can also select multiple rows and check or uncheck several rows at the same time.

The waveform is shown in a separate window. You can add filtering to it if you have a noisy waveform. The setting for the filter is stored individually for each row. To add smoothing:

1. First select the rows you want (in this case the first five rows).

View / Select	#	Set kV (kV)	Tube voltage (kV)	kVp diff %	Exposure (mGy)	Exposure time (ms)
	1	55				
	2	60				
R	3	65				
	4	70				
	5	75				
	6	80				
	7	85				
	8	90				
	9	95				
	10	100				
	11	105				
	12	110				
	13	115				
	14	120				

2. Right-click on the waveform window.



3. Select the amount of smoothing you want to have.

This option is also available when you do measurements and you can also add smoothing "on-the-fly".

8.3.3.10 Add a user calculation

To add your own calculation you must have the user-defined column "User calc (Calculated)" in your test. This column shows the results of a user-defined formula belonging to this. If you have this column in your test you can use any values present in the grid and your own formula to calculate a value. You can add a user formula to the entire column by clicking on the column heading. You can also add a formula to an individual cell (in the User Calculation column). A formula in a cell has higher overrides a formula that has been assigned to the entire column.

Add a user-defined calculation

All columns has predefined names which you can use in the formulas. You can also give columns/cells your own names. The first example here shows how to calculate the relative output when doing an HVL measurement.

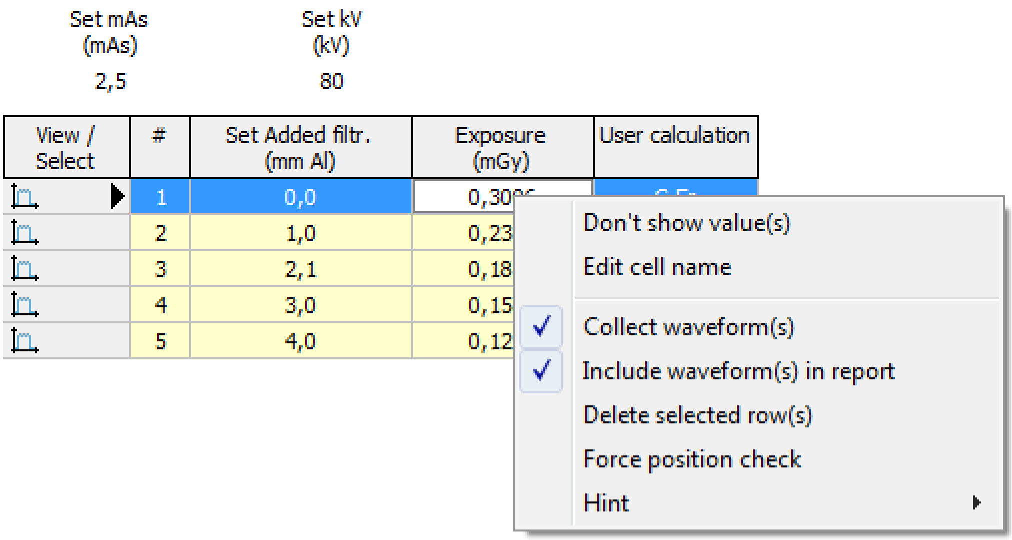
Set mAs (mAs)	Set kV (kV)
2,5	80

View / Select	#	Set Added filtr. (mm Al)	Exposure (mGy)
	1	0,0	0,3006
	2	1,0	0,2341
	3	2,1	0,1847
	4	3,0	0,1588
	5	4,0	0,1276

We want now to add a column that shows the relative output when we add filtration.

1. Add the column "User calc (Calculated)".

2. You will need to reference the first exposure value (for 0 mm Al) to do the calculation and you must give this cell a name. Right-click in this cell:



Select "Edit cell name" and name the cell to "Exposure0mmAl".

or

you can just double-click on the cell and the cell name dialogue appears directly. You can also double-click on the column heading if you want to name the column.

3. You have now named the cell you want to use and the exposure column has a predefined name you can use. The next step is to enter your formula. The calculation you want to do is:

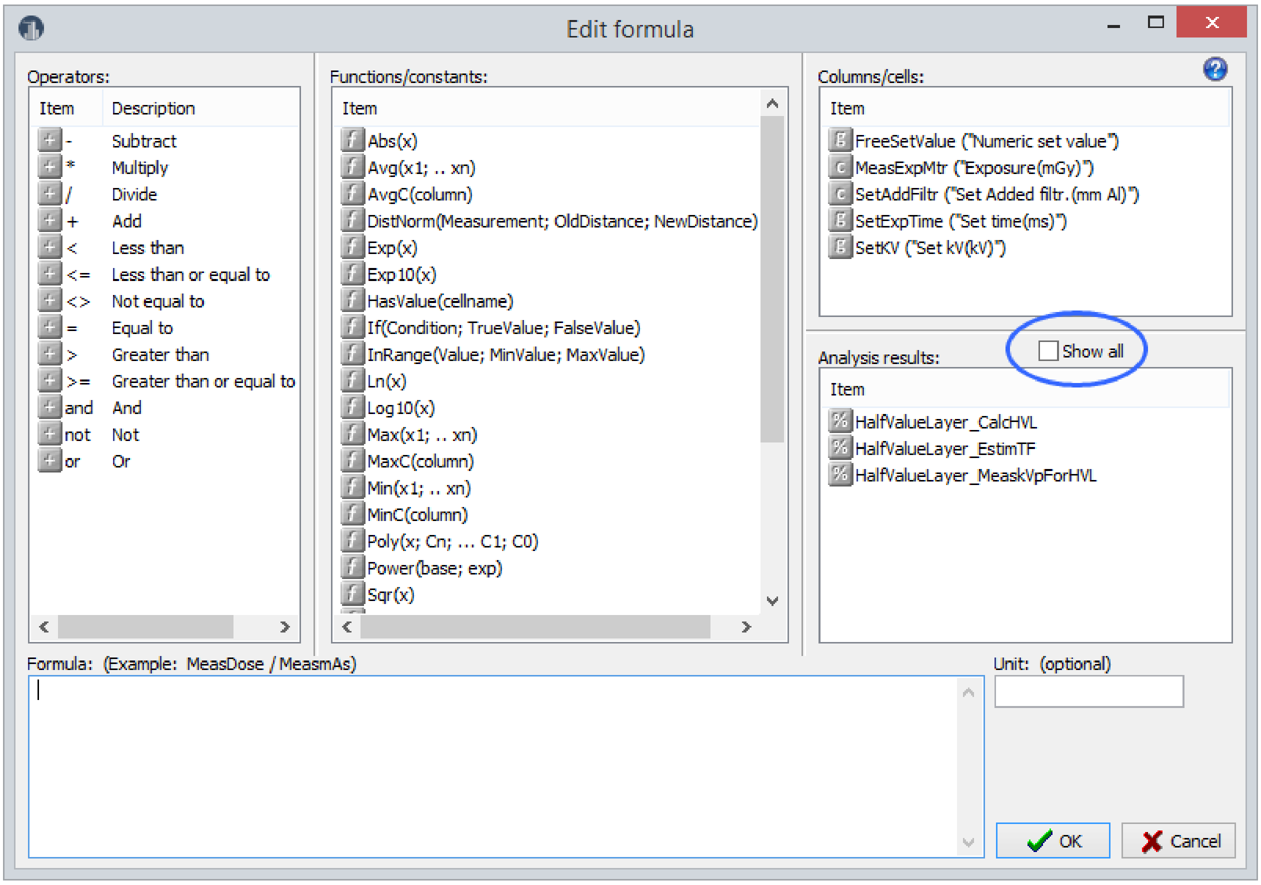
100*(Exposure0mmAl - Exposure) / Exposure0mmAl.

4. Right click on the "User calculation" column heading and select "Edit formula...". (if you want to add a formula to a cell instead, click on a cell and select "Edit formula...").

or

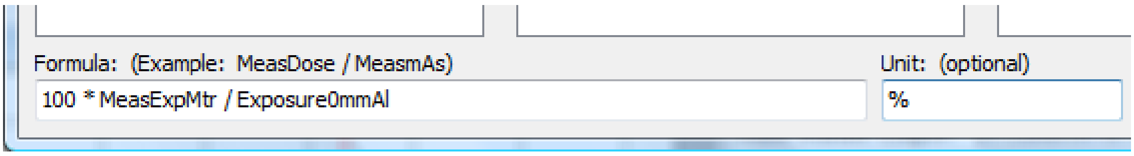
just type "=" in the cell and the dialogue appears directly.

5. A dialogue is shown:



6. You can now create the formula by clicking on the items. To the left you have operators, middle functions and to the right columns, named cells and macros from all analysis in this test (or real-time display). To show all macros, check "Show all". Create the formula.

7. You can also specify a unit, in this case "%".



Click to compress

8. Click OK when you have entered the calculation.

9. The last thing to do is to give the new column a title. Right-click, select "Edit column title" and change to "Rel. exposure".

10. It should now look like this:

Set mAs (mAs)	Set kV (kV)
2,5	80

View / Select	#	Set Added filtr. (mm Al)	Exposure (mGy)	Rel. exposure (%)
	1	0,0	0,3006	100,0
	2	1,0	0,2341	77,9
	3	2,1	0,1847	61,4
	4	3,0	0,1588	52,8
	5	4,0	0,1276	42,4

You now have a column showing how the exposure is decreasing when you add the Al filters.

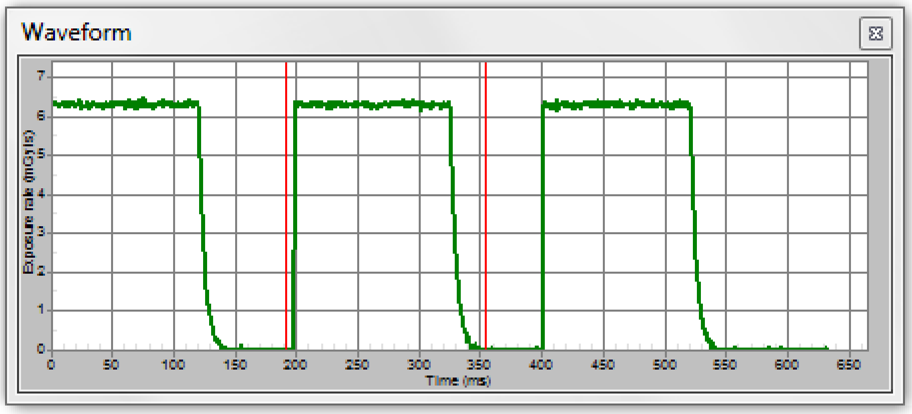
Available operations and function

Read the topic User Calculation to get information about all available operations and function.

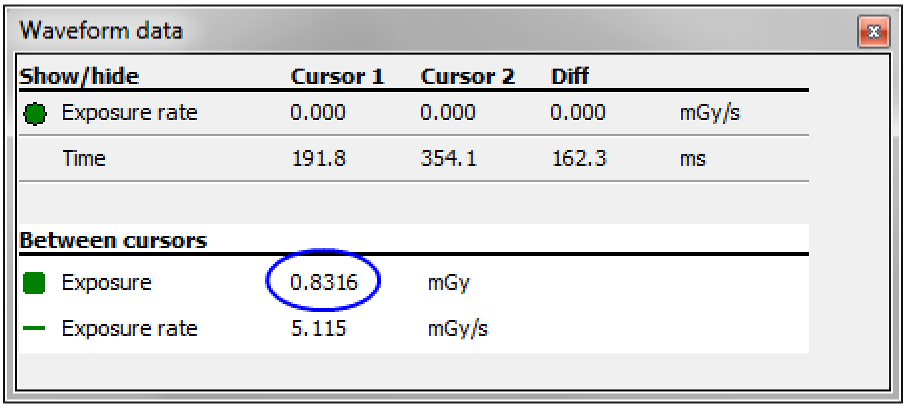
8.3.3.11 Waveform data in a column

It is possible to get waveform data directly into a column in the grid. This is done by creating a link from the waveform data to a user-defined column in the grid. Assume that you have the following measurement:

View / Select	#	Exposure (mGy)	Exposure rate (mGy/s)	Exposure time (ms)
	1	2.392	4.557	524.9
	2	3.836	7.204	532.5
	3	6.844	12.43	550.5
	4	11.78	21.30	553.0
	5	28.24	52.93	533.5
	6	36.70	65.12	563.6

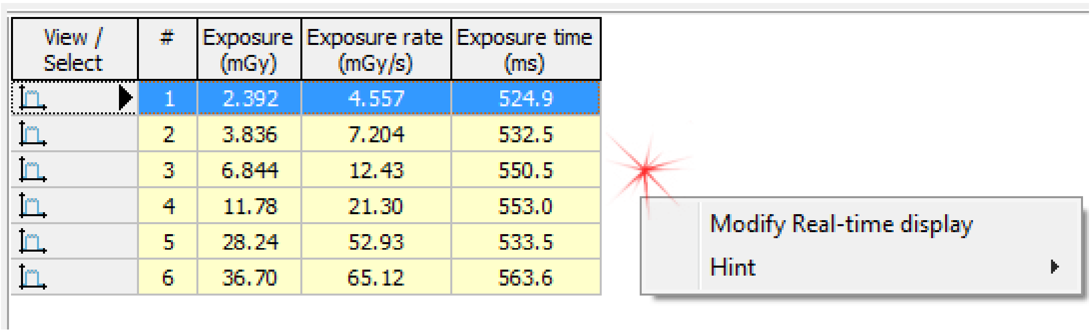


You have measured a pulsed exposure and you want to record the exposure only for the second pulse. This value is available on the waveform data panel if you place the cursors as shown in the picture above.



To show waveform data in a column:

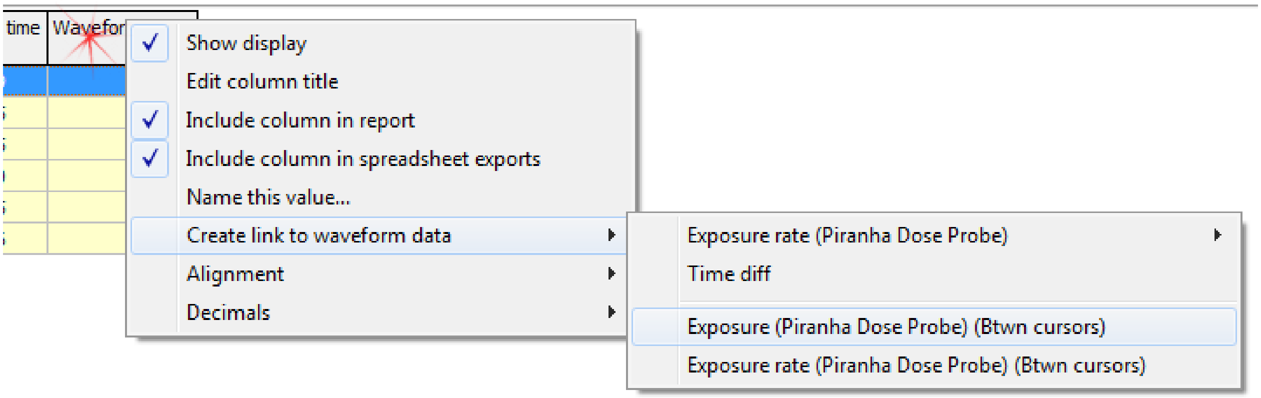
1. Right-click outside the grid and select "Modify real-time display" (or "Modify test" if it is a test you are working with).



2. A wizard is shown and a list of all columns are shown. Go to the group Other and add the column "Waveform value (Calculated)".

3. Finish the wizard. The new column appear in the grid.

4. Now create a link to show the value from the waveform panel. Right-click on the new column's heading.



5. Select "Create link to waveform data" and the parameter you want, in this case the exposure between the cursors.

6. The link is created (if the test or real-time display has data already all cells are updated according to current cursor position).

7. You may want to change the column title. Right-click on the column heading and select "Edit column title".

View / Select	#	Exposure (mGy)	Exposure rate (mGy/s)	Exposure time (ms)	Exposure for the 2nd pulse (mGy)
	1	2.392	4.557	524.9	0.8316
	2	3.836	7.204	532.5	1.277
	3	6.844	12.43	550.5	2.182
	4	11.78	21.30	553.0	3.882
	5	28.24	52.93	533.5	9.111
	6	36.70	65.12	563.6	12.18

8.3.3.12 Report

There are a few things you can do that will affect on how a test appears in the report. These are:

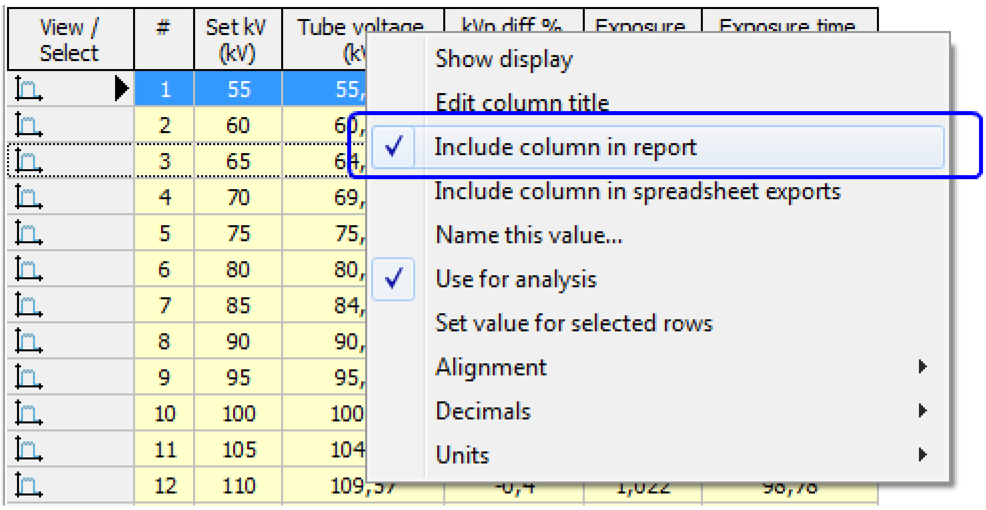
- Exclude columns from the report
- Include waveforms in the report
- Change the width of columns

Exclude columns from the report

All columns will be included in the report by default. You can exclude columns from the report if you like. This is a very useful feature to have, especially if you are having problems fitting all columns on a page. Also there are columns in a template that may not be part of the test, so you may not want to show these columns in a report. An example of this type of column is any column with supporting information for the person who performs the test.

To exclude columns from the report, follow the steps below:

1. Right-click on the column heading, and a drop-down list like the one below will appear.



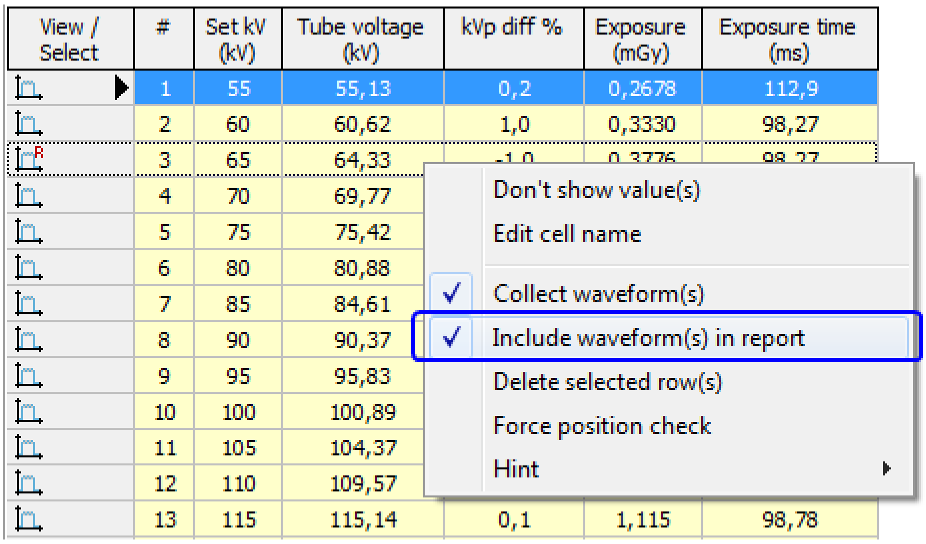
2. Uncheck the "Include column in report" option and that column will be excluded from the report.

Include waveforms

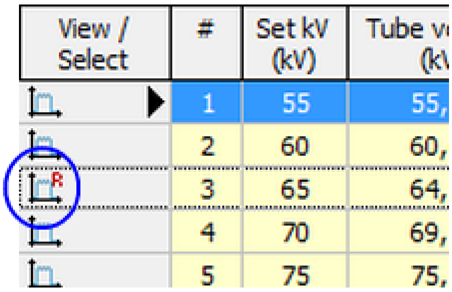
No waveforms are included in the report by default. You can include waveforms using the following steps:

1. Select a row (or use multi-row select to select multiple rows).

2. Right-click on the selected row(s) and a drop-down menu will appear as in the picture below.



3. To include waveforms in the report, check "Include waveform(s) in report" the waveforms in the report. Included waveforms are indicated directly in the grid:



You can also toggle this on and off by clicking on the waveform icon in the grid.

NOTE: If you want waveforms in the report, the "Collect waveform(s)" option must also be checked. This option is always checked by default, as waveforms are always collected when available.

Change the width of columns

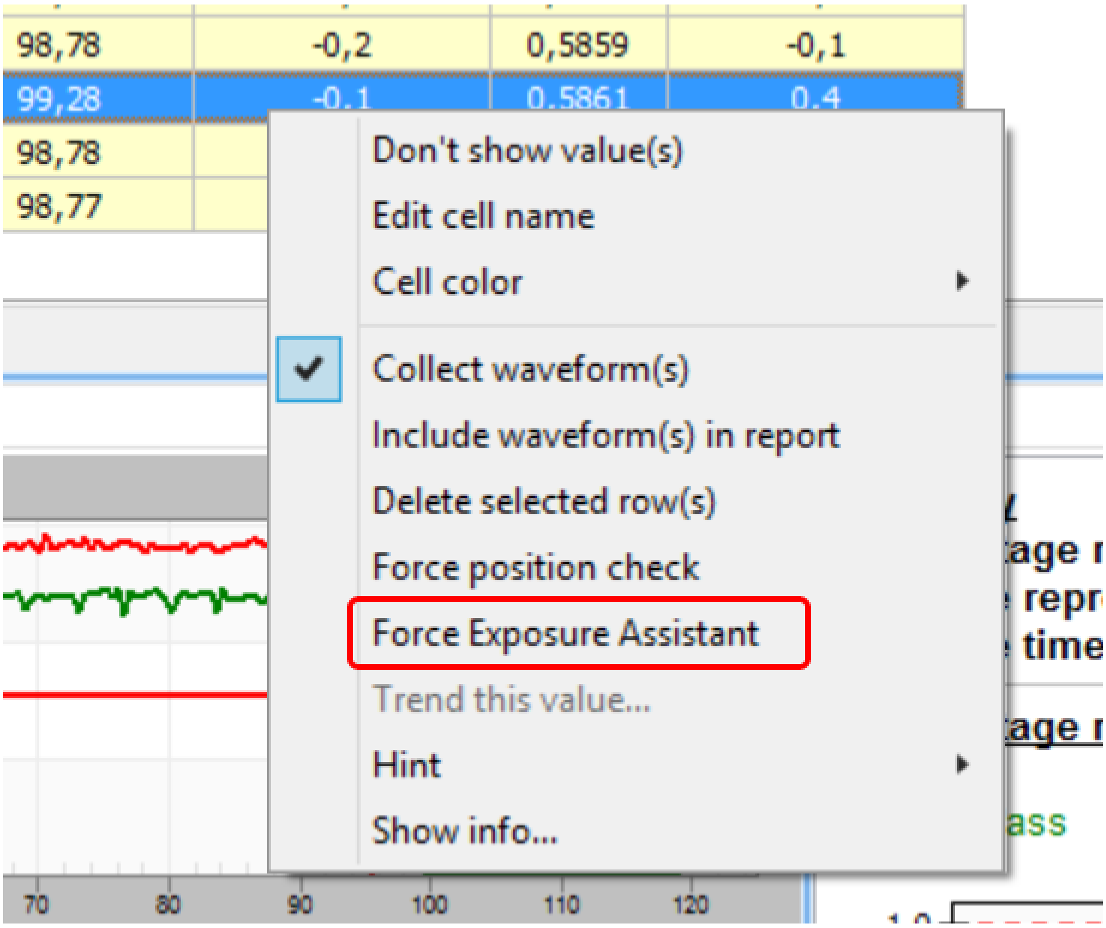
The width you give columns on the screen will be saved in the template and used when the test is printed in the report. Just click on any vertical line and drag the line over to the new width desired then release the mouse button and the new width is now set.

8.3.3.13 Forced Exposure Assistant

You can use "forced exposure assistant" if you want to make sure to enable it even if it isn't enabled on the main menu.

1. Right-click on the row where you want to use the Exposure Assistant.

2. From the menu select "Force Exposure Assistant".



8.3.3.14 Position check (only Piranha)

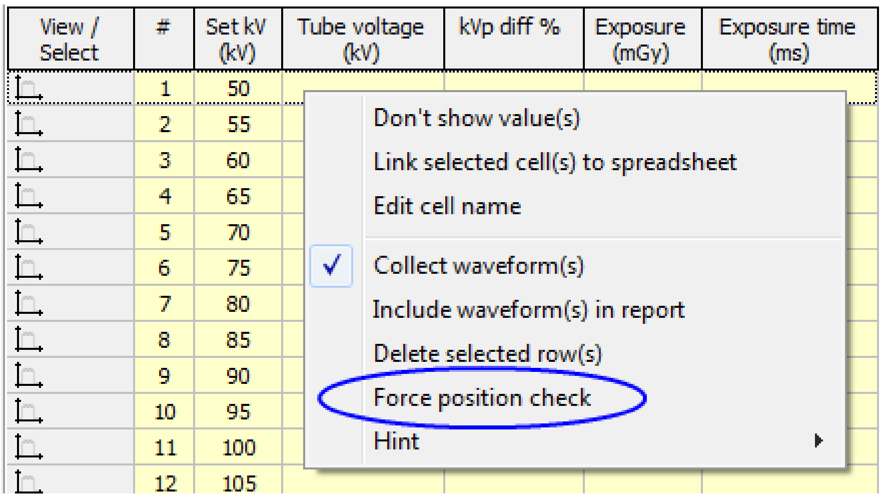
This describes how to use position check function with Piranha.

8.3.3.14.1 Forced position check

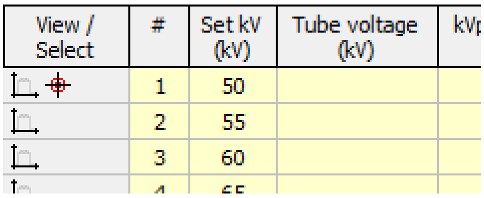
You can use "forced position check" if you want to make sure that you (or somebody else using the templates you design) don't forget to do the position check.

1. Right-click on the row where you want to do the position check.

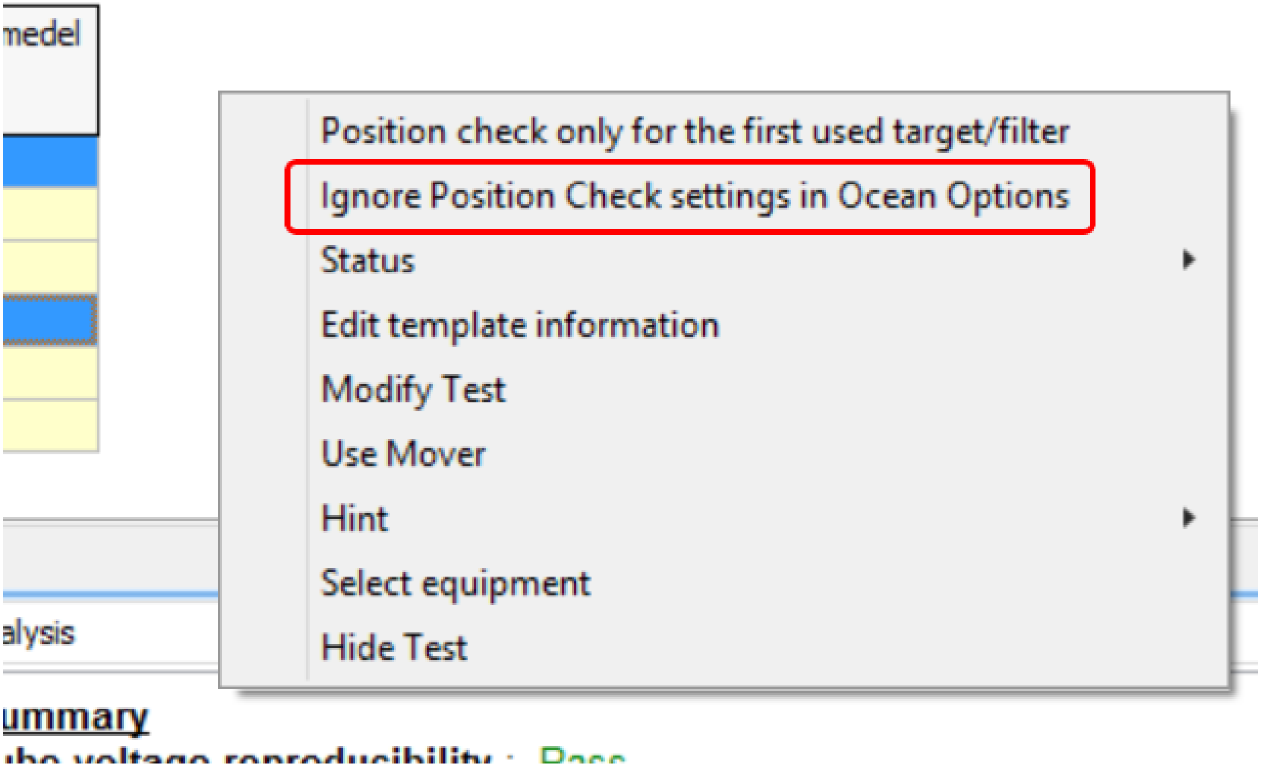
2. From the menu select "Force position check".



3. An icon in the view/select column indicates the forced position check.



Note 1: This option is a complement to the settings in Program Options that defines when to do a position check. To get full control over when position check is done and notr done, another option is available that tells Ocean to ignore what is set in Program Options. This setting is available by right clicking on the empty space outside the grid:

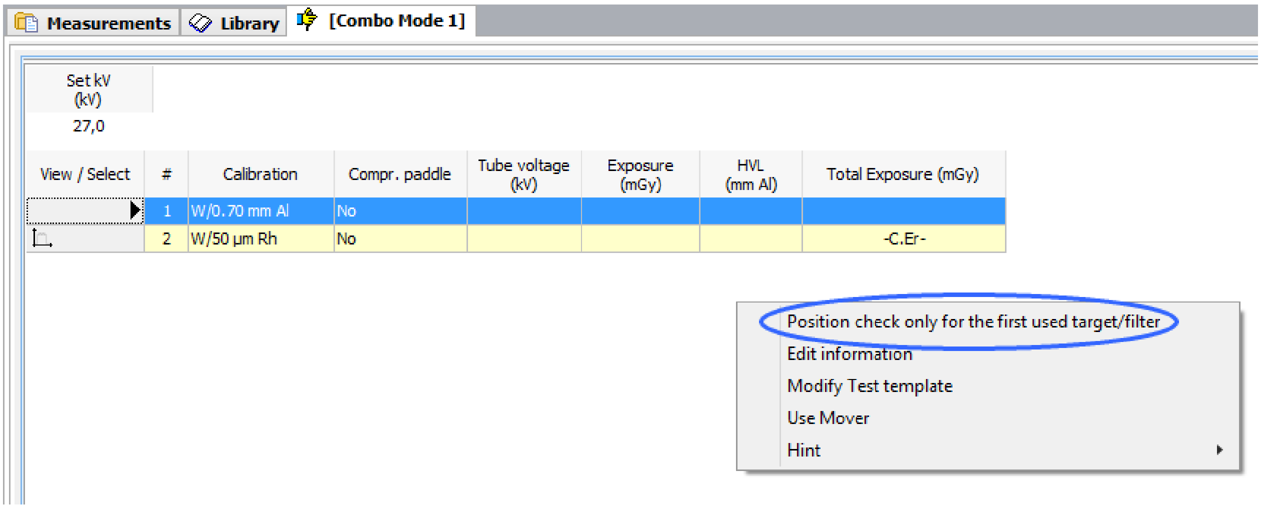


Select "Ignore Position Check settings in Ocean Options". In this way, postition check is only performed on rows where "Force position check" is enabled.

Note 2: Any position check is ignored if Cobia is used.

8.3.3.14.2 Position check only for first used target/filer

Sometimes you want to be sure that position check is done only once i a template regardless of settings in the Program Options. One example is if you measure Combo mode on mammography and want to capture both exposures. Below is an example:



You want to be sure that a position check doesn't occur on the second row since there is no time for this during the two exposures. The waveform is also disabled on the first row to allow Ocean 2014 to move to the second row between the two exposure.

Right-click outside the grid and select "Position check only for the first used target/filter to activate it.

8.3.4 Create a Checklist page

You can design your own checklist templates. They can be adapted to your own requirements to maximize speed, efficiency and user-friendliness.

Designing a checklist template involves the following steps:

1. Create the grid with the columns you need.

2. Create questions/tasks/headings in your test template.

3. Change order and width of columns.

4. Add supporting information (documents and web links).

5. Add analysis.

8.3.4.1 Create the grid

The first step in designing a checklist template is to create the grid (rows and columns). Your meter does not need to be connected while designing the checklist template.

As an example of how to create a checklist template, we will go through the steps necessary to create a grid that is shown in the picture below.

Radiographic questions

Test date:

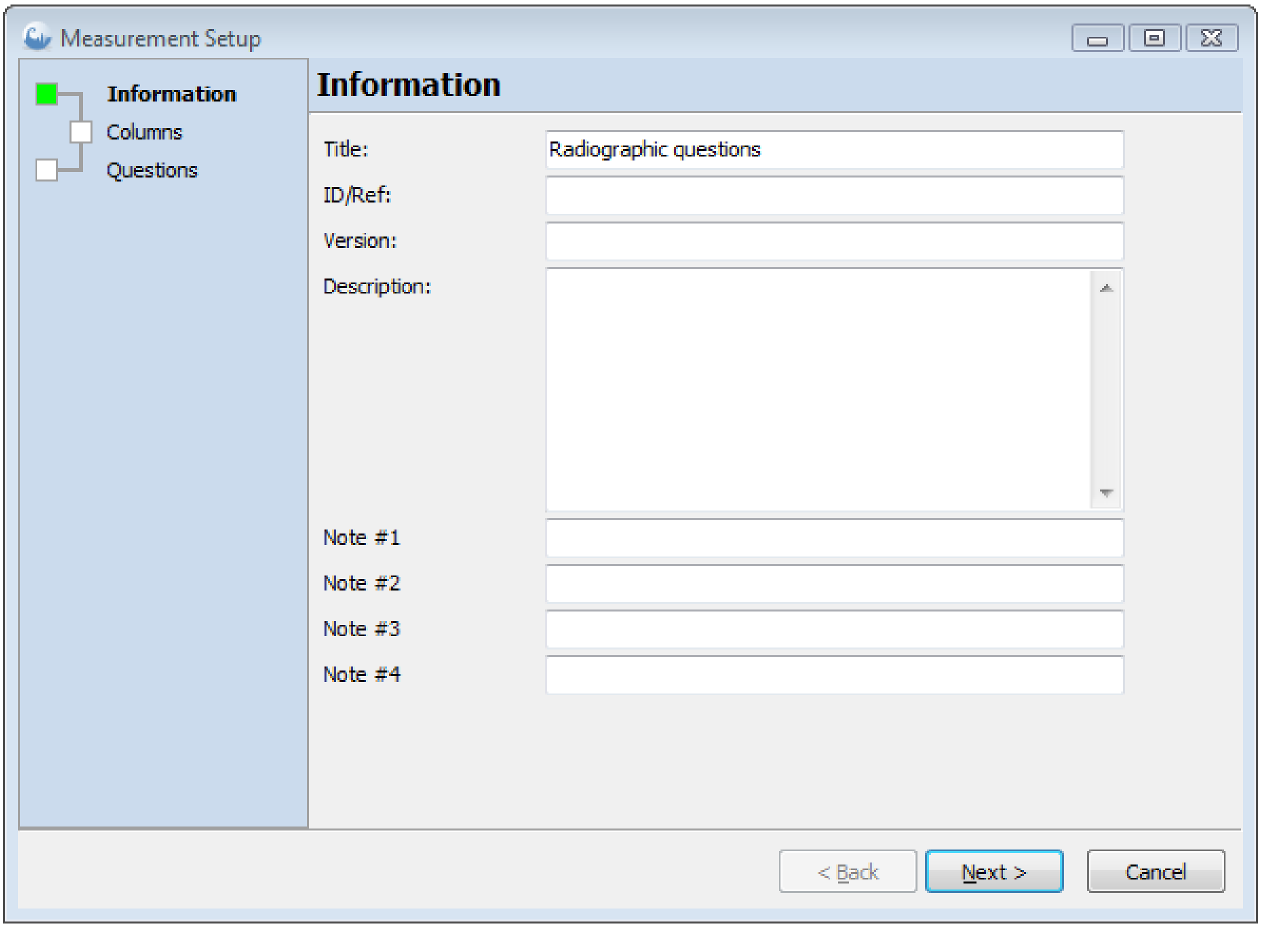
Questionnaire

#	Question	Answer	Result	Recommendation
1	**OPERATOR PROTECTION**			
2	Exposure switch mounted properly?			
3	Gloves and aprons available			
4	**PATIENT PROTECTION**			
5	Gonadal protection provided?			
6	Technique charts available?			

Follow the easy steps below to create your own checklist grid:

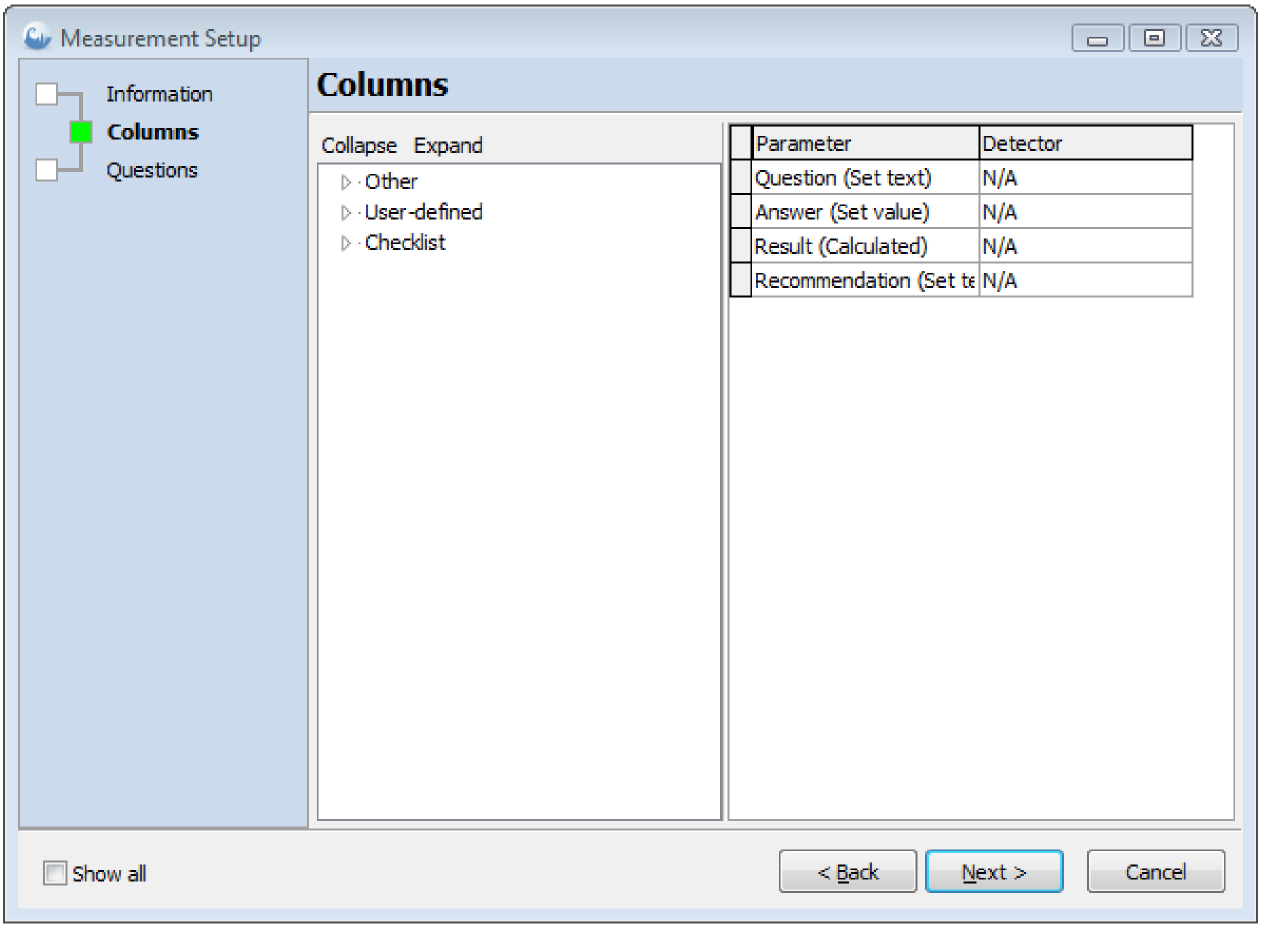
1. The first step is to go to the Design page on the ribbon bar and select Checklist from the Template button.

2. This will start the new checklist template wizard to help guide you through the process. You will see that the lower Status Bar is indicating that you are designing a checklist template in Design mode. You need to enter a title for the checklist and a type (for our example we will create a set of radiographic questions, so we will call the type "Radiographic questions" for easy reference. The checklist we are making will be referred to by its title throughout Ocean whenever we use this particular checklist template.



As you can see on the picture above, there are other fields on this page not used by Ocean, but sometimes you, as the user, would want to put more than just a title and a type to identify your checklists. For instance, a description would be very handy to have in a checklist when you pass templates along to other Ocean users to make your checklists different from the ones they created for themselves. When you have finished entering all the information you want, click Next to continue.

3. The next page of the wizard will look like the picture below. This is where you can select the columns you want to have in your checklist. The columns on the right are the columns that will be present in your checklist. As you can see, there are four suggested columns already chosen for you when you get to this page.

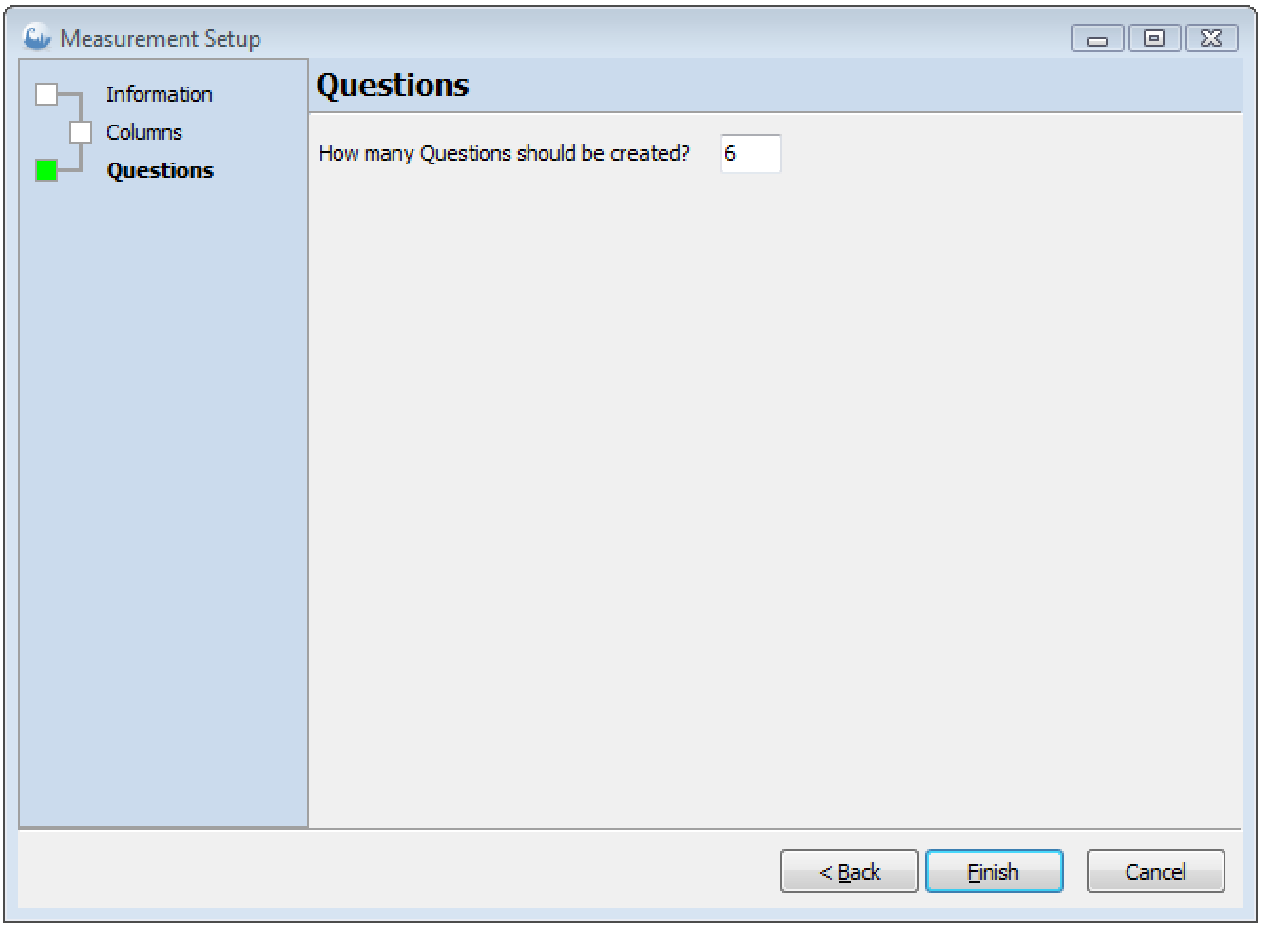


The four columns are:

Questions: This is where you will be typing your question text, therefore, this column must be present in the grid.
Answer: This is where you will be typing the answer text, therefore, this column must be present in the grid.
Result: This is where you can define the pass/fail criteria for your question. This column is optional and you can delete it if you want.
Recommendation: This is another optional column that would be used to show a recommended action to be taken if this question fails.

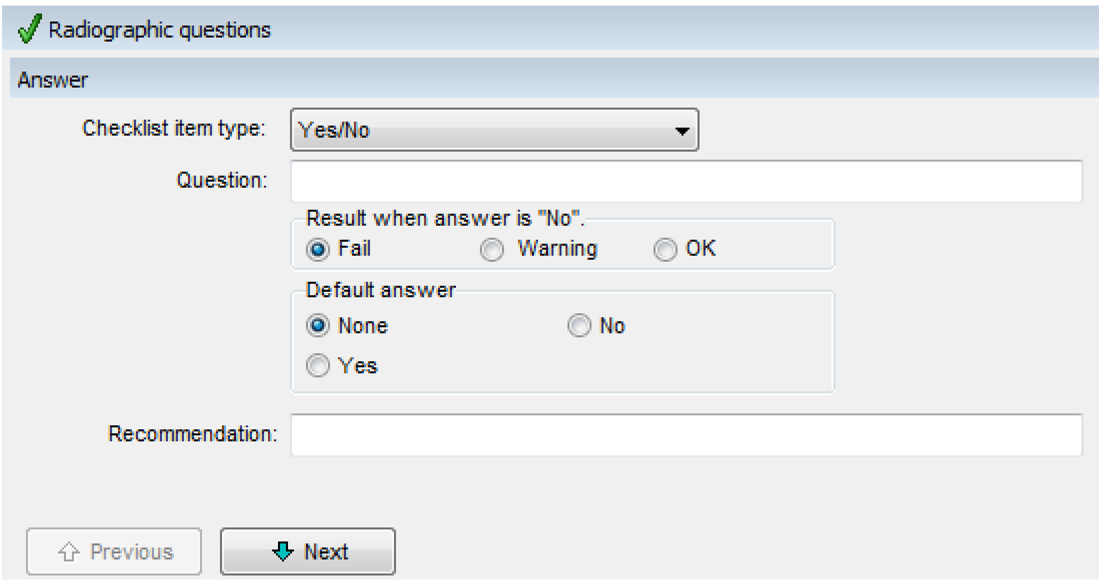
For our example, we will use the pre-selected columns only and click Next to continue with the example.

4. The next page you come to looks like the picture below. This is where you select how many rows you want in this checklist template. There must be a row accounted for every question you want to add to the checklist template. It is possible to add/delete rows even after the checklist has been created. For our example, we'll choose six rows and then click Finish to end the wizard and create the grid.



5. This would be a good place to save our work so click Save, give your new template a name so it will be saved in the Library. The next step is to create our questions and headings.

6. The window below is the next window you will come to after you saved your work. This is where we'll enter our questions and headings that will be shown in the grid when we use this template.



If you refer to the grid at the beginning of our example, we have two sets of questions divided by headings. You would use headings to group similar questions together. Let's enter the first heading called "Operator Protection".

7. To enter the heading, you will see "Checklist item type:" at the top of the window with a drop-down list. Click on the drop-down list, and choose the "Heading" option.

8. Type "OPERATOR PROTECTION" in the "heading" field then click Next to continue.

9. The next step is to add the two questions that go under this heading. In our example, all of our questions will be Yes/No question, however there are other types of questions available to you. To read more about the other question types and how to use them, read the [Different types of checklist items](#) topic.

10. We will now add the first question. In our grid at the beginning of this example, the first question is the "Exposure switch mounted properly?" question. To add this question, go to the "Checklist item type:" at the top of the page, then choose the "Yes/No" question option from the drop-down list.

11. Type "Exposure switch mounted properly?" in the "question" field. You can also add the pass/fail criteria by clicking on the appropriate radio buttons, and add a recommendation in the "Recommendation" field. This recommendation will be shown when this question fails.

12. Finish adding the rest of the questions and the heading the same way we described above, then click Save after you filled in all six rows to save your work.

13. If you want to see how your questions work, you can, while in Design mode, enter some or all of the answers you have chosen to see if the checklist behaves the way you want it to. These answers will not be saved, since you are in Design mode, but it enables you to make adjustments to your template before you start using it in the field.

Other adjustments you may consider making at this time are:

- Modify column widths to fit your needs (and fit on the paper when you print out the report)
- Change column headings
- Add hints
- Add supporting information

How to to add a hint is described here...

How to add supporting information to the test is described here...

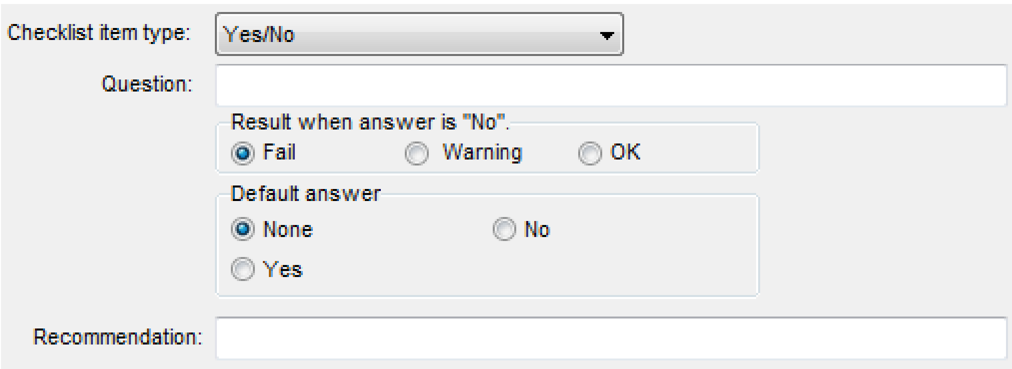
8.3.4.2 Different type of checklist items

You can choose from six types of questions when you design a checklist template. They are listed below:

Yes/No question: provides two options; "Yes" or "No".
Yes/No/N.A. question: provides three options; "Yes", "No" or "N.A."
Heading: insert a heading in the checklist
Text: the answer is a text
Number: the answer is numeric
User defined question: provides up to six user-defined options

8.3.4.2.1 Yes/No question

This window is shown when you want to add a question with a pass/fail value of Yes/No value.



Question: type the question text here

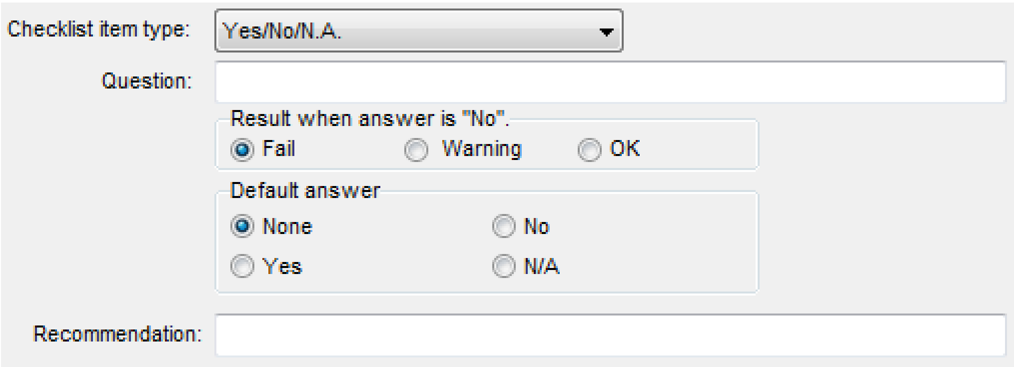
Result when answer is "No": specify if a "No" answer is fail, pass or a warning

Default answer: If you want a default answer requiring the user to answer with a single click only, then you can just select the appropriate radio button for the default answer. If no default answer is provided, the user must always answer "Yes" or "No" and then click Next to go to the next question.

Recommendation: the text you type here is shown automatically if you answered "Fail" or "Warning" to a question

8.3.4.2.2 Yes/No/N.A. question

This window is shown when you want to add a question with a pass/fail value of Yes/No/N.A. value.



Question: type the question text here

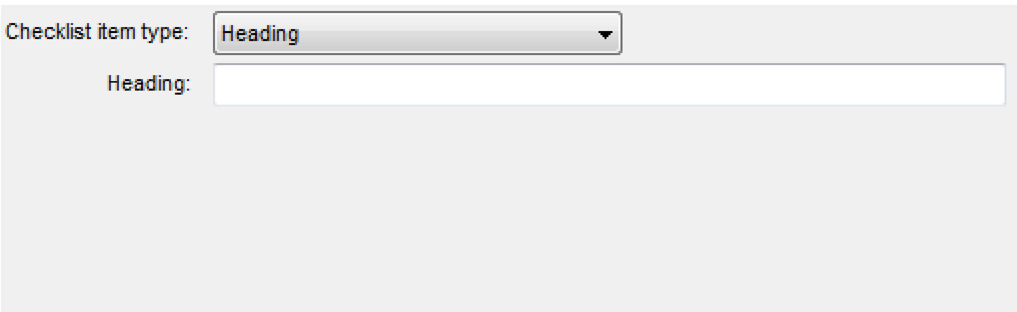
Result when answer is "No": specify if a "No" answer is fail, pass or a warning

Default answer: If you want a default answer requiring the user to answer with a single click only, then you can just select the appropriate radio button for the default answer. If no default answer is provided, the user must always answer "Yes" or "No" and then click Next to go to the next question.

Recommendation: the text you type here is shown automatically if you answered "Fail" or "Warning" to a question

8.3.4.2.3 Heading

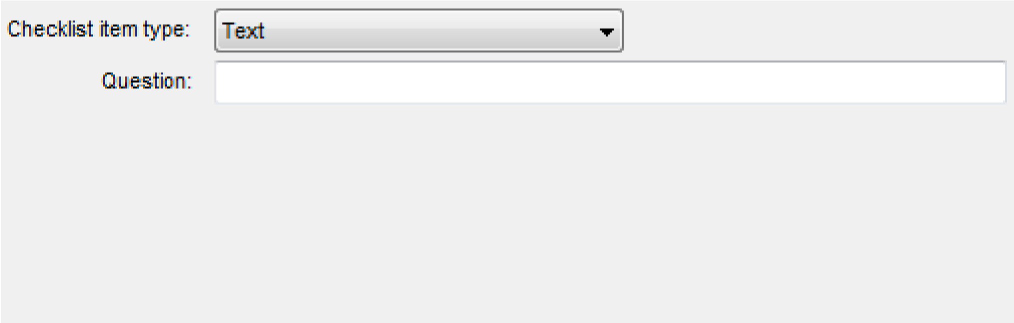
This window is shown when you want to add a heading to identify different groups of questions.



Heading: type the heading text here

8.3.4.2.4 Text

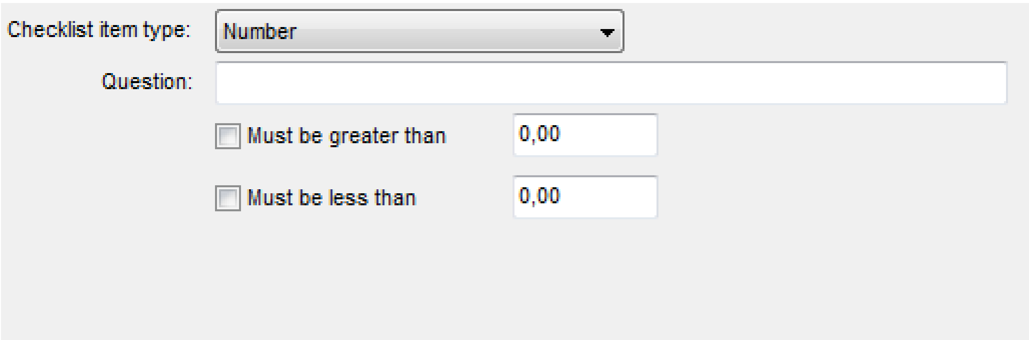
This window is shown when you want to add a question with a pass/fail text value.



Question: type the question text here

8.3.4.2.5 Number

This window is shown when you want to add a question with a pass/fail numerical value.

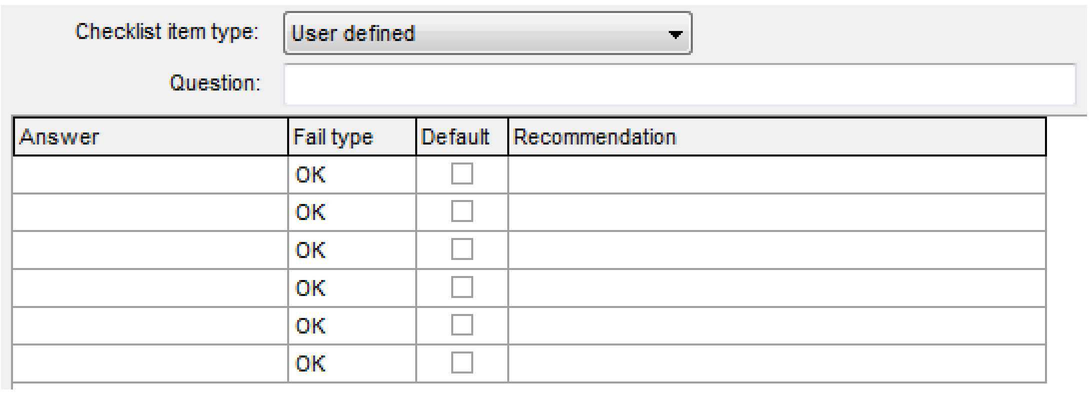


Question: type the question text here

Must be greater than: Lowest allowed value (optional)

Must be less than: Highest allowed value (optional)

8.3.4.2.6 User defined



This checklist item type enables you to cerate your own question with up to six possible answers. Radio buttons will be used to offer a simple and quick way to answer the user-defined questions. You can choose "Fail", "OK" or "Warning" definition for each answer.

Question: type the question text here

Answer: type the answer text here

Fail type: this is a pull-down menu, you can select between "OK", "Fail", "Warning"

Default: you can chose one to be the default answer

Recommendation: the text you type here is shown automatically if "Fail" or "Warning" is indicated

8.3.4.3 Modify a question

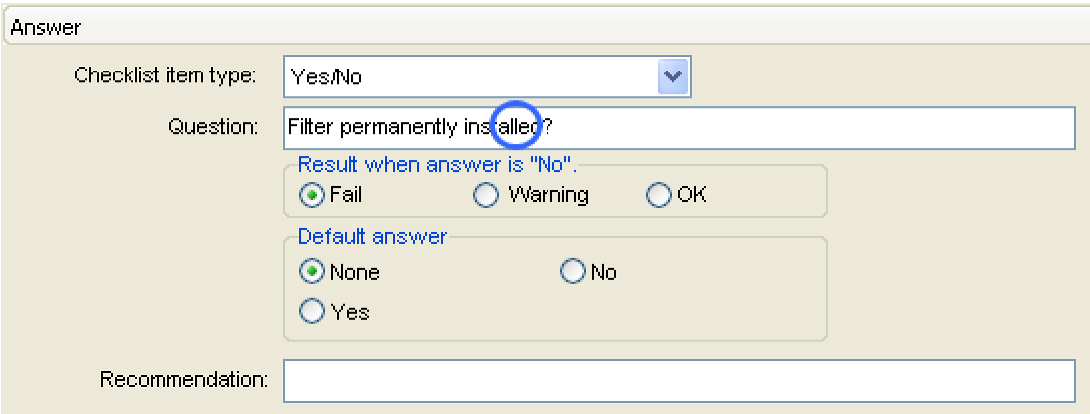
In this example, we will show how to modify a question. Let's assume that we discovered a spelling error in a question and want to correct it. Follow the steps below:

View / Select	#	Question	Answer	
	1	**OPERATOR PROTECTION**		
	2	Exposure switch mounted properly?		
	3	Gloves and aprons available		
	4	Gloves and aprons in good condition?		
	5	**PATIENT PROTECTION**		
	6	Gonadal protection provided?		
	7	Technique charts available?		
	8	Filter permanently installled?		
	9	**AREA SURVEY**		
	10	Approved warning sign on door(s)?		
	11	**EQUIPMENT**		
	12	Collimation functioning properly?		
	13	Audible exposure signal?		
	14	X-Ray warning sign on unit?		
	15	All controls, meters, lights and indicators working?		

1. Go to the Design page on the ribbon bar and click the "Edit question" button.

2. Select the row with the spelling error by clicking in the left column (View/Select).

3. Correct the question text in the question edit window. The question edit window looks like the picture below.



4. Quit edit mode by clicking on the Close button or click on the "Edit question" button again.

8.3.4.4 Add/delete rows

You add/delete rows in checklist templates the same way as you add/delete rows in a test template. Learn more by reading how to add/delete rows in test templates.

8.3.4.5 Hints

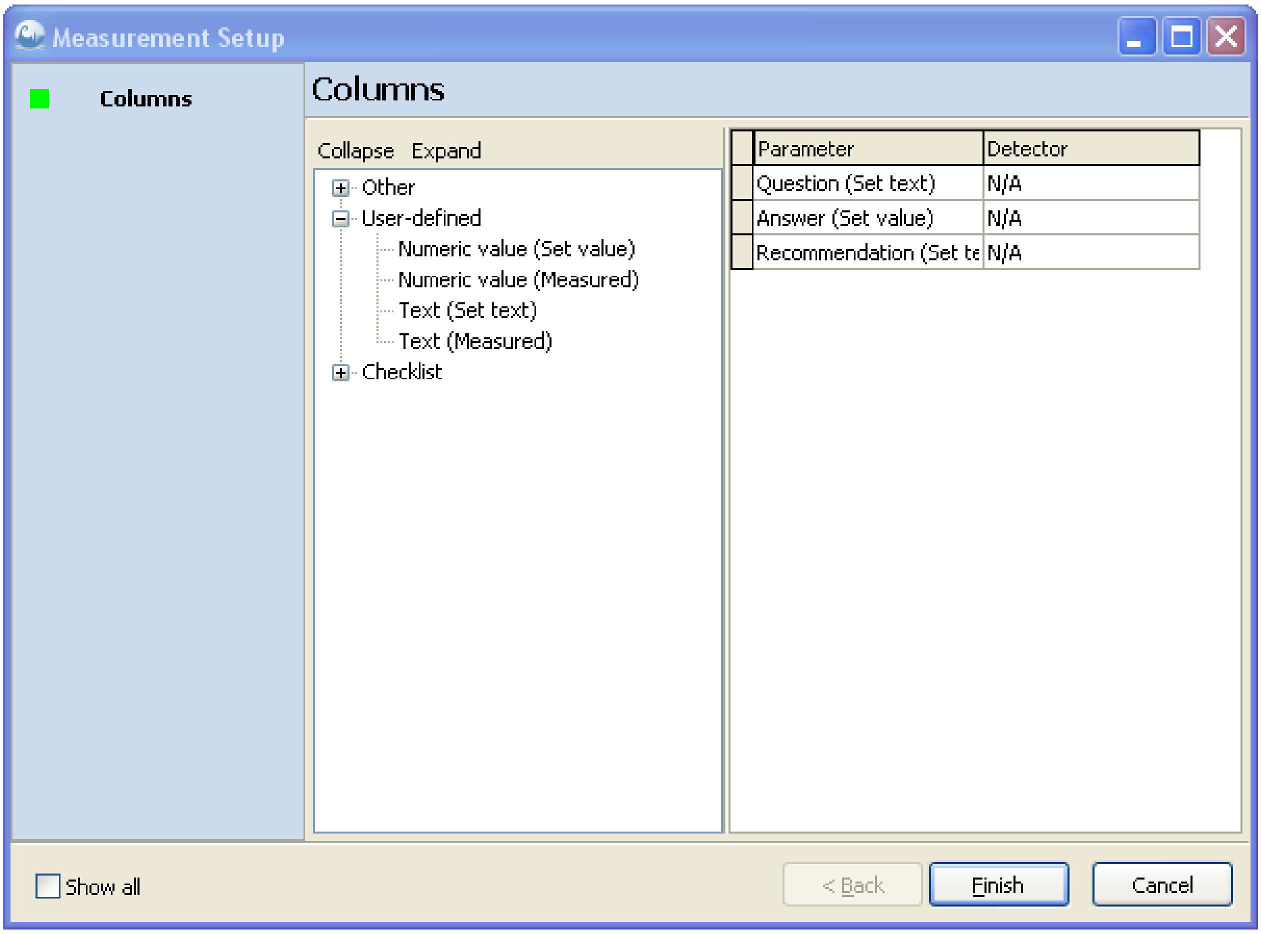
Hints can be attached to checklists templates the same way as to test templates. Learn more by reading how to add hints to test templates.

8.3.4.6 Add/delete columns

It is possible to add or delete columns in a checklist. The following instructions will tell you how:

1. Before you can proceed with adding and deleting checklist columns, you must have a checklist template open or a checklist you have already completed open. Right-click outside the grid on the empty space to the right or below the grid to access the drop-down menu and select "Modify checklist". You can also go to the Design page on the ribbon bar and select Modify from the Test/Checklist group to achieve the same result.

2. A wizard will pop up next, showing the columns on the left and the parameters on the right (see picture below):



To add a column: Use drag-and-drop to select a column on the left side and drop it on the right side. You can also double-click on columns on the left side to select them.

To delete a column: Right-click on a column on the right side, select Delete from the menu. You can also select a column from the right side by clicking on it and then press the Delete on the keyboard to achieve the same result.

Note: The Question and Answer columns cannot be removed.

3. When the checklist template is to your liking, click the Finish button to close the wizard.

As soon as the wizard finishes, the changes you made are now visible in the checklist template.

8.3.4.7 Add/delete analysis

A checklist analysis is available to you. It basically reports if the checklist passed or failed. If you choose to use this analysis, you can see how many questions passed, as well as how many warnings there were. The default layout for the checklist analysis is described in the topic Checklist.

We will show you how to use a checklist analysis to create a certain result. Let's assume that you have a checklist divided into several different sections (see the picture below):

View / Select	#	Question	Answer	Recommendation
	1	**OPERATOR PROTECTION**		
	2	Exposure switch mounted properly?		
	3	Gloves and aprons available		
	4	Gloves and aprons in good condition?		
	5	**PATIENT PROTECTION**		
	6	Gonadal protection provided?		
	7	Technique charts available?		
	8	Filter permanently installed?		
	9	**AREA SURVEY**		
	10	Approved warning sign on door(s)?		
	11	**EQUIPMENT**		
	12	Collimation functioning properly?		
	13	Audible exposure signal?		
	14	X-Ray warning sign on unit?		
	15	All controls, meters, lights and indicators working?		

If you just assign an analysis to the checklist (it is the same procedure as for test templates), the result looks like this:

Analysis

Summary
Checklist: FAIL

Checklist

Result: FAIL

Total of 1 question(s) failed.
There were 0 warning(s).

However, if you want something a bit more creative, you can use several checklist analyses to show the results of each section. It can then look like this:

Analysis

Summary
Operator protection: Pass
Patient protection: FAIL
Area survey: Pass
Equipment: Pass
Complete cheklist: FAIL

Total of 1 question(s) failed.
There were 0 warning(s).

We used five checklist analyses to create the above result. Four were assigned to the rows in each section respectively, and the last one is covering all rows to give the overall result. The layout has been modified to create appearance of the above picture.

An analysis is deleted from the checklist the same way as an analysis is deleted from a test template.

8.3.4.8 Report

There are some things you can do to a test template that will affect on how it appears in the report:

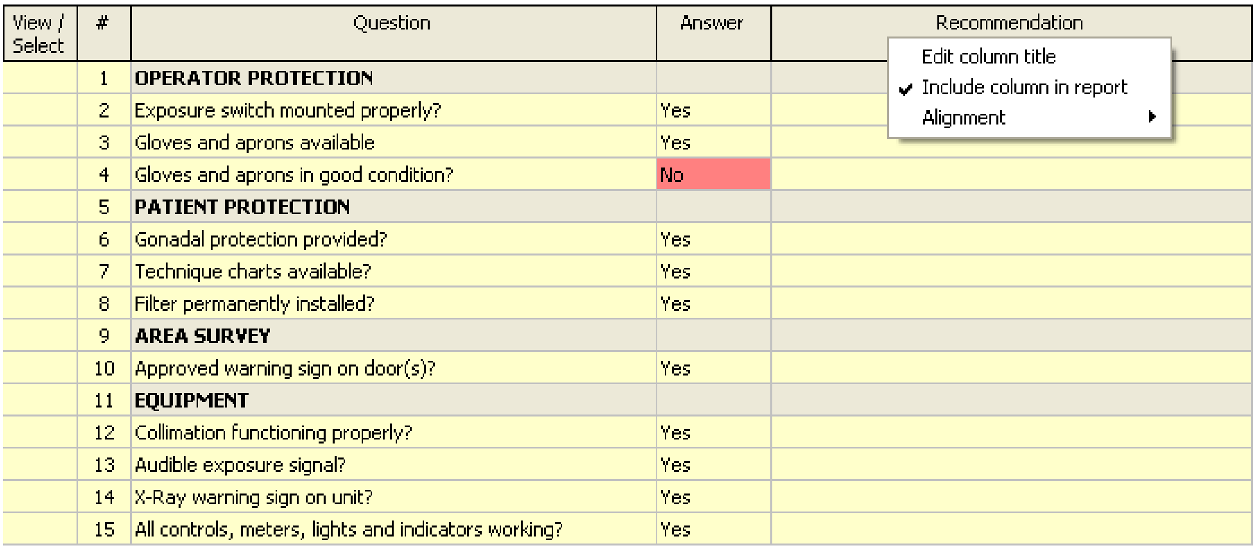
- Exclude columns from the report
- Change the width of columns

Exclude columns from the report

All columns will be included in the report by default. You can exclude columns if you like. Excluding columns is especially useful if you find you have a problem fitting the entire grid on a page. It is also useful to exclude columns from the report if the columns are support information columns and not really part of the test.

To exclude/include columns from the report, follow the steps below:

1. Right-click on the column heading.



View / Select	#	Question	Answer	Recommendation
	1	**OPERATOR PROTECTION**		
	2	Exposure switch mounted properly?	Yes	
	3	Gloves and aprons available	Yes	
	4	Gloves and aprons in good condition?	No	
	5	**PATIENT PROTECTION**		
	6	Gonadal protection provided?	Yes	
	7	Technique charts available?	Yes	
	8	Filter permanently installed?	Yes	
	9	**AREA SURVEY**		
	10	Approved warning sign on door(s)?	Yes	
	11	**EQUIPMENT**		
	12	Collimation functioning properly?	Yes	
	13	Audible exposure signal?	Yes	
	14	X-Ray warning sign on unit?	Yes	
	15	All controls, meters, lights and indicators working?	Yes	

2. Uncheck or check "Include column in report" to exclude/include it in the report.

Change the width of columns

The width you give columns on the screen will be saved in the template and used when the test is printed in the report. Use drag-and-drop to modify the width of the columns.

8.3.5 Modify an existing Session template

There are different changes you might want to do:

- Add/delete pages.
- Modify a specific page.
- Change the template information
- Change the report format.

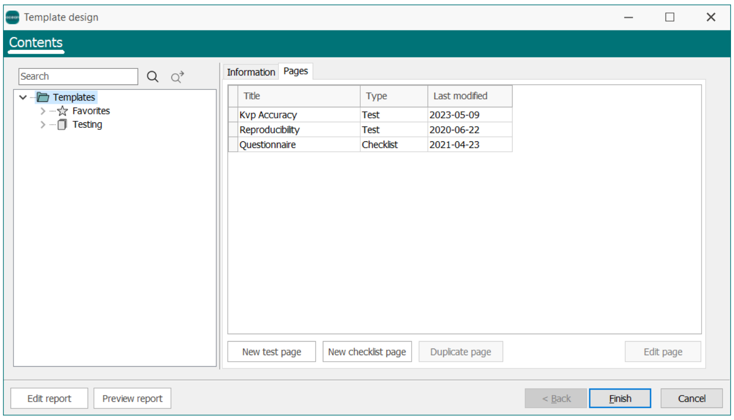
The procedure describe here uses a Session Template, but the same procedure can be used with a Session if you need to make a modification to it "on the fly" at any time when you have started a measurement.

Add/Delete a test or checklist page

1. Open the Session Template you want to modify.

2. On the Summary page, right-click on the white space outside the grid and select "Modify template...".

3. The "Template Design" dialogue is opened:



4. To delete a page, just select one on the right side and press the Delete key or right-click on it and select "Delete". You can also select "Hide", in this case is the page kept but it is hidden and will not be used.

5. To add a page, you can do in several ways:

   - You can click on the **New test page** or **New checklist page** button and add a new page from scratch.
   - You can click on the **Duplicate** button to create a duplicate page and modify it.
   - You can select a Session template from the left side and add it, all included pages will be added to your list on the right side. Delete the ones you don't want.

6. When you are ready, click on the **Finish** button.

7. From the Studio View click on the **Save** button to save your Session Template.

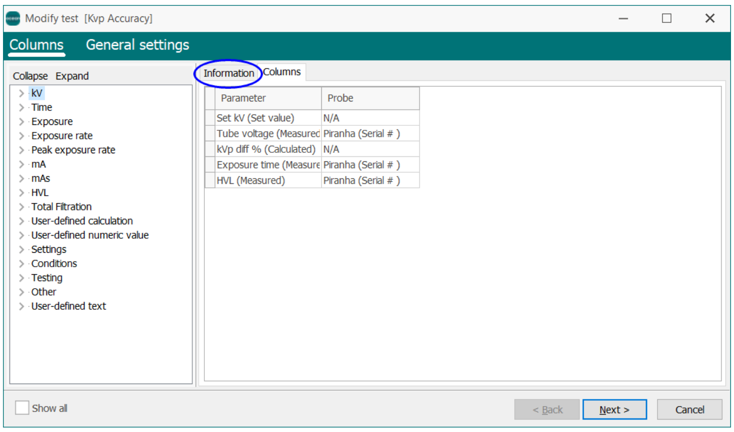
Modify s specific page

1. Open the Session Template you want to modify.

2. Go to the page you want to modify and activate it.

3. Right-click on the white space outside the grid and select "Modify template...".

4. The Page design wizard opens and shows the content for the page you activated:



You can here add, remove and change order of columns.

You can also modify the "Page Information" if you click on the **Information** tab.

5. When you have done your changes, click on **Next**.

6. In the next step you can change the General Settings. Click **Finish** when you are ready.

7. You are now back the the "Template design" dialogue.

8. If you are ready click on the **Finish** button.

9. From the Studio View click on the **Save** button to save your Session Template.

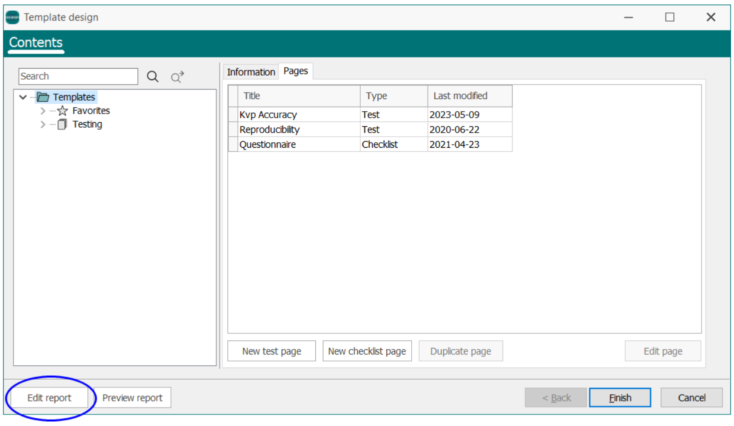
Modify the Report format

1. Open the Session Template you want to modify.

2. Go to the Summary page.

3. Right-click on the white space outside the grid and select "Modify template...".

4. The Page design wizard opens and shows the content for the page you activated:



Click on the **Edit report** button.

5. The "Report template" dialogue is opened. You can read in the topic How to create a report template how you can change the report settings.

6. When you are ready close the "Report template" dialogue.

7. You are now back the the "Template design" dialogue.

8. If you are ready click on the **Finish** button.

9. From the Studio View click on the **Save** button to save your Session Template.

8.3.6 Probe selection

If you need to change which probe is used to measure a specific parameter you do this by clicking on the **Probe selection** button on the Design page of the Ribbon bar.

The procedure describe here uses a Session Template, but the same procedure can be used with a Session if you need to make a modification to it "on the fly" at any time when you have started a measurement.

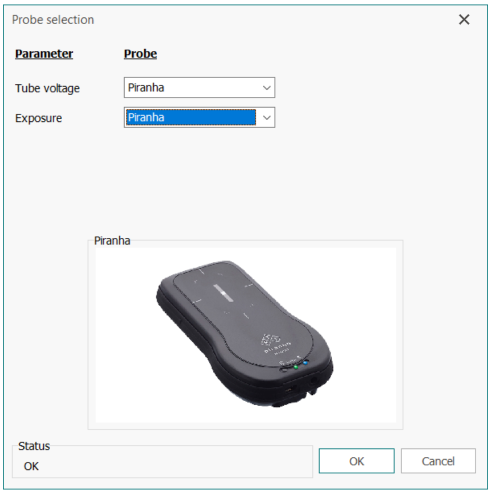
To change probe selection:

1. Open the Session Template you want to modify.

2. Make sure to activate the page where you want to change probe selection. Assume that here is "Tube voltage" and "Exposure" measured.

3. Go to the Design page and click on the **Probe selection** button.

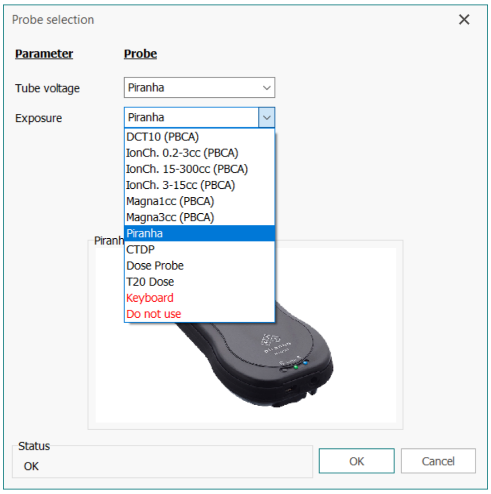
4. The "Probe selection" dialogue is opened:



It shows that current probe selection is "Piranha" for both parameters.

5. Assume that we want to use RTI Dose Probe instead for the Exposure measurement. Click on the drop-down list that corresponds to "Exposure".

6. The list shows all possible probes that can measure "Exposure", in case you have Piranha connected and "on line" with Ocean Next, only connected probe is shown.



There are also two alternatives "Keyboard" and "Do not use".

- *Keyboard* - if you select this, the parameter will not be measured instead it is expected to be typed in from the keyboard. After each exposure a dialogue will automatically pop up where you can enter a value.
- *Do not use* - if you select this, the parameter will be ignored and not measured.

7. Select the probe you want to use.

8. When you are ready click **OK**.

9. From the Studio View click on the **Save** button to save your Session Template.

8.3.7 Add a hint

Sometimes it is useful to get a reminder at specific point when you do a specific measurement, it can be to "remove a filter before you start the measurement", "add a filter before you start a measurement" or something else. You can add a "hint" to a test page or to a specific row in a test page that pops up when you reach that point when you do the measurement.

The procedure described here uses a Session Template, but the same procedure can be used with a Session if you need to make a modification to it "on the fly" at any time when you have started a measurement.

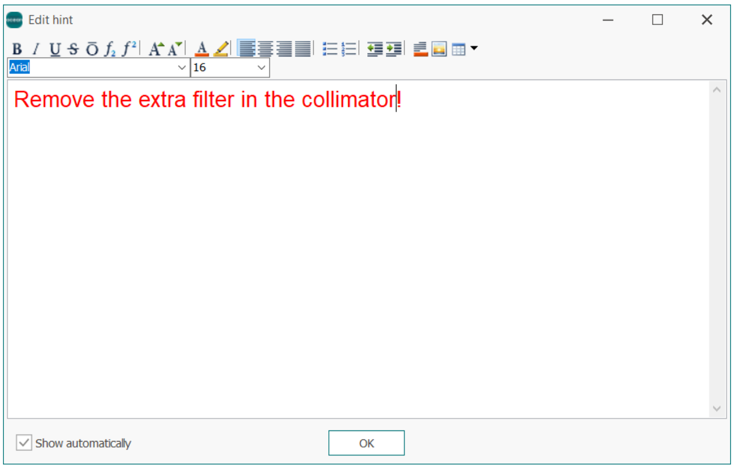
Assume you want to show a reminder to remove a filter when you start a specific test page:

1. Open the Session Template you want to modify.

2. Make sure to activate the page where you want to add the Hint.

3. In this case we want to add the hint "to the page" and have it appear when user activates this page. Right-click on the white space outside the grid and select "Hint" and select "Edit".
   If you want to add it to a specific row, right-click instead on that row.

4. The "Hint" dialogue is shown:



   You can now enter the text you want, you can format the text, add pictures, etc.

5. You can control if it shall show automatically or not when the page is activated (or when you reach a specific row when you measure) by check/uncheck the box in the lower left corner of the dialogue.

6. Click **OK** when you are ready.

7. From the Studio View click on the **Save** button to save your Session Template.

8.3.8 Attach information

Sometimes it is useful to include some kind of instruction to a test page, it can for example be a PDF file, a picture or maybe a link to a web page. You can attach information to a Session and/or a specific test page.

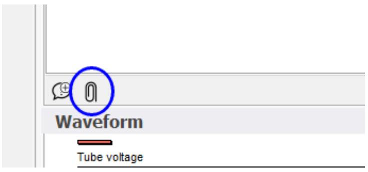
Note: This function is not intended to use for "storage" of any data, the attached information is not included in the report.

Assume that you want to include a PDF document with an instruction with a specific test page in a Session Template:

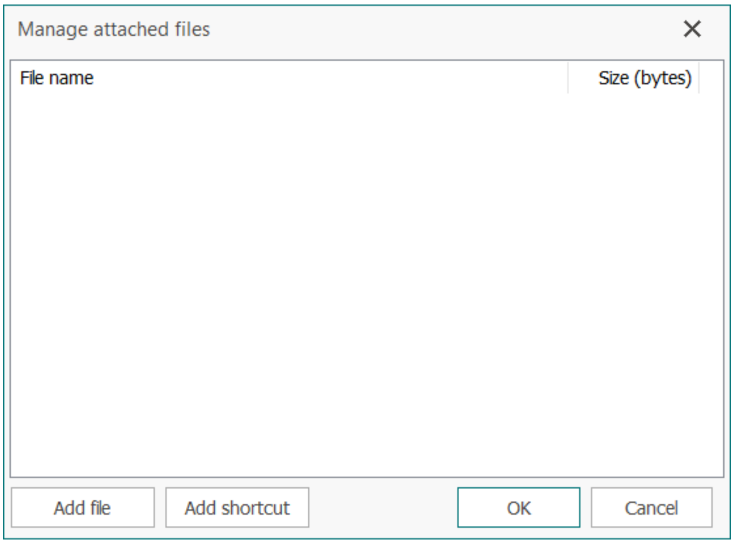
1. Open the Session Template you want to modify.

2. Make sure to activate the page where you want to attach the PDF document.

3. In the lower right corner of the test grid panel, click on the paper-clip:



4. The "Manage Attachments" dialogue is shown:

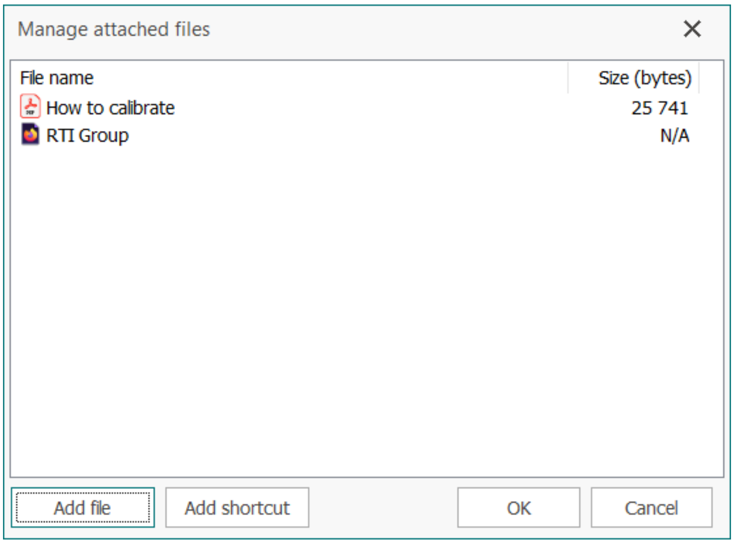


You can now add one or several files that will be directly available for for the person that uses the template.

5. Click on **Add file** button and select the file(s) you want to attach.

6. You can also click on **Add shortcut** and include a link to a web page.

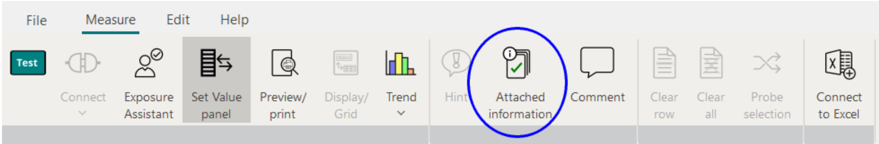
7. It can look like this with a PDF file and a web link:



8. Click **OK** when you are ready.

9. From the Studio View click on the **Save** button to save your Session Template.

When the Session template later is used by someone, the measurement has started and the page activated, the **Attached Information** button on the Ribbon bar is enabled:



8.3.9 Link to an Excel workbook

There are four different ways to send data to Excel:

- Use compy and paste to move data do Excel. Read more in the topic Copy and Paste.
- Dump all data including column headers into a spreadsheet. Read more in the topic Send data to Excel.
- Send data row-by-row for each new exposure. Read more in the topic Free workbook.
- Connect cells in your Ocean template to cells in your spreadsheet. Read more in the topic Link a session to Excel.

Ocean's Cell-to-cell mode is very powerful and makes it possible for you to take full control of how and where the measured data is placed in your spreadsheet. You can also choose if the measured data should be sent to the spreadsheet automatically as you make each exposure or manually when you click on the "Send data" button.

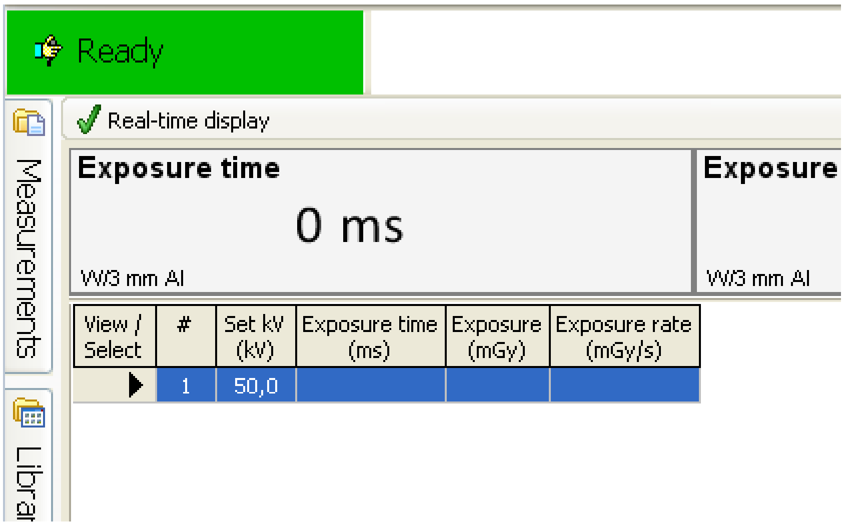
8.3.9.1 Free workbook

Use a free workbook when you want to transfer exposure data row-by-row quickly and easily to an Excel workbook. When you use this feature, a connection between your Ocean Next object and the workbook is established while the documents are open. As soon as you save and quit, the connection is closed. It is not "remembered" by the Ocean Next as it is if you use an embedded or associated workbook.

For the example below, assume you have the following table in your spreadsheet and you want to fill it with measured data:

	A	B	C	D	E
1					
2					
3					
4		Set kV	Time(ms)	Dose (mGy)	Dose rate (mGy/s)
5		50			
6		70			
7		90			
8		110			
9					
10					

1. Assume you have a test page with four columns; Set kV, Time, Exposure and Exposure rate.



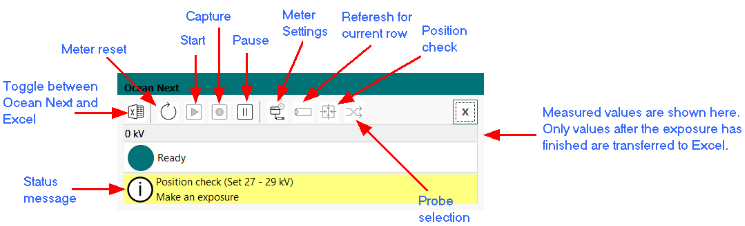
2. Go to the Data link page on the Ribbon bar and click on the "Add workbook" button.

3. Select "Free workbook".

4. A dialogue is activated to help you select a Microsoft Excel spreadsheet.

5. Locate the file with the table you want to fill in and select it.

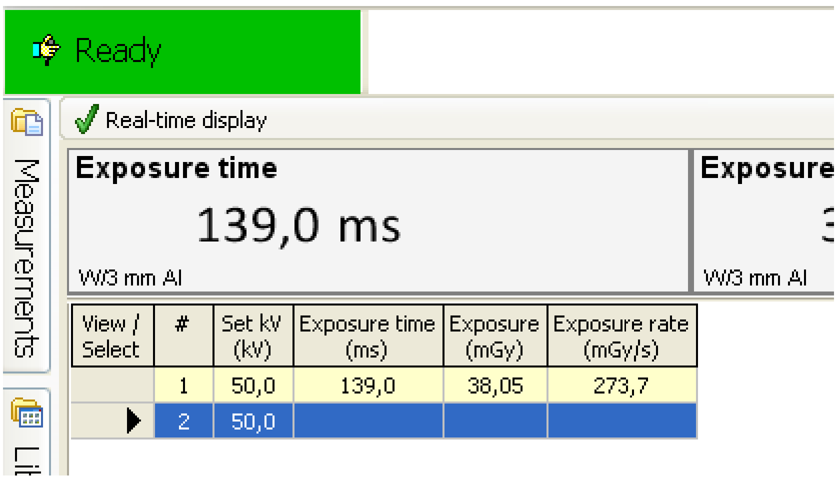
6. Ocean Next will start Excel and show you the workbook. Ocean Next will also activate a "minimized Ocean Next window" from where you can operate Ocean Next but still see your Excel spreadsheet.



7. Select the upper left cell in the table (in the spreadsheet). You have two options here:

- Place it in the "Set kV" column, the value from Ocean will overwrite the value in the spreadsheet.
- Right-click on the "Set kV" column heading in Ocean and uncheck "Include column in spreadsheet exports". In this case select the first row in the Time column in the spreadsheet.

8. Set the generator and make an exposure.



9. Measured data is now transferred to the spreadsheet.

Set kV	Time(ms)	Dose (mGy)	Dose rate (mGy/s)
50	139,0	38,1	273,7
70			
90			
110			

8.3.9.2 Associate or embed a workbook

If you have license level ADVANTAGE or PROFESSIONAL, you can associate or embed any Excel workbook with a session. The spreadsheet can be empty or one that already has predefined calculations and other information in it, so all you really want to do is fill in the measurement values in the spreadsheet.

Ocean Next allows you to automate the process and create a "link" or "association" between the Ocean Next Session and your Excel spreadsheet. It enables you to send all your measurement data to one spreadsheet or, if you prefer, send some of the data to one spreadsheet and other data from the same template to another spreadsheet. The Session template and your specified spreadsheet(s) will become a single unit, complementing each other to make data transfer from Ocean Next to spreadsheet smooth and fast.

Ocean Next offers two ways to link spreadsheets:

Associate

If you choose this option, your workbook is stored somewhere on your computer, but the workbook location is stored as part of your Session template. Once you created this association Ocean Next will take care of the file for you. When you open your Session, Ocean Next also opens the associated Excel workbook automatically. When you close your Session, any new work you did will be saved and the Excel workbook will also be closed automatically. A Session with an associated workbook will have the Excel symbol appear in Studio View at the bottom of the grid as shown in the picture below:

NOTE: When you use the association method of linking your workbook to Session templates, you must make sure that you don't move the Excel files Ocean Next is using, because Ocean Next saves the location of these files inside your template and expects them to be found at the location you originally specified. Also, if you want to share your Session templates, you must not forget to send along the associated Excel workbook as well. If you for some reason move the associated file and Ocean doesn't find it; you will get an option to browse for a new Excel file or locate the missing file. All links you may have will be kept and linked to the new file.

When you remove an association to a workbook, the workbook will remain unchanged since it is only the link to a specific location you are removing from Ocean Next. You are not removing your workbook from your computer.

Embed

If you choose this option, your workbook will be embedded into your Session template and the whole workbook will become part of your Session. A copy of the workbook will be left on your computer but Ocean Next will use the embedded copy and the other copy on your computer will not be updated with new data. When you open your Session, Ocean Next starts Excel automatically and opens the embedded workbook too. When you close your Session, any new work you did will be saved and the embedded workbook will be closed as well.

When you embed the workbook, it will always reside inside Ocean Next and will become a permanent part of the Session until you remove it. If you send an Session or Session template with an embedded Excel workbook to someone, they will automatically get the Excel workbook as well. A Session template with an embedded workbook will in Studio View have the Excel symbol in a black rectangle appear at the bottom of the grid as shown in the picture below:

When you remove an embedded workbook from a Session, the workbook will be deleted. It is permanently removed from the Ocean database. If you want to keep the workbook, follow the procedure below:

1. Open the session or template, when you do this, Ocean will start Excel.

2. Use the Excel save function to save the workbook on your computer. You now have a copy of the embedded workbook on your computer.

3. Remove the embedded workbook from the session or template.

8.3.9.3 Copy and paste

You can use copy and paste to move data from Ocean Next's grid into Excel:

1. Select the cells you want to copy.

View / Select	#	Set kV (kV)	Tube voltage (kV)	kVp diff %	Exposure (mGy)	Exposure time (ms)
	1	55	55,13	0,2	0,2678	112,9
	2	60	60,62	1,0	0,3330	98,27
	3	65	64,33	-1,0	0,3776	98,27
	4	70	69,77	-0,3	0,4390	98,77
	5	75	75,42	0,6	0,5179	99,27
	6	80	80,88	1,1	0,5885	98,77
	7	85	84,61	-0,5	0,6444	99,28
	8	90	90,37	0,4	0,7168	98,77
	9	95	95,83	0,9	0,8055	98,77
	10	100	100,89	0,9	0,8833	98,78
	11	105	104,37	-0,6	0,9383	98,77
	12	110	109,57	-0,4	1,022	98,78
	13	115	115,14	0,1	1,115	98,78
	14	120	120,43	0,4	1,195	98,77

2. Type Ctrl+c and open the document you want to copy to, for example Excel.

3. Select a cell.

4. Type Ctrl+v to paste the data into Excel.

B3 fx 55

	A	B	C	D	E	F	G
1							
2							
3		55	55,13	0,2	0,2678		
4		60	60,62	1	0,333		
5		65	64,33	-1	0,3776		
6		70	69,77	-0,3	0,439		
7		75	75,42	0,6	0,5179		
8		80	80,88	1,1	0,5885		
9		85	84,61	-0,5	0,6444		
10		90	90,37	0,4	0,7168		
11		95	95,83	0,9	0,8055		
12		100	100,89	0,9	0,8833		
13							
14							

8.3.9.4 Link a session to Excel

This topic will describe how you can connect a workbook to a session and how you can link certain cells in the Ocean Next's grid to certain cells in Excel. You can also link a waveform to a certain cell in the workbook.

Connect a workbook to a session

You can connect a spreadsheet two different ways (associate or embed).

1. Select the session (or session template) to which you wish to connect a workbook and open it.

2. Go to the Data link page on the Ribbon bar and click the **Add** button.

3. Choose either Embed or Associate link, depending on what you want. It is recommended to use "embedded" since the workbook is then stored inside the session (or session template). You can read about the difference Associate or Embed a workbook.

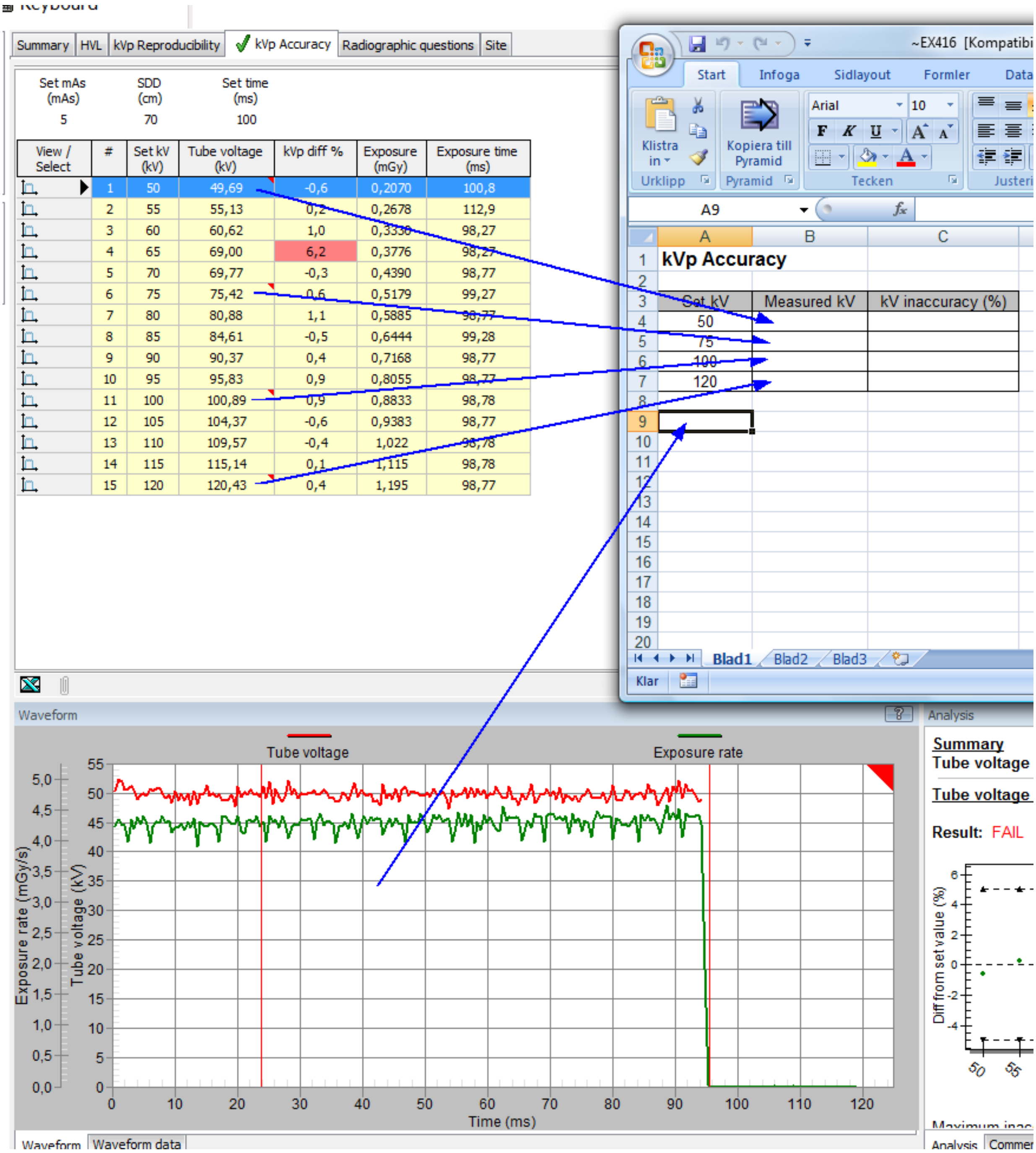
4. A browse window will open so you can browse your way to the file you want to link. Select the file you want.

5. 6. Click **Save** (in Ocean Next) to save the Session.

Now the workbook and the Session (or Session template) are permanently connected to each other and if you chose "embed" the Excel workbook is not part of your Session (or Session Template) and will now be saved in Ocean Next's database.

Create link between cells in Excel and cells in an Session (or Session template)

The most powerful and effective way to use Ocean Next with Excel is to use what is called "cell-to-cell" mode. The following example shows the principle of using "cell-to-cell" linking. For the example, we will assume that you have a session with a test page and an Excel workbook with a spreadsheet as shown in the picture below:



The arrows indicates where you want data from Ocean Next to go in your spreadsheet.

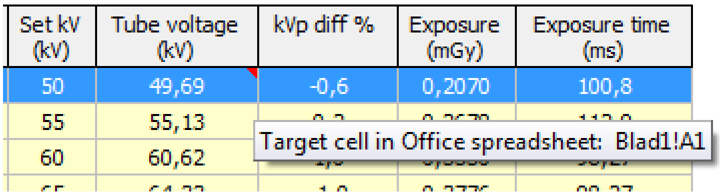
1. Make sure that the test page (or checklist page) you are going to link from is activated.

3. Select the first cell in Excel:

	A	B	C
1	kVp Accuracy		
2			
3	Set kV	Measured kV	kV inaccuracy (%)
4	50		
5	75		
6	100		
7	120		
8			

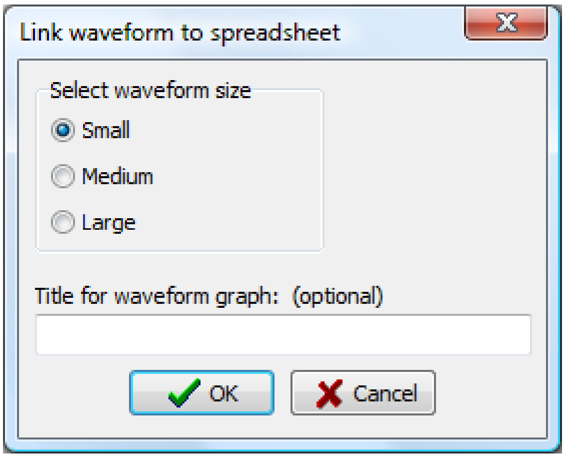
3. Now go to Ocean Next and right-click in the cell you want to link. Select "Link selected cell(s) to Office spreadsheet" from the menu.

4. A red arrow will appear to indicate that this cell is linked. If you hover the cursor over the cell, a hint will tell you where this cell is linked to. It is possible to link a block of cells simultaneously, see how to do this further down in this topic.



5. You can also link the waveform that "belong" to the exposure. First go back to the spreadsheet and select a cell where you want the upper left corner of the waveform graph to appear.

6. Now go back to Ocean and right-click on the waveform panel. From the menu select Link waveform to spreadsheet. A dialogue is shown:



Click **OK**.

7. A link is now created between the cell in Excel and the waveform. This is indicated by a red triangle in the upper right corner of the waveform graph.

8. Repeat the above step #3 and #4 to link the other three cells (in this example are waveforms for additional rows not included). Once the links are done, your Ocean grid should look like this:

View / Select	#	Set kV (kV)	Tube voltage (kV)	kVp diff %	Exposure (mGy)	Exposure time (ms)
	1	50	49,69	-0,6	0,2070	100,8
	2	55	55,13	0,2	0,2678	112,9
	3	60	60,62	1,0	0,3330	98,27
▶	4	65	64,33	-1,0	0,3776	98,27
	5	70	69,77	-0,3	0,4390	98,77
	6	75	75,42	0,6	0,5179	99,27
	7	80	80,88	1,1	0,5885	98,77
	8	85	84,61	-0,5	0,6444	99,28
	9	90	90,37	0,4	0,7168	98,77
	10	95	95,83	0,9	0,8055	98,77
	11	100	100,89	0,9	0,8833	98,78
	12	105	104,37	-0,6	0,9383	98,77
	13	110	109,57	-0,4	1,022	98,78
	14	115	115,14	0,1	1,115	98,78
	15	120	120,43	0,4	1,195	98,77

6. Click **Save** to save what you have done.

You can choose to send the data to the workbook either manually each time you click "Send data" or automatically after each exposure. Check "Auto send" if you want to send it automatically after each exposure.

Link a block of cells

It is possible to link an entire block of cells simultaneously. To do this, follow the steps described below:

1. Select the cell in the spreadsheet that represents the upper left corner of the block you want to create links for.

2. Switch to Ocean Next. Click (select) the upper left cell in the block you want to create links for.

(kV)	(kV)	
50	49,69	-0,6
55	55,13	0,2
60	60,62	1,0
65	64,33	-1,0
70	69,77	-0,3

3. Hold down the left mouse button and move the mouse pointer to the lower right corner. The selected cells are marked. You can also hold down the Shift key and click on the cell in the lower right corner of the block.

4. The selected cells are now highlighted (see picture below):

View / Select	#	Set kV (kV)	Tube voltage (kV)	kVp diff %	Exposure (mGy)	Exposure time (ms)
▶	1	50	49,69	-0,6	0,2070	100,8
	2	55	55,13	0,2	0,2678	112,9
	3	60	60,62	1,0	0,3330	98,27
	4	65	64,33	-1,0	0,3776	98,27
	5	70	69,77	-0,3	0,4390	98,77
	6	75	75,42	0,6	0,5179	99,27
	7	80	80,88	1,1	0,5885	98,77
	8	85	84,61	-0,5	0,6444	99,28
	9	90	90,37	0,4	0,7168	98,77
	10	95	95,83	0,9	0,8055	98,77
	11	100	100,89	0,9	0,8833	98,78
	12	105	104,37	-0,6	0,9383	98,77
	13	110	109,57	-0,4	1,022	98,78
	14	115	115,14	0,1	1,115	98,78
	15	120	120,43	0,4	1,195	98,77

5. Make sure that "Direction"; Down or Across, is set in the way you want.

6. Right-click anywhere on the selected block to get a menu. From the menu select the "Link selected cell(s) to Office spreadsheet..." option.

7. All the cells are now linked to the spreadsheet.

View / Select	#	Set kV (kV)	Tube voltage (kV)	kVp diff %	Exposure (mGy)	Exposure time (ms)
▶	1	50	49,69	-0,6	0,2070	100,8
	2	55	55,13	0,2	0,2678	112,9
	3	60	60,62	1,0	0,3330	98,27
	4	65	64,33	-1,0	0,3776	98,27
	5	70	69,77	-0,3	0,4390	98,77
	6	75	75,42	0,6	0,5179	99,27
	7	80	80,88	1,1	0,5885	98,77
	8	85	84,61	-0,5	0,6444	99,28
	9	90	90,37	0,4	0,7168	98,77
	10	95	95,83	0,9	0,8055	98,77
	11	100	100,89	0,9	0,8833	98,78
	12	105	104,37	-0,6	0,9383	98,77
	13	110	109,57	-0,4	1,022	98,78
	14	115	115,14	0,1	1,115	98,78
	15	120	120,43	0,4	1,195	98,77

Links and real-time displays with "Auto new row" enabled

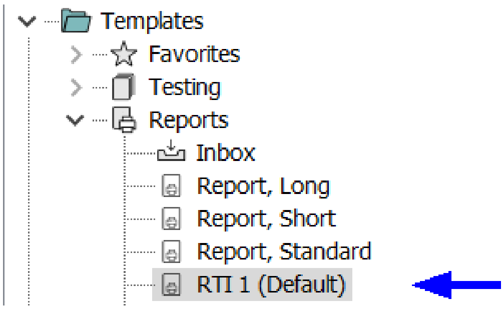
If you are using the real-time display and have Auto new row enabled, a new row is created for each exposure. The new row is a copy of the previous row except for the links. To avoid overwriting the data in the workbook, the links for the new row are automatically pointed to the next row in the workbook. The column pointers are kept.

Exchange a linked or embedded workbook

In some situations you may want to exchange the work book you have embedded or associated and at the same time keep all the links you have. This can be done just by embedding or associating the new workbook without deleting the existing one first. A dialogue will be shown and you must confirm that you want to load a new workbook.

8.4 How to create a Report Template

Every Session and Session template has an "embedded" Report template that defines the format for printing and creation of PDF files. If the you don't include a specific Report template when you create a Session template, the default one will be used. The default format is defined by the Report template you have set to "default. The Report Templates are stored in the database tree under Templates:



The default Report template is indicated with the text "(Default)" after it's name.

New Report Template

You can create create different Report templates to be used for different purposes. A Report template contains the following information:

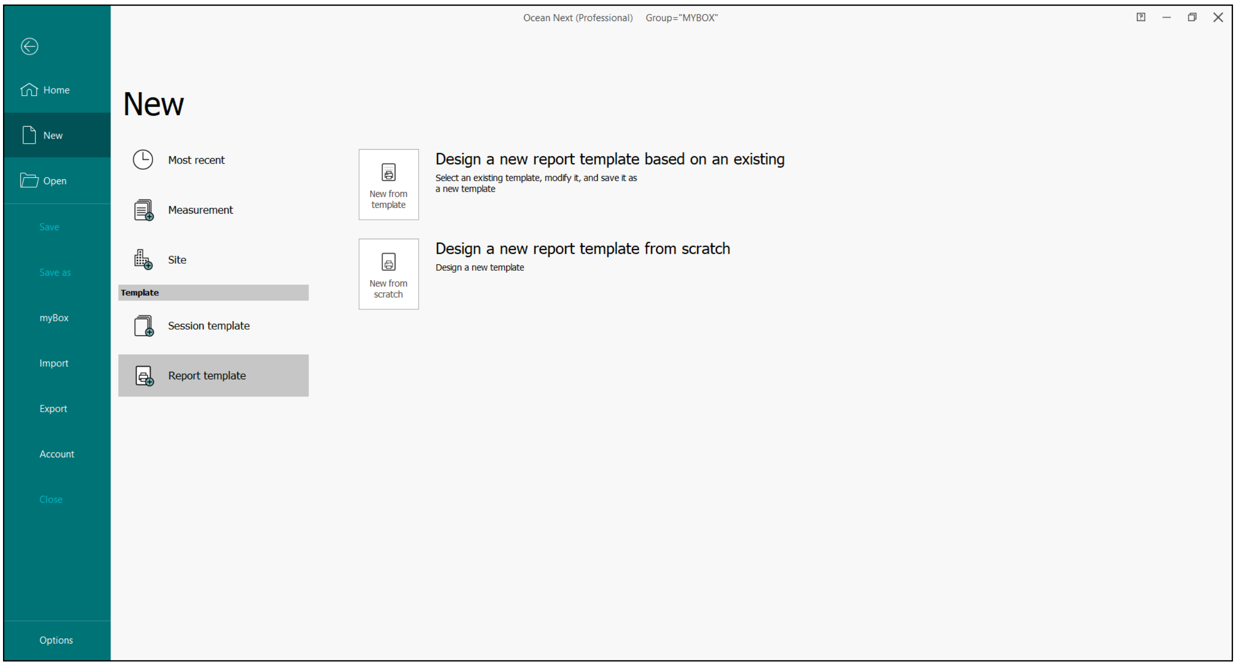
- Header and footer
- Content, which parts of a Session, section, images, titles, etc., shall be included in the printed report.
- Print options

Any saved Report template can be used whenever a report is to be printed or a PDF is to be created.

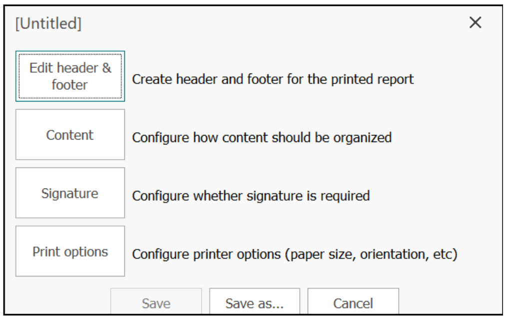
New Report template from scratch

The description below serve as an example on how to create a new Report template from scratch.

From the Backstage/New, select **Report template** in the left part of the main screen, and then select **Design a new report template from scratch.**



The Report Design window below will show up. From here the different parts of the report are reached, and saved.



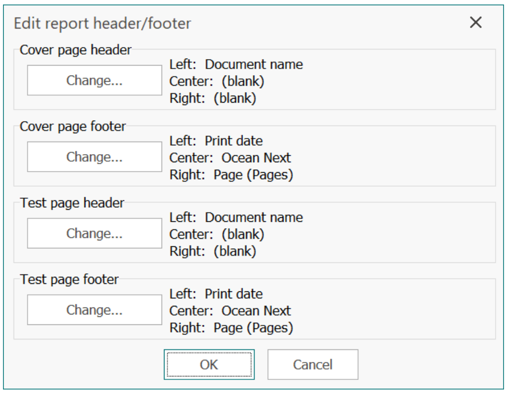
You can now define Head, Footer, Content, Signature and Print options for the report layout. Each section below describes how to set up the different parts of a report template.

Define header and footer

You can customize the header and footer for the printed report. Different headers and footers can be setup and stored in a layout for quick and easy use. You can add text and pictures, and you can define the height for the header and footer.

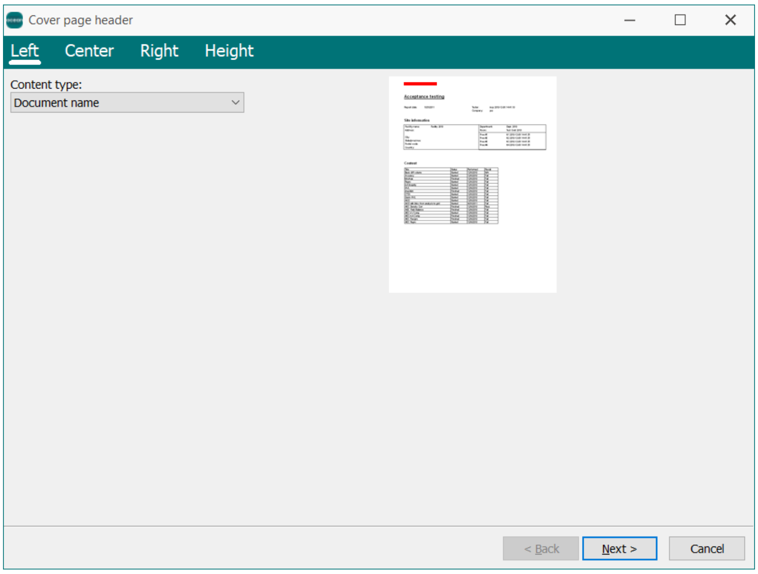
1. Click on the button "Edit header & footer".

2. A dialogue is shown where you can set up individual header/footer for the cover page and the following test pages.



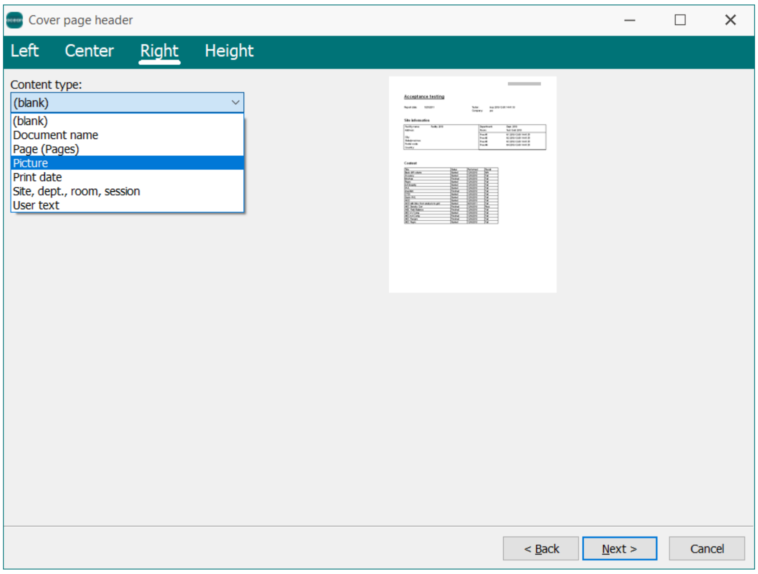
You can now for each header and footer select content for left - center and right position. You select a text or a picture.

3. Click on the Cover page header Change... button. Assume that you in the header just want to have your logo to the right.

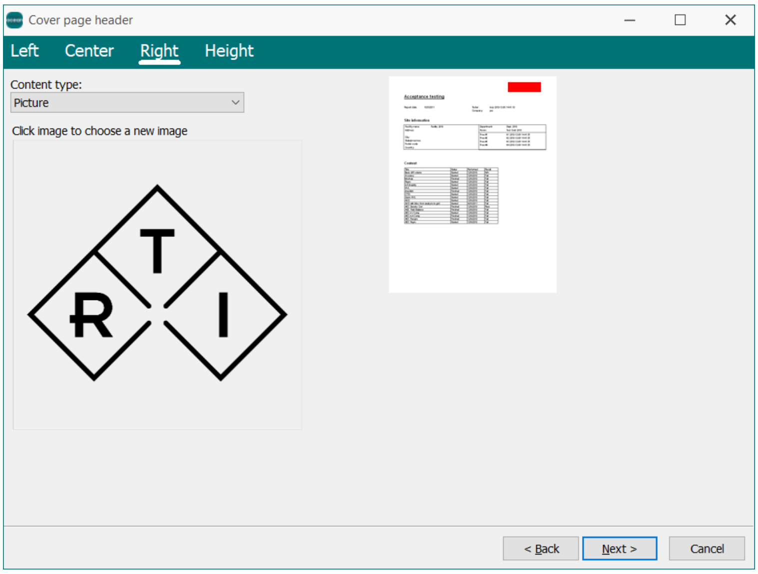


Just click Next here since you want to leave it blank, click also Next for the center position text.

4. Select Content type **Picture** from the drop-down list.

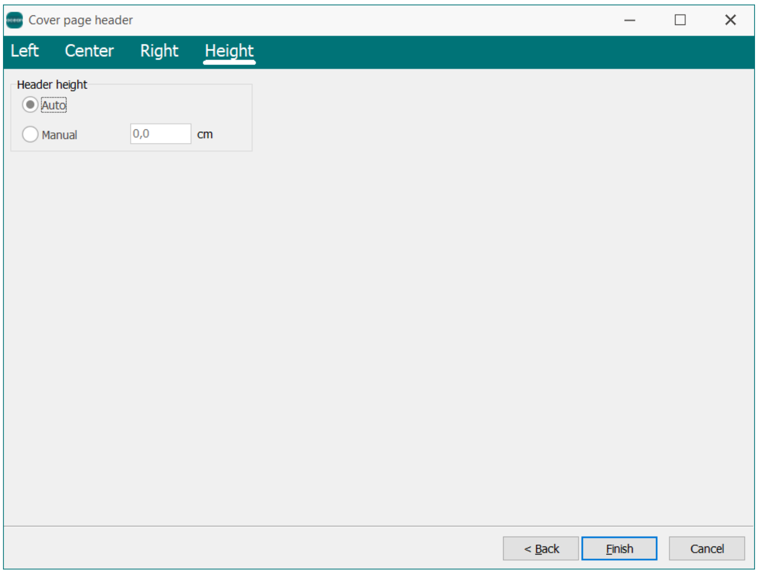


5. A frame appears, click on it and locate your logo picture.



6. Click on Next.

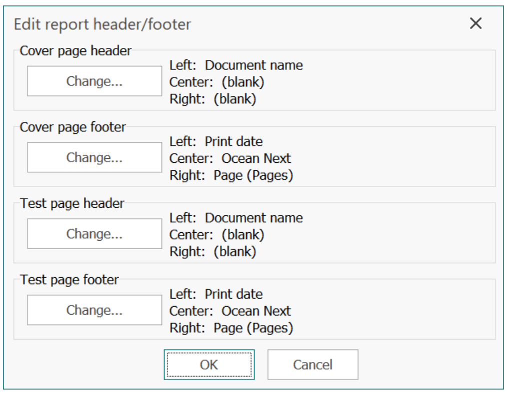
7. Now specify the space you want the header to occupy.



Default is to let Ocean Auto size the height.

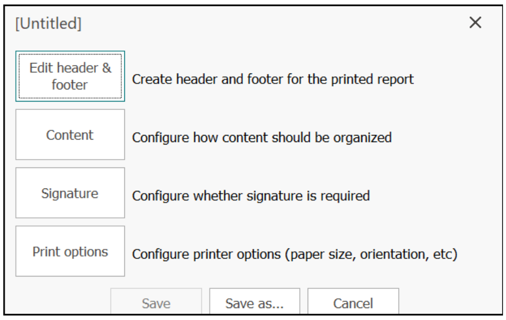
Click **Finish**.

8. Repeat the same procedure for the other headers and footers.



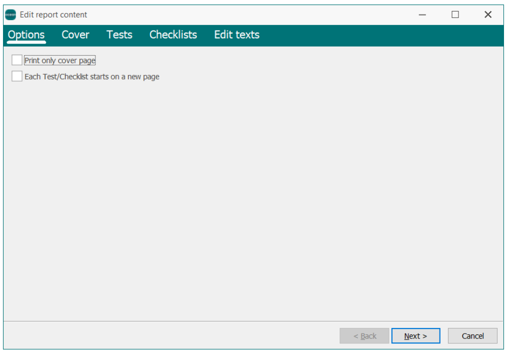
Click **OK.**

Define content



1. When you are ready with all headers and footers click on the **Content** button. A wizard is started that will allow you to modify the content in the report:

- Print only cover page
- Decide if you want each test to start on a new page
- for the cover, tests and checklists:
  - Change title for each section
  - Exclude or include sections
  - Change order of sections
- Modify all fixed texts in the report

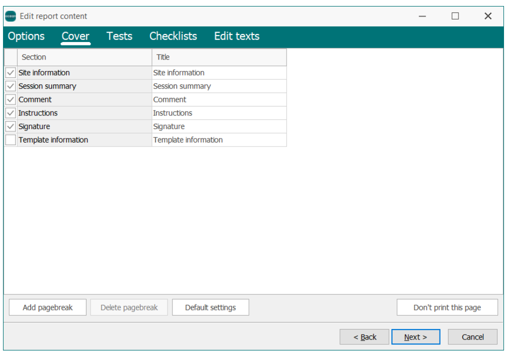


Print only cover page - Only the cover page with th summary page will be in the report.

Each test/checklist starts on a new page - Each test and checklist in the session will start on a new page.

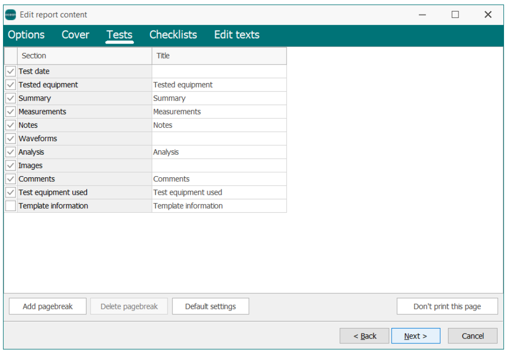
Make the desired selections and click **Next**.

2. Design the Cover page.



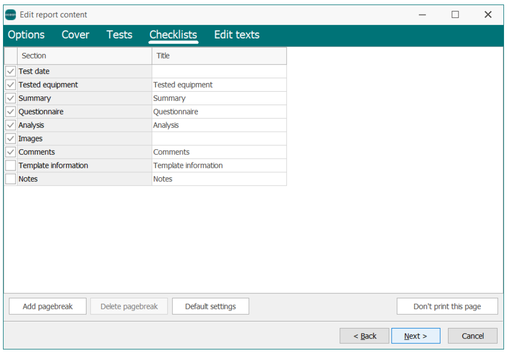
You can change order of the different sections on the cover page. You also check or uncheck sections to include or exclude them. You can also modify the title if you want another text.
Make the desired selections and click **Next**.

3. Design the Test pages.



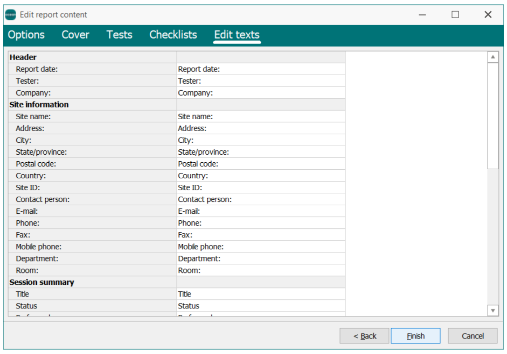
You can change order of the different sections on the cover page. You also check or uncheck sections to include or exclude them. You can also modify the title if you want another text.
Make the desired selections and click **Next**.

4. Design the Checklist pages.



You can change order of the different sections on the cover page. You also check or uncheck sections to include or exclude them. You can also modify the title if you want another text.
Make the desired selections and click **Next**.

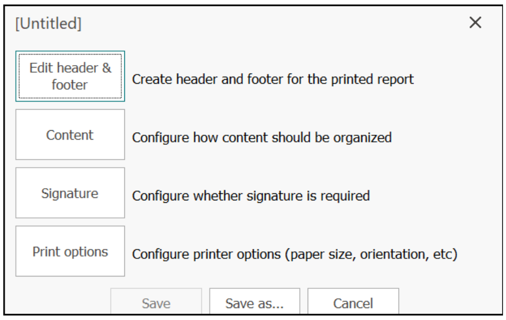
5. Edit texts



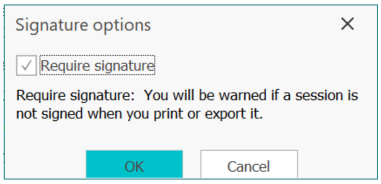
You can also modify the label if you want another text.
Edit the texts and click **Finish**.

You have now defined how the content will appear in the report when you use this Report termplate.

Define signature

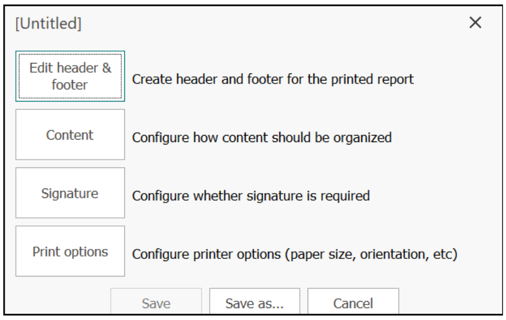


1. Define if the report should have a signature or not.



Click **OK** to finish.

Define printer settings



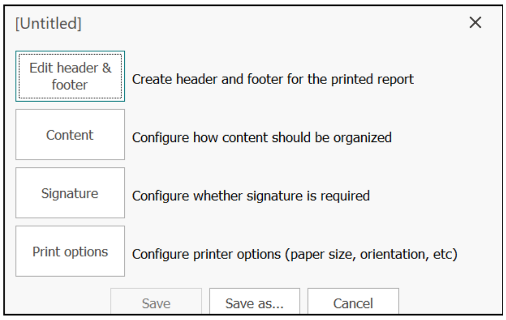
Under Print options you specify the printer options based on your installed printers.

Click **OK** to finish.

Save the Report template

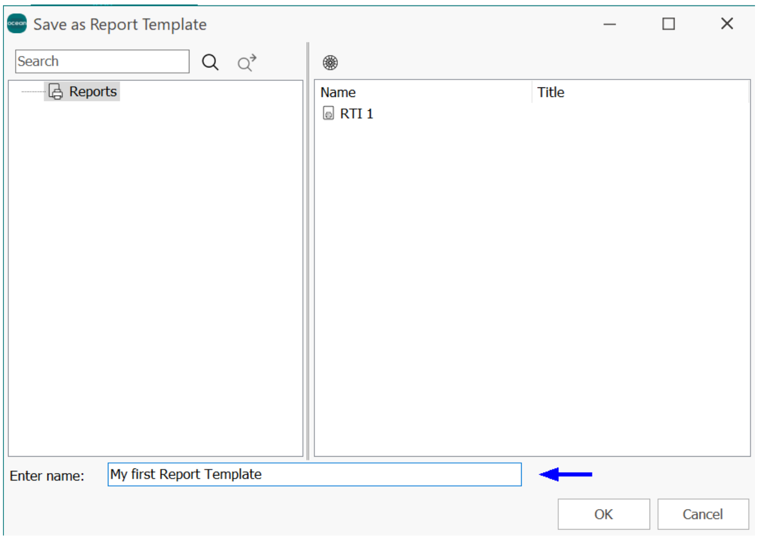
Do as follows to save your report template.

1. Select Save As...



Click on the **Save as...** button.

2. Enter name for the Report Template and click **OK**.



Now the new Report Template is ready for use.

Select a Report Template as the "default Report Template"

The "default Report Template" is always added to a new Session Template you create. Set the "default Report template" in the following way:

1. Go to the Studio View.

2. Go to the database tree and locate the "Reports" folder under "Templates".

3. Locate the Report template you want to use as your "default" and right-click on it.

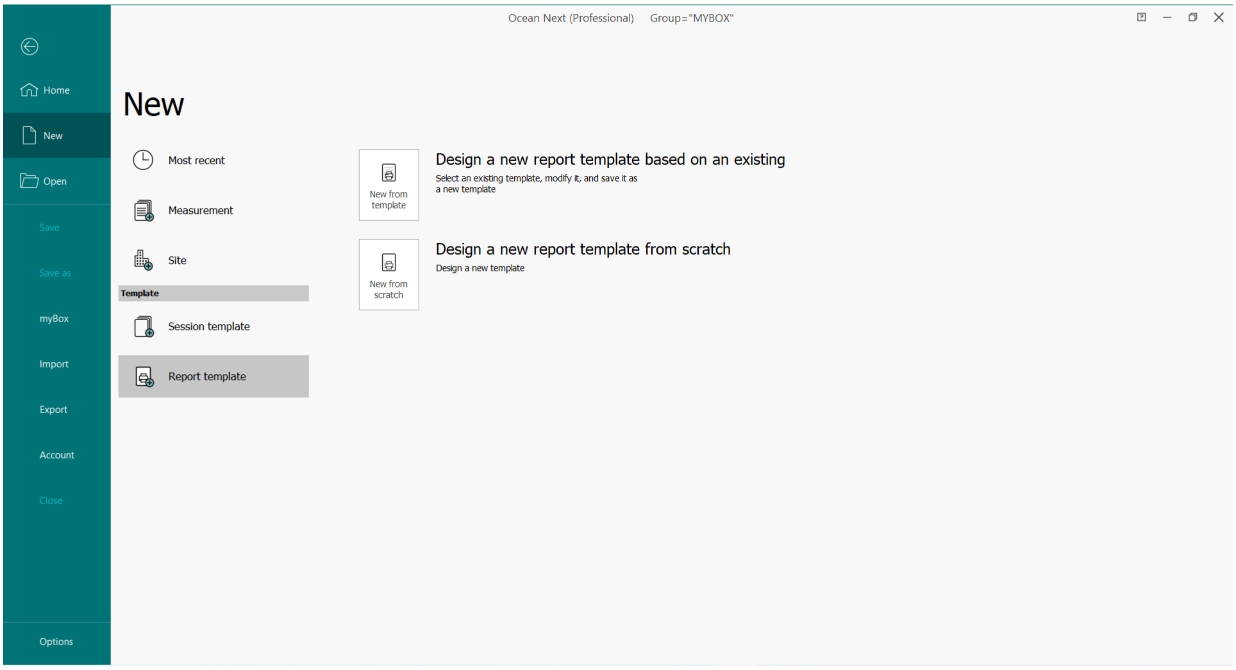
4. Select "Default".

The selected Report template is now your "default Report Template" and will be used every time you create a new Session template.

New report template based on an existing

A new report template can also be crated by modifying an existing report template.

From the Backstage/New, select **Report template** in the left part of the main screen, and then select **Design a new report template based on an existing.**



The Report Design window as describe above will show up, and the same procedure as for **New report template form scratch** above apply.

Change Report template for a Session template or Session

The report template can be added to a Session template (or Session). In this way, the session template "knows" how the report should look like. You can have different report layouts if you have need for different headers and footers for different type of reports you create. The Report template is added to an open Session or Session template in the following way:

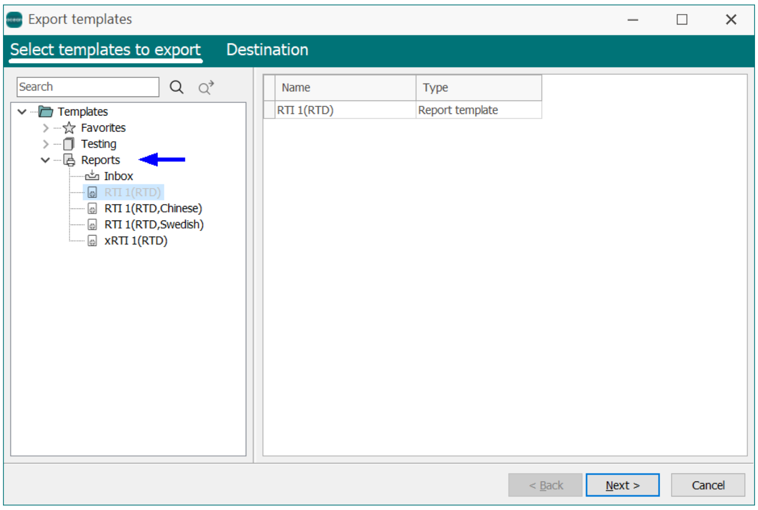
- To a Session Template: Only from the Test View, go to the Reporting page on the Ribbon bar, click on **Report template** and select the Report template you want to use.
- To a Session: Can be done both from the Test and Studio View. In the Test View, go to the Edit page on the Ribbon bar, click on **Modify Report** and select the Report template you want to use.

Export and Import report template

Report templates can be shared with other users of Ocean by using export and import. Note that Report templates cannot be shared via myBox.
The exported report template will get the file extension (*.otex).

To export a report template:

1. From the Backstage/Export, select **Templates** and the Export wizard is opened.

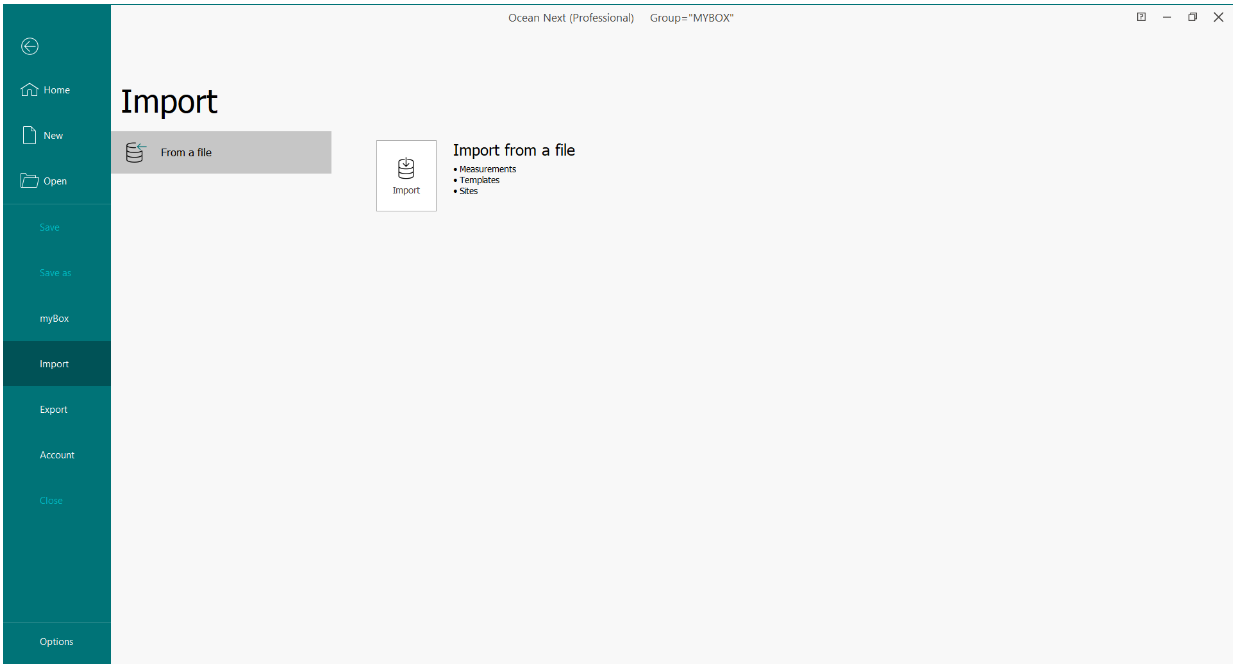


2. Select the templates (double-click or use drag-n-drop to move templates to the right side) you want to export.

3. Select destination, to a "File" or "E-mail". The file with exported Report templates will get the file extension (*.otex).

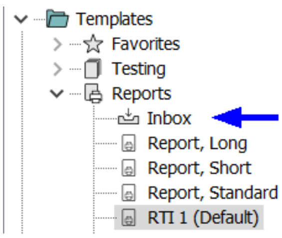
To import a report template:

1. From the Backstage/Import, select **From a file** in the left part of the main screen, and then select **Import from a file**.



2. Locate the file that contain the report template (the file extension is (*.otex)

3. Click on Open and follow the import wizard to import it.



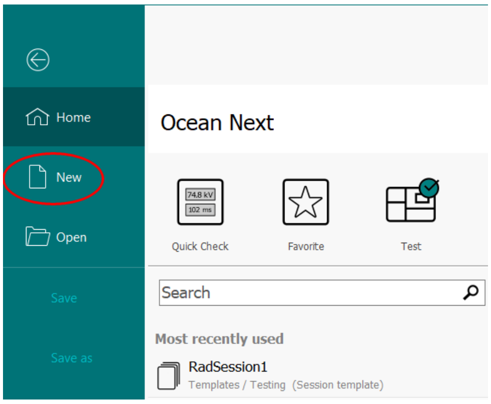
The imported report template(s) are now located in the Report templates **Inbox**.

8.5 Measurements in Studio View

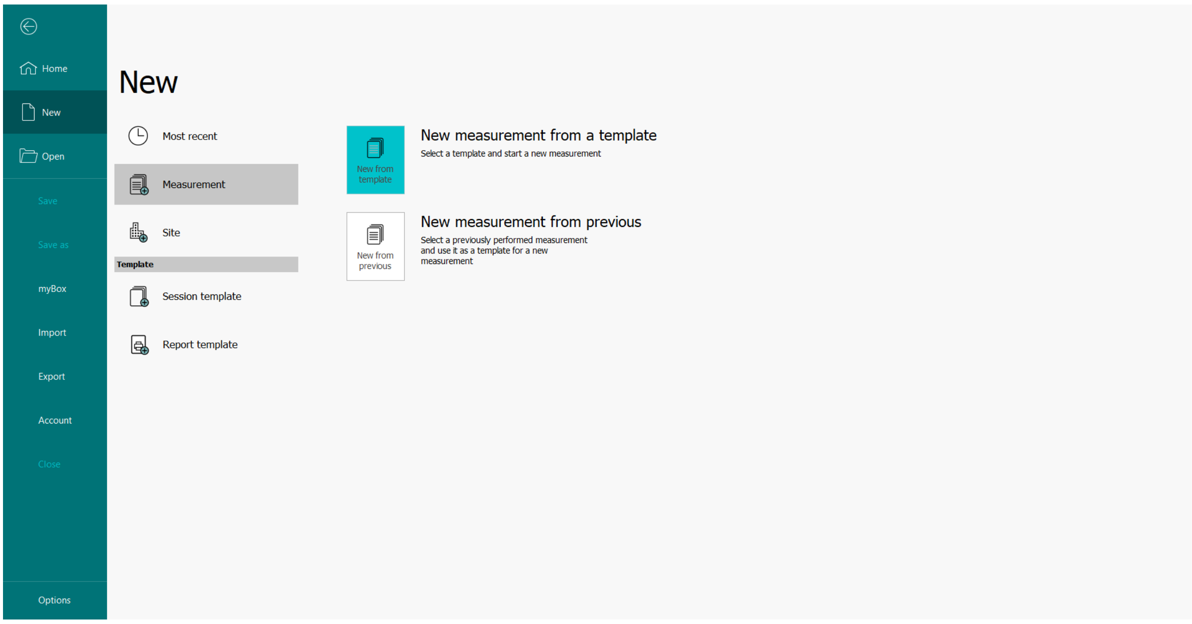
When Ocean Next is started, and if you start a measurement the default view is the Test View. If you for any reason want to use the Studio View (this is the main view from Ocean 2014) to do measurements, then you must actively select the Studio View.

The description below uses as an example a predefined Session template that comes from "Examples (RTI)" that comes with Ocean Next's installation.

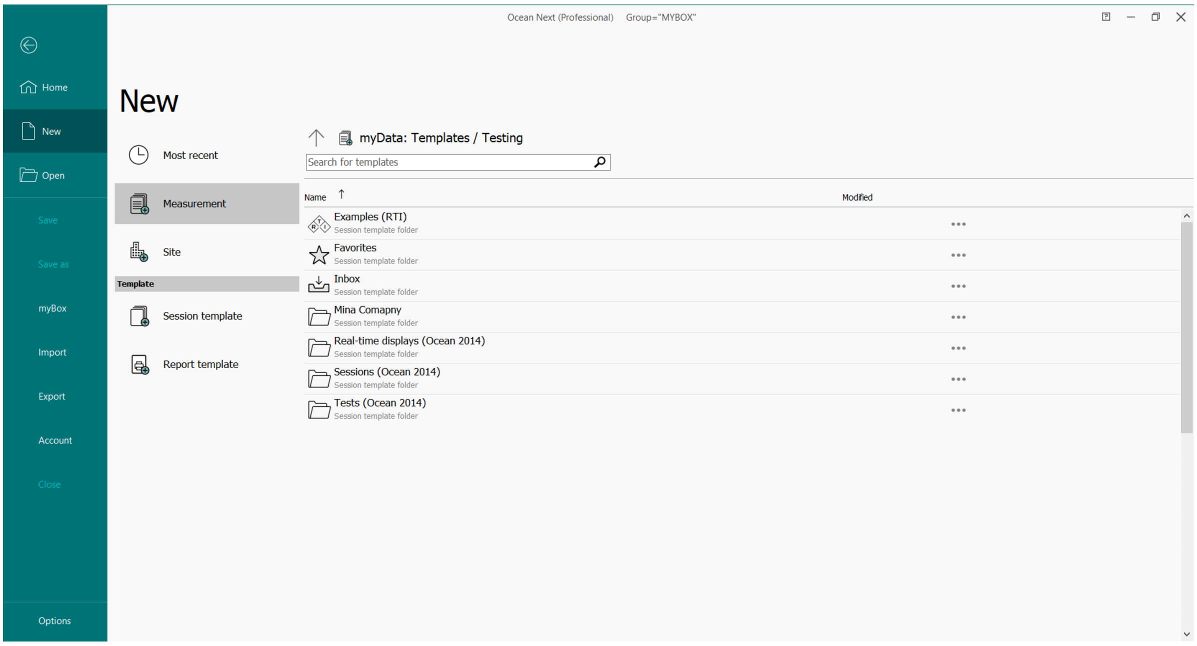
1. Power on the meter. Select **New** in the left bar.



2. Select "Measurement" in the left part of the main screen, and then select "New measurement from a template".

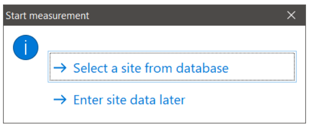


3. You can now browse for a Session Template in the "Testing" folder:



Select the folder "Examples (RTI) and locate the session template "Rad. kVp Accu.": "Templates - Gy" -> "Single-page sessions" -> "Radiography" -> "Rad. kVp Accu."

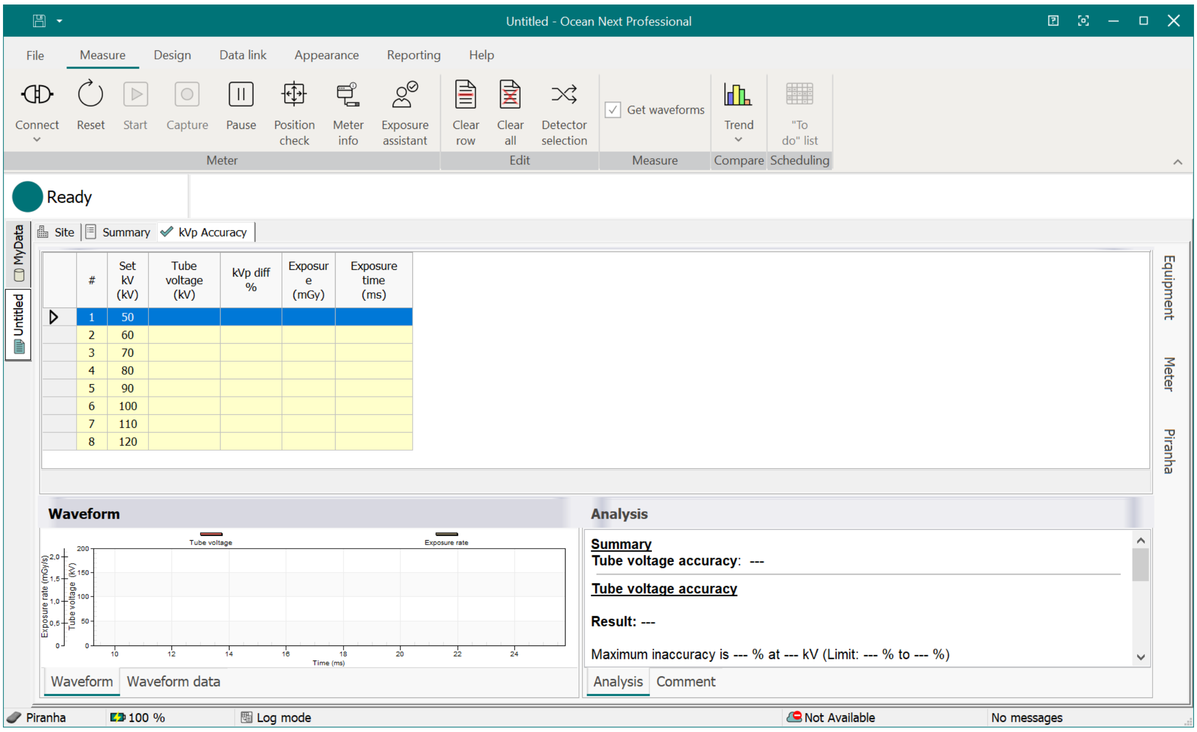
4. The template is loaded and a dialogue is shown:



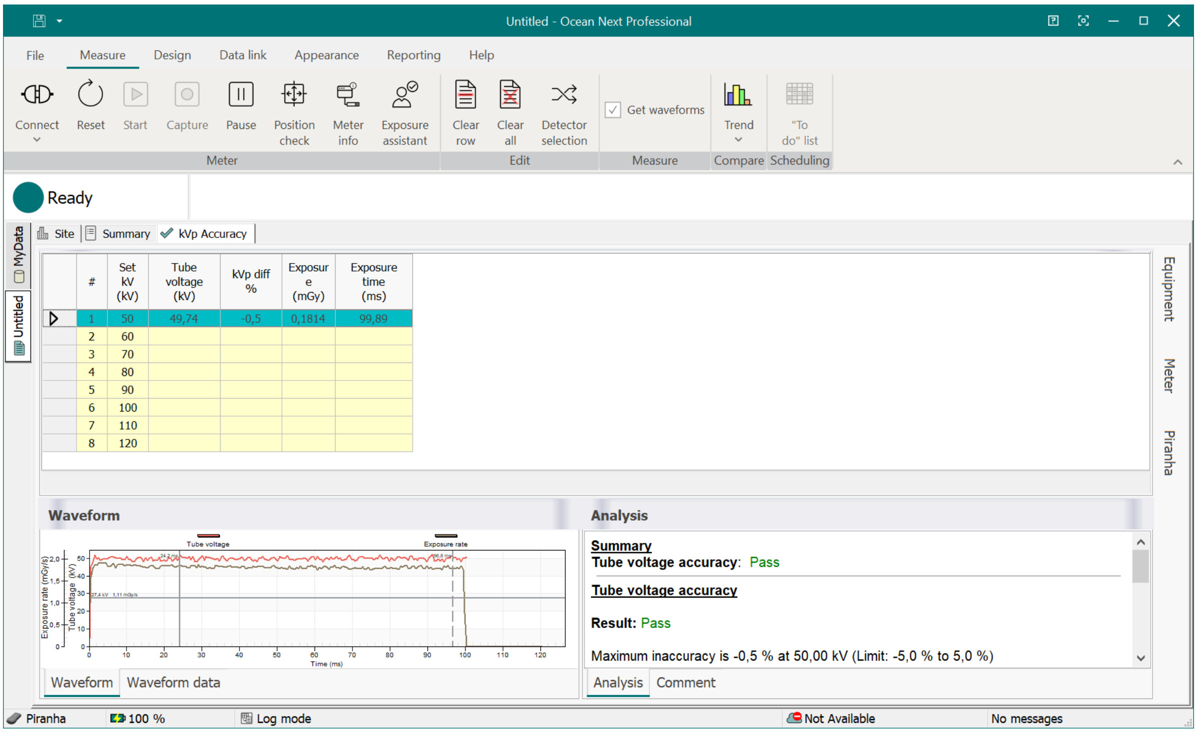
Before you start the measurement you must select if you want to pick a site from your database or enter this information later. Select in this case "Enter site data later".

5. The Session Template is loaded and the measurement starts in the Test View. Switch over to the Studio View (this topic describes how to use Studio View to do measurements).

6. When the green **Ready** sing is visible in the upper right part of the screen Ocean is ready for measurement.



7. Make an exposure.
   Measured values will show up in the grid.
   The corresponding waveform will show in the waveform display (down left).
   Results of the kV accuracy analysis will show in the Analysis display (down right).

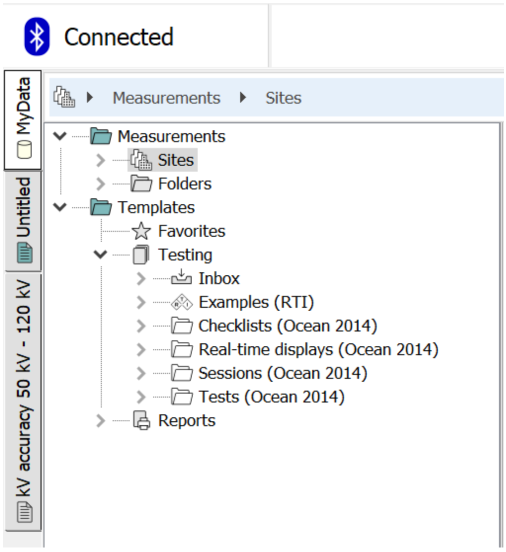


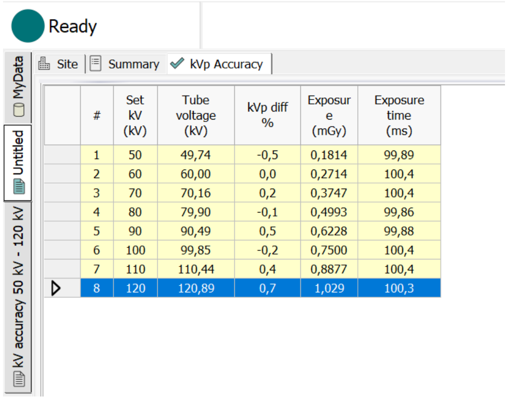
Navigate in Studio Measurement View

From Ocean Studio Measurement View you can navigate in Ocean in different ways.
The [Studio Main Functions](#) in the ribbon bar include most of the accessible functions, whereof most of them are also available by right-clicking over areas where respectively function apply. But there are also a left tab bar and a right bar for quick access to measurements, database, and settings.

Measurement and Database tabs
On the left side of the main screen a bar of tabs is available.

The upper tab is always **myData**. This is a quick access to the Ocean database with sites, measurements, and templates, in a classic database format.





Below the myData tab, the open sessions (measurements) and templates will show up. Every session and template will be shown on separate tabs until it is closed.

Settings

On the right side of the main screen a bar of tabs is available.
The upper tab is always **Equipment**. On this tab equipment from the site database is shown. If no site is selected, pre-defined information will be populated in obligatory fields.
Below the Equipment tab, various tab for meter settings will show up depending on template and meter in use.

8.6 Standard columns (Definitions)

The standard columns are described In the following sections. The columns are divided into different column types and for each type a number of different columns are available. The following columns types are available:

Column type	**Columns related to...**
kV	measurement of tube voltage
Time	measurement of exposure time
Exposure	measurement of exposure (dose)
Exposure rate	measurements of exposure rate (dose rate)
Frames	measurement of frames, frame rate and exposure/frame, mAs/frame....
mA	measurements of tube current
mAs	measurements of tube current*time product (mAs)
HVL	direct measurement of half value layer
Total Filtration	direct measurement total filtration
Light	measurement of light, illuminance and luminance
CT exposure	measurement of CT dose (pencil ion chamber)
CT exposure rate	measurement of CT dose rate (pencil ion chamber)
DAP exposure	measurement of dose area product (DAP chamber)
DAP exposure	measurement of dose area product rate (DAP chamber)

User-defined calculations	add your own calculation
User-defined numeric value	enter measured values from the keyboard
Settings	set values and meter settings
Conditions	conditions related to the measurement
Testing	evaluation and analysis of measured data
Other	varios columns
User-defined	enter user-defiend text strings

8.6.1 kV

This group of columns is related to the measurement of tube voltage:

Set kV	Set value
Tube voltage	Measured value
kVp diff %	Relative difference between measured value and reference value
kVp diff Δ	Absolute difference between measured value and reference value
kVp diff from mean (%)	Relative difference between measured value and the mean value

8.6.1.1 Set kV (Set value)

This is the kV set value. It is used to select a suitable kV range for the tube voltage measurement, but it is also the reference value when calculating the inaccuracy of kVp.

You can only have one instance of this column.

This column is required for the following analysis
Accuracy (kVp)
AGD(ACR)
AGD(EUREF)
AGD(IAEA)
HVL
QuickHVL

8.6.1.2 Tube voltage (Measured)

This is the measured tube voltage. There is only one detector that can measure tube voltage, but you can have multiple instances of this column to show the tube voltage differently, for instance, one column might show "kVp" and the other one "PPV". This value is used when calculating the inaccuracy of tube voltage.

This column is required for the following analysis
Accuracy (kVp)
Reproducibility (kVp)

8.6.1.3 kVp diff % (Calculated)

This is the calculated inaccuracy (relative) for tube voltage (kVp).

> The following calculation is done on each row included in the analysis:
>
> kVp diff % = **100 * (** Tube voltage (Measured) - Set kV **) /** Set kV

This column is required for the following analysis
Accuracy (kVp, relative)

8.6.1.4 kVp diff ∆ (Calculated)

This is the calculated inaccuracy (absolute) for tube voltage (kVp).

The following calculation is done on each row included in the analysis: kVp diff ∆ = Tube voltage (Measured) - Set kV

This column is required for the following analysis
Accuracy (kVp, absolute)

8.6.1.5 kVp diff from mean (%) (Calculated)

It is the calculated relative difference from the mean value of kVp. The mean value is calculated based on the measured kVp of all rows included in the reproducibility analysis.

It is calculated in the following way:

The mean value is calculated as: kVp mean = **(kVp_1 + kVp_2 + ... + kVp_n) / n** (based on all rows included in the reproducibility analysis) and the following calculation is done on each row included in the reproducibility analysis: kVp diff from mean (%) = **100 * (** Tube voltage (Measured) **- kVp mean) / kVp mean**

This column is required for the following analysis
Reproducibility (kVp)

8.6.2 Time

This group of columns is related to the measurement of exposure time:

Set time	Set value
Exposure time	Measured value
Total exposure time	Measured total time from start of radiation to end of radiation
Effective exposure time	Measured time when radiation is present (time between pulses is excluded)
Time diff %	Relative difference between measured value and reference value
Time diff ∆	Absolute difference between measured value and reference value
Time diff from mean (%)	Relative difference between measured value and the mean value

8.6.2.1 Set time (Set value)

This is the time set value. This value is the reference value when calculating the inaccuracy of exposure time.

You can only have one instance of this column.

This column is required for the following analysis
Accuracy (time)

8.6.2.2 Exposure time (Measured)

This is the measured exposure time. There are several detectors that can measure exposure time. However, it is recommended that you use the internal detector. You can have several instances of this column but having more than one column of this type is not really practical.

This column is required for the following analysis
Accuracy (Exposure time)
Reproducibility (Exposure time)

8.6.2.3 Total exposure time (Measured)

This is the measured total from radiation is detected and until no radiation is detected. Note: this is not what normally is defined as the exposure time.

This column can be optionally used for the following analysis
Accuracy (Exposure time)
Reproducibility (Exposure time)

8.6.2.4 Effective exposure time (Measured)

This is the time from start of radiation to end of radiation with any "dead time" between pulses excluded.

This column can be optionally used for the following analysis
Accuracy (Exposure time)
Reproducibility (Exposure time)

8.6.2.5 Time diff % (Calculated)

This is the calculated inaccuracy (relative) for exposure time.

The following calculation is done on each row included in the analysis: Time diff % = **100 * (** Exposure time (Measure) - Set time **) /** Set time

This column is required for the following analysis
Accuracy (Exposure time, relative)

8.6.2.6 Time diff Δ (Calculated)

This is the calculated inaccuracy (absolute) for exposure time.

The following calculation is done on each row included in the analysis: Time diff Δ = Exposure time (Measured) - Set time

This column is required for the following analysis
Accuracy (Exposure time, absolute)

8.6.2.7 Time diff from mean (%) (Calculated)

This is the calculated relative difference from the mean value of exposure time. The mean value is calculated based on the measured exposure time of all rows included in the reproducibility analysis.

It is calculated in the following way:

The mean value is calculated as:

Time mean = **(Exp time$_1$ + Exp time$_2$ + ... + Exp time$_n$) / n** (based on all rows included in the reproducibility analysis)

and the following calculation is done on each row included in the reproducibility analysis:

Time diff from mean (%) = **100 * (** Exposure time (Measured) **- kVp mean) / kVp mean**

This column is required for the following analysis
Reproducibility (Exposure time)

8.6.3 Exposure

This group of columns is related to the measurement of exposure (dose):

Set exposure	Set value
Exposure (norm)	Normalized (measured) value
Exposure	Measured value
Exposure (win)	Measured value during the window
Exposure diff %	Relative difference between measured value and reference value
Exposure diff Δ	Absolute difference between measured value and reference value
Exposure diff from mean (%)	Relative difference between measured value and the mean value

Note: If you want to measure CTDI by using exposure and chamber length, use instead this column and select your CT chamber. If it doesn't appear, it may need to be reconfigured by using the RTI Detector Manager. To use a CT chamber and measure exposure, it shall be configured with two calibration factors, one for exposure and one for exposure-length.

If you need help, please contact the support at RTI:

US: support.us@rtigroup.com
Rest of the world: support@rtigroup.se

8.6.3.1 Set exposure (Set value)

This is the exposure set value. This value is the reference value when calculating the inaccuracy of exposure.

You can only have one instance of this column.

This column is required for the following analysis
Accuracy (Exposure)

8.6.3.2 Exposure (Measured)

This is the measured exposure. There are several detectors that can measure exposure (dose). You can have several instances of this column for different detectors or the same detector and just to show measured values in different units. This value is used when calculating the inaccuracy of exposure.

This column or "Exposure (norm) (Measured)" is required for the following analysis
Accuracy (Exposure)
Reproducibility (Exposure)
AEC kV compensation (Exposure)
AEC mA compensation (Exposure)
AEC reproducibility (Exposure)
AEC reciprocity (Exposure)
AEC field balance (Exposure)
AEC density correction (Exposure)

8.6.3.3 Exposure (win) (Measured)

This is the measured exposure during the meters window time. There are several detectors that can measure exposure (dose). You can have several instances of this column for different detectors or the same detector and just to show measured values in different units.

Please refer to the meter manual for the definition of window time.

This column can be used with the following analysis
Accuracy (Exposure)
Reproducibility (Exposure)
AEC kV compensation (Exposure)
AEC mA compensation (Exposure)
AEC reproducibility (Exposure)
AEC reciprocty (Exposure)
AEC field balance (Exposure)
AEC density correction (Exposure)

Warning!
Make sure you understand how this parameter works before using it to avoid incorrect results.

8.6.3.4 Exposure (norm) (Measured)

This is the normalized (normalized to a certain distance) measured exposure. There are several detectors that can measure exposure rate (dose). You can have several instances of this column for different detectors or the same detector and just to show measured values in different units. To get the exposure normalized the columns SDD and SSD are required. If both the SDD and SSD columns are not present, this column gives the same value as the "Exposure (Measured)" column. The exposure value can also be normalized to a certain mAs value. This is done by using the values Set mAs (Set value) and Ref mAs (Set value).

The normalized exposure is calculated as:

Exposure (norm) (Measured) = Exposure (Measured) *** (** SDD (Set value) **/** SSD (Set value) **)² * (** Ref mAs **/** Set mAs **)**

If the values SDD/SSD and Ref mAs/Set mAs are missing, the following formula is used:

Exposure (norm) (Measured) = Exposure (Measured)

This column or "Exposure (Measured)" is required for the following analysis
Accuracy (Exposure)
Reproducibility (Exposure)
AEC kV compensation (Exposure)
AEC mA compensation (Exposure)
AEC reproducibility (Exposure)
AEC reciprocty (Exposure)
AEC field balance (Exposure)
AEC density correction (Exposure)

8.6.3.5 Exposure diff % (Calculated)

This is the calculated inaccuracy (relative) for exposure.

The following calculation is done on each row included in the analysis:

Exposure diff % = **100 * (** Exposure (Measure) - Set exposure **) /** Set exposure

This column is required for the following analysis

Accuracy (Exposure, relative)

8.6.3.6 Exposure diff from mean (%) (Calculated)

It is the calculated relative difference from the mean value of exposure (dose). The mean value is calculated based on the measured exposure of all rows included in the reproducibility analysis.

The mean value is calculated as: Exp mean = **(Exp_1 + Exp_2 + ... + Exp_n) / n** (based on all rows included in the reproducibility analysis) and the following calculation is done on each row included in the reproducibility analysis: Exposure diff from mean (%) = **100 * (** Exposure (Measured) **- Exp mean) / Exp mean**

This column is required for the following analysis
Reproducibility (Exposure)

8.6.3.7 Exposure diff Δ (Calculated)

This is the calculated inaccuracy (absolute) for exposure.

The following calculation is done on each row included in the analysis: Exposure diff Δ = Exposure (Measured) - Set exposure

This column is required for the following analysis
Accuracy (Exposure, absolute)

8.6.4 Exposure rate

This group of columns is related to the measurement of exposure rate:

Set exposure rate	Set value
Exposure rate (norm)	Normalized (measured) value
Exposure rate	Measured value
Exposure rate (win)	Measured value during the window
Exposure rate diff %	Relative difference between measured value and reference value
Exposure rate diff Δ	Absolute difference between measured value and reference value
Exposure rate diff from mean (%)	Relative difference between measured value and the mean value

8.6.4.1 Set exposure rate (Set value)

This is the exposure rate set value. This value is the reference value when calculating the inaccuracy of exposure rate.

You can only have one instance of this column.

This column is required for the following analysis
Accuracy (Exposure rate)

8.6.4.2 Exposure rate (Measured)

This is the measured exposure rate. There are several detectors that can measure exposure rate (dose rate). You can have several instances of this column for different detectors or the same detector and just to show measured values in different units. This value is used when calculating the inaccuracy of exposure rate.

This column or "Exposure rate (norm) (Measured)" is required for the following analysis
Accuracy (Exposure rate)
Reproducibility (Exposure rate)

8.6.4.3 Exposure rate (win) (Measured)

This is the measured exposure rate during the window. There are several detectors that can measure exposure rate (dose rate). You can have several instances of this column for different detectors or the same detector and just to show measured values in different units.

This column can be used with the following analysis
Accuracy (Exposure rate)
Reproducibility (Exposure rate)

Warning!
Make sure you understand how this parameter works before using it to avoid incorrect results.

8.6.4.4 Exposure rate (norm) (Measured)

This is the normalized (normalized to a certain distance) measured exposure rate. There are several detectors that can measure exposure rate (dose rate). You can have several instances of this column for different detectors or the same detector and just to show measured values in different units. To get the exposure rate normalized the columns SDD and SSD are required. If both the SDD and SSD columns are not present, this column gives the same value as the "Exposure rate (Measured)" column. The exposure value can also be normalized to a certain mAs value. This is done by using the values Set mAs (Set value) and Ref mAs (Set value).

The normalized exposure is calculated as: Exposure rate (norm) (Measured) = Exposure rate (Measured) *** (** SDD (Set value) **/** SSD (Set value) **)²** *** (** Ref mAs **/** Set mAs **)** If the values SDD/SSD and Ref mAs/Set mAs are missing, the following formula is used: Exposure (norm) (Measured) = Exposure rate (Measured)

This column or "Exposure rate (Measured)" is required for the following analysis
Accuracy (Exposure rate)
Reproducibility (Exposure rate)

8.6.4.5 Exposure rate diff % (Calculated)

This is the calculated inaccuracy (relative) for exposure rate.

The following calculation is done on each row included in the analysis: Exposure rate diff % = **100 * (** Exposure rate (Measure) - Set exposure rate **) /** Set exposure rate

This column is required for the following analysis
Accuracy (Exposure rate, relative)

8.6.4.6 Exposure rate diff ∆ (Calculated)

This is the calculated inaccuracy (absolute) for exposure rate.

The following calculation is done on each row included in the analysis: Exposure rate diff Δ = Exposure rate (Measured) - Set exposure rate

This column is required for the following analysis
Accuracy (Exposure rate, absolute)

8.6.4.7 Exposure rate diff from mean (%) (Calculated)

It is the calculated relative difference from the mean value of exposure rate (dose rate). The mean value is calculated based on the measured exposure rate of all rows included in the reproducibility analysis.

It is calculated in the following way:

The mean value is calculated as: Exp rate mean = **(Exp rate$_1$ + Exp rate$_2$ + ... + Exp rate$_n$) / n** (based on all rows included in the reproducibility analysis) and the following calculation is done on each row included in the reproducibility analysis: Exposure rate diff from mean (%) = **100 * (** Exposure rate (Measured) **- Exp rate mean) / Exp rate mean**

This column is required for the following analysis
Reproducibility (Exposure rate)

8.6.5 Frame count

This group of columns is related to the measurement of frame or pulse count:

Set frames	Set value
Frames	Measured value
Frames diff %	Relative difference between measured value and reference value
Frames diff Δ	Absolute difference between measured value and reference value
Frames diff from mean (%)	Relative difference between measured value and the mean value

Note!
You can just rename the column headings to "Pulse" if you want to use this instead of "Frame"

8.6.5.1 Set frames (Set value)

This is the frame (pulse) count set value. This value is the reference value when calculating the inaccuracy of frame (pulse) count.

You can only have one instance of this column.

This column is required for the following analysis
Accuracy (Frame count)

8.6.5.2 Frames (Measured)

This is the measured frame (pulse) count. There are several detectors that can measure frame (pulse) count. You can have several instances of this column for different detectors or the same detector and just to show measured values in different units. This value is used when calculating the inaccuracy of frame count.

This column is required for the following analysis
Accuracy (Frame count)
Reproducibility (Frame count)

8.6.5.3 Frames diff % (Calculated)

This is the calculated inaccuracy (relative) for frame (pulse) count.

> The following calculation is done on each row included in the analysis:
>
> Frames diff % = **100 * (** Frames (Measure) - Set frames (Set value) **) /** Set frames

This column is required for the following analysis
Accuracy (Frame count, relative)

8.6.5.4 Frames diff Δ (Calculated)

This is the calculated inaccuracy (absolute) for frame (pulse) count.

> The following calculation is done on each row included in the analysis:
>
> Frames diff Δ = Frames (Measured) - Set frames

This column is required for the following analysis
Accuracy (Frame count, absolute)

8.6.5.5 Frames diff from mean (%) (Calculated)

This is the calculated relative difference from the mean value of frame (pulse) count. The mean value is calculated based on the measured exposure of all rows included in the reproducibility analysis.

> The mean value is calculated as:
>
> Frames mean = **(Frames$_1$ + Frames$_2$ + ... + Frames$_n$) / n** (based on all rows included in the reproducibility analysis)
>
> and the following calculation is done on each row included in the reproducibility analysis:
>
> Frames diff from mean (%) = **100 * (** Frames (Measured) **- Frames mean) / Frames mean**

This column is required for the following analysis
Reproducibility (Frame (pulse) count)

8.6.6 Frame rate

This group of columns is related to the measurement of frame or pulse rate:

Set frame rate	Set value
Frames/s	Measured value
Frames/s diff %	Relative difference between measured value and reference value
Frames/s diff Δ	Absolute difference between measured value and reference value
Frames/s diff from mean (%)	Relative difference between measured value and the mean value

Note!
You can just rename the column headings to "Pulse" if you want to use this instead of "Frame"

8.6.6.1 Set frames/s (Set value)

This is the frame (pulse) rate set value. This value is the reference value when calculating the inaccuracy of frame (pulse) rate.

You can only have one instance of this column.

This column is required for the following analysis
Accuracy (Frame rate)

8.6.6.2 Frames/s (Measured)

This is the measured frame (pulse) rate. There are several detectors that can measure frame (pulse) rate. You can have several instances of this column for different detectors or the same detector and just to show measured values in different units. This value is used when calculating the inaccuracy of frame (pulse) rate.

This column is required for the following analysis
Accuracy (Frame rate)
Reproducibility (Frame rate)

8.6.6.3 Frames/s diff % (Calculated)

This is the calculated inaccuracy (relative) for frame (pulse) rate.

The following calculation is done on each row included in the analysis:

Frames/s diff % = **100 * (** Frames/s (Measure) - Set frames/s **) /** Set frames/s

This column is required for the following analysis
Accuracy (Frame rate, relative)

8.6.6.4 Frames/s diff Δ (Calculated)

This is the calculated inaccuracy (absolute) for frame (pulse) rate.

The following calculation is done on each row included in the analysis:

Frames/s diff Δ = Frames/s (Measured) - Set frames/s

This column is required for the following analysis
Accuracy (Frame rate, absolute)

8.6.6.5 Frames/s diff from mean (%) (Calculated)

This the calculated relative difference from the mean value of frame (pulse) count. The mean value is calculated based on the measured exposure of all rows included in the reproducibility analysis.

The mean value is calculated as: Frames/s mean = **(Frames/s_1 + Frames/s_2 + ... + Frames/s_n) / n** (based on all rows included in the reproducibility analysis) and the following calculation is done on each row included in the reproducibility analysis: Frames/s diff from mean (%) = **100 * (** Frames/s (Measured) **- Frames/s mean) / Frames/s mean**

This column is required for the following analysis
Reproducibility (Frame (pulse) count)

8.6.7 Exposure/frame

This group of columns is related to the measurement of exposure/frame (dose/frame):

Set Exposure/frame	Set value
Exposure/frame (norm)	Normalized (measured) value
Exposure/frame	Measured value
Exposure/frame diff %	Relative difference between measured value and reference value
Exposure/frame diff Δ	Absolute difference between measured value and reference value
Exposure/frame diff from mean (%)	Relative difference between measured value and the mean value

Note!
You can just rename the column headings to "Pulse" if you want to use this instead of "Frame"

8.6.7.1 Set Exposure/frame (Set value)

This is the Exposure/frame (Exposure/pulse or dose/pulse) set value. This value is the reference value when calculating the inaccuracy of Exposure/frame.

You can only have one instance of this column.

This column is required for the following analysis
Accuracy (Exposure/frame)

8.6.7.2 Exposure/frame (norm) (Measured)

This is the normalized (normalized to a certain distance) measured exposure/frame. There are several detectors that can measure exposure/frame (Dose/frame or Dose/pulse). You can have several instances of this column for different detectors or the same detector and just to show measured values in different units. To get the Frame exposure rate normalized the columns SDD and SSD are required. If both the SDD and SSD columns are not present, this column gives the same value as the "Frame exposure rate (Measured)" column.

This column or "Exposure/frame (Measured)" is required for the following analysis
Accuracy (Exposure/frame)
Reproducibility (Exposure/Frame)

8.6.7.3 Exposure/frame (Measured)

This is the measured Exposure/frame (Exposure/pulse or Dose/pulse). There are several detectors that can measure Exposure/frame. You can have several instances of this column for different detectors or the same detector and just to show measured values in different units. This value is used when calculating the inaccuracy of Exposure/frame.

This column or "Exposure/frame (norm) (Measured)" is required for the following analysis
Accuracy (Exposure/frame)
Reproducibility (Exposure/frame)

8.6.7.4 Exposure/frame diff % (Calculated)

This is the calculated inaccuracy (relative) for Exposure/frame (Exposure/pulse or dose/pulse).

The following calculation is done on each row included in the analysis:

Exposure/frame diff % = **100 * (** Exposure/frame (Measure) - Set Exposure/frame **) /** Set Exposure/frame

This column is required for the following analysis
Accuracy (Exposure/frame, relative)

8.6.7.5 Exposure/frame diff Δ (Calculated)

This is the calculated inaccuracy (absolute) for Exposure/frame (Exposure/pulse or Dose/pulse).

The following calculation is done on each row included in the analysis:

Exposure/frame diff Δ = Exposure/frame (Measured) - Set Exposure/frame

This column is required for the following analysis
Accuracy (Exposure/frame, absolute)

8.6.7.6 Exposure/frame diff from mean (%) (Calculated)

This is the calculated relative difference from the mean value of Exposure/frame (Exposure/pulse or Dose/pulse). The mean value is calculated based on the measured exposure of all rows included in the reproducibility analysis.

The mean value is calculated as:

Exposure/frame mean = $(\text{Exp/frame}_1 + \text{Exp/frame}_2 + \ldots\ldots + \text{Exp/frame}_n) / n$ (based on all rows included in the reproducibility analysis)

and the following calculation is done on each row included in the reproducibility analysis:

Exposure/frame diff from mean (%) = **100 * (** Exposure/frame (Measured) **- Exp/frame mean) / Exp/frame mean**

This column is required for the following analysis
Reproducibility (Exposure/frame)

8.6.8 mAs/Frame

This group of columns is related to the measurement of mAs/frame (mAs/pulse):

Set mAs/frame	Set value
mAs/frame	Measured value
mAs/frame diff %	Relative difference between measured value and reference value
mAs/frame diff Δ	Absolute difference between measured value and reference value
mAs/frame diff from mean (%)	Relative difference between measured value and the mean value

Note!
You can just rename the column headings to "Pulse" if you want to use this instead of "Frame"

8.6.8.1 Set mAs/frame (Set value)

This is the mAs/frame (mAs/pulse) set value. This value is the reference value when calculating the inaccuracy of mAs/frame.

You can only have one instance of this column.

This column is required for the following analysis
Accuracy (mAs/frame)

8.6.8.2 mAs/frame (Measured)

This is the measured mAs/frame (mAs/pulse). There are several detectors that can measure mAs/frame. This value is used when calculating the inaccuracy of mAs/frame.

This column or is required for the following analysis
Accuracy (mAs/frame)
Reproducibility (mAs/frame)

8.6.8.3 mAs/frame diff % (Calculated)

This is the calculated inaccuracy (relative) for mAs/frame (mAs/pulse).

The following calculation is done on each row included in the analysis: mAs/frame diff % = **100 * (** mAs/frame (Measure) - Set mAs/frame **) /** Set mAs/frame

This column is required for the following analysis
Accuracy (mAs/frame, relative)

8.6.8.4 mAs/frame diff Δ (Calculated)

This is the calculated inaccuracy (absolute) for mAs/frame (mAs/pulse).

The following calculation is done on each row included in the analysis: mAs/frame diff Δ = mAs/frame (Measured) - Set mAs/frame

This column is required for the following analysis
Accuracy (mAs/frame, absolute)

8.6.8.5 mAs/frame diff from mean (%) (Calculated)

This is the calculated relative difference from the mean value of mAs/frame (mAs/pulse). The mean value is calculated based on the measured mAs/frame of all rows included in the reproducibility analysis.

The mean value is calculated as:

mAs/frame mean = **(mAs/frame$_1$ + mAs/frame$_2$ + ... + mAs/frame$_n$) / n** (based on all rows included in the reproducibility analysis)

and the following calculation is done on each row included in the reproducibility analysis:

mAs/frame diff from mean (%) = **100 * (** mAs/frame (Measured) **- mAs/frame mean) / mAs/frame mean**

This column is required for the following analysis
Reproducibility (mAs/frame)

8.6.9 Frame mA

This group of columns is related to the measurement of frame or pulse mA:

Set frame mA	Set value
Frame mA	Measured value
Frame mA diff %	Relative difference between measured value and reference value
Frame mA diff Δ	Absolute difference between measured value and reference value
Frame mA diff from mean (%)	Relative difference between measured value and the mean value

Note!
You can just rename the column headings to "Pulse" if you want to use this instead of "Frame"

8.6.9.1 Set frame mA (Set value)

This is the frame (pulse) mA set value. This value is the reference value when calculating the inaccuracy of frame (pulse) mA.

You can only have one instance of this column.

This column is required for the following analysis
Accuracy (Frame mA)

8.6.9.2 Frame mA (Measured)

This is the measured frame (pulse) mA. There are several detectors that can measure frame (pulse) mA. This value is used when calculating the inaccuracy of Frame mA.

This column is required for the following analysis
Accuracy (Frame mA)
Reproducibility (Frame mA)

8.6.9.3 Frame mA diff % (Calculated)

This is the calculated inaccuracy (relative) for frame (pulse) mA.

The following calculation is done on each row included in the analysis:

Frame mA diff % = **100 * (** Frame mA (Measure) - Set frame mA **) /** Set frame mA

This column is required for the following analysis
Accuracy (Frame mA, relative)

8.6.9.4 Frame mA diff ∆ (Calculated)

This is the calculated inaccuracy (absolute) for frame (pulse) mA.

The following calculation is done on each row included in the analysis:

Frame mA diff Δ = Frame mA (Measured) - Set frame mA

This column is required for the following analysis
Accuracy (Frame mA, absolute)

8.6.9.5 Frame mA diff from mean (%) (Calculated)

This is the calculated relative difference from the mean value of Frame (pulse) mA. The mean value is calculated based on the measured exposure of all rows included in the reproducibility analysis.

The mean value is calculated as:

Frame mA mean = **(Frame mA$_1$ + Frame mA$_2$ + ... + Frame mA$_n$) / n** (based on all rows included in the reproducibility analysis)

and the following calculation is done on each row included in the reproducibility analysis:

Frame mA diff from mean (%) = **100 * (** Frame mA (Measured) **- Frame mA mean) / Frame mA mean**

This column is required for the following analysis
Reproducibility (Frame mA)

8.6.10 Frame exposure rate

This group of columns is related to the measurement of Frame exposure rate:

Set frame exp. rate	Set value
Frame exp. rate (norm)	Normalized (measured) value
Frame exp. rate	Measured value
Frame exp. rate diff %	Relative difference between measured value and reference value
Frame exp. rate diff Δ	Absolute difference between measured value and reference value
Frame exp. rate diff from mean (%)	Relative difference between measured value and the mean value

Note!
You can just rename the column headings to "Pulse" if you want to use this instead of "Frame"

8.6.10.1 Set frame exp. rate (Set value)

This is the exposure Frame exposure rate set value. This value is the reference value when calculating the inaccuracy of Frame exposure rate.

You can only have one instance of this column.

This column is required for the following analysis
Accuracy (Frame exposure rate)

8.6.10.2 Frame exp. rate (norm) (Measured)

This is the normalized (normalized to a certain distance) measured Frame exposure rate. There are several detectors that can measure Frame exposure rate. You can have several instances of this column for different detectors or the same detector and just to show measured values in different units. To get the Frame exposure rate normalized the columns SDD and SSD are required. If both the SDD and SSD columns are not present, this column gives the same value as the "Frame exposure rate (Measured)" column.

This column or "Frame exposure rate (Measured)" is required for the following analysis
Accuracy (Frame exposure rate)
Reproducibility (Frame exposure rate)

8.6.10.3 Frame exp. rate (Measured)

This is the measured Frame exposure rate. There are several detectors that can measure Frame exposure rate. You can have several instances of this column for different detectors or the same detector and just to show measured values in different units. This value is used when calculating the inaccuracy of Frame exposure rate.

This column or "Exposure rate (Measured)" is required for the following analysis
Accuracy (Frame exposure rate)
Reproducibility (Frame exposure rate)

8.6.10.4 Frame exp. diff % (Calculated)

This is the calculated inaccuracy (relative) for Frame exposure rate.

The following calculation is done on each row included in the analysis:

Frame exp. diff % = **100 * (** Frame exp. rate (Measure) - Set frame exp. rate **) /** Set frame exp. rate

This column is required for the following analysis
Accuracy (Frame exposure rate, relative)

8.6.10.5 Frame exp. diff Δ (Calculated)

This is the calculated inaccuracy (absolute) for Frame exposure rate.

The following calculation is done on each row included in the analysis:

Frame exp. diff Δ = Frame exp. rate (Measured) - Set frame exp. rate

This column is required for the following analysis
Accuracy (Frame exposure rate, absolute)

8.6.10.6 Frame exp. diff from mean (%) (Calculated)

This is the calculated relative difference from the mean value of Frame exposure rate. The mean value is calculated based on the measured Frame exposure rate of all rows included in the reproducibility analysis.

The mean value is calculated as:

Frame exp rate mean = **(Frame exp rate$_1$ + Frame exp rate$_2$ + ... + Frame exp rate$_n$) / n** (based on all rows included in the reproducibility analysis)

and the following calculation is done on each row included in the reproducibility analysis:

Frame exp. rate diff from mean (%) = **100 * (** Frame exp. rate (Measured) **- Frame exp rate mean) / Frame exp rate mean**

This column is required for the following analysis
Reproducibility (Frame exposure rate)

8.6.11 Pulse Width

This group of columns is related to the measurement of pulse width.

Set pulse width	Set value
Pulse width	Measured value
Pulse width diff %	Relative difference between measured value and reference value
Pulse width diff Δ	Absolute difference between measured value and reference value
Pulse width diff from mean (%)	Relative difference between measured value and the mean value

Note!
You can just rename the column headings to "Frame" if you want to use this instead of "Pulse"

8.6.11.1 Set pulse width (Set value)

This is the pulse width set value. This value is the reference value when calculating the inaccuracy of pulse width.

You can only have one instance of this column.

This column is required for the following analysis
Accuracy (Pulse width)

8.6.11.2 Pulse width (Measured)

This is the measured pulse width. This value is used when calculating the inaccuracy of pulse width.

This column is required for the following analysis
Accuracy (Pulse width)
Reproducibility (Pulse width)

8.6.11.3 Pulse width diff % (Calculated)

This is the calculated inaccuracy (relative) for pulse width.

The following calculation is done on each row included in the analysis:

Pulse width diff % = **100 * (** Pulse width (Measure) - Set pulse width **) /** Set pulse width

This column is required for the following analysis
Accuracy (Pulse width, relative)

8.6.11.4 Pulse width diff ∆ (Calculated)

This is the calculated inaccuracy (absolute) for pulse width.

The following calculation is done on each row included in the analysis:

Pulse width diff Δ = Pulse width (Measured) - Set pulse width

This column is required for the following analysis
Accuracy (Pulse width, absolute)

8.6.11.5 Pulse width diff from mean (%) (Calculated)

This is the calculated relative difference from the mean value of pulse width. The mean value is calculated based on the measured pulse width of all rows included in the reproducibility analysis.

The mean value is calculated as:

Pulse width mean = **(Pulse width$_1$ + Pulse width$_2$ + ... + Pulse width$_n$) / n** (based on all rows included in the reproducibility analysis)

and the following calculation is done on each row included in the reproducibility analysis:

Pulse width diff from mean (%) = **100 * (** Pulse width (Measured) **- Pulse width mean) / Pulse width mean**

This column is required for the following analysis
Reproducibility (Pulse width)

8.6.12 Duty Cycle

This group of columns is related to the measurement of duty cycle:

Set duty cycle	Set value
Pulse duty cycle	Measured value
Duty cycle diff Δ	Absolute difference between measured value and reference value
Duty cycle diff from mean (%)	Relative difference between measured value and the mean value

8.6.12.1 Set duty cycle (Set value)

This is the duty cycle set value. This value is the reference value when calculating the inaccuracy of duty cycle.

You can only have one instance of this column.

This column is required for the following analysis
Accuracy (Duty cycle)

8.6.12.2 Duty cycle (Measured)

This is the measured duty cycle. This value is used when calculating the inaccuracy of duty cycle.

This column is required for the following analysis
Accuracy (Duty cycle)
Reproducibility (Duty cycle)

8.6.12.3 Duty cycle diff ∆ (Calculated)

This is the calculated inaccuracy (absolute) for duty cycle. :

The following calculation is done on each row included in the analysis: Duty cycle diff ∆ = Duty cycle (Measured) - Set duty cycle

This column is required for the following analysis
Accuracy (Duty cycle, absolute)

8.6.12.4 Duty cycle diff from mean (%) (Calculated)

This is the calculated relative difference from the mean value of duty cycle. The mean value is calculated based on the measured duty cycle of all rows included in the reproducibility analysis.

The mean value is calculated as: Duty cycle mean = **(Duty cycle$_1$ + Duty cycle$_2$ + ... + Duty cycle$_n$) / n** (based on all rows included in the reproducibility analysis) and the following calculation is done on each row included in the reproducibility analysis: Duty cycle diff from mean (%) = **100 * (** Duty cycle (Measured) **- Duty cycle mean) / Duty cycle mean**

This column is required for the following analysis
Reproducibility (Duty cycle)

8.6.13 mA

This group of columns is related to measurement of tube current:

Set mA	Set value
Tube mA	Measured value
Tube mA (win)	Measured value during the window
mA diff %	Relative difference between measured value and reference value
mA diff ∆	Absolute difference between measured value and reference value
mA diff from mean (%)	Relative difference between measured value and the mean value

8.6.13.1 Set mA (Set value)

This is the mA set value. This value is the reference value when calculating the inaccuracy of mA.

You can only have one instance of this column.

This column is required for the following analysis
Accuracy (mA)

8.6.13.2 Tube mA (Measured)

This is the measured tube mA. This value is used when calculating the inaccuracy, reproducibility of mA. It may also be used when analyzing the mA linearity.

This column is required for the following analysis
Accuracy (mA)

Reproducibility (mA)
mA linearity (optional)

8.6.13.3 Tube mA (win) (Measured)

This is the measured tube mA during the window time.

This column can be used in the following analysis
Accuracy (mA)
Reproducibility (mA)
mA linearity (optional)

Warning!
Make sure you understand how this parameter works before using it to avoid incorrect results.

8.6.13.4 mA diff % (Calculated)

This is the calculated inaccuracy (relative) for tube current (mA).

The following calculation is done on each row included in the analysis: mA diff % = **100 * (** Tube mA (Measured) - Set mA **) /** Set mA

This column is required for the following analysis
Accuracy (mA, relative)

8.6.13.5 mA diff Δ (Calculated)

This is the calculated inaccuracy (absolute) for tube current (mA).

The following calculation is done on each row included in the analysis: mA diff Δ = Tube mA (Measured) - Set mA

This column is required for the following analysis
Accuracy (mA, absolute)

8.6.13.6 mA diff from mean (%) (Calculated)

This is the calculated relative difference from the mean value of mA. The mean value is calculated based on the measured mA of all rows included in the reproducibility analysis.

The mean value is calculated as: mA mean = $\mathbf{(\ mA_1 + mA_2 + \ldots\ldots + mA_n\ )\ /\ n}$ (based on all rows included in the reproducibility analysis) and the following calculation is done on each row included in the reproducibility analysis: mA diff from mean (%) = **100 * (** Tube mA (Measured) **- mA mean) / mA mean**

This column is required for the following analysis
Reproducibility (mA)

8.6.14 mAs

This group of columns is related to the measurement of mAs.

Set mAs	Set value
Tube mAs	Measured value
Tube mAs (win)	Measured value during the window time
mAs diff %	Relative difference between measured value and reference value
mAs diff Δ	Absolute difference between measured value and reference value
mAs diff from mean (%)	Relative difference between measured value and the mean value

8.6.14.1 Set mAs (Set value)

This is the mAs set value. This value is the reference value when calculating the inaccuracy of mAs.

You can only have one instance of this column.

This column is required for the following analysis
Accuracy (mAs)
mA linearity (if evaluated based on Set mAs)

8.6.14.2 Tube mAs (Measured)

This is the measured tube mAs. This value is used when calculating the inaccuracy, reproducibility of mAs. It may also be used when analyzing the mA linearity.

This column is required for the following analysis
Accuracy (mAs)
Reproducibility (mAs)
mA linearity (optional)

8.6.14.3 Tube mAs (win) (Measured)

This is the measured tube mAs during the window time.

This column can be used in the following analysis
Accuracy (mAs)
Reproducibility (mAs)
mA linearity (optional)

Warning!
Make sure you understand how this parameter works before using it to avoid incorrect results.

8.6.14.4 mAs diff % (Calculated)

This is the calculated inaccuracy (relative) for tube mAs.

> The following calculation is done on each row included in the analysis:
>
> mAs diff % = **100 * (** Tube mAs (Measured) - Set mAs **) /** Set mAs

This column is required for the following analysis
Accuracy (mAs, relative)

8.6.14.5 mAs diff ∆ (Calculated)

This is the calculated inaccuracy (absolute) for tube mAs.

The following calculation is done on each row included in the analysis: mAs diff Δ = Tube mAs (Measured) - Set mAs

This column is required for the following analysis
Accuracy (mAs, absolute)

8.6.14.6 mAs diff from mean (%) (Calculated)

This is the calculated relative difference from the mean value of mAs. The mean value is calculated based on the measured mAs of all rows included in the reproducibility analysis.

The mean value is calculated as: mAs mean = $\mathbf{(mAs_1 + mAs_2 + \ldots\ldots + mAs_n) / n}$ (based on all rows included in the reproducibility analysis) and the following calculation is done on each row included in the reproducibility analysis: mAs diff from mean (%) = **100 * (** Tube mAs (Measured) **- mAs mean) / mAs mean**

This column is required for the following analysis
Reproducibility (mAs)

8.6.15 HVL

This group of columns is related to the measurement of HVL (QuickHVL):

Set HVL	Set value
HVL	Measured value
HVL diff %	Relative difference between measured value and reference value
HVL diff Δ	Absolute difference between measured value and reference value
HVL diff from mean (%)	Relative difference between measured value and the mean value

8.6.15.1 Set HVL (Set value)

This is the QuickHVL set value. This value is the reference value when calculating the inaccuracy of QuickHVL. Note that Accuracy is not the normal way to evaluate HVL. Instead, use the QuickHVL analysis.

You can only have one instance of this column.

This column is required for the following analysis
Accuracy (HVL)

8.6.15.2 HVL (Measured)

This is the measured HVL value (QuickHVL). This value is used when calculating the inaccuracy and reproducibility of HVL.

This column is required for the following analysis
Accuracy (HVL)
Reproducibility (HVL)

[QuickHVL]

8.6.15.3 HVL diff % (Calculated)

This is the calculated inaccuracy (relative) for HVL.

The following calculation is done on each row included in the analysis: HVL diff % = **100 * (** HVL (Measured) - Set HVL **) /** Set HVL

This column is required for the following analysis
Accuracy (HVL, relative)

8.6.15.4 HVL diff ∆ (Calculated)

This is the calculated inaccuracy (absolute) for HVL.

The following calculation is done on each row included in the analysis: HVL diff Δ = HVL (Measured) - Set HVL

This column is required for the following analysis
Accuracy (HVL, absolute)

8.6.15.5 HVL diff from mean (%) (Calculated)

This is the calculated relative difference from the mean value of HVL. The mean value is calculated based on the measured HVL of all rows included in the reproducibility analysis.

The mean value is calculated as: HVL mean = $\mathbf{(HVL_1 + HVL_2 + ... + HVL_n) / n}$ (based on all rows included in the reproducibility analysis) and the following calculation is done on each row included in the reproducibility analysis: HVL diff from mean (%) = **100 * (** HVL (Measured) **- HVL mean) / HVL mean**

This column is required for the following analysis
Reproducibility (HVL)

8.6.16 Total filtration

This group of columns is related to the measurement of total filtration:

Set TF	Set value
Total filtr.	Measured value
Total filtr. diff %	Relative difference between measured value and reference value
Total filtr. diff Δ	Absolute difference between measured value and reference value
Total filtr. diff from mean (%)	Relative difference between measured value and the mean value

8.6.16.1 Set TF (Set value)

This is the total filtration set value. This value is the reference value when calculating the inaccuracy of total filtration.

You can only have one instance of this column.

This column is required for the following analysis
Accuracy (Total filtration)

8.6.16.2 Total filtr. (Measured)

This is the measured total filtration. This value is used when calculating the inaccuracy and reproducibility of total filtration.

This column is required for the following analysis
Accuracy (Total filtration)
Reproducibility (Total filtration)

8.6.16.3 Total filtr. diff % (Calculated)

This is the calculated inaccuracy (relative) for total filtration.

The following calculation is done on each row included in the analysis:

Total filtr. diff % = **100 * (** Total filtr. (Measured) - Set TF **) /** Set TF

This column is required for the following analysis
Accuracy (Total filtration, relative)

8.6.16.4 Total filtr. diff Δ (Calculated)

This is the calculated inaccuracy (absolute) for total filtration.

The following calculation is done on each row included in the analysis:

Total filtr. diff Δ = Total filtr. (Measured) - Set TF

This column is required for the following analysis
Accuracy (Total filtration, absolute)

8.6.16.5 Total filtr. diff from mean (%) (Calculated)

This is the calculated relative difference from the mean value of total filtration. The mean value is calculated based on the measured total filtration of all rows included in the reproducibility analysis.

The mean value is calculated as:

TF mean = $\mathbf{(TF_1 + TF_2 + ... + TF_n) / n}$ (based on rows included in the reproducibility analysis)

and the following calculation is done on each row included in the reproducibility analysis:

TF diff from mean (%) = **100 * (** Total filtr. (Measured) **- TF mean) / TF mean**

This column is required for the following analysis
Reproducibility (Total filtration)

8.6.17 Light

This group of columns is related to the measurement of light (illuminance and luminance):

Set Light	Set value
Light	Measured value
Light (win)	Measured value during the window time
Light diff %	Relative difference between measured value and reference value
Light diff Δ	Absolute difference between measured value and reference value
Light diff from mean (%)	Relative difference between measured value and the mean value

8.6.17.1 Set Light (Set value)

This is the light set value (illuminance or luminance, depending on the user's selection). This value is the reference value when calculating the inaccuracy of light.

You can only have one instance of this column.

This column is required for the following analysis
Accuracy (Light)

8.6.17.2 Light (Measured)

This is the measured light (illuminance or luminance) value. This value is used when calculating the inaccuracy and reproducibility of light.

This column is required for the following analysis
Accuracy (Light)
Reproducibility (Light)

8.6.17.3 Light (win) (Measured)

This is the measured light (illuminance or luminance) value during the window time.

This column can be used in the following analysis
Accuracy (Light)
Reproducibility (Light)

Warning!
Make sure you understand how this parameter works before using it to avoid incorrect results.

8.6.17.4 Light diff % (Calculated)

This is the calculated inaccuracy (relative) for light.

The following calculation is done on each row included in the analysis: Light diff % = **100 * (** Light (Measured) - Set Light **) /** Set Light

This column is required for the following analysis
Accuracy (Light, relative)

8.6.17.5 Light diff Δ (Calculated)

This is the calculated inaccuracy (absolute) for light.

The following calculation is done on each row included in the analysis: Light diff Δ = Light (Measured) - Set Light

This column is required for the following analysis
Accuracy (Light, absolute)

8.6.17.6 Light diff from mean (%) (Calculated)

This is the calculated relative difference from the mean value of light measurement. The mean value is calculated based on the measured light value of all rows included in the light analysis.

The mean value is calculated as: Light mean = $\mathbf{(Light_1 + Light_2 + ... + Light_n) / n}$ (based on all rows included in the light analysis) and the following calculation is done on each row included in the light analysis: Light diff from mean (%) = **100 * (** Light (Measured) **- Light mean) / Light mean**

This column is required for the following analysis
Reproducibility (Light)

8.6.18 CT exposure

This group of columns is related to the measurement of CT exposure (CT dose).

Set CT exposure	Set value
CT exposure	Measured value
CT exposure diff %	Relative difference between measured value and reference value
CT exposure diff Δ	Absolute difference between measured value and reference value
CT exposure diff from mean (%)	Relative difference between measured value and the mean value

Note: If you want to measure CTDI by using exposure and chamber length, use instead the Exposure column and select your CT chamber. If it doesn't appear, it may need to be reconfigured by using the RTI Detector Manager. To use a CT chamber and measure exposure, it shall be configured with two calibration factors, one for exposure and one for exposure-length.

If you need help, please contact the support at RTI:

US: support.us@rtigroup.com
Rest of the world: support@rtigroup.se

8.6.18.1 Set CT exposure (Set value)

This is the CT exposure (CT dose) set value. This value is the reference value when calculating the inaccuracy of CT exposure.

You can only have one instance of this column.

<u>This column is required for the following analysis</u>
Accuracy (CT exposure)

8.6.18.2 CT exposure (Measured)

This is the measured CT exposure (CT dose). There are several detectors that can measure CT exposure (CT dose). You can have several instances of this column for different detectors or the same detector and just to show measured values in different units. This value is used when calculating the CTDI and inaccuracy of CT exposure.

<u>This column or is required for the following analysis</u>
CTDI
Accuracy (CT exposure)
Reproducibility (CT exposure)

8.6.18.3 CT exposure diff % (Calculated)

This is the calculated inaccuracy (relative) for CT exposure (CT dose).

The following calculation is done on each row included in the analysis:

CT exposure diff % = **100 * (** CT exposure (Measure) - Set CT exposure **) /** Set CT exposure

<u>This column is required for the following analysis</u>
Accuracy (CT exposure, relative)

8.6.18.4 CT exposure diff Δ (Calculated)

This is the calculated inaccuracy (absolute) for CT exposure (CT dose).

The following calculation is done on each row included in the analysis:

CT exposure diff Δ = CT exposure (Measured) - Set CT exposure

<u>This column is required for the following analysis</u>
Accuracy (CT exposure, absolute)

8.6.18.5 CT exposure diff from mean (%) (Calculated)

This is the calculated relative difference from the mean value of CT exposure (CT dose). The mean value is calculated based on the measured CT exposure for all rows included in the reproducibility analysis.

The mean value is calculated as:

CTexp mean = $(\text{CT exp}_1 + \text{CT exp}_2 + \ldots\ldots + \text{CT exp}_n) / n$ (based on all rows included in the reproducibility analysis)

and the following calculation is done on each row included in the reproducibility analysis:

CT exposure diff from mean (%) = **100 * (** CT exposure (Measured) **- CT exp mean) / CT exp mean**

<u>This column is required for the following analysis</u>
Reproducibility (CT exposure)

8.6.19 CT exposure rate

This group of columns is related to the measurement of CT exposure rate (CT dose rate):

Set CT exposure rate	Set value
CT exposure rate	Measured value
CT exposure rate diff %	Relative difference between measured value and reference value
CT exposure rate diff Δ	Absolute difference between measured value and reference value
CT exposure rate diff from mean (%)	Relative difference between measured value and the mean value

8.6.19.1 Set CT exposure rate (Set value)

This is the CT exposure rate (CT dose rate) set value. This value is the reference value when calculating the inaccuracy of CT exposure rate.

You can only have one instance of this column.

This column is required for the following analysis
Accuracy (CT exposure rate)

8.6.19.2 CT exposure rate (Measured)

This is the measured CT exposure rate (CT dose rate). There are several detectors that can measure CT exposure rate (CT dose rate). You can have several instances of this column for different detectors or the same detector and just to show measured values in different units. This value is used when calculating inaccuracy and reproducibility of CT exposure rate.

This column or is required for the following analysis
Accuracy (CT exposure)
Reproducibility (CT exposure)

8.6.19.3 CT exposure rate diff % (Calculated)

This is the calculated inaccuracy (relative) for CT exposure rate (CT dose rate).

The following calculation is done on each row included in the analysis:

CT exposure rate diff % = **100 * (** CT exposure rate (Measure) - Set CT exposure rate **) /** Set CT exposure rate

This column is required for the following analysis
Accuracy (CT exposure rate, relative)

8.6.19.4 CT exposure rate diff Δ (Calculated)

This is the calculated inaccuracy (absolute) for CT exposure rate (CT dose rate).

The following calculation is done on each row included in the analysis:

CT exposure rate diff Δ = CT exposure rate (Measured) - Set CT exposure rate

This column is required for the following analysis
Accuracy (CT exposure rate, absolute)

8.6.19.5 CT exposure rate diff from mean (%) (Calculated)

It is the calculated relative difference from the mean value of CT exposure rate (CT dose rate). The mean value is calculated based on the measured CT exposure rate of all rows included in the reproducibility analysis.

The mean value is calculated as: CT exp rate mean = **(CT exp rate$_1$ + CT exp rate$_2$ + ... + CT exp rate$_n$) / n** (based on all rows included in the reproducibility analysis) and the following calculation is done on each row included in the reproducibility analysis: CT exposure rate diff from mean (%) = **100 * (** CT exposure rate (Measured) **- CT exp rate mean) / CT exp rate mean**

This column is required for the following analysis
Reproducibility (CT exposure rate)

8.6.20 DAP exposure

This group of columns is related to the measurement of DAP exposure:

Set DAP exposure	Set value
DAP exposure	Measured value
DAP exposure diff %	Relative difference between measured value and reference value
DAP exposure diff Δ	Absolute difference between measured value and reference value
DAP exposure diff from mean (%)	Relative difference between measured value and the mean value

8.6.20.1 Set DAP exposure (Set value)

This is the DAP exposure set value. This value is the reference value when calculating the inaccuracy of DAP exposure.

You can have only one instance of this column.

This column is required for the following analysis
Accuracy (DAP exposure)

8.6.20.2 DAP exposure (Measured)

This is the measured DAP exposure. You can have several instances of this column for different detectors (or several instances for the same detector) and just to show the measured values in different units. This value is used when calculating the inaccuracy or reproducibility of DAP exposure.

This column or is required for the following analysis
Accuracy (DAP exposure)
Reproducibility (DAP exposure)

8.6.20.3 DAP exposure diff % (Calculated)

This is the calculated inaccuracy (relative) for DAP exposure.

The following calculation is done on each row included in the analysis: DAP exposure diff % = **100 * (** DAP exposure (Measure) - Set DAP exposure **) /** Set DAP exposure

This column is required for the following analysis
Accuracy (DAP exposure, relative)

8.6.20.4 DAP exposure diff Δ (Calculated)

This is the calculated inaccuracy (absolute) for DAP exposure.

The following calculation is done on each row included in the analysis:

DAP exposure diff Δ = DAP exposure (Measured) - Set DAP exposure

This column is required for the following analysis
Accuracy (DAP exposure, absolute)

8.6.20.5 DAP exposure diff from mean (%) (Calculated)

This is the calculated relative difference from the mean value of DAP exposure (DAP dose). The mean value is calculated based on the measured DAP exposure of all rows included in the reproducibility analysis.

The mean value is calculated as:

DAP exp mean = **(DAP exp$_1$ + DAP exp$_2$ + ... + DAP exp$_n$) / n** (based on rows included in the reproducibility analysis)

and the following calculation is done on each row included in the reproducibility analysis:

DAP exposure diff from mean (%) = **100 * (** DAP exposure (Measured) **- DAP exp mean) / DAP exp mean**

This column is required for the following analysis
Reproducibility (DAP exposure)

8.6.21 DAP exposure rate

This group of columns is related to the measurement of DAP exposure rate:

Set DAP exposure rate	Set value
DAP exposure rate	Measured value
DAP exposure rate diff %	Relative difference between measured value and reference value
DAP exposure rate diff Δ	Absolute difference between measured value and reference value
DAP exposure rate diff from mean (%)	Relative difference between measured value and the mean value

8.6.21.1 Set DAP exposure rate (Set value)

This is the DAP exposure rate set value. This is the reference value when calculating the inaccuracy of DAP exposure rate.

You can only have one instance of this column.

This column is required for the following analysis
Accuracy (DAP exposure rate)

8.6.21.2 DAP exposure rate (Measured)

This is the measured DAP exposure rate. You can have several instances of this column for different detectors or the same detector and just to show measured values in different units. This value is used when calculating inaccuracy and reproducibility of DAP exposure rate.

This column or is required for the following analysis
Accuracy (DAP exposure)
Reproducibility (DAP exposure)

8.6.21.3 DAP exposure rate diff % (Calculated)

This is the calculated inaccuracy (relative) for DAP exposure rate.

The following calculation is done on each row included in this analysis: DAP exposure rate diff % = **100 * (** DAP exposure rate (Measure) - Set DAP exposure rate **) /** Set DAP exposure rate

This column is required for the following analysis
Accuracy (DAP exposure rate, relative)

8.6.21.4 DAP exposure rate diff Δ (Calculated)

This is the calculated inaccuracy (absolute) for DAP exposure rate.

The following calculation is done on each row included in this analysis: DAP exposure rate diff Δ = DAP exposure rate (Measured) - Set DAP exposure rate

This column is required for the following analysis
Accuracy (DAP exposure rate, absolute)

8.6.21.5 DAP exposure rate diff from mean (%) (Calculated)

This the calculated relative difference from the mean value of DAP exposure rate. The mean value is calculated based on the measured DAP exposure rate of all rows included in the reproducibility analysis.

It is calculated in the following way:

The mean value is calculated as: DAP exp rate mean = **(DAP exp rate$_1$ + DAP exp rate$_2$ + ... + DAP exp rate$_n$) / n** (based on all rows included in the reproducibility analysis) and the following calculation is done on each row included in the reproducibility analysis: DAP exposure rate diff from mean (%) = **100 * (** DAP exposure rate (Measured) **- DAP exp rate mean) / DAP exp rate mean**

This column is required for the following analysis
Reproducibility (DAP exposure rate)

8.6.22 User-defined calculation

This group of columns is related to the user-defined calculation:

Set User Calculation	Set value
User Calculation	Value calculated with a user-defined formula
User Calculation value diff %	Relative difference between calculated value and reference value
User Calculation value diff Δ	Absolute difference between calculated value and reference value
User Calculation diff from mean (%)	Relative difference between calculated value and the mean value

8.6.22.1 Set User Calculation (Set value)

This is the user-calculation set value. It is the reference value when calculating the inaccuracy of the user-calculated value.

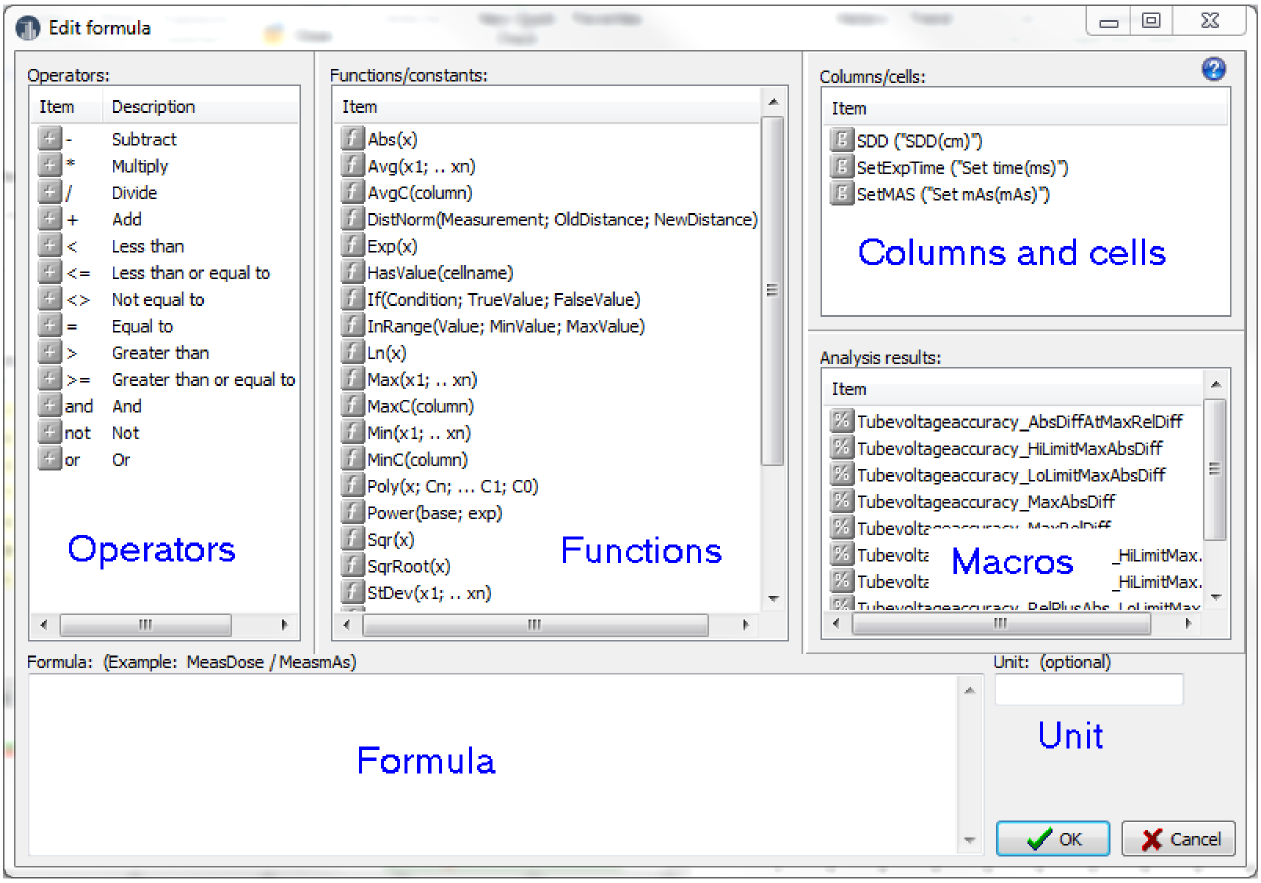
You can only have one instance of this column.

<u>This column is required for the following analysis</u>
Accuracy (User-calculation)

8.6.22.2 User Calculation (Calculated)

This column shows the results of a user-defined formula belonging to this column. If you have this column in your test you can use any values present in the grid and your own formula to calculate a value. Read how to add a user calculation in the topic Add a user calculation.

There are several operations and functions available for you to use in your own formulas:



Click to compress

This dialogue is shown when you are specifiying a formula for a column or for an individual cell.

Numeric operators

-	Subtract
*	Multiply
/	Divide
+	Add

These operators are used to perform numeric operations.

Logical operators

<	Less than
<=	Less than or equal to
<>	Not equal to
=	Equal to
>	Greater than
>=	Greater than or equal to
and	And
not	Not
or	Or

These operators are used in the IF-function to specify the "Condition". See examples below.

Functions

Several predefined functions are available to perform different calculations:

Item
Abs(x)
Avg(x1; .. xn)
AvgC(column)
DistNorm(Measurement; OldDistance; NewDistance)
Exp(x)
HasValue(cellname)
If(Condition; TrueValue; FalseValue)
InRange(Value; MinValue; MaxValue)
Ln(x)
Max(x1; .. xn)
MaxC(column)
Min(x1; .. xn)
MinC(column)
Poly(x; Cn; ... C1; C0)
Power(base; exp)
Sqr(x)
SqrRoot(x)
Sum(x1; .. xn)
SumC(column)
Pi

Abs(x)

This function gives the absolute value of a parameter.

Avg(x1;....xn)

This function returns the average of the values x1, x2, ...,xn.

AvgC(column)

This function is returns the average of all values in a column.

DistNorm(Measurement; OldDistance; NewDistance)

This function is used to normalize a value (normally an exposure or an exposure rate value) to a different distance as

$$\text{Normalized value} = \textit{Measurement} * (\textit{OldDistance} / \textit{NewDistance})^2$$

Exp(x)

This is the exponential function e^x.

If(Condition; TrueValue; FalseValue)

This conditional function that makes it possible to evaluate the value depending on the "Condition". The Condition statement can contain cell names, column names and logical operators. The TrueValue and FalseValue can be another function, a calculation, value or a text.

Example:
Assume that you have the following measurement:

View / Select	#	Calibration	Set kV (kV)	Exposure (mGy)
	1	Mo/30 µm Mo	24	0,7393
	2	Mo/30 µm Mo	26	0,9635
	3	Mo/30 µm Mo	28	1,207
	4	Mo/30 µm Mo	30	1,465
	5	Mo/30 µm Mo	32	1,760

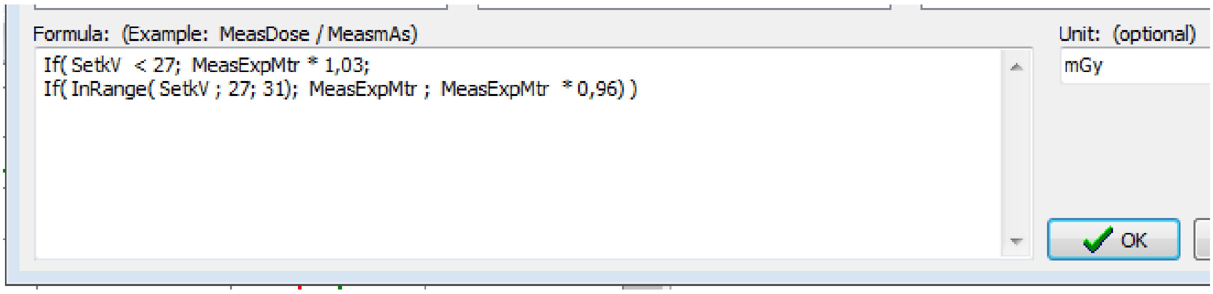
You want to add the following compensation to the measured Exposure values:

For kV lower that 27 kV - multiply with 1.03
For kV between 27 and 31 kV - multiply with 1.00
For kV above 31 kV - multiply with 0.96

Add the User Calculation column. Change the title to "Compensated Exposure":

View / Select	#	Calibration	Set kV (kV)	Exposure (mGy)	Compensated Exposure
	1	Mo/30 µm Mo	24	0,7393	
	2	Mo/30 µm Mo	26	0,9635	
	3	Mo/30 µm Mo	28	1,207	
	4	Mo/30 µm Mo	30	1,465	
	5	Mo/30 µm Mo	32	1,760	

Now add the formula. Right-click on the heading of the user calculation column and add the following formula and unit:
(note the line break after "1,03;" is only for better readability and is not required)



Click to compress

Now it looks like this:

View / Select	#	Calibration	Set kV (kV)	Exposure (mGy)	Compensated Exposure (mGy)
	1	Mo/30 µm Mo	24	0,7393	0,7614
	2	Mo/30 µm Mo	26	0,9635	0,9924
	3	Mo/30 µm Mo	28	1,207	1,207
	4	Mo/30 µm Mo	30	1,465	1,465
	5	Mo/30 µm Mo	32	1,760	1,690

If TrueValue and/or FalseValue shall be a text, the text-string shall be enclosed by "". Example:

if(SetkVp > 30; "Specified kV is too high"; "OK")

InRange(Value; MinValue; MaxValue)

This function returns True if Value is within the range specified by MinValue and MaxValue, otherwise False.

Ln(x)

This is the inverse of the exponential function e^x.

Max(x1;...;xn)

This function returns the maximum of the values x1, x2, ..., xn. x can be individual cells or columns.

MaxC(column)

This function returns the maximum value in the specified column.

Min(x1;...;xn)

This function returns the minimum of the values x1, x2, ..., xn. x can be individual cells or columns.

MinC(column)

This function returns the minimum value in the specified column.

Poly(x; Cn; .....; C1; C0)

This function returns the value of the polynomial function:

$C0 + C1*x + C2*x^2 + ... + Cn*x^n$

maximum value for n is 6.

Power(Base; exp)

This function calculates the value of $Base^{exp}$.

Sqr(x)

This function calculates x^2. x can be individual cell or column.

SqrRoot(x)

This function calculates $\sqrt{x}$. x can be individual cell or column.

Sum(x1;...;xn)

This function calculates the sum of x1, ..., xn. x can be individual cells.

SumC(column)

This function calculates the sum of all values in "column.

Pi

This functions returns the value π (3,141592653589793).

Columns and cells

Here are column names and cell names shown. If you give your own name to a cell or a column, it shows up here. You can easily pick from this list when you create your own formulas.

Macros

Here are available macros from the analysis listed. The analysis name is used to identify the macros, the macro is shown as:

AnalysisName_MacroName

This makes it possible to use results from the analysis in your own calculations.

8.6.22.3 User Calculation value diff % (Calculated)

This is the calculated inaccuracy (relative) for user-defined calculation.

The following calculation is done on each row included in the analysis: User calculation diff % = **100 * (** User calculation(Calculated) - Set User Calculation **) /** Set User Calculation

<u>This column is required for the following analysis</u>
Accuracy (User calculation, relative)

8.6.22.4 User Calculation value diff Δ (Calculated)

This is the calculated inaccuracy (absolute) for user-defined calculation.

The following calculation is done on each row included in the analysis: kVp diff Δ = User Calculation (Calculated) - Set User Calculation

This column is required for the following analysis
Accuracy (User Calculation, absolute)

8.6.22.5 User Calculation diff from mean (Calculated)

This is the calculated relative difference from the mean value of user-calculated values. The mean value is calculated based on the measured value of all rows included in the reproducibility analysis.

This value is calculated according to the following formula:

The mean value is calculated as:

user calc mean = **(value$_1$ + value$_2$ + ... + value$_n$) / n** (based on all rows included in the reproducibility analysis)

and the following calculation is done on each row included in the reproducibility analysis:

User calculation diff from mean (%) = **100 * (** User calculation **- user calc mean) / user calc mean**

This column is required for the following analysis
Reproducibility (for user calculated values)

8.6.23 User-defined numeric value

This group of columns is related to the user-defined calculation:

Numeric set value	Set value
Numeric value	Value calculated with a user-defined formula
Numeric value diff %	Relative difference between calculated value and reference value
Numeric value diff Δ	Absolute difference between calculated value and reference value
Numeric value diff from mean (%)	Relative difference between calculated value and the mean value

8.6.23.1 Numeric set value (Set value)

This is the user-defined numeric set value. It is the reference value when calculating the inaccuracy of the user-defined numeric value.

You can only have one instance of this column.

This column is required for the following analysis
Accuracy (Numeric value)

8.6.23.2 Numeric value (Measured)

This is a user-defined numeric measured value. You can use this column to store any numeric (measured) value you enter from the keyboard.

This value is a measured value and it will not be stored as measured data.

8.6.23.3 Numeric value diff % (Calculated)

This is the calculated inaccuracy (relative) for user-defined numeric value.

The following calculation is done on each row included in the analysis:

User calculation diff % = **100 * (** Numeric value(Measured) - Numeric set value **) /** Numeric set value

This column is required for the following analysis

Accuracy (User defined numeric value, relative)

8.6.23.4 Numeric value diff ∆ (Calculated)

This is the calculated inaccuracy (absolute) for user-defined numeric value.

The following calculation is done on each row included in the analysis: Numeric value diff ∆ = Numeric value (Measured) - Numeric set value

This column is required for the following analysis
Accuracy (Numeric value, absolute)

8.6.23.5 Numeric value diff from mean (Calculated)

This is the calculated relative difference from the mean value of user-defined numeric values. The mean value is calculated based on the measured value of all rows included in the reproducibility analysis.

This value is calculated according to the following formula:

The mean value is calculated as: user calc mean = **(value$_1$ + value$_2$ + ... + value$_n$) / n** (based on all rows included in the reproducibility analysis) and the following calculation is done on each row included in the reproducibility analysis: User calculation diff from mean (%) = **100 * (** Numeric value **- user calc mean) / user calc mean**

This column is required for the following analysis
Reproducibility (for numeric values)

8.6.24 Settings

This group of columns is related to different settings (Added filtration, compression paddle, beam correction factor and calibration).

Set Added filtr.	Added filtration (used for example for HVL)
Compr. paddle	Compression paddle status
Beam corr. factor	Beam correction factor (optional correction factor for exposure and exposure rate)
Calibration	Shows selected calibration for a detector

8.6.24.1 Set Added filtr. (Set value)

This column (it can also be in general settings) is specifying the amount of added filtration. It can be used for different purposes but normally you would use it when you are doing an HVL measurement to specify the amount of aluminum you add. It can also be used to increase accuracy of measured kVp and dose/dose rate when the meter is unable to estimate the amount of filtration or you are using a detector that doesn't have automatic energy correction.

You can also set this parameter on the Meter adjust tabs (unless you are doing an HVL calculation). It is found on tabs for RTI kVp and dose detectors. This value is specific for each detector used in a test or real-time display.

This column is required for the following analysis
HVL

8.6.24.2 Compr. paddle (Selection)

This column (it can also be in general settings) is specifying if the compression plate is present or not. This column is relevant only for mammography measurements.

You can also set this parameter on the Meter adjust tabs. It is found on tabs for RTI kVp and dose detectors. This value is specific for each detector used in a test or real-time display.

This column is required for the following analysis
not required for any analysis

8.6.24.3 Beam corr. factor (Set value)

This column (or in general settings) is specifying a factor that measured exposure and exposure rate is multiplied with. This column can be used to apply a correction to a measured exposure or exposure rate value.

You can also set this parameter on the Meter adjust tabs. It is found on tabs corresponding to all type of exposure detectors. This value is specific for each detector used in a test or real-time display.

This column is required for the following analysis
not required for any analysis

8.6.24.4 Calibration (Selection)

This is column is specifying the calibration used for corresponding detector.

Mammography
The calibration names shown are the default names or user-defined names specified under Program Options -> Preferences -> Modify shown mammography calibrations. The actual calibrations and their names are stored in the document when it is created. If you want to update the list click on the button "Refresh calibration list" on the Design page on the Ribbon bar.

You can set this value on the Meter adjust tabs in situations where it is not important to see what calibration is used. For example, when doing radiography, fluoroscopy and dental measurements, only one calibration is available. However, when doing mammography measurements, there are several different calibrations available and it may be useful to easily see the calibration being used for the measurement. This setting is also found on the meter adjust tabs for the RTI kVp and dose detectors. This value is specific for each detector used in a test or real-time display.

This column is required for the following analysis
AGD(ACR)
AGD(EUREF)
AGD(IAEA)

8.6.24.5 Measuring time

This column is specifying if the measuring time for **Timed Mode**.

You can also set this parameter on the Meter adjust tabs. It is found on the Meter tab when Timed Mode is activated. This value is specific for each row in the test or real-time display.

This column is required for the following analysis
not required for any analysis but normally used for CT Dose Profiler analysis

8.6.25 Conditions

This group of columns is related to different measuring conditions (for example SSD, SDD, focal spot and more).

Temperature	Temperature (used for TP compensation of ion chamber readings)
Pressure	Pressure (used for TP compensation of ion chamber readings)
SSD	Source-Skin-Distance (used for normalization of exposure and exposure rate readings)

SDD	Source-Detector-Distance (used for normalization of exposure and exposure rate readings)
Focal spot	Indicates focal spot (if present it is used by the mA linearity analysis)
CT phantom position	Indicates CT pahntom position (used by the CTDI analysis)
Slice Thickness	CT slice thickness (used by the CTDI analysis)
Number of slices	Number slices (used by the CTDI analysis)
Pitch	Pitch value

8.6.25.1 Temperature (Set value)

This is the set value for temperature. It is used to calculate the TP-factor used to compensate readings from ion chambers. Normally you would place this parameter in the general settings.

8.6.25.2 Pressure (Set value)

This is the set value for pressure. It is used to calculate the TP-factor used to compensate readings from ion chambers. Normally you would place this parameter in the general settings.

8.6.25.3 SSD (Set value)

This is the Source Skin Distance. It is used when calculating the normalized exposure or exposure rate.

The normalized exposure is calculated as:

Exposure (norm) (Measured) = Exposure (Measured) *** (** SDD (Set value) **/** SDD (Set value) **)^2 * (** Ref mAs **/** Set mAs **)**

or

Exposure rate (norm) (Measured) = Exposure rate (Measured) *** (** SDD (Set value) **/ SSD (Set value))^2 * (** Ref mAs **/** Set mAs **)**

If any of the values SDD, SDD, Ref mAs or Set mAs are missing the following formula is used:

Exposure (norm) (Measured) = Exposure (Measured) or Exposure (norm) (Measured) = Exposure rate (Measured)

8.6.25.4 SDD (Set value)

This is the Source Detector Distance. It is used when calculating the normalized exposure or exposure rate.

The normalized exposure is calculated as:

Exposure (norm) (Measured) = Exposure (Measured) *** (** SDD (Set value) **/** SDD (Set value) **)^2 * (** Ref mAs **/** Set mAs **)**

or

Exposure rate (norm) (Measured) = Exposure rate (Measured) *** (SDD (Set value) /** SSD (Set value) **)^2 * (** Ref mAs **/** Set mAs **)**

If any of the values SDD, SDD, Ref mAs or Set mAs are missing the following formula is used:

Exposure (norm) (Measured) = Exposure (Measured) or Exposure (norm) (Measured) = Exposure rate (Measured)

8.6.25.5 Focal spot (Set value)

This is the focal spot size. The parameter can have three different values; "Small", Medium" or "Large". It is not required for any analysis but the mA linearity analysis takes the focal spot into account if this parameter is present.

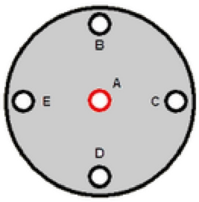
8.6.25.6 Density (Set value)

This is the AEC set densitiy value. It is use for AEC density correction analysis.

This column is required for the following analysis
AEC density correction (Exposure or O.D.).

8.6.25.7 CT phantom position (Set value)

This is the CT phantom position. This parameter is used when doing CTDI analysis. It can have six different values:



A (center)
B (12 o'clock)
C (3 o'clock)
D (6 o'clock)
E (9 o'clock)

This column is required for the following analysis
CTDI

8.6.25.8 Slice Thickness (Set value)

This is the CT slice thickness. It is used for the CTDI analysis.

This column is required for the following analysis
CTDI

8.6.25.9 Number of slices (Set value)

This is the number of slices. It is used for the CTDI analysis.

This column is required for the following analysis
CTDI

8.6.25.10 Pitch (Set value)

This is the pitch. It is used to calculate CTDI volume for a helical scan.

8.6.25.11 Scan time (Set value)

This is the CT scan time. It is used for the CTDI analysis with the CT Dose Profiler detector. Default unit is seconds.

This column is required for the following analysis
CTDI(helical scan/in phantom)
CTDI(helical scan/free-in-air)

8.6.25.12 K-factor (Set value)

The k-factor is used to calculate weighted CTDI from $CTDI_{100}$ measured in the center hole of the phantom:

$$CTDI_w = CTDI_{100,c} * k$$

The k-factors has been determined for a large number of CT scanners by measurement of $CTDI_{100}$ in the center and in the peripheral holes. A factor (the k-factor) between the weighted CTDI and the CTDI in the center hole has been determined for each scanner model. The factor has been determined for different kV and for head and body phantom, respectively.

The analysis CTDI(helical scan/in phantom) will automatically look up the appropriate k-factor depending on specified values and use that for the calculation of weighted CTDI. THis column is optional but will override the automatic lookup if it is used in the test.

8.6.25.13 Scan length (Set value)

This is the CT scan length. Default unit is millimeters.

This column is required for the following analysis
It is not required for any analysis.

8.6.25.14 Tube rotation time (Set value)

This is the CT tube rotation time. It is used for the CTDI analysis with the CT Dose Profiler detector. Default unit is seconds.

This column is required for the following analysis
CTDI(helical scan/in phantom)
CTDI(helical scan/free-in-air)

8.6.25.15 Collimation (Set value)

This is the CT collimation. It is used for the evaluation of Geometric Efficiency with the CT Dose Profiler detector. Default unit is millimeters.

This column is required for the following analysis
CTDI(helical scan/in phantom)
CTDI(helical scan/free-in-air)

8.6.25.16 CT phantom type (Set value)

This value specifies the type of CT phantom used. It is used for the CTDI analysis with the CT Dose Profiler detector. It can have three different values **Head**, **Body** and **Free-in-air**.

This column is required for the following analysis
CTDI(helical scan/in phantom)
CTDI(helical scan/free-in-air)

8.6.26 Testing

This group of columns is related to analysis and calculations used in analysis:

HVL(AGD)	This is the HVL value used for the AGD calculation
Ratio	This is the ratio between the measured exposure when filtration is added compared to the exposure value with no added filtration.
Ratio[rate]	This is the ratio between the measured exposure when filtration is added compared to the exposure value with no added filtration.
Diff from ref. val.	This column is not used in this version of Ocean.
Value/Average	This column is not used in this version of Ocean.
CTDI	This is the calculated CTDI value (for each phantom position).
Analysis comment	A special column used by the analysis.
Exposure/Set mAs	Calculated value Exposure/set mAs is used by mA linearity analysis
Exposure/meas mAs	Calculated value Exposure/meas mAs is used by mA linearity analysis
Ref mAs	Reference mAs is used for the AGD calculation according to the IAEA protocol
Phantom	Pantom thickness (sed by the AGD calculation according to the EUREF protocol)
AGD	This is the calculated AGD value

8.6.26.1 Scan speed (Calculated)

Scan speed is calculated as:

Scan speed = (Pitch * Collimation) / Tube rotation time

It is used to create a room scale that is related to the time scale.

This column is required for the following analysis
CTDI(helical scan/in phantom)
CTDI(helical scan/free-in-air)

8.6.26.2 HVL(AGD) (Measured)

This is a set value column. This column is required when average glandular dose is calculated. You must enter this value.

This column is required for the following analysis
AGD(ACR)
AGD(EUREF)
AGD(IAEA)

8.6.26.3 Ratio (Calculated)

This column is a calculated value and it can be used in an HVL test. It takes the exposure for the row where Set added filtr. = 0 and calculates the ratio of the measured exposure and the value where no filtration is added. This column is optional, but it must not be selected for the HVL analysis.

The following calculation is done on each row included in the analysis:

Ratio = 100 * Exposure (Measured) **/ "Exposure (Measured) at 0 mm Al"**

8.6.26.4 Ratio[rate] (Calculated)

This column is a calculated value and it can be used in an HVL test. It takes the exposure rate for the row where Set added filtr. = 0 and calculates the ratio of the measured exposure rate and the value where no filtration is added. This column is optional, but it must not be selected for the HVL analysis.

The following calculation is done on each row included in the analysis:

Ratio = 100 * Exposure rate (Measured) **/ "Exposure rate (Measured) at 0 mm Al"**

8.6.26.5 Diff from ref. val. (%) (Calculated)

This column is used for the AEC density correction analysis. It is the calculated relative difference from a reference exposure value. The reference value is the exposure measured when the density correction is set to "0".

The reference value, **Exposure ref**, is measured exposure when density correction is set to "0". The column used is Set density(Set value).

The following calculation is done on each row included in the AEC density correction analysis:

Diff from ref val (%)= = **100 * (** Exposure (Measured) **- Exposure ref) / Exposure ref**

This column is required for the following AEC analysis if measured exposure is used
AEC density correction (Exposure)

8.6.26.6 Value/Average (Calculated)

This column is not used in this version of Ocean.

8.6.26.7 CTDI (Calculated)

This is the CTDI value calculated for each phantom position. The calculated $CTDI_{(100,w)}$ (weighted CTDI) is presented by the CTDI analysis.

CTDI of an individual position is calculated as follows: **$CTDI_{(100,A(or\ B\ C\ D\ E))}$ = Measured CTdose / (N × h)** where N is the number of slices h is the slice thickness

This column is required for the following analysis
CTDI

8.6.26.8 Analysis comment (Calculated)

This column is a text column generated by the analysis. You can read in the topic Analysis comment to learn how to use it. This column is not required to use an analysis.

8.6.26.9 Exposure/mAs (Calculated)

This column is used by the mA linearity analysis. It shows the calculated exposure per mAs value when the mAs set (or set mA and set time) value is used in the mA linearity evaluation.

The following calculation is done on each row included in the analysis: Exposure/mAs = Exposure (Measured) / mAs The denominator, "mAs", is defined by the Source selection in the mAs and mAs linearity analysis.

This column is required for the following analysis
mA and mAs linearity

8.6.26.10 Exposure/Set mAs (Obsolete)

This column is removed from the Ocean release June 2018. It is replace by a new column Exposure/mAs. Templates and measurements created before June 2018 will continue to function as before and calculate according to the old mA linearity analysis. However, if they are modified the columns "Exposure/Set mAs" or "Exposure/meas mAs" is removed, only the new column Exposure/mAs is available and must be used.

Read more in the section mA and mAs Linearity.

8.6.26.11 Exposure/meas mAs (Obsolete)

This column is removed from the Ocean release June 2018. It is replace by a new column Exposure/mAs. Templates and measurements created before June 2018 will continue to function as before and calculate according to the old mA linearity analysis. However, if they are modified the columns "Exposure/Set mAs" or "Exposure/meas mAs" is removed, only the new column Exposure/mAs is available and must be used.

Read more in the section mA and mAs Linearity.

8.6.26.12 Ref mAs (Set value)

This column is used by the AGD(EUREF) and the AGD(IAEA) analyses. It is used together with the Set mAs (Set value) to normalize the exposure value used in the average glandular dose calculation.

The normalized exposure is calculated as: Exposure (norm) (Measured) = Exposure (Measured) *** (** SDD (Set value) **/** SDD (Set value) **)² * (** Ref mAs **/** Set mAs **)** or Exposure rate (norm) (Measured) = Exposure rate (Measured) *** (** SDD (Set value) **/** SSD (Set value) **)² * (Ref mAs / ** Set mAs **)** If the values SDD/SSD and Ref mAs/Set mAs are missing, the following formula is used: Exposure (norm) (Measured) = Exposure (Measured) or Exposure (norm) (Measured) = Exposure rate (Measured)

8.6.26.13 Phantom Thickness (Set value)

This value is used by the AGD(EUREF) analysis. It specifies the PMMA thickness used.

This column is required for the following analysis
AGD(EUREF)

8.6.26.14 Field selection (Set value)

This value is used by the AEC field balance analysis. It specifies the AEC field(s) used.

This column is required for the following analysis
AEC field balance

8.6.26.15 AGD (Calculated)

This value is the calculated average glandular dose. This column is required for all types of AGD analysis.

For the calculation of AGD, the half value layer value is required. You can use a value from a tradional HVL measurement (by adding filters until you have decreased the measured dose to less than half) or use the Qick HVL that the meter gives for each exposure. If you use the later, you can get the AGD with only one exposure.

This column is required for the following analysis
AGD(ACR)
AGD(EUREF)
AGD(IAEA)

8.6.26.16 Result (Calculated)

If this column is present it shows "Pass" or "Fail" for each row. It will look at all analysis that evaluates this row and indicate "Pass" if all analysis pass that row. If at least one analysis fails the row, the column will indicate "Fail".

8.6.27 Other

There are various columns found in this group, for example Date/time, Position check and more.

Attachments	A column where files can be attached to a row.
Memo	Formatted comments can be entered in this column.
Date/time	Shows the date and time for each exposure.
Position check	Shows the result from the position check.
Meas O.D.	Measured optical density
Diff from mean (O.D.)	Difference from mean for optical density
Diff from ref val (O.D.)	Difference from reference value for optical density

Charge	This column is related to measurements of charge.
Current	This column is related to measurements of current.
Beam Quality Index	Beam quality index is a ratio value that is reflecting the beam quality.
Waveform data	Shows waveform data in the grid

8.6.27.1 Attachments (Measured)

You can add attachments in this column. They can be pictures, documents and so on. The the files you put here are stored in the session or real-time display. Files you put here are considered to be "measured data", they are not saved in a template and they are erased if you do "Clear data". If you attach pictures you can have them appear in the report if the "Images" section is enabled in the report template.

NOTE: This column is not by default shown in the report shown in the report.

8.6.27.2 Memo (Measured)

You can write formatted text in this column. The text you put here is considered to be "measured data" so it is not saved in a template and is erased if you do "Clear data".

NOTE: This column is not supported in the report.

8.6.27.3 Date/time (Calculated)

If this column is present it shows the date and time of every exposure made in a test or real-time display.

8.6.27.4 Position check (Measured)

The results of the position check is presented in this column. It is possible to see if a position check has been done and if it passed or failed. This can be used in situations where detector positioning is critical to the success of a measurement to make sure that a position check has been done and that the measurement was done correctly.

8.6.27.5 Meas O.D. (Measured)

This is the measured optical densitiy. This value is entered from the keyboard. This value is used for AEC performance analysis.

This column is required for the following analysis
AEC kV compensation (O.D.)
AEC mA compensation (O.D.)
AEC reproducibility (O.D.)
AEC reciprocity (O.D.)
AEC field balance (O.D.)
AEC density correction (O.D.)

8.6.27.6 Diff from mean (O.D.) (Calculated)

It is the calculated relative difference from the mean value of measured optical density. The mean value is calculated based on the optical density of all rows included in the AEC analysis.

The mean value is calculated as:

O.D. mean = **(Meas O.D.$_1$ + Meas O.D.$_2$ + ... + Meas O.D.$_n$) / n** (based on all rows included in the reproducibility analysis)

and the following calculation is done on each row included in the reproducibility analysis:

Diff from mean (O.D.) = Meas O.D. (Measured) **- O.D. mean**

This column is required for the following AEC analysis if optical density is used
AEC kV compensation (O.D.)
AEC mA compensation (O.D.)
AEC reproducibility (O.D.)
AEC reciprocity (O.D.)

AEC field balance (O.D.)
AEC density correction (O.D.)

8.6.27.7 Diff from ref. val (O.D.) (Calculated)

This column is used for the AEC density correction analysis. It is the calculated difference from a reference optical density value. The reference value is the optical density measured when the density correction is set to "0".

The reference value, **O.D. ref,** is measured optical density when density correction is set to "0". The column used is Set density(Set value).

The following calculation is done on each row included in the AEC density correction analysis:

Diff from ref val (O.D.)= = Meas O.D. (Measured) **- O.D. ref**

This column is required for the following AEC analysis if optical density is used
AEC density correction (O.D.)

8.6.27.8 Charge

This is the measured charge from a detector.

8.6.27.9 Current

This is the measured current from a detector.

8.6.27.10 Beam Quality Index

Beam quality index ratio is a value that is reflecting the beam quality. It is not calibrated in any way and not used by Ocean.

8.6.27.11 Waveform data

This column is used to show waveform data in the grid. All parameters shown on the waveform data panel can be shown in this column.

You can read in the topic Waveform data in a column how to use this column.

8.6.28 User-defined text

The list below is showing all the user-defined columns available to you:

Set text	This is a user-defined set text (the text you type in this column is assumed to be "set values".
Text	This is a user-defined "measured" text (the text you type in this column is assumed to be "measured values".

8.6.28.1 Set text (Set value)

This is a user-defined set text string. You can use this column (or general setting) for any text set value you may want in a test.

This text is a set value and it will be stored in your templates.

8.6.28.2 Text (Measured)

This is a user-defined "measured" text value. You can use this column to store any text you enter from the keyboard.

This text is a measured value and it will not be stored in your templates.

8.7 Analysis (Definitions)

An analysis is a pre-defined calculation that is applied to the grid. You can include all rows or just rows you select in the analysis. You can for each analysis define your own pass/fail limits.

There are several different analysis available:

Accuracy	Evaluates the accuracy for all measured parameters. It calculates the deviation between a measured value and a set value (reference value) and compares against specified pass/fail criteria.
Reproducibility	Evaluates the reproducibility for all measured parameters. It calculates difference from mean value, coefficient of variation and standard deviation.
mA linearity	Evaluates the mA linearity. It compares the mA/exposure value for the different mA stations. It can be used both with mA/time and mAs generators.
HVL	Calculates half value layer based on a number of exposures with increasing added filtration. Calculated half value layer is compared to specified pass/fail criteria.
QuickHVL	Compares the direct measured half value layer with specified pass/fail criteria.
CTDI	Calculates CTDI based on five CT dose values measured in different positions in a CT phantom. It calculates CTDI, weighted CTDI and normalized CTDI.
CTDI(helical scan/in phantom)	Calculates CTDIw, CTDIvol and DLP from a helical scan and a measurement in the center hole of the phantom using the RTI CT Dose Profiler detector.
CTDI(helical scan/free-in-air)	Calculates Geometric efficiency from a helical scan free-in-air using the RTI CT Dose Profiler detector.
AGD(ACR)	Calculates average glandular dose according to the rules specified by *ACR, Mammography uality Manual, 1999, ISBN 1-55903-142-5* . Required input is an HVL value, a entrance kerma dose value and the target/filter used.
AGD(EUREF)	Calculates average glandular dose according to the rules specified by *European Protocol for e Quality Control of the Physical and Technical Aspects of Mammography Screening, ppendices, page 110, 2005* . Required input is an HVL value, a entrance kerma dose value, the target/filter used and phantom thickness.
AGD(IAEA)	Calculates average glandular dose according to the rules specified by *IAEA, Technical eports Series no 457, Dosimetry in Diagnostic Radiology: An International code of Practice, ige 155-163, 2007, ISSN 0074-1914; no 457* . Required input is an HVL value, a entrance kerma dose value and the target/filter used.
Min/Max	Compares specified parameter with a high and/or low accepted limit. It can be used with all measured parameters and the user-calculation column.
Checklist	Presents the result for a checklist, if it passed or failed, how many fails and how many warnings there were.
AEC kV compensation	Evaluates the automatic exposure control.
AEC mA compensation	Evaluates the automatic exposure control.
AEC reproducibility	Evaluates the automatic exposure control.
AEC reciprocity	Evaluates the automatic exposure control.
AEC field balance	Evaluates the automatic exposure control.

AEC density correction Evaluates the automatic exposure control.

8.7.1 Accuracy

The Accuracy analysis is used to evaluate the inaccuracy for a parameter. This analysis can calculate the relative and absolute difference between the reference value (set value) and the measured value. The differences are compared to the acceptance limits you have specified. The accuracy analysis can be used with all measured parameters (all measured parameters that have diff % and diff Δ columns). You can read the topic Add analysis to see how you add the analysis to a test.

The analysis can calculate and evaluate:

Relative difference: diff %

Absolute difference: diff Δ

By default, only the relative difference is evaluated. If you want to include absolute difference you must modify the standard analysis. See topic Modify analysis and Advanced analysis for more information.

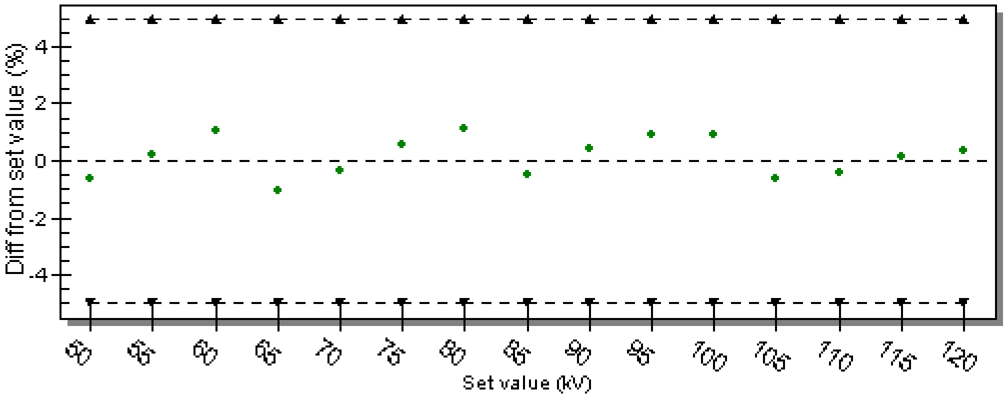
Typical accuracy test

Set mAs (mAs)	SDD (cm)	Set time (ms)
5	70	100

View / Select	#	Set kV (kV)	Tube voltage (kV)	kVp diff %	Exposure (mGy)	Exposure time (ms)
	1	50	49,69	-0,6	0,2070	100,8
	2	55	55,13	0,2	0,2678	112,9
	3	60	60,62	1,0	0,3330	98,27
	4	65	64,33	-1,0	0,3776	98,27
	5	70	69,77	-0,3	0,4390	98,77
	6	75	75,42	0,6	0,5179	99,27
	7	80	80,88	1,1	0,5885	98,77
	8	85	84,61	-0,5	0,6444	99,28
	9	90	90,37	0,4	0,7168	98,77
	10	95	95,83	0,9	0,8055	98,77
	11	100	100,89	0,9	0,8833	98,78
	12	105	104,37	-0,6	0,9383	98,77
	13	110	109,57	-0,4	1,022	98,78
	14	115	115,14	0,1	1,115	98,78
	15	120	120,43	0,4	1,195	98,77

Tube voltage accuracy

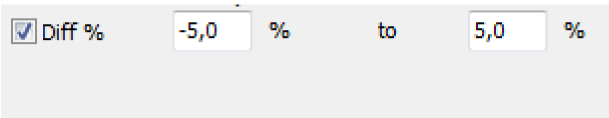
Result: Pass



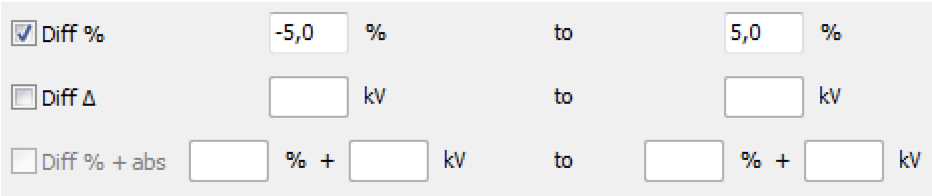
Maximum inaccuracy is 1,1 % at 80,00 kV (Limit: -5,0 % to 5,0 %)

Default pass/fail criteria

When you add the Accuracy analysis the following pass/fail criteria is shown:



When you modify an Accuracy analysis, all pass/fail criteria is available:

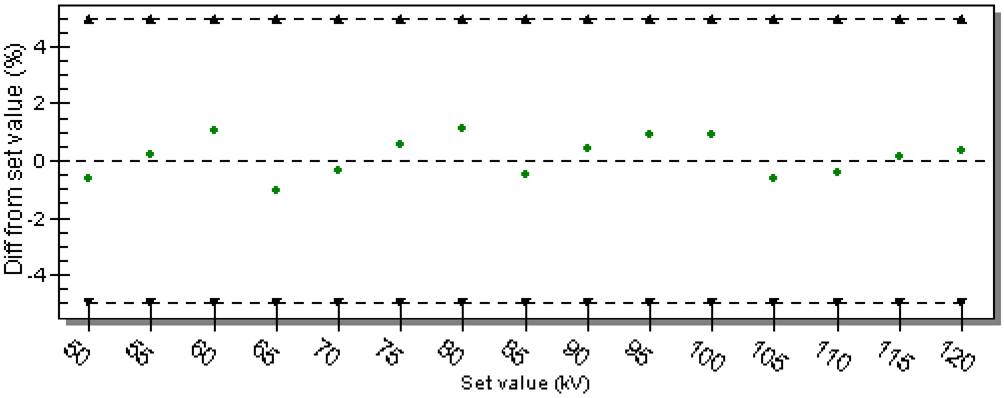


You must modify the layout to see the results of the additional parameters.

Default result

Tube voltage accuracy

Result: Pass



Maximum inaccuracy is 1,1 % at 80,00 kV (Limit: -5,0 % to 5,0 %)

Result layout and macros

As described in the topic Advanced analysis, it is possible to modify the the layout of the analysis result. The layout is defined by text combined with "macros". When the analysis result is shown, the macros are replaced with the appropriate calculated values, set values and measured values. The default layout of text Accuracy analysis looks like this:

$Title **Result:** $Result $GraphRel Maximum inaccuracy is $MaxRelDiff % at $SetValueAtMaxRelDiff $Unit (Limit: $LoLimitMaxRelDiff % to $HiLimitMaxRelDiff %)

This text can be modified and more macros can be used to show more calculated results, for example the relative difference. The following macros are available for the Accuracy analysis:

$Title (Specified title)
$TestResult (Pass or fail text, the overall result for the test)
$Result (Analysis result)
$GraphRel (Graphical representation of the results as %)
$GraphAbs (Graphical representation of the results)
$MaxRelDiff (Maximum relative difference)
$AbsDiffAtMaxRelDiff (Maximum absolute relative difference)
$SetValueAtMaxRelDiff (The set value for where maximum relative difference occur)
$HiLimitMaxRelDiff (High acceptance limit for the value where maximum difference occur)
$LoLimitMaxRelDiff (Low acceptance limit for the value where maximum difference occur)
$MaxAbsDiff (Maximum absolute difference)
$SetValueAtMaxAbsDiff (The set value for where maximum absolute difference occur)
$HiLimitMaxAbsDiff (High acceptance limit for the value where maximum difference occur)
$LoLimitMaxAbsDiff (Low acceptance limit for the value where maximum difference occur)
$Unit (The current unit)

Calculations

The relative difference is calculated as:

diff % = 100 * (Measured value - Set value) / Set value

The absolute difference is calculated as:

diff Δ = Measured value - Set value

Required columns (or general settings)

The following columns are required for the Accuracy analysis:

Parameter	Description
Set value	This is the reference value the measured values is compared to. The set value can be placed as column or in general settings.
Measured value	The measured value is used to calculate the deviation from the reference value.
diff %	This is the calculated relative difference between the reference value and the measured value. This column is optional, but if relative difference is evaluated, it is recommended to include this column since the indication of failing values is done in this column.
diff Δ	This is the calculated absolute difference between the reference value and the measured value. This column is optional, but if absolute difference is evaluated, it is recommended to include this column since the indication of failing values is done in this column.

8.7.2 Reproducibility

The Reproducibility analysis is used to evaluate the reproducibility for a parameter. This analysis can calculate the deviation from mean value, coefficient of variation and standard deviation. You can specify pass/fail criteria for these parameters. The reproducibility analysis can be used with all parameters that have a "diff from mean (%)" column (this is all measured parameters and the user calculation) and all user defined and user-calculated columns. You can have multiple instances of this analysis (it is not limited to columns that are set to "Use for analysis"). You can read the topic Add analysis to see how you add the analysis to a test.

By default, deviation from mean value and coefficient of variation are evaluated. If you want to include the standard deviation also, you must modify the standard analysis. See topic Modify analysis and Advanced analysis for more information.

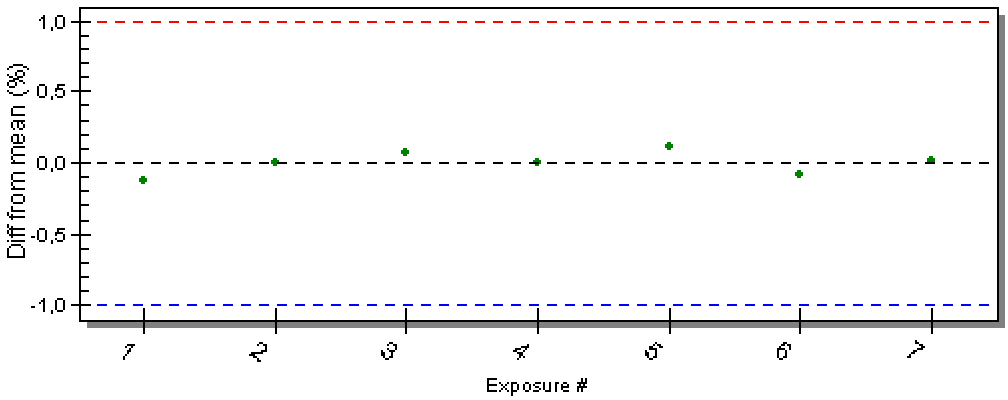
Typical reproducibility test

Set time (ms)	Set mAs (mAs)	SDD (cm)
100	5	70

View / Select	#	Set kV (kV)	Tube voltage (kV) (Piranha)	kVp diff from mean (%)
	1	80	80,59	-0,1
	2	80	80,69	0,0
	3	80	80,74	0,1
	4	80	80,69	0,0
	5	80	80,77	0,1
	6	80	80,62	-0,1
	7	80	80,70	0,0

Tube voltage reproducibility

Result: Pass



Coefficient of variation is 0,1 % (Limit: 1,0 %)
The mean value is 80,69 kV (Standard deviation: 0,07 kV)
Maximum deviation from the mean value is 0,1 % (Limit 1,0 %)

Default pass/fail criteria

When you add the Reproducibility analysis the following pass/fail criteria is shown:

☑ Maximum relative deviation from the mean	±	5,0	%
☐ Maximum absolute deviation from the mean	±		kV
☑ Maximum coefficient of variation:		10,0	%

When you modify an Reproducibility analysis, all pass/fail criteria are available:

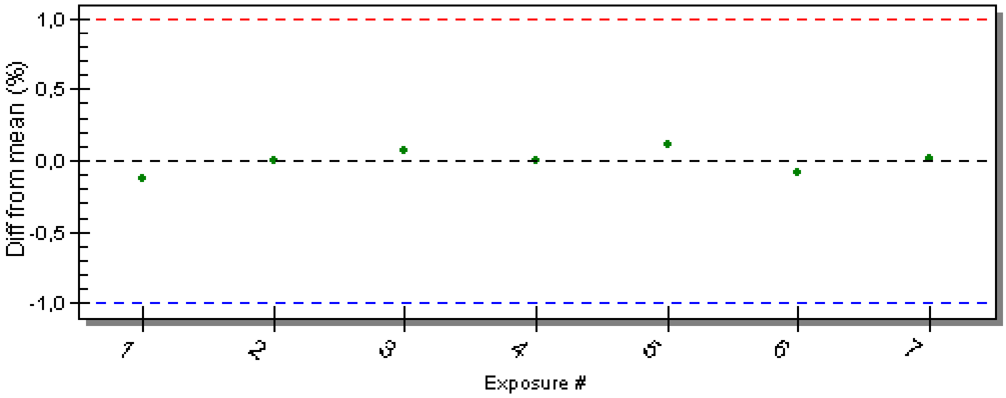
☑ Maximum relative deviation from the mean	±	1,0	%
☐ Maximum absolute deviation from the mean	±		kV
☑ Maximum coefficient of variation:		1,0	%
☐ Maximum standard deviation:			kV

You must modify the layout to see the results of the additional parameters.

Default result

Tube voltage reproducibility

Result: Pass



Coefficient of variation is 0,1 % (Limit: 1,0 %)
The mean value is 80,69 kV (Standard deviation: 0,07 kV)
Maximum deviation from the mean value is 0,1 % (Limit 1,0 %)

Result layout and macros

As described in the topic Advanced analysis, it is possible to modify the the layout of the analysis result. The layout is defined by text combined with "macros". When the analysis result is shown, the macros are replaced with the appropriate calculated values, set values and measured values. The default layout of text Reproducibility analysis looks like this:

$Title

Result: $Result

$GraphRel

Coefficient of variation is $CoeffOfVariation % (Limit: $LimitForCoeffOfVariation %)
The mean value is $MeanValue $Unit (Standard deviation: $StandardDeviation $Unit)
Maximum deviation from the mean value is $MaxDevFromMean % (Limit $LimitForMaxDevFromMean %)

This text can be modified and more macros can be used to show more calculated results, for example the relative difference. The following macros are available for the Reproducibility analysis:

$Title (Specified title)

$Result (Analysis result)

$TestResult (Pass or fail text, the overall result for the test)

$Unit (The current unit)

$GraphRel (Graphical representation of the results as %)

$MaxDevFromMean (Maximum deviation from mean value (%))

$SetValueAtMaxDevFromMean (The set value for where maximum deviation from mean value occurred)

$LimitForMaxDevFromMean (Acceptance limit for maximum deviation from mean value)

$MeanValue (Mean value)

$StandardDeviation (Standard deviation)

$LimitForStandardDeviation (Maximum allowed standard deviation)

$CoeffOfVariation (Coefficient of variation)

$LimitForCoeffOfVariation (Maximum allowed coefficient of variation)

$TargetFilter (Calibration for first exposure used in analysis)

$AbsMeanValueDeviationFromSetValue (Mean deviation from Set value)

$RelMeanValueDeviationFromSetValue (Mean deviation from Set value (%))

$LimitAbsMeanValueDeviationFromSetValue (Limit for mean deviation from Set value)

$LimitRelMeanValueDeviationFromSetValue (Limit for mean deviation from Set value (%))

Calculations

The mean ($MeanValue) is calculated as:

\$MeanValue = (Value$_1$ + Value$_2$ + ... + Value$_n$) / n (based on rows included in the reproducibility analysis)

for each row included in the reproducibility is the following (a column is available for this for each parameter)

diff from mean (%) = 100 * (Measured value - Mean value) / Mean value

The macro $MaxDevFromMean is set to the maximum of these values.

Coefficient of variation is calculated as:

$CoeffOfVariation = $StandardDeviation / $MeanValue

where the Standard deviation is calculated as:

\$StandardDeviation = √ [((X$_1$ - \$MeanValue)^2 + (X$_2$ - \$MeanValue)^2 + ... + (X$_n$ - \$MeanValue)^2)/n]

Deviation of mean value from Set value:

$AbsMeanValueDeviationFromSetValue = $MeanValue - $SetValueAtMaxDevFromMean

$RelMeanValueDeviationFromSetValue = 100 * ($MeanValue - $SetValueAtMaxDevFromMean) / $SetValueAtMaxDevFromMean

Required columns (or general settings)

The following columns are required for the Reproducibility analysis:

Parameter	Description
Measured value	The measured values are used to calculate the difference from mean value, coefficient of variation and standard deviation.
diff from mean (%)	This is the calculated relative difference between the each individual measured value and the mean value of all measured values. This column is optional, however, it is recommended to have this column if this parameter is evaluated since the indication of failing exposures is made in this column.

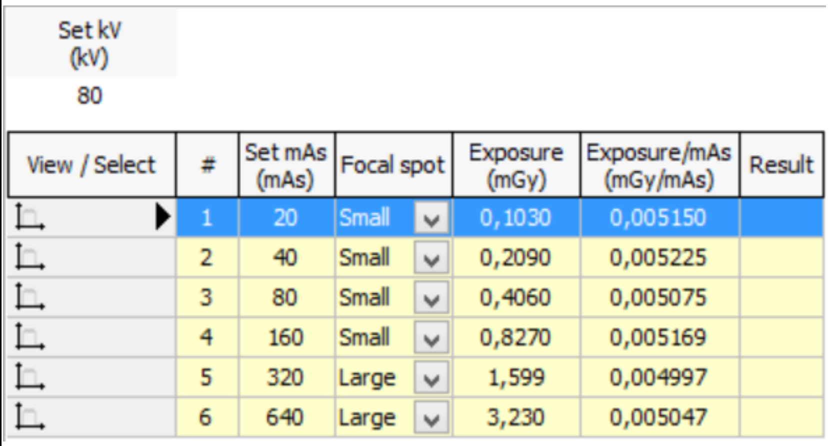
8.7.3 mA and mAs linearity

The mA linearity analysis is used to evaluate the linearity of an X-ray system. The analysis can check the exposure/mAs between adjacent stations, difference between highest/lowest and the deviation from average. You can also specify pass/fail criteria for these parameters. It can be set up for mAs or mA/time generators and you can chose between mA or mAs stations. You can read the topic Add analysis to see how you add the analysis to a test.

By default, only the difference between adjacent stations are evaluated. See topic Modify analysis and Advanced analysis for more information about how to configure and use more of the built-in calculations.

NOTE: From the release in June 2018 and forward the mA linearity analysis has a new format. Before June 2018 there was two columns "Exposure/Set mAs" and "Exposure/meas mAs" that were used to evaluate the linearity. These two columns are now replaced by one new column "Exposure/mAs". Old measurements and templates with the old analysis will continue to work as long as they are not modified. As soon as you remove either of the two old columns, it can only be replaced by the new one.

Typical mAs linearity test



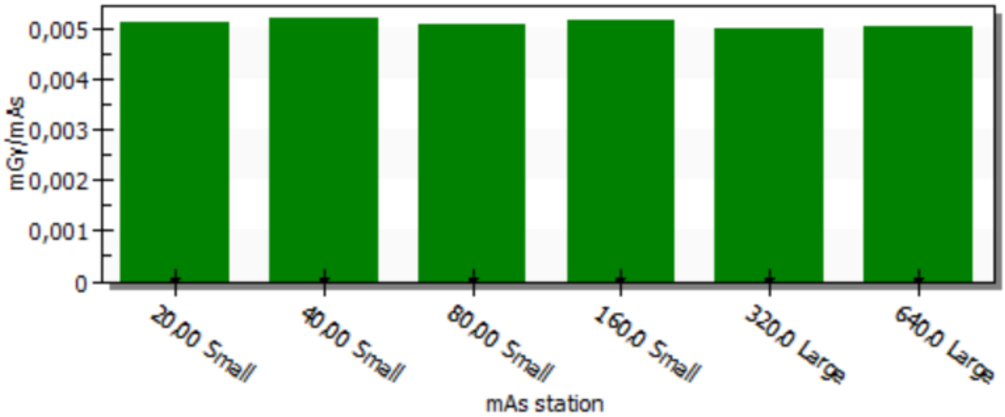
Set kV (kV)
80

View / Select	#	Set mAs (mAs)	Focal spot	Exposure (mGy)	Exposure/mAs (mGy/mAs)	Result
	1	20	Small	0,1030	0,005150	
	2	40	Small	0,2090	0,005225	
	3	80	Small	0,4060	0,005075	
	4	160	Small	0,8270	0,005169	
	5	320	Large	1,599	0,004997	
	6	640	Large	3,230	0,005047	

mAs linearity

Result: Pass

Maximum difference in mGy/mAs between adjacent stations: 1,7 % (limit 10,0 %)



Typical mA linearity test

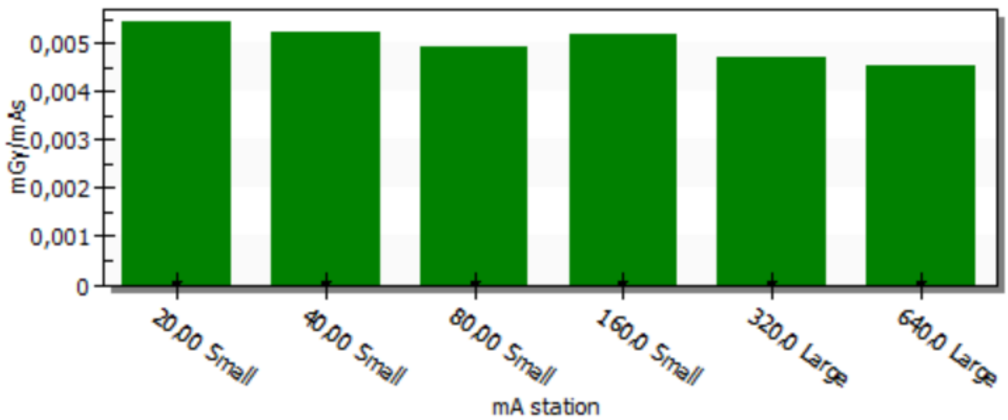
Set kV (kV)
80

View / Select	#	Set mA (mA)	Set time (ms)	Focal spot	Exposure (mGy)	Exposure/mAs (mGy/mAs)	Result
	1	20	1000	Small	0,1090	0,005450	
	2	40	1000	Small	0,2090	0,005225	
	3	80	1000	Small	0,3950	0,004938	
	4	160	1000	Small	0,8270	0,005169	
	5	320	1000	Large	1,502	0,004694	
	6	640	1000	Large	2,900	0,004531	

mA linearity

Result: Pass

Maximum difference in mGy/mAs between adjacent stations: 4,8 % (limit 10,0 %)

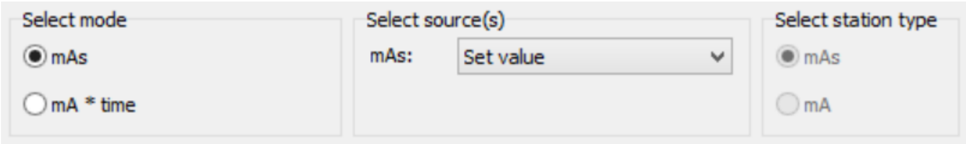


Select parameters

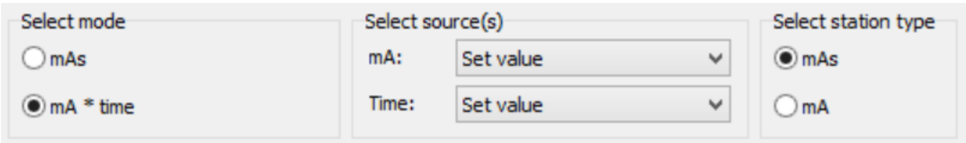
This analysis has several options to adapt it for different generator type and for different type of calculations. You can select Mode, Source and Station when you setup the analysis (or modify as described in section Advanced analysis):

Mode:

If you set mAs on the generator: select "mAs"
If you set mA and time on the generator: select "mA * time"

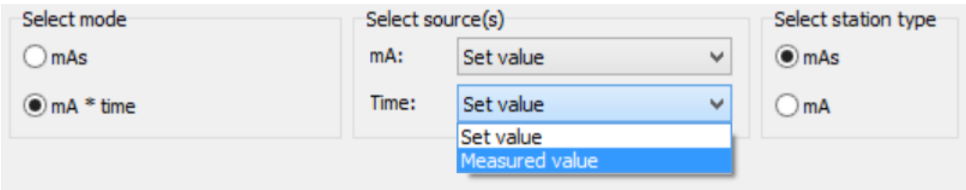


or



Source:

This defines what is used in the denominator when Exposure/mAs is calculated. When doing mA or mAs linearity, the normal method is to use the values, mAs or mA and time, you set on the generator:



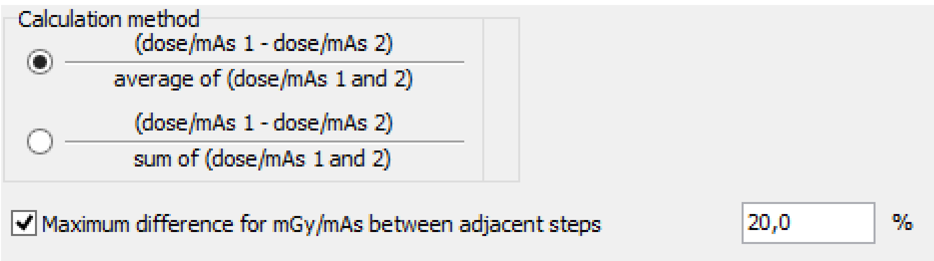
The analysis allows you also to use measured mAs or measured mA and/or time to calculate the denominator. However, note this is not the standard way to check mA or mAs linearity and is intended for special situations.

Station:

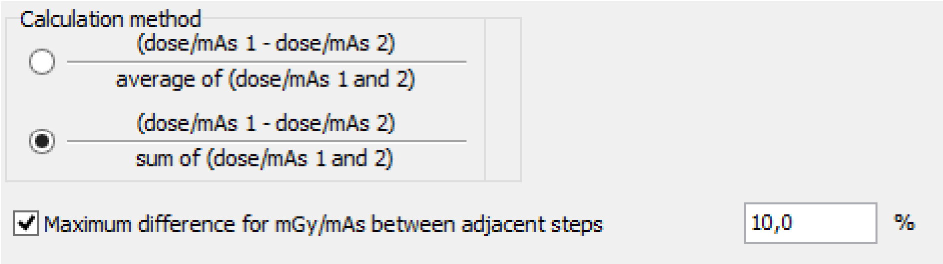
mAs or mA can be used as station. Station the values that define the mA or mAs points for which Exposure/mAs is calculated. If more than one exposure is made for a station, the average is automatically calculated and used in the calculations. Above is two typical linearity tests shown, the "mAs linearity" uses mAs as station and the "mA linearity" uses mA as station.

Default pass/fail criteria

There are two different calculations methods to chose from:

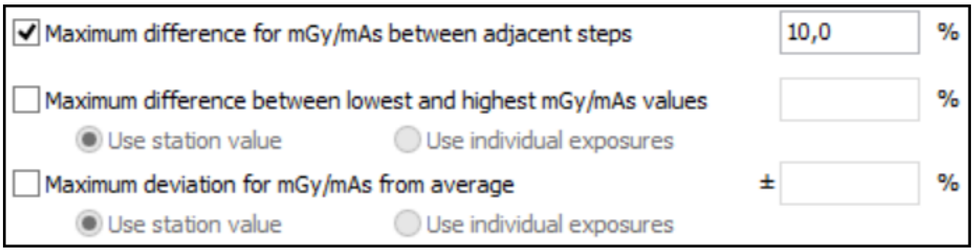


or



The second method is default and is most commonly used. Note: Both methods give exactly the same result with the pass/fail limits shown in the pictures above.

When you modify an mA linearity analysis as described in Modify analysis, all pass/fail criteria is available:



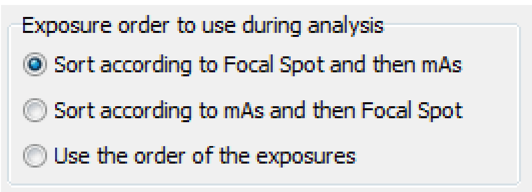
Here you specify the maximum difference you allow between adjacent steps (stations). You also has the possibility to add further checks:

- Maximum difference between lowest and highest Exposure/mAs
- Maximum deviation for Exposure/mAs from average

You can chose to check station values or check every individual exposure if you make more than one exposure per station. You must modify the layout, as described in section Advanced analysis, to see the results from these optional tests.

Select sort order

You can decide how you want the stations be sorted before the analysis is performed. This only affects the calculations of difference between adjacent steps.



Sort according to Focal Spot and then mAs
Exposure are sorted based on the Focal Spot size information you have provided in this column. For each focal spot size used, the exposures are sorted based on mAs. The calculations will be done after the sorting is completed.

Sort according to mAs and then Focal Spot
Exposure are sorted based on mAs. For each mAs station used, the exposures are sorted based on focal spot size. The calculations will be done after the sorting is completed.

Use the order of the exposures
No sorting is performed. The evaluation of linearity is done on the exposures exactly in the same order as they where measured.

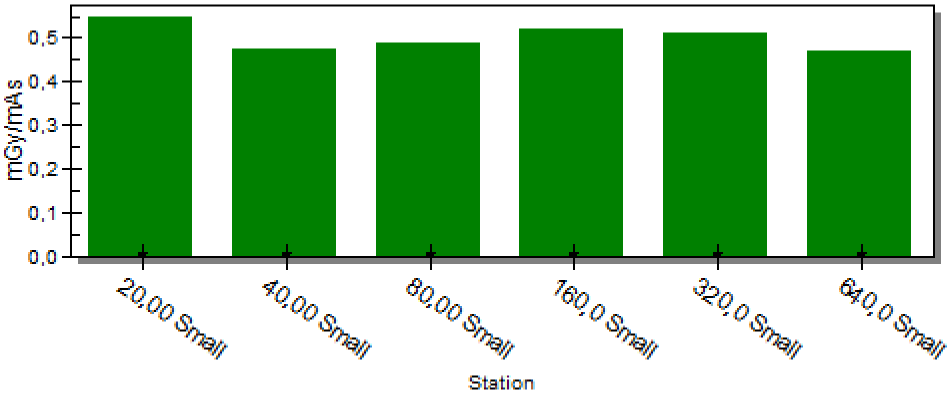
Result layout and macros

The default analysis result looks like shown below.

mA linearity

Result: Pass

Maximum difference in mGy/mAs between adjacent stations: 7,3 % (limit 10,0 %)



As described in the topic Advanced analysis, it is possible to modify the the layout of the analysis result. The layout is defined by text combined with "macros". When the analysis result is shown, the macros are replaced with the appropriate calculated values, set values and measured values. The default layout of text mA linearity analysis looks like this:

$Title

Result: $TestResult

Maximum difference in $Unit between adjacent stations: $MaxDiffAdjSteps % (limit $LimitMaxDiffAdjSteps %)

$GraphAbs

This text can be modified and more macros can be used to show more calculated results, for example the relative difference. The following macros are available for the mA linearity analysis:

$MeterUsedType (Meter type)

$MeterUsedSN (Meter S/N)

$MeterUsedCalDate (Meter calibration date)

$ExtDetUsedType (External detector type)

$ExtDetUsedSN (External detector S/N)

$ExtDetUsedCalDate (External detector calibration date)

$Title (Specified title)

$Result (Analysis result)

$TestResult (Pass or fail text, the overall result for the test)

$GraphRel (Graphical representation of the results as %)

$GraphAbs (Graphical representation of the results)

$TargetFilter (Calibration for first exposure used in analysis)

$Unit (The current unit)

$SetKV (Set value for kV for the lowest mAs value (or from general settings))

$FocalSpot (Focal spot for lowest mAs value (or from general settings))

$MaxExpPermAs (Maximum value)

$MinExpPermAs (Minimum value)

$AverageExpPermAs (Average value)

$MaxDevFromAverage (Maximum deviation from average (%))

$LimitMaxDevFromAverage (Limit for maximum deviation from average (%))

$DiffHighLow (Difference between the highest and lowest Exp/mAs value (%))

$LimitDiffHighLow (Limit for difference between the highest and lowest Exp/mAs value (%))

$MaxDiffAdjSteps (Maximum difference between adjacent steps (%))

$LimitMaxDiffAdjSteps (Limit for maximum difference between adjacent steps (%))

$LimitMinExpPermAs (Limit for min. value)

$LimitMaxExpPermAs (Limit for max. value)

Calculations

- The Exposure/mAs differences between adjacent stations are calculated as:

Diff between adjacent steps = **100 * | ValueA - ValueB | / (ValueA + ValueB)**

The macro $MaxDiffAdjSteps is set to the maximum of these values and compared against the limit you specify for "Maximum difference between adjacent stations"

- The Exposure/mAs difference between highest and lowest for each station or exposure is calculated as:

diff between high and low = **100 * (Highest - Lowest) / (Highest + Lowest)**

The macro $DiffHighLow is set to the maximum of these values and compared against the limit you specify for "Maximum difference between highest and lowest"

- The mean value is calculated as:

$MeanValue = (Exposure/mAs**$_1$ **+ Exposure/mAs$_2$ **+ . . . . . + Exposure/mAs**$_n$ **) / n**

for each station or exposure included in the analysis the following is calculated:

diff from mean (%) = 100 * (Exposure/mAs - Mean value) / Mean value

The macro $MaxDevFromAverage is set to the maximum of these values and compared with the limit you set for "Maximum deviation from average"

Required columns (or general settings)

The following columns are required for the mA linearity analysis:

Parameter	Description
Set mAs (Set value) or Tube mAs (Measured)	For a **mAs generator** the set mAs or the measured mAs is required to evaluate the linearity. One of these columns are required for mAs generators.
Set mA (Set value) or Tube mA (Measured)	For a **mA-time generator** the set mA and the is always required. If measured mA is used to evaluate the mA linearity this column is required as well.
Set Time (Set value) or Exposure time (Measured)	For a **mA-time generator** the set Time and the is always required. If measured Time is used to evaluate the mA linearity this column is required as well.
Exposure (Measured) or Exposure (norm)	The measured exposure value is required for the evaluation of linearity. You can use the measured exposure or the normalized (normalized to a certain distance). One of these columns is required for mA-time generators.
Exposure/Set mAs or Exposure/mAs (Measured)	This is the calculated "exposure/mAs" value.

8.7.4 HVL

The HVL analysis is used to evaluate the half value layer based on a number of exposures where filtration is added in steps to decrease the exposure (or exposure rate) to 50% or less. The HVL analysis can be used with exposure or exposure rate measurements. You can read the topic Add analysis to see how you add the analysis to a test.

If you want to modify the standard analysis, see topic Modify analysis and Advanced analysis for more information.

⊟ **Typical HVL test**

Set mAs (mAs)	Set kV (kV)
2,5	80

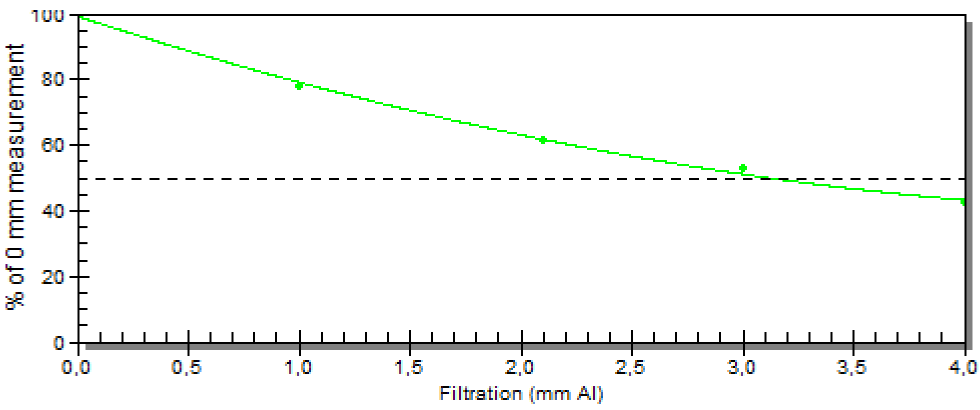
View / Select	#	Set Added filtr. (mm Al)	Exposure (mGy)
	1	0,0	0,3006
	2	1,0	0,2341
	3	2,1	0,1847
	4	3,0	0,1588
	5	4,0	0,1276

Half Value Layer

Result: Pass

HVL is 3,190 mm Al
HVL limit: minimum 2,300 mm Al

Estimated total filtration: 3,219 mm Al

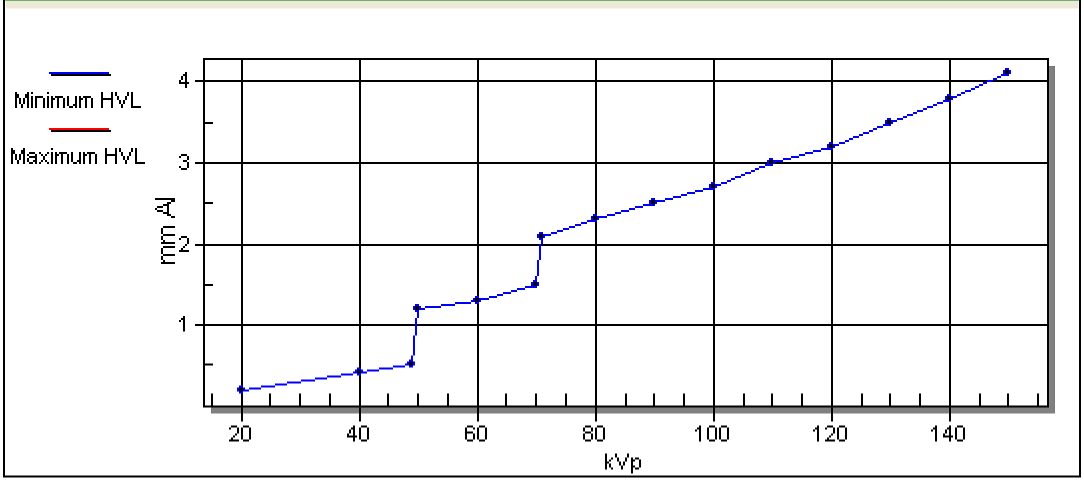


Default pass/fail criteria

When you add the HVL analysis the following pass/fail criteria is shown:

Select a different HVL limit: Mam/Rad/Fluoro

kV	Min HVL (mm Al)	Max HVL (mm Al) blank=no limit
20	0,200	
40	0,400	
49	0,500	
50	1,20	
60	1,30	
70	1,50	
71	2,10	



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There are a number of pre-defined HVL pass/fail criteria to chose from:

ACR/CAR Mammo Mo/Mo
ACR/CAR Mammo Mo/Rh
ACR/CAR Mammo Rh/Rh
ACR/CAR Mammo W/Rh
FDA (mfg. before June 10 2006)
FDA (mfg. on/after June 10, 2006)
FDA Dental (mfg. after Dec. 1, 1980)
FDA Dental (mfg. on/before Dec. 1, 1980)
Mam/Rad/Fluoro
Mammo Mo/Mo
Mammo Mo/Rh
Mammo Rh/Rh
Mammo W/Rh
None

You can also select "None" and create your own pass/fail criteria. If no pass/fail criteria is specified, the HVL analysis always pass.

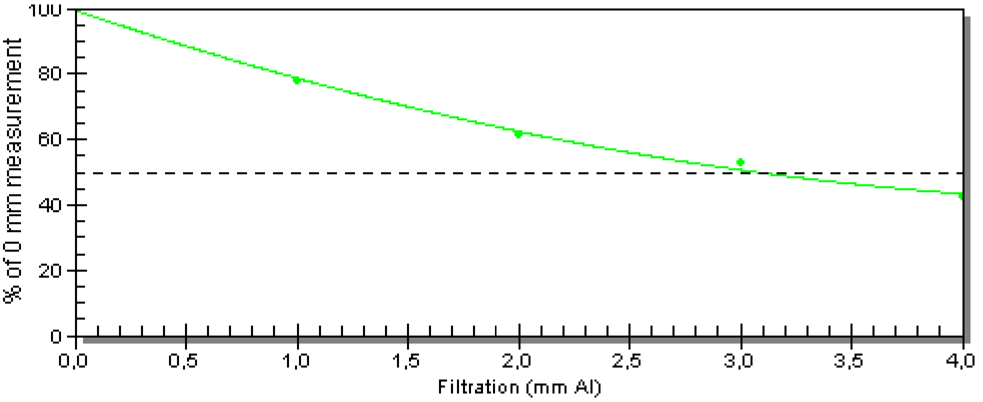
Default result

Half Value Layer

Result: Pass

HVL is 3,190 mm Al
HVL limit: minimum 2,300 mm Al

Estimated total filtration: 3,219 mm Al



Result layout and macros

As described in the topic Advanced analysis, it is possible to modify the the layout of the analysis result. The layout is defined by text combined with "macros". When the analysis result is shown, the macros are replaced with the appropriate calculated values, set values and measured values. The default layout of text HVL analysis looks like this:

$Title

Result: $Result

HVL is $CalcHVL mm Al
HVL limit: minimum $MinHVL mm Al

Estimated total filtration: $EstimTF mm Al

$Graph

This text can be modified and more macros can be used to show more calculated results, for example the relative difference. The following macros are available for the HVL analysis:

$Title (Specified title)
$TestResult (Pass or fail text, the overall result for the test)
$Result (Analysis result)
$CalcHVL (Calculated HVL)
$EstimTF (Estimated TF)
$Graph (Graphical representation of the result)
$LimitGraph (Graphical presentation of the limits)
$MaxHVL (High limit for HVL)
$MinHVL (Low limit for HVL)
$SetkVpForHVL (Set kVp for HVL measurement)
$MeaskVpForHVL (Meas. kVp for HVL measurement)
$Unit (The current unit)

Calculations

- The HVL is calculated with the 2-point method:

$$HVL = \left(T_b \cdot \ln\left(\frac{2 \cdot E_a}{E_0}\right) - T_a \cdot \ln\left(\frac{2 \cdot E_b}{E_0}\right)\right) \Big/ \ln\left(\frac{E_a}{E_b}\right)$$

HVL is set to $CalcHVL

where
ln = natural logarithm
Eo = Direct exposure reading without added filtration = 0 mm
Ea = Exposure reading above 50 %
Eb = Exposure reading below 50 %
Ta = Added filtration used when Ea measurement was made
Tb = Added filtration used when Eb measurement was made

Required columns (or general settings)

The following columns are required for the mA linearity analysis:

Parameter	Description
Added filtr. (Set value)	This column is required to calculate the half value layer.
Exposure (Measured) or Exposure rate (Measured)	The measured exposure value (or exposure rate) is required fro the calculation of half value layer. You can use the measured exposure or the normalized (normalized to a certain distance).
Ratio (Calculated) or Ratio [rate] (Calculated)	This column shows how much the exposure (or exposure rate) has decreased compared to added filtration = 0 mm Al. This column is optional.
Set kV (Set value)	Tube voltage used for the half value layer measurement.

8.7.5 QuickHVL

The HVL analysis is used to compare the direct measured HVL with the pass/fail criteria. This analysis is evaluating only **one exposure**. You can read the topic Add analysis to see how you add the analysis to a test.

If you want to modify the standard analysis, see topic Modify analysis and Advanced analysis for more information.

Typical QuickHVL test

Set mAs (mAs)	SDD (cm)	Set time (ms)
5	70	100

View / Select	#	Set kV (kV)	Tube voltage (kV)	kVp diff %	Exposure (mGy)	Exposure time (ms)	HVL (mm Al)
	1	50	49,69	-0,6	0,2070	100,8	
	2	55	55,13	0,2	0,2678	112,9	
	3	60	60,62	1,0	0,3330	98,27	
	4	65	64,33	-1,0	0,3776	98,27	
	5	70	69,77	-0,3	0,4390	98,77	
	6	75	75,42	0,6	0,5179	99,27	
	7	80	80,88	1,1	0,5885	98,77	3,23
	8	85	84,61	-0,5	0,6444	99,28	
	9	90	90,37	0,4	0,7168	98,77	
	10	95	95,83	0,9	0,8055	98,77	
	11	100	100,89	0,9	0,8833	98,78	
	12	105	104,37	-0,6	0,9383	98,77	
	13	110	109,57	-0,4	1,022	98,78	
	14	115	115,14	0,1	1,115	98,78	
	15	120	120,43	0,4	1,195	98,77	

(the QuickHVL analysis is only using row #7 in this case)

Half Value Layer

Result:

HVL is 3,23 mm Al at 80 kV
HVL limit: minimum 2,30 mm Al

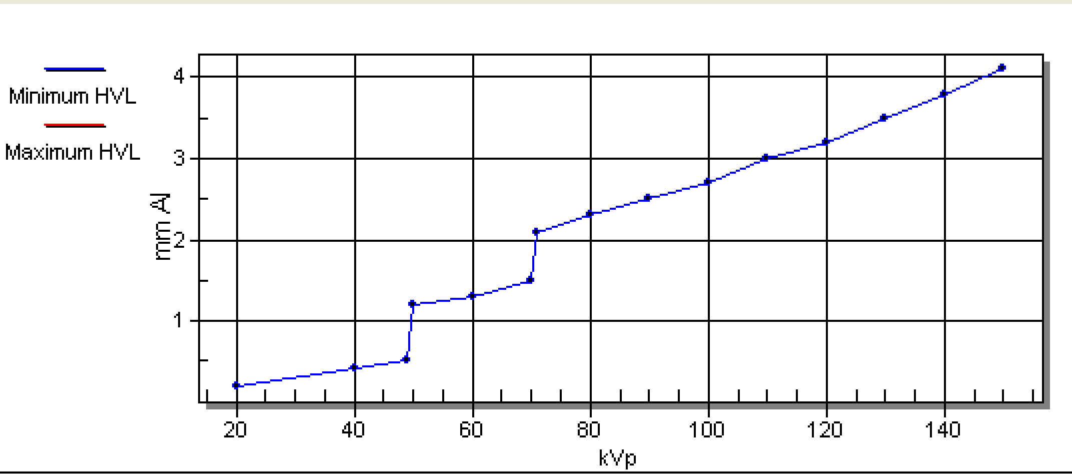
Total filtration: --- mm Al

Default pass/fail criteria

When you add the QuickHVL analysis the following pass/fail criteria is shown:

Select a different HVL limit: Mam/Rad/Fluoro

kV	Min HVL (mm Al)	Max HVL (mm Al) blank=no limit
20	0,200	
40	0,400	
49	0,500	
50	1,20	
60	1,30	
70	1,50	
71	2,10	



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There are a number of pre-defined HVL pass/fail criteria to chose from:

ACR/CAR Mammo Mo/Mo
ACR/CAR Mammo Mo/Rh
ACR/CAR Mammo Rh/Rh
ACR/CAR Mammo W/Rh
FDA (mfg. before June 10 2006)
FDA (mfg. on/after June 10, 2006)
FDA Dental (mfg. after Dec. 1, 1980)
FDA Dental (mfg. on/before Dec. 1, 1980)
Mam/Rad/Fluoro
Mammo Mo/Mo
Mammo Mo/Rh
Mammo Rh/Rh
Mammo W/Rh
None

You can also select "None" and create your own pass/fail criteria.

Default result

Half Value Layer

Result: Pass

HVL is 3,10 mm Al
HVL limit: minimum 2,30 mm Al

Total filtration: 3,2 mm Al

Result layout and macros

As described in the topic Advanced analysis, it is possible to modify the the layout of the analysis result. The layout is defined by text combined with "macros". When the analysis result is shown, the macros are replaced with the appropriate calculated values, set values and measured values. The default layout of text QuickHVL analysis looks like this:

```
$Title

Result: $TestResult

HVL is $MeasHVL mm Al
HVL limit:  minimum $MinHVL mm Al

Total filtration:  $MeasTF mm Al
```

This text can be modified and more macros can be used to show more calculated results, for example the relative difference. The following macros are available for the Reproducibility analysis:

$Title (Specified title)
$TestResult (Pass or fail text, the overall result for the test)
$Result (Analysis result)
$LimitGraph (Graphical presentation of the limits)
$MaxHVL (High limit for HVL)
$MinHVL (Low limit for HVL)
$SetkVpForHVL (Set kVp for HVL measurement)
$MeaskVpForHVL (Meas. kVp for HVL measurement)
$MeasHVL (Measured HVL value)
$MeasTF (Measured total filtration)
$RowNo (Row number that is evaluated)
$Unit (The current unit)

Calculations

- The HVL is measured directly and available from the meter:

$MeasHVL = HVL (Measured)

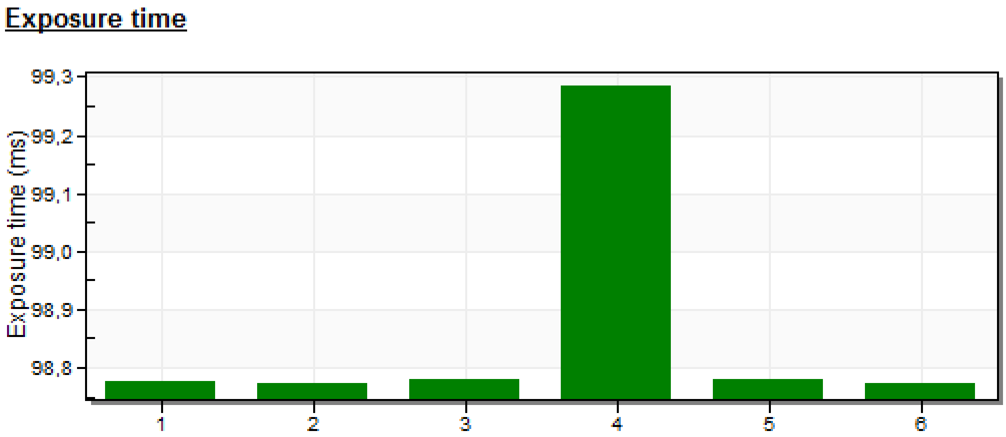
Required columns (or general settings)

The following columns are required for the mA linearity analysis:

Parameter	Description
HVL (Measured)	This column is required.
Total filtr. (Measured)	This column is optional but required if you want the total filtration value presented.

8.7.6 Graph (one column)

This analysis is used to show a graph in the report. It shows the values from one column, for example:



You can also choose between linear and log scale for the y-axis. It also includes an optional Min/Max analysis.

The following macros are available if you want to expand the graph with optional text:

$Title (Specified title)
$Result (Analysis result)
$TestResult (Pass or fail text, the overall result for the test)
$Graph (Graphical representation of the results)
$TargetFilter (Calibration for first exposure used in analysis)
$MinValue (Y axis minimum value)
$MaxValue (Y axis maximum value)
$MinLimit (Y axis minimum limit)
$MaxLimit (Y axis maximum limit)
$YAxisUnit (Y axis unit)

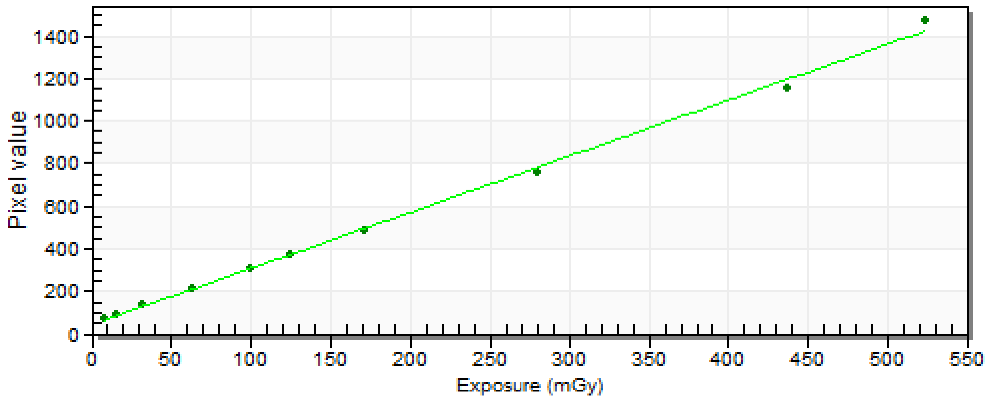
Any column can be used in the Graph.

8.7.7 Graph (one column against another)

This analysis is used to show a graph in the report when you want to plot two different columns against each other. You can in this analysis fit a line to your data points. You can use a straight line up to a 6-degree polynom. You can get the line equation, Correlation Coefficient and Coefficient of Determination. It also includes an Min/Max analysis. You can also choose between linear and log scale separately for the x- and y-axis, respectively.

Here is an example where this analysis has been used to evaluate the detector linearity. Pixel values are plotted against exposure readings. Manufacturer states that the correlations coefficient must be larger than 0.99:

Detector linearity



Test: Pass

The correlation coefficient is 0,9989 (Limit is 0.99)

The following macros are available if you want to expand the graph with optional text:

$Title (Specified title)
$Result (Analysis result)
$TestResult (Pass or fail text, the overall result for the test)
$Graph (Graphical representation of the results)
$TargetFilter (Calibration for first exposure used in analysis)
$MinValue (Y axis minimum value)
$MaxValue (Y axis maximum value)
$MinLimit (Y axis minimum limit)
$MaxLimit (Y axis maximum limit)
$YAxisUnit (Y axis unit)
$XAxisUnit (X axis unit)
$BestFitFormula (Best-fit line formula)
$LimitMinCorrelationCoeff (Min. correlation coefficent)
$LimitMaxCorrelationCoeff (Max. correlation coefficent)
$LimitMinCoeffOfDeterm (Min. coefficient of determination)
$CorrelationCoeff (Correlation coefficent (r))
$CoeffOfDeterm (Coefficient of determination (r^2))
$C0 (Best-fit line polynomial coefficient C0)
$C1 (Best-fit line polynomial coefficient C1)
$C2 (Best-fit line polynomial coefficient C2)
$C3 (Best-fit line polynomial coefficient C3)
$C4 (Best-fit line polynomial coefficient C4)
$C5 (Best-fit line polynomial coefficient C5)

Any columns can be used in the Graph analysis.

8.7.8 CTDI

The CTDI analysis is used to evaluate the CT dose index on computed tomography systems. It uses 5 exposures (with a dose-length calibrated detector, normally a pencil ion chamber) where a 5-hole phantom is used. You can read the topic Add analysis to see how you add the analysis to a test.

If you want to modify the standard analysis, see topic Modify analysis and Advanced analysis for more information.

Typical CTDI test

View / Select	#	Set kV (kV)	CT phantom position	CT exposure (mGycm)	Slice Thickness (cm)	Number of slices	Set mAs (mAs)	Pitch (mm/rot)	CTDI (mGy)
	1	80,0	A (center)	0,1346	1,00	0,5	250,0	0,3	0,2692
	2		B (12 o'clock)	0,1396					0,2792
	3		C (3 o'clock)	0,1392					0,2784
	4		D (6 o'clock)	0,1382					0,2764
	5		E (9 o'clock)	0,1392					0,2784
	6	120,0	A (center)	0,3560	2,00	0,5	200,0	0,5	0,3560
	7		B (12 o'clock)	0,3602					0,3602
	8		C (3 o'clock)	0,3607					0,3607
	9		D (6 o'clock)	0,3600					0,3600
	10		E (9 o'clock)	0,3596					0,3596

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CTDI at 80 kV

Result: Pass

Weighted CTDI: CTDI(100 w) is 0,2751 mGy

CTDI at 120 kV

Result: Pass

Weighted CTDI: CTDI(100 w) is 0,3588 mGy

Default pass/fail criteria

When you add the CTDI analysis the following pass/fail criteria is shown:

	Min	Max	
☑ Min and max limit for CTDI(100,w):			mGy

No default limits are specified, you must fill out limit. If you leave a limit blank not test for that criteria is done.

When you modify an CTDI analysis, all pass/fail criteria are available:

	Min	Max	
☑ Use limit for CTDI(100,w)		7,000	Gy
☐ Use limit for CTDI(100,w,n)			Gy/mAs
☐ Use limit for CTDI(100,vol)			Gy
☐ Use limit for DLP			Gycm

You must modify the layout to see the results of the additional parameters.

Default result

CTDI

Result: Pass

Weighted CTDI at 100,0 kV is CTDI(100,w) = 5,734 mGy (Limit: max 7,000 mGy)

Result layout and macros

As described in the topic Advanced analysis, it is possible to modify the the layout of the analysis result. The layout is defined by text combined with "macros". When the analysis result is shown, the macros are replaced with the appropriate calculated values, set values and measured values. The default layout of text CTDI analysis looks like this:

$Title

Result: $TestResult

Weighted CTDI at $SetkVForCTDI kV is CTDI(100,w) = $CTDIw $Unitw (Limit: max $MaxCTDIw $Unitw)

This text can be modified and more macros can be used to show more calculated results, for example the relative difference. The following macros are available for the CTDI analysis:

$Title (Specified title)

$Result (Analysis result)

$TestResult (Pass or fail text, the overall result for the test)

$TargetFilter (Calibration for first exposure used in analysis)

$SetkVForCTDI (Set kV at which CTDI was evaluated (if a column, take value for Pos A))

$SetNumOfSlices (Set value for number of slices)

$SetSliceThickness (Set value for slice thickness)

$SetPitch (Set pitch)

$MinCTDIwn (Minimum value)

$MaxCTDIwn (Maximum value)

$MinCTDIw (Minimum value)

$MaxCTDIw (Maximum value)

$CTDIwn (Measured value CTDI normalized)

$Unitwn (Unit for CTDI normalized)

$CTDIw (Measured value CTDI weighted)

$Unitw (Unit for CTDI weighted)

$MinCTDIvol (Minimum value)

$MaxCTDIvol (Maximum value)

$CTDIvol (Measured value CTDI volume)

$Unitvol (Unit for CTDI volume)

$DLP (Measured value for DLP)

$UnitDLP (Unit for DLP)

$MinDLP (Minimum value)

$MaxDLP (Maximum value)

$SetmAs (Set mAs)

$CTDI100c (CTDI(100, c))

$CTDI100p (CTDI(100, p))

Calculations

The analysis includes all rows that are selected in the calculation. It is assumed that all included are exposed using the same kV set value.

- If more than one exposure is performed for a specific phantom position, the analysis automatically calculates the average of the exposures and uses that to calculate the CTDI for that position.
- If not all peripheral phantom positions are measured the analysis automatically uses the average of the measured positions for the positions not measured. To calculate the weighted CTDI, must the center position and one peripheral position be measured.

CTDI for an individual position is calculated as:

CTDI(100,A(or B C D E)) = Avg[CT Exposure(Measured)] / (Num of Slices × Slice Thickness)

where

The central CTDI is calculated as:

CTDI(100,c) = CTDI(100,A)

The peripheral CTDI is calculated as:

CTDI(100,p) = [CTDI(100,B) + CTDI(100,C) + CTDI(100,D) + CTDI(100,E)] / 4

The weighted CTDI, CTDI(100,w), is calculated as:

$CTDIw = 1/3 * CTDI(100,c) + 2/3 * CTDI(100,p)

The normalized CTDI, CTDI(100,w,n) is calculated as:

$CTDIwn = $CTDIwn / Set mAs

The volume CTDI, CTDI(100,vol), for a helical (spiral) scanning is calculated as:

$CTDIvol = CTDI(100,w) / Pitch

where the Pitch is the table movement per gantry rotation.

The dose-length product, DLP, is calculated as:

$DLP = CTDIvol / Scan length

where the Pitch is the table movement per gantry rotation.

For more information on CTDI read the report "Radiation Exposure in Computed Tomography" from COCIR, European Coordination Committee of the Radiological and Electromedical Industries (e-mail: cocir@zvei.org)

Required columns (or general settings)

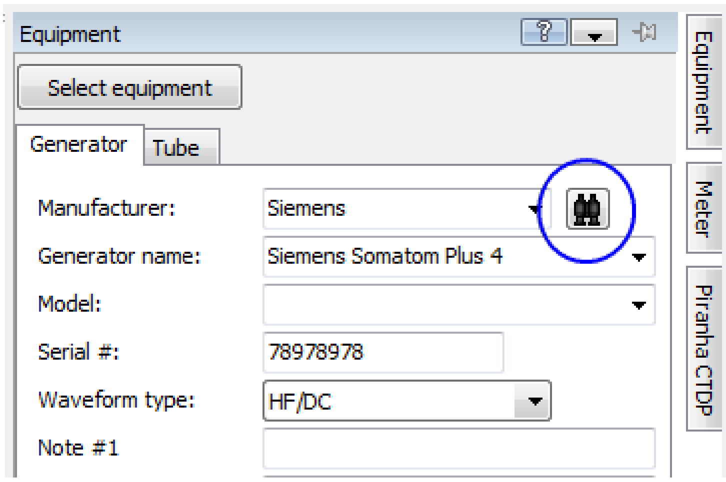
The following columns are required for the CTDI analysis:

Parameter	Description
CT Exposure(Measured)	The measured CT dose is used to calculate the CT dose index.
CT phantom position (Set value)	This specifies where the CT chamber is positioned in the phantom. This column is required.
Slice Thickness (Set value)	This column specifies the slice thickness. This column is required.
Number of slices (Set value)	This column specifies the number of slices used. This value is required.
Set mAs (Set value)	This column is required to calculate the normalized CTDI, CTDI(100,n).
Scan length(Set value)	This column is required to calculate DLP.

8.7.9 CTDI(helical scan/in phantom)

The CTDI(helical scan/in phantom) analysis is used to evaluate the CT dose index on computed tomography systems using the RTI CT Dose Profiler detector. It uses one exposure in the center hole of a 5-hole phantom and calculates the CTDIw, CTDIvol and DLP. You can read the topic Add analysis to see how you add the analysis to a test. The separate documentation "CT Dose Profiler User' Manual" (comes with the CT Dose Profiler detector) describes the probe and the theory. Since a measurement is only done in the center hole of the phantom, a know relationship between the measured CTDI in the center hole and the peripheral holes is used. This relationship is unique for each CT scanner and is in Ocean defined as the k-factor. A list with the k-factors Ocean uses is available in the topic k-factors. This analysis picks the correct k-factor depending on the CT scanner name you specify. Use the binocular and pick a scanner from the list. The list will show different CT scanners for the specified manufacturer. Next to each model name, the kV values supported are listed.

If you want to use an axial scan, the RTI Mover is required. This is a device that makes it possible to move the CT Dose Profiler through the beam to measure the dose profile. The Mover and how to use it with Ocean is described in a separate manual, RTI Mover User's Manual.



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If you want to modify the standard analysis, see topic Modify analysis and Advanced analysis for more information.

Typical CTDI(helical scan/in phantom) test

This example shows two measurements, each with its own analysis. One is a measurement in a head phantom and the other is in a body phantom.

View / Select	#	Set kV (kV)	CT phantom type	Collimation (mm)	Pitch	Scan length (mm)	Tube rotation time (s)	Scan speed (mm/s)	Measuring time (s)	Exposure (mGy)
	1	80	Head	12	1,000	171	1,00	12,00	16	30,04
	2	120	Head	12	1,000	171	1,00	12,00	16	
	3	100	Body	12	1,000	171	1,00	12,00	16	

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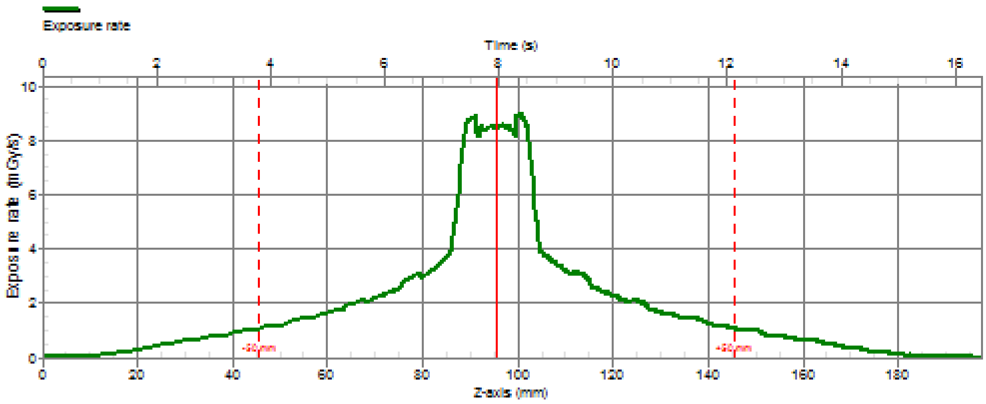
Note that you should use TIMED MODE for this measurement.

CTDI #1 (spiral scan/in phantom)

Result: Pass

Set kV	80 kV
CTDI(100,c)	26,52 mGy
CTDI(w)	30,28 mGy
CTDIvol	30,28 mGy
DLP	517,8 mGycm



Click to compress

Default pass/fail criteria

When you add the CTDI(helical scan/in phantom) analysis the following pass/fail criteria is shown:

	Min	Max	
☑ Use CTDI(100,w) limit			mGy

No default limits are specified, you must fill out limit. If you leave a limit blank not test for that criteria is done.

When you modify an CTDI(helical scan/in phantom) analysis, all pass/fail criteria are available:

	Min	Max	
☐ Use CTDI(100,w) limit			mGy
☐ Use CTDI(100,w,n) limit			mGy/mAs
☐ Use CTDI(100,vol) limit			mGy
☐ Use DLP limit			mGycm

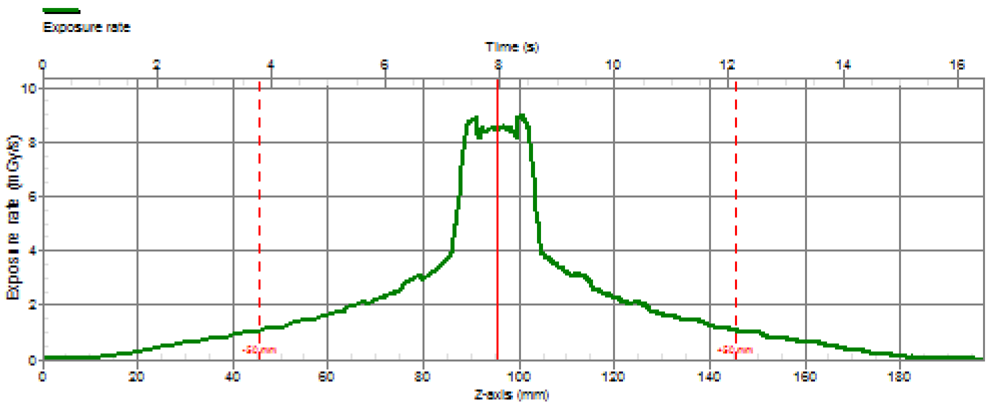
You must modify the layout to see the results of the additional parameters.

Default result

CTDI #1 (spiral scan/in phantom)

Result: Pass

Set kV	80 kV
CTDI(100,c)	26,52 mGy
CTDI(w)	30,28 mGy
CTDIvol	30,28 mGy
DLP	517,8 mGycm



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Result layout and macros

As described in the topic Advanced analysis, it is possible to modify the the layout of the analysis result. The layout is defined by text combined with "macros". When the analysis result is shown, the macros are replaced with the appropriate calculated values, set values and measured values. The default layout of text for the CTDI(helical scan/in phantom) analysis looks like this:

$Title

Result: $TestResult

Set kV	$SetkV kV
CTDI(100,c)	$CTDIc $Unitw
CTDI(w)	$CTDIw $Unitw
CTDIvol	$CTDIvol $Unitvol
DLP	$DLP $UnitDLP

$DoseProfileGraph

This text can be modified and more macros can be used to show more calculated results, for example the relative difference. The following macros are available for the CTDI(helical scan/in phantom) analysis:

$RowNo (Row number used for the analysis)

$Title (Specified title)

$Result (Analysis result)

$TestResult (Pass or fail text, the overall result for the test)

$TargetFilter (Calibration)

$SetkV (Set kVp)

$SetmAs (Set mAs)

$SetPitch (Set pitch)

$SetScanTime (Set value for the scan time (s))

$SetTubeRotTime (Set tube rotation time (s))

$SetCollimationNT (Set value for the collimation)

$SetPhantomType (Set value for phantom type)

$ScanSpeed (Calculated scan speed = Set Pitch * Collimation(NT) / Set Tube Rot Time)

$DoseProfileGraph (The CT dose profile graph)

$BeamWidthFWHM (Beam width from waveform)

$CTDIc (Measured CTDI(100,c) (center position) from waveform)

$CTDIwn (Measured value CTDI normalized)

$Unitwn (Unit for CTDI normalized)

$MinCTDIwn (Minimum value)

$MaxCTDIwn (Maximum value)

$CTDIw (Measured value CTDI weighted)

$Unitw (Unit for CTDI weighted)

$MinCTDIw (Minimum value)

$MaxCTDIw (Maximum value)

$CTDIvol (Measured value CTDI volume)

$Unitvol (Unit for CTDI volume)

$MinCTDIvol (Minimum value)

$MaxCTDIvol (Maximum value)

$DLP (Measured value for Dose Length Product)

$UnitDLP (Unit for Dose Length Product)

$MinDLP (Minimum value)

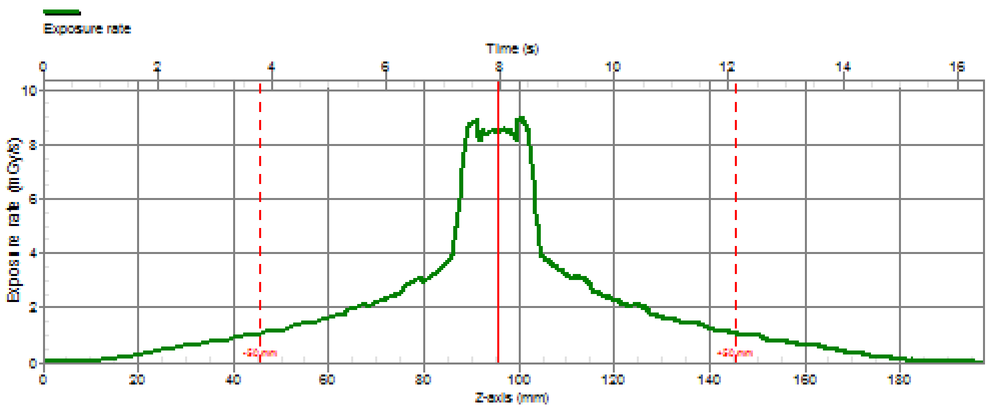
$MaxDLP (Maximum value)

$kFactor (Used k-factor (if blank, automatically selected by the analysis))

Calculations

The CTDI(100,c) is calculated in the following way:

All calculations are done from the dose profile waveform.



Click to compress

The waveform is an array of samples where the Z-axis (see graph above) represents the position of the sensor and the y-axis represents the exposure rate. The waveform includes a maximum of 1024 samples.

Ocean finds key locations in the waveform in the following way:

1. Find the maximum dose rate that occurred during the scan.
2. Search backward from this point to find where the dose profile goes below 50% of the maximum value and call this position X1 (not shown on graph).
3. Search forward from the point found in step 1 to find where the dose profile goes below 50% of the maximum value and call this position X2 (not shown on graph).
4. Calculate the position halfway between X1 and X2. Call this point X3 (shown as a solid red line in graph above).
5. Calculate "X3-50 mm" and "X3+50 mm" and call these positions X4 and X5, respectively. They are marked with red dotted lines in the graph above and labeled with the text "-50 mm" and "+50 mm", respectively.

If the points X1 and X2 can't be found automatically the analysis will show a calculation error. In this case, in the waveform graph (not the analysis graph), use the mouse pointer and grab the center pointer. You can now move it. Position it manually in the center of the dose profile. Two new indicators, for FWHM, become visible. Move these and position in a position where the dose rate is half of the maximum dose rate.Now are all parameters in the analysis calculated based on the manual positions you have done. If you want to go back to automatic calculation; right-click on the waveform graph and check "Auto-position center indicator".

If the RTI Mover is used (axial scan), an internal Pitch is calculated as:

(Mover Speed * Rotation time) / Collimation

The central CTDI, CTDI(100,c) is calculated as:

$CTDIc = "Integrated dose between X4 and X5" * Pitch

Pitch must be specified in the grid.

The weighted CTDI, CTDI(100,w), is calculated as:

$CTDIw = $CTDIc * $kFactor

The k-factor is from the table in the Appendix. The k-factor is found based on kVp, phantom type and CT scanner name. If you want to specify your own k-factor add the "k-factor" column.

The volume CTDI, CTDI(100,vol) for a helical scan is calculated as:

$CTDIvol = $CTDIw / Pitch

The dose-length product, DLP, is calculated as:

$DLP = $CTDIvol * Scan length

Recommended columns (or general settings)

The following columns are recommended for the CTDI(helical scan/in phantom) analysis.

Parameter	Description
Exposure(Measured)	The measured dose from the CT Dose Profiler detector.
Set kV	The set value for kV
CT Phantom type (Set value)	The phantom type, specifies head or body for this analysis
CT phantom position (Set value)	This specifies where the CT chamber is positioned in the phantom. (*not required, center ole is assumed if not specified*)
Collimation (Set value)	This column specifies the collimation.
Pitch (Set value)	This column specifies the pitch. *(not required if the RTI Mover is used)*
Scan length (Set value)	This specifies the length of the scan.
Scan speed (Set value)	This specifies the scan speed *(not required if the RTI Mover is used)*
selection	This is the measuring time for TIMED MODE. This is a meter setting (a value used by the meter).
Tube rotation time (Set value)	This is the tube rotation time.

8.7.9.1 k-factors

The table below shows the k-factors Ocean Next uses. There is one factor for head and body, respectively. The k-factors are based on data from impactctscan.org and from measurements.

Manufacturer	Model	Modalities	kVp	Head	Body
Canon	Aquilion One / Genesis Edition	CT	80	1,07	1,64
Canon	Aquilion One / Genesis Edition	CT	100	1,05	1,52
Canon	Aquilion One / Genesis Edition	CT	120	1,04	1,48
Canon	Aquilion One / Genesis Edition	CT	135	1,04	1,46
Canon	Aquilion Lightning (SP)	CT	80	1,09	1,82
Canon	Aquilion Lightning (SP)	CT	100	1,07	1,72
Canon	Aquilion Lightning (SP)	CT	120	1,07	1,62
Canon	Aquilion Lightning (SP)	CT	135	1,07	1,57
Canon	Aquilion Multi/4	CT	80	1,117	2,072
Canon	Aquilion Multi/4	CT	100	1,079	1,846
Canon	Aquilion Multi/4	CT	120	1,057	1,728
Canon	Aquilion Multi/4	CT	135	1,034	1,672
Canon	Aquilion 16	CT	80	1,147	2,206
Canon	Aquilion 16	CT	100	1,07	1,959
Canon	Aquilion 16	CT	120	1,056	1,779
Canon	Aquilion 16	CT	135	1,051	1,728
Canon	Generic scanner	CT	80	1,14	2,14
Canon	Generic scanner	CT	100	1,09	1,97
Canon	Generic scanner	CT	120	1,03	1,58
Canon	Generic scanner	CT	130	1,02	1,47
Canon	Generic scanner	CT	135	1,02	1,45
Elscint	Exel 2400 Elect	CT	120	1,069	1,527

Elscint	Exel 2400 Elect	CT	140		1,43
Elscint	CT Twin	CT	120	1,047	1,466
Elscint	Helicat	CT	120	1,047	1,466
Elscint	Generic scanner	CT	120	1,05	1,49
Elscint	Generic scanner	CT	140	1,03	1,43
FujiFilm	Scenaria View (Normal Bow-tie)	CT	80	1,103	1,948
FujiFilm	Scenaria View (Normal Bow-tie)	CT	100	1,072	1,792
FujiFilm	Scenaria View (Normal Bow-tie)	CT	120	1,058	1,718
FujiFilm	Scenaria View (Normal Bow-tie)	CT	140	1,05	1,671
FujiFilm	Scenaria View (Small Bow-tie)	CT	80	1,038	1,676
FujiFilm	Scenaria View (Small Bow-tie)	CT	100	1,02	1,56
FujiFilm	Scenaria View (Small Bow-tie)	CT	120	1,012	1,494
FujiFilm	Scenaria View (Small Bow-tie)	CT	140	1,009	1,471
GE	8800/9000 Series	CT	120	0,962	1,68
GE	9800 Series	CT	120	1,038	1,585
GE	9800 Series	CT	140	1,02	1,503
GE	CT Max	CT	120	0,961	1,505
GE	Discovery 670 (SPECT-CT)	CT	80	1,065	1,985
GE	Discovery 670 (SPECT-CT)	CT	100	1,035	1,765
GE	Discovery 670 (SPECT-CT)	CT	120	1,015	1,66
GE	Discovery 670 (SPECT-CT)	CT	140	1,005	1,595
GE	Discovery 690 (PET-CT)	CT	80	1	1,93
GE	Discovery 690 (PET-CT)	CT	100	1,09	1,7
GE	Discovery 690 (PET-CT)	CT	120	1,07	1,59
GE	Discovery 690 (PET-CT)	CT	140	1,05	1,53
GE	Discovery CT750	CT	80	0,965	2,1
GE	Discovery CT750	CT	100	1,111	1,85
GE	Discovery CT750	CT	120	1,09	1,73
GE	Discovery CT750	CT	140	1,084	1,67
GE	Discovery CT750 (small, bd)	CT	120		1,56
GE	FX/i	CT	80	1,145	2,213
GE	FX/i	CT	120	1,058	1,692
GE	FX/i	CT	140	1,037	1,605
GE	HiLight	CT	80	1,047	1,6
GE	HiLight	CT	100	1,008	1,636
GE	HiLight	CT	120	1,03	1,605
GE	HiLight	CT	140	1,015	1,571
GE	HiSpeed CT/i no SmartBeam	CT	80	1,047	1,6
GE	HiSpeed CT/i no SmartBeam	CT	100	1,008	1,636
GE	HiSpeed CT/i no SmartBeam	CT	120	1,03	1,605
GE	HiSpeed CT/i no SmartBeam	CT	140	1,015	1,571
GE	HiSpeed CT/i with SmartBeam	CT	80	1,047	2,093
GE	HiSpeed CT/i with SmartBeam	CT	100	1,008	1,827
GE	HiSpeed CT/i with SmartBeam	CT	120	1,03	1,607
GE	HiSpeed CT/i with SmartBeam	CT	140	1,015	1,568
GE	HiSpeed NX/i	CT	80	1,027	1,81

GE	HiSpeed NX/i	CT	120	0,993	1,5
GE	HiSpeed NX/i	CT	140	0,968	1,48
GE	HiSpeed ZX/i	CT	80	1,027	1,81
GE	HiSpeed ZX/i	CT	120	0,993	1,5
GE	HiSpeed ZX/i	CT	140	0,968	1,48
GE	LightSpeed	CT	80	1,032	1,927
GE	LightSpeed	CT	100	0,999	1,73
GE	LightSpeed	CT	120	0,987	1,633
GE	LightSpeed	CT	140	0,977	1,57
GE	LightSpeed 16;Optima 520;Revolution GSI	CT	80	1,046	1,819
GE	LightSpeed 16;Optima 520;Revolution GSI	CT	100	1,01	1,627
GE	LightSpeed 16;Optima 520;Revolution GSI	CT	120	0,993	1,611
GE	LightSpeed 16;Optima 520;Revolution GSI	CT	140	0,984	1,483
GE	LightSpeed Plus	CT	80	1,032	1,927
GE	LightSpeed Plus	CT	100	0,999	1,73
GE	LightSpeed Plus	CT	120	0,987	1,633
GE	LightSpeed Plus	CT	140	0,977	1,57
GE	LightSpeed Pro 16;Optima 540	CT	80	1,057	1,996
GE	LightSpeed Pro 16;Optima 540	CT	100	1,013	1,771
GE	LightSpeed Pro 16;Optima 540	CT	120	0,994	1,652
GE	LightSpeed Pro 16;Optima 540	CT	140	0,983	1,577
GE	LightSpeed RT;Optima 580	CT	80	1,093	2,14
GE	LightSpeed RT;Optima 580	CT	100	1,052	1,897
GE	LightSpeed RT;Optima 580	CT	120	1,028	1,77
GE	LightSpeed RT;Optima 580	CT	140	1,015	1,694
GE	LightSpeed Ultra	CT	80	1,042	2,009
GE	LightSpeed Ultra	CT	100	1,009	1,787
GE	LightSpeed Ultra	CT	120	0,994	1,656
GE	LightSpeed Ultra	CT	140	0,985	1,614
GE	LightSpeed VCT	CT	80	1,136	2,046
GE	LightSpeed VCT	CT	100	1,088	1,778
GE	LightSpeed VCT	CT	120	1,066	1,648
GE	LightSpeed VCT	CT	140	1,048	1,566
GE	LightSpeed VCT (small hd, large bd)	CT	80	1,061	2,041
GE	LightSpeed VCT (small hd, large bd)	CT	100	1,022	1,802
GE	LightSpeed VCT (small hd, large bd)	CT	120	1,004	1,684
GE	LightSpeed VCT (small hd, large bd)	CT	140	0,993	1,614
GE	LX/i	CT	80	1,145	2,213
GE	LX/i	CT	120	1,058	1,692
GE	LX/i	CT	140	1,037	1,605
GE	Optima 660;Revolution EVO;Revolution Apex;Revolution Ascend	CT	80	1,037	1,958
GE	Optima 660;Revolution EVO;Revolution Apex;Revolution Ascend	CT	100	1,006	1,764
GE	Optima 660;Revolution EVO;Revolution Apex;Revolution Ascend	CT	120	0,996	1,643
GE	Optima 660;Revolution EVO;Revolution Apex;Revolution Ascend	CT	140	0,996	1,58

GE	Pace	CT	80	1,162	2,164
GE	Pace	CT	120	1,053	1,734
GE	Pace	CT	135	1,041	1,627
GE	Pace	CT	140	1,061	1,636
GE	Prospeed	CT	120	1,052	1,713
GE	Prospeed	CT	140	1,04	1,61
GE	QX/i	CT	80	1,032	1,927
GE	QX/i	CT	100	0,999	1,73
GE	QX/i	CT	120	0,987	1,633
GE	QX/i	CT	140	0,977	1,57
GE	Revolution	CT	80	1,11	
GE	Revolution	CT	100	1,1	1,76
GE	Revolution	CT	120	1,08	1,69
GE	Revolution	CT	140	1,061	1,63
GE	Sytec	CT	80	1,162	2,164
GE	Sytec	CT	120	1,053	1,734
GE	Sytec	CT	135	1,041	1,627
GE	Sytec	CT	140	1,061	1,636
GE	Generic scanner	CT	80	1,07	1,98
GE	Generic scanner	CT	100	1,03	1,8
GE	Generic scanner	CT	120	1,02	1,75
GE	Generic scanner	CT	135	1,01	1,63
GE	Generic scanner	CT	140	1,01	1,58
Hitachi	Generic scanner	CT	80	1,01	2,018
Hitachi	Generic scanner	CT	90	1,095	1,885
Hitachi	Generic scanner	CT	100	1,066	1,888
Hitachi	Generic scanner	CT	120	1,049	1,771
Hitachi	Generic scanner	CT	130	1,045	1,763
Hitachi	Generic scanner	CT	140	1,033	1,638
Philips	Philips 310 (GE2, no Cu)	CT	120	1,089	
Philips	Philips 350 (GE2, no Cu)	CT	120	1,089	
Philips	Philips 310 (GE2, w. Cu)	CT	120	1,025	
Philips	Philips 350 (GE2, w. Cu)	CT	120	1,025	
Philips	Philips 310 (GE3, no Cu)	CT	120		1,956
Philips	Philips 350 (GE3, no Cu)	CT	120		1,956
Philips	Philips 310 (GE3, w. Cu)	CT	120		
Philips	Philips 350 (GE3, w. Cu)	CT	120		
Philips	Philips AV	CT	80	1,12	2,034
Philips	Philips AV	CT	100	1,061	1,795
Philips	Philips AV	CT	120	1,061	1,718
Philips	Philips AV	CT	130	1,066	1,739
Philips	Philips AV	CT	140	1,048	1,666
Philips	Philips LX	CT	80	1,12	2,034
Philips	Philips LX	CT	100	1,061	1,795
Philips	Philips LX	CT	120	1,061	1,718
Philips	Philips LX	CT	130	1,066	1,739

Philips	Philips LX	CT	140	1,048	1,666
Philips	Philips SR7000	CT	80	1,12	2,034
Philips	Philips SR7000	CT	100	1,061	1,795
Philips	Philips SR7000	CT	120	1,061	1,718
Philips	Philips SR7000	CT	130	1,066	1,739
Philips	Philips SR7000	CT	140	1,048	1,666
Philips	Philips CX	CT	120	1,059	1,572
Philips	Philips CX/S	CT	120	1,059	1,572
Philips	Philips SR4000	CT	120	1,053	1,724
Philips	Philips SR 5000	CT	120	1,065	1,768
Philips	Philips SR 5000	CT	130	1,052	1,886
Philips	Philips M/EG	CT	120	1,199	2,64
Philips	Philips M/EG	CT	130	1,196	2,631
Philips	Philips TX	CT	100		
Philips	Philips TX	CT	120	1,038	
Philips	Philips TX	CT	130		
Philips	Philips CT Secura	CT	120	1,06	1,688
Philips	Philips CT Secura	CT	140	1,052	1,638
Philips	Philips Mx8000	CT	90	1,096	1,888
Philips	Philips Mx8000	CT	120	1,061	1,683
Philips	Philips Mx8000	CT	140		1,653
Philips	Philips AcQSim	CT	120	1,13	2,057
Philips	Philips AcQSim	CT	130	1,114	1,983
Philips	Mx8000 IDT/Brilliance 16 (& Power)	CT	90	1,072	1,765
Philips	Mx8000 IDT/Brilliance 16 (& Power)	CT	120	1,059	1,623
Philips	Mx8000 IDT/Brilliance 16 (& Power)	CT	140	1,062	1,554
Philips	Aura	CT	120	1,114	1,667
Philips	Big Bore	CT	90	1,113	1,996
Philips	Big Bore	CT	120	1,083	1,778
Philips	Big Bore	CT	140	1,063	1,718
Philips	Brilliance 16	CT	90	1,08	1,785
Philips	Brilliance 16	CT	120	1,06	1,625
Philips	Brilliance 16	CT	140	1,05	1,56
Philips	Brilliance 64	CT	80	1,1	1,897
Philips	Brilliance 64	CT	100	1,06	1,75
Philips	Brilliance 64	CT	120	1,058	1,69
Philips	Brilliance 64	CT	140	1,05	1,57
Philips	Brilliance iCT	CT	80	1,105	1,865
Philips	Brilliance iCT	CT	100	1,1	1,74
Philips	Brilliance iCT	CT	120	1,085	1,625
Philips	Brilliance iCT	CT	140	1,06	1,585
Philips	Ingenuity	CT	80	1,095	1,875
Philips	Ingenuity	CT	100	1,07	1,72
Philips	Ingenuity	CT	120	1,055	1,63
Philips	Ingenuity	CT	140	1,05	1,565
Philips	Iqon	CT	80	1,16	2,115

Philips	Iqon	CT	100	1,12	1,865
Philips	Iqon	CT	120	1,095	1,76
Philips	Iqon	CT	140	1,085	1,745
Philips	Generic scanner	CT	80	1,12	2,03
Philips	Generic scanner	CT	90	1,09	1,88
Philips	Generic scanner	CT	100	1,07	1,8
Philips	Generic scanner	CT	120	1,07	1,8
Philips	Generic scanner	CT	130	1,06	1,75
Philips	Generic scanner	CT	140	1,05	1,65
Picker	Picker 1200SX	CT	80		3,008
Picker	Picker 1200SX	CT	120	0,95	2,087
Picker	Picker 1200SX	CT	130	1,018	2,053
Picker	Picker 1200SX	CT	140	0,895	1,938
Picker	Picker PQ Series	CT	120	0,966	1,96
Picker	Picker PQ Series	CT	130	0,95	2,053
Picker	Picker PQ Series	CT	140	0,95	1,937
Picker	Picker UltraZ	CT	80	1,076	3,328
Picker	Picker UltraZ	CT	100	1,047	2,185
Picker	Picker UltraZ	CT	120	0,977	1,955
Picker	Picker UltraZ	CT	130	0,965	1,926
Picker	Picker UltraZ	CT	140	0,96	1,868
Picker	Generic scanner	CT	80	1,08	2,5
Picker	Generic scanner	CT	100	1,05	2,19
Picker	Generic scanner	CT	120	0,96	2
Picker	Generic scanner	CT	130	0,95	2,01
Picker	Generic scanner	CT	140	0,94	1,91
Philips	Philips/Marconi Mx8000	CT	90	1,096	1,888
Marconi	Marconi Mx8000	CT	90	1,096	1,888
Marconi	Marconi Mx8000	CT	120	1,061	1,683
Marconi	Marconi Mx8000	CT	140		1,653
Marconi	Marconi AcQSim	CT	120	1,13	2,057
Marconi	Marconi AcQSim	CT	130	1,114	1,983
Marconi	Generic scanner	CT	90	1,1	1,89
Marconi	Generic scanner	CT	120	1,1	1,87
Marconi	Generic scanner	CT	130	1,11	1,7
Marconi	Generic scanner	CT	140	1,1	1,65
Shimadzu	Shimadzu SCT	CT	80	1,134	2,47
Shimadzu	Shimadzu SCT	CT	120	1,079	1,992
Shimadzu	Shimadzu SCT	CT	130	1,07	1,984
Shimadzu	Generic scanner	CT	80	1,13	2,47
Shimadzu	Generic scanner	CT	120	1,08	1,99
Shimadzu	Generic scanner	CT	130	1,07	1,98
Siemens	Naeotom Alpha	CT	70	1,05	1,84
Siemens	Naeotom Alpha	CT	80	1,02	1.69
Siemens	Naeotom Alpha	CT	90	1,01	1,59
Siemens	Naeotom Alpha	CT	100	1,01	1,58

Siemens	Naeotom Alpha	CT	110	1,01	1,53
Siemens	Naeotom Alpha	CT	120	1	1,55
Siemens	Naeotom Alpha	CT	130	1	1,5
Siemens	Naeotom Alpha	CT	140	1,01	1,5
Siemens	Siemens CR	CT	125	1,121	2,164
Siemens	Siemens CR512	CT	125	1,121	2,164
Siemens	Siemens DR1/2/3	CT	125	1,117	2,19
Siemens	Siemens DRG	CT	125		
Siemens	Siemens DRG1	CT	125		
Siemens	Siemens DRH	CT	125	1,121	2,164
Siemens	SOMATOM 2	CT	125	1,117	2,19
Siemens	SOMATOM Access	CT	80	1,201	2,135
Siemens	SOMATOM Access	CT	120	1,124	1,75
Siemens	SOMATOM Access	CT	140	1,107	1,696
Siemens	SOMATOM AR.SP	CT	110	1,076	1,817
Siemens	SOMATOM AR.SP	CT	130	1,067	1,736
Siemens	SOMATOM AR/HP	CT	130	1,036	1,565
Siemens	SOMATOM AR-C	CT	110	1,076	1,817
Siemens	SOMATOM AR-C	CT	130	1,067	1,736
Siemens	SOMATOM AR-T	CT	110	1,076	1,817
Siemens	SOMATOM AR-T	CT	130	1,067	1,736
Siemens	SOMATOM Balance	CT	110	1,085	1,806
Siemens	SOMATOM Balance	CT	130	1,074	1,729
Siemens	SOMATOM Definition AS plus	CT	70	1,086	1,79
Siemens	SOMATOM Definition AS plus	CT	80	1,067	1,67
Siemens	SOMATOM Definition AS plus	CT	100	1,04	1,56
Siemens	SOMATOM Definition AS plus	CT	120	1,035	1,52
Siemens	SOMATOM Definition AS plus	CT	140	1,03	1,47
Siemens	SOMATOM Definition AS;Biograph	CT	80	1,054	1,851
Siemens	SOMATOM Definition AS;Biograph	CT	100	1,036	1,68
Siemens	SOMATOM Definition AS;Biograph	CT	120	1,031	1,587
Siemens	SOMATOM Definition AS;Biograph	CT	140	1,027	1,525
Siemens	SOMATOM Definition Flash	CT	70	1,132	1,934
Siemens	SOMATOM Definition Flash	CT	80	1,103	1,801
Siemens	SOMATOM Definition Flash	CT	100	1,064	1,632
Siemens	SOMATOM Definition Flash	CT	120	1,052	1,573
Siemens	SOMATOM Definition Flash	CT	125	0,815	1,625
Siemens	SOMATOM Definition Flash	CT	130	0,543	1,612
Siemens	SOMATOM Definition Flash	CT	133	0,38	1,603
Siemens	SOMATOM Definition Flash	CT	137	0,163	1,593
Siemens	SOMATOM Definition Flash	CT	140	1,045	1,521
Siemens	SOMATOM Drive;SOMATOM Force	CT	70	1,05	1,84
Siemens	SOMATOM Drive;SOMATOM Force	CT	80	1,02	1.69
Siemens	SOMATOM Drive;SOMATOM Force	CT	90	1,01	1,59
Siemens	SOMATOM Drive;SOMATOM Force	CT	100	1,01	1,58
Siemens	SOMATOM Drive;SOMATOM Force	CT	110	1,01	1,53

Siemens	SOMATOM Drive;SOMATOM Force	CT	120	1	1,55
Siemens	SOMATOM Drive;SOMATOM Force	CT	130	1	1,5
Siemens	SOMATOM Drive;SOMATOM Force	CT	140	1,01	1,5
Siemens	SOMATOM DXP	CT	120	1,102	1,789
Siemens	SOMATOM DXP	CT	137	1,068	1,749
Siemens	SOMATOM Emotion	CT	110	1,085	1,806
Siemens	SOMATOM Emotion	CT	130	1,074	1,729
Siemens	SOMATOM Emotion 6	CT	80	0,821	1,751
Siemens	SOMATOM Emotion 6	CT	110	0,854	1,584
Siemens	SOMATOM Emotion 6	CT	130	1,024	1,526
Siemens	SOMATOM Emotion Duo	CT	80	1,108	1,951
Siemens	SOMATOM Emotion Duo	CT	110	1,055	1,666
Siemens	SOMATOM Emotion Duo	CT	130	1,039	1,606
Siemens	SOMATOM Go All	CT	70	1,07	1,93
Siemens	SOMATOM Go All	CT	80	1,05	1,76
Siemens	SOMATOM Go All	CT	100	1,03	1,64
Siemens	SOMATOM Go All	CT	110	1,02	1,61
Siemens	SOMATOM Go All	CT	120	1,02	1,58
Siemens	SOMATOM Go All	CT	130	1,02	1,57
Siemens	SOMATOM Go All	CT	140	1,01	1,55
Siemens	SOMATOM Hi Q	CT	133	1,079	2,027
Siemens	SOMATOM Perspective	CT	80	1,06	1,84
Siemens	SOMATOM Perspective	CT	110	1,04	1,64
Siemens	SOMATOM Perspective	CT	130	1,02	1,55
Siemens	SOMATOM Plus	CT	120	1,102	1,789
Siemens	SOMATOM Plus	CT	137	1,068	1,749
Siemens	SOMATOM Plus 4 Series	CT	80	1,1	2,047
Siemens	SOMATOM Plus 4 Series	CT	120	1,075	1,782
Siemens	SOMATOM Plus 4 Series	CT	140	1,062	1,738
Siemens	SOMATOM Plus-S	CT	120	1,102	1,789
Siemens	SOMATOM Plus-S	CT	137	1,068	1,749
Siemens	SOMATOM Sensation 10	CT	80	1,155	1,893
Siemens	SOMATOM Sensation 10	CT	100	1,111	1,743
Siemens	SOMATOM Sensation 10	CT	120	1,086	1,639
Siemens	SOMATOM Sensation 10	CT	140		1,584
Siemens	SOMATOM Sensation 16	CT	80	1,142	1,893
Siemens	SOMATOM Sensation 16	CT	100	1,103	1,743
Siemens	SOMATOM Sensation 16	CT	120	1,079	1,639
Siemens	SOMATOM Sensation 16	CT	140		1,584
Siemens	SOMATOM Sensation 16 Straton	CT	80	1,258	1,893
Siemens	SOMATOM Sensation 16 Straton	CT	100	1,209	1,663
Siemens	SOMATOM Sensation 16 Straton	CT	120	1,088	1,629
Siemens	SOMATOM Sensation 16 Straton	CT	140		1,571
Siemens	SOMATOM Sensation 4	CT	80	1,156	1,939
Siemens	SOMATOM Sensation 4	CT	120	1,086	1,656
Siemens	SOMATOM Sensation 4	CT	140		1,602

Siemens	SOMATOM Sensation 64	CT	80	1,042	1,684
Siemens	SOMATOM Sensation 64	CT	100	1,027	1,581
Siemens	SOMATOM Sensation 64	CT	120	1,022	1,532
Siemens	SOMATOM Sensation 64	CT	140		1,538
Siemens	SOMATOM Sensation Open	CT	80	1,071	1,812
Siemens	SOMATOM Sensation Open	CT	100	1,046	1,674
Siemens	SOMATOM Sensation Open	CT	120	1,037	1,601
Siemens	SOMATOM Sensation Open	CT	140		1,558
Siemens	SOMATOM Volume Zoom	CT	80	1,201	2,135
Siemens	SOMATOM Volume Zoom	CT	120	1,124	1,75
Siemens	SOMATOM Volume Zoom	CT	140	1,107	1,696
Siemens	Symbia Intevo 16	CT	80	1,05	1,81
Siemens	Symbia Intevo 16	CT	110	1,01	1,62
Siemens	Symbia Intevo 16	CT	130	1.02	1,55
Siemens	Symbia T2	CT	80	1,09	1,83
Siemens	Symbia T2	CT	110	1,05	1,63
Siemens	Symbia T2	CT	130	1,04	1,53
Siemens	Symbia T6	CT	80	1,05	1,83
Siemens	Symbia T6	CT	110	1,04	1,58
Siemens	Symbia T6	CT	130	1,02	1,56
Siemens	Generic scanner	CT	80	1,11	1,92
Siemens	Generic scanner	CT	100	1,09	1,68
Siemens	Generic scanner	CT	120	1,08	1,69
Siemens	Generic scanner	CT	125	1,07	1,68
Siemens	Generic scanner	CT	130	1,06	1,67
Siemens	Generic scanner	CT	133	1,08	1,65
Siemens	Generic scanner	CT	137	1,07	1,65
Siemens	Generic scanner	CT	140	1,07	1,61
Toshiba	Toshiba TCT 600	CT	120	0,987	1,527
Toshiba	Xspeed II	CT	120	0,995	1,598
Toshiba	Xpress GX (Pre '98)	CT	120	1,035	
Toshiba	Xvision/EX	CT	120	0,952	1,354
Toshiba	Xpress HS1	CT	120	1,039	1,369
Toshiba	Xpress HS	CT	120	1	1,359
Toshiba	Xpress GX (Post '98), Asteion	CT	120	1,035	1,501
Toshiba	Xpress GX (Post '98), Asteion	CT	130	1,017	1,472
Toshiba	Asteion	CT	120	1,035	1,501
Toshiba	Asteion	CT	130	1,017	1,472
Toshiba	Aquilion One / Genesis Edition	CT	80	1,07	1,64
Toshiba	Aquilion One / Genesis Edition	CT	100	1,05	1,52
Toshiba	Aquilion One / Genesis Edition	CT	120	1,04	1,48
Toshiba	Aquilion One / Genesis Edition	CT	135	1,04	1,46
Toshiba	Aquilion Lightning (SP)	CT	80	1,09	1,82
Toshiba	Aquilion Lightning (SP)	CT	100	1,07	1,72
Toshiba	Aquilion Lightning (SP)	CT	120	1,07	1,62
Toshiba	Aquilion Lightning (SP)	CT	135	1,07	1,57

Toshiba	Aquilion Multi/4	CT	80	1,117	2,072
Toshiba	Aquilion Multi/4	CT	100	1,079	1,846
Toshiba	Aquilion Multi/4	CT	120	1,057	1,728
Toshiba	Aquilion Multi/4	CT	135	1,034	1,672
Toshiba	Auklet	CT	120	1,019	1,47
Toshiba	Asteion Multi (older tube)	CT	80	1,141	2,131
Toshiba	Asteion Multi (older tube)	CT	100	1,099	2,039
Toshiba	Asteion Multi (older tube)	CT	120	1,076	1,731
Toshiba	Asteion Multi (older tube)	CT	135	1,062	1,841
Toshiba	Asteion Multi (CXB-400C tube)	CT	80	1,141	2,131
Toshiba	Asteion Multi (CXB-400C tube)	CT	100	1,099	2,039
Toshiba	Asteion Multi (CXB-400C tube)	CT	120	1,076	1,731
Toshiba	Asteion Multi (CXB-400C tube)	CT	135	1,062	1,841
Toshiba	Asteion Dual	CT	120	1,117	1,857
Toshiba	Asteion Dual	CT	135	1,07	1,685
Toshiba	Aquilion 16	CT	80	1,147	2,206
Toshiba	Aquilion 16	CT	100	1,07	1,959
Toshiba	Aquilion 16	CT	120	1,056	1,779
Toshiba	Aquilion 16	CT	135	1,051	1,728
Toshiba	Generic scanner	CT	80	1,14	2,14
Toshiba	Generic scanner	CT	100	1,09	1,97
Toshiba	Generic scanner	CT	120	1,03	1,58
Toshiba	Generic scanner	CT	130	1,02	1,47
Toshiba	Generic scanner	CT	135	1,02	1,45
Generic Manufacturer	Generic scanner	CT	80	1,01	2,018
Generic Manufacturer	Generic scanner	CT	90	1,095	1,885
Generic Manufacturer	Generic scanner	CT	100	1,066	1,888
Generic Manufacturer	Generic scanner	CT	120	1,049	1,771
Generic Manufacturer	Generic scanner	CT	130	1,045	1,763
Generic Manufacturer	Generic scanner	CT	140	1,033	1,638
United Imaging	uCT 760 & 780 (SFOV 300)	CT	70	1,0824	2,0209
United Imaging	uCT 760 & 780 (SFOV 300)	CT	80	1,0809	1,695
United Imaging	uCT 760 & 780 (SFOV 300)	CT	100	1,0474	1,5955
United Imaging	uCT 760 & 780 (SFOV 300)	CT	120	1,0363	1,5088
United Imaging	uCT 760 & 780 (SFOV 300)	CT	140	1,0315	1,4819
United Imaging	uCT 760 & 780 (SFOV 500)	CT	70	1,1783	2,2636
United Imaging	uCT 760 & 780 (SFOV 500)	CT	80	1,1093	2,0036
United Imaging	uCT 760 & 780 (SFOV 500)	CT	100	1,0971	1,8283
United Imaging	uCT 760 & 780 (SFOV 500)	CT	120	1,0852	1,7273
United Imaging	uCT 760 & 780 (SFOV 500)	CT	140	1,0852	1,6742

8.7.10 Geometric Efficiency(helical scan/free-in-air)

The CTDI(helical scan/free-in-air) analysis is used to evaluate the geometric efficiency on computed tomography systems using the RTI CT Dose Profiler detector. It uses one exposure and calculates calculates the geometric efficiency and CTDI free in air. You can read the topic Add analysis to see how you add the analysis to a test. The separate documentation "CT Dose Profiler User's Manual" (comes with the CT Dose Profiler detector) describes the probe and the theory.

If you want to use an axial scan, the RTI Mover is required. This is a device that makes it possible to move the CT Dose Profiler through the beam to measure the dose profile. The Mover and how to use it with Ocean is described in a separate manual, RTI Mover User's Manual.

If you want to modify the standard analysis, see topic Modify analysis and Advanced analysis for more information.

Typical CTD free-in-air and geometric efficiency(helical scan/free-in-air) test

This example shows two measurements, each with its own analysis. One is a measurement in a head phantom and the other is in a body phantom.

View / Select	#	Set kV (kV)	Collimation (mm)	Pitch	Tube rotation time (s)	Scan speed (mm/s)	Measuring time (s)	Exposure (mGy)
	1	120	24	1,000	1,00	24,00	5	87,89
	2	120	12	1,000	1,00	12,00	15	
	3	120	12	1,000	1,00	12,00	5	

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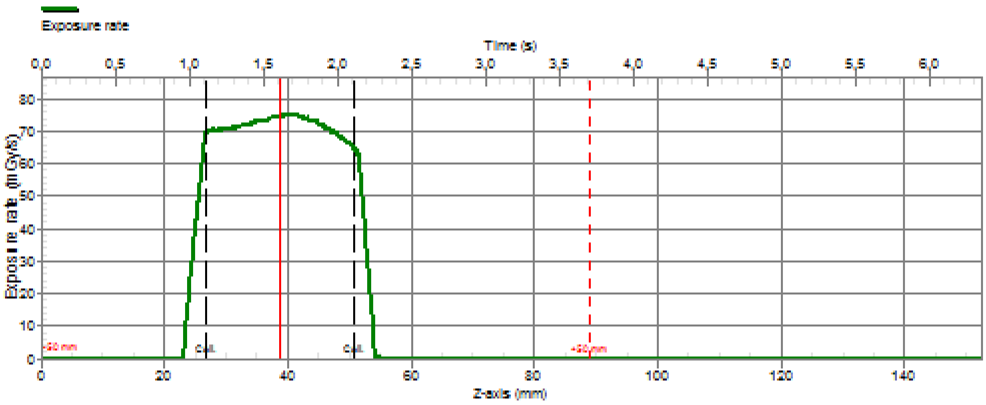
Note that you should use TIMED MODE for this measurement.

Geometric Efficiency (spiral scan/free-in-air)

Result: Pass

Set kV	120 kV
Geometric efficiency	86,7 %
Beam width (FWHM)	27,7 mm
CTDI(100)	83,21 mGy



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Default pass/fail criteria

When you add the CTDI(helical scan/in phantom) analysis the following pass/fail criteria is shown:

	Min	Max	
Geometric efficiency:			%
Beam width (FWHM):			mm

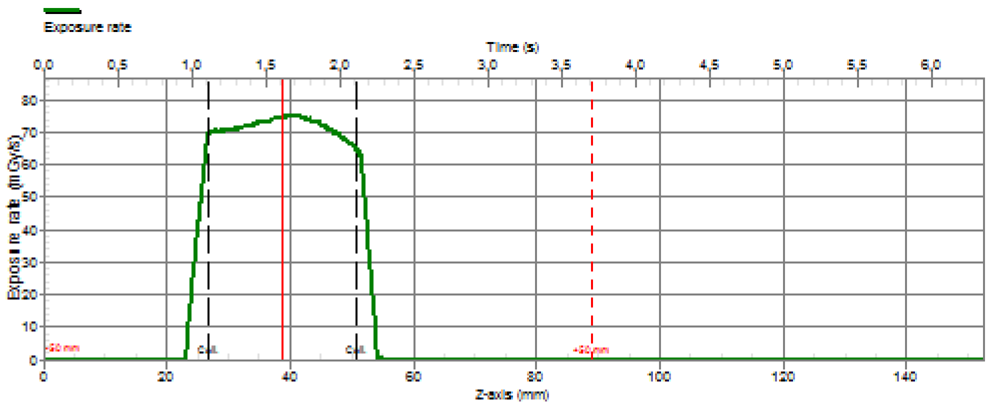
No default limits are specified, you must fill out limit. If you leave a limit blank not test for that criteria is done.

Default result

Geometric Efficiency (spiral scan/free-in-air)

Result: Pass

Set kV	120 kV
Geometric efficiency	86,7 %
Beam width (FWHM)	27,7 mm
CTDI(100)	83,21 mGy



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Result layout and macros

As described in the topic Advanced analysis, it is possible to modify the the layout of the analysis result. The layout is defined by text combined with "macros". When the analysis result is shown, the macros are replaced with the appropriate calculated values, set values and measured values. The default layout of text for the CTDI(helical scan/free-in-air) analysis looks like this:

$Title

Result: $TestResult

Set kV	$SetkV kV
Geometric efficiency	$GeometricEfficiency %
Beam width (FWHM)	$BeamWidthFWHM mm
CTDI(100)	$CTDI100 $UnitCTDI100

$DoseProfileGraph

This text can be modified and more macros can be used to show more calculated results, for example the relative difference. The following macros are available for the CTDI(helical scan/free-in-air) analysis:

$Title (Specified title)

$Result (Analysis result)

$TestResult (Pass or fail text, the overall result for the test)

$SetkV (Set kVp)

$SetmAs (Set mAs)

$SetPitch (Set pitch)

$SetScanTime (Set value for the scan time)

$SetTubeRotTime (Set tube rotation time)

$SetCollimationNT (Set value for the collimation)

$SetPhantomType (Set value for phantom type)

$ScanSpeed (Calculated scan speed = Set Pitch * Collimation(NT) / Set Tube Rot Time)

$DoseProfileGraph (The CT dose profile graph)

$CTDI100 (Measured CTDI100)

$UnitCTDI100 (Unit for CTDI)

$BeamWidthFWHM (Beam width from waveform)

$MinBeamWidthFWHM (Minimum value)

$MaxBeamWidthFWHM (Maximum value)

$GeometricEfficiency (Geometric efficiency (from waveform))

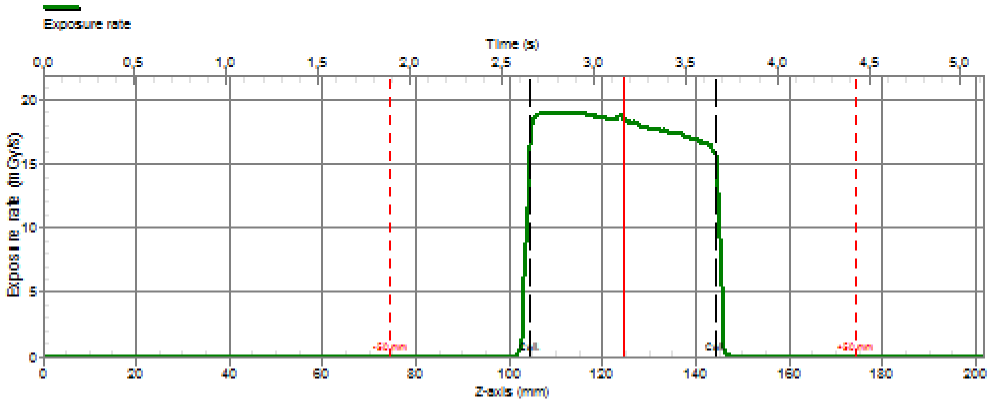
$MinGeometricEfficiency (Minimum value)

$MaxGeometricEfficiency (Maximum value)

Calculations

The CTDI(100,c) is calculated in the following way:

All calculations are done from the dose profile waveform.



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The waveform is an array of samples where the Z-axis (see graph above) represents the position of the sensor and the y-axis represents the exposure rate. The waveform includes a maximum of 1024 samples.

Ocean finds key locations in the waveform in the following way:

1. Find the maximum dose rate that occurred during the scan.
2. Search backward from this point to find where the dose profile goes below 50% of the maximum value and call this position X1 (not shown on graph).
3. Search forward from the point found in step 1 to find where the dose profile goes below 50% of the maximum value and call this position X2 (not shown on graph).
4. Calculate the position halfway between X1 and X2. Call this point X3 (shown as a solid red line in graph above).
5. Calculate "X3-50 mm" and "X3+50 mm" and call these positions X4 and X5, respectively. They are marked with red dotted lines in the graph above and labeled with the text "-50 mm" and "+50 mm", respectively.
Next find index for the collimation, X6 and X7. The collimation must be specified in the grid. Indicate X6 and X7 with black dotted lines labeled with "Col".

If the points X1 and X2 can't be found automatically the analysis will show a calculation error. In this case, in the waveform graph (not the analysis graph), use the mouse pointer and grab the center pointer. You can now move it. Position it manually in the center of the dose profile. Two new indicators, for FWHM, become visible. Move these and position in a position where the dose rate is half of the maximum dose rate.Now are all parameters in the analysis calculated based on the manual positions you have done. If you want to go back to automatic calculation; right-click on the waveform graph and check "Auto-position center indicator".

If the RTI Mover is used (axial scan), an internal Pitch is calculated as:

(Mover Speed * Rotation time) / Collimation

The CTDI free in air is calculated as:

$CTDI100 = "Integrated dose between X4 and X5" * Pitch

Pitch must be specified in the grid.

FWHM is calculated as the distance between X1 and X2:

$BeamWidthFWHM = X2 - X1

Calculate Geometric efficiency in the z-direction (according to IEC 60601-2-44) as:

$GeometricEfficiency = 100* (Dose between X6 and X7) / (Total dose)

Note!
The dose profile waveform is adjusted with the following function (X = FWHM) for 3 mm < X < 40 mm:

CorrF = 1.25466313 - 0.43935032 * X +0.34546921 * X^2 - 0.14128364 * X^3 + 0.03057638 * X^4 - 0.00330919 * X^5 + 0.00014071 * X^6

For X < 3 mm, no valid correction available

Recommended columns (or general settings)

The following columns are recommended for the CTDI(helical scan/free-in-air) analysis.

Parameter	Description
Exposure(Measured)	The measured dose from the CT Dose Profiler detector.
Set kV	The set value for kV
CT Phantom type (Set value)	The phantom type, specifies head or body for this analysis (*not required*)
Collimation (Set value)	This column specifies the collimation.
Pitch (Set value)	This column specifies the pitch.
Scan length (Set value)	This specifies the length of the scan (*not required*)
Scan speed (Set value)	This specifies the scan speed.
Measuring time	This is the measuring time for TIMED MODE. THis is a meter setting (a value used by the meter).
Tube rotation time (Set value)	This is the tube rotation time.

8.7.11 Dose Profile

The Dose Profile analysis is used when you just want to use the CT Dose Profiler detector to measure any dose profile. This analysis provides the graph over the dose profile and the only calculation done is FWHM (Full Width Half Maximum). You can read the topic Add analysis to see how you add the analysis to a test. The separate documentation "CT Dose Profiler User's Manual" (comes with the CT Dose Profiler detector) describes the probe and the theory.

If you need a way to move the CT Dose Profiler through the beam, the RTI Mover is available. This is a device that makes it possible to move the CT Dose Profiler through the beam to measure the dose profile. The Mover and how to use it with Ocean is described in a separate manual, RTI Mover User's Manual.

If you want to modify the standard analysis, see topic Modify analysis and Advanced analysis for more information.

Typical dose profile measured free-in-air from a CT

This example shows two measurements of the dose profile from a CT. The measurement is done free in air.

View / Select	#	Set kV (kV)	Collimation (mm)	Pitch	Scan time (s)	Scan length (mm)	Tube rotation time (s)	Scan speed (mm/s)	Measuring time (s)	Exposure (mGy)
	1	120,0	32	0,688	5,0	150	0,50	44,03	5	35,81
	2	100,0	40	1,000	10,0	150	1,00	40,00	10	
	3	120,0	40	1,000	10,0	150	1,00	40,00	10	

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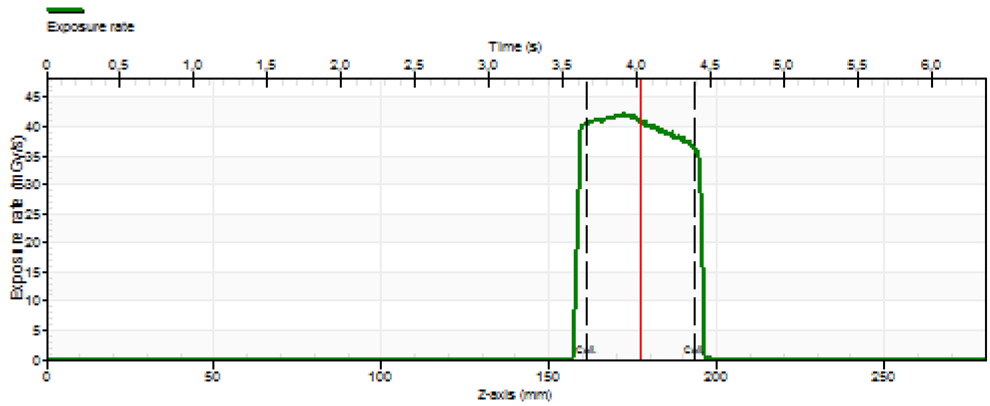
Note that you should use TIMED MODE for this measurement.

Dose Profile (CT Dose Profiler) [Row 1]



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Default pass/fail criteria

There are no pass/fail criteria for the dose profile analysis. The only thing you can specify is if you want the scatter removal filter to be active or not. This is scatter generated inside the CT Dose Profiler itself. It is recommended to turn this on for free-in-air measurements.

Dose Profile (CT Dose Profiler) [Row 1]

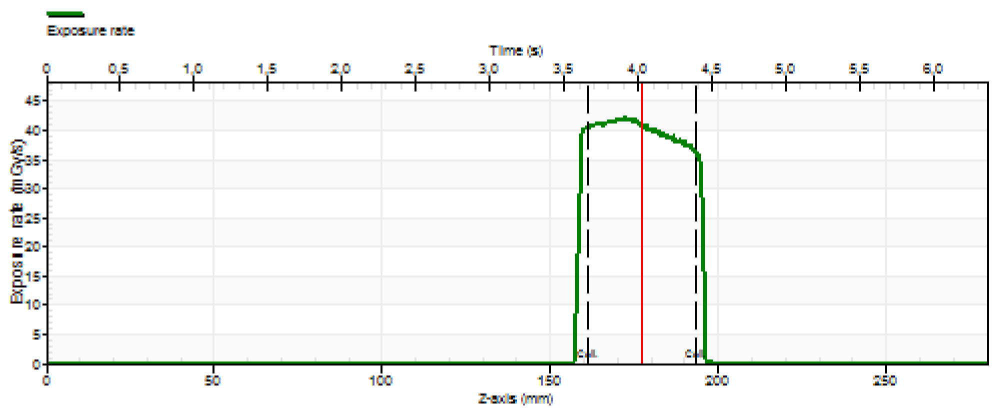
There are no pass/fail limits for this analysis type.

☑ Remove scatter

Default status for "Remove scatter" is unchecked.

Default result

Dose Profile (CT Dose Profiler) [Row 1]



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Result layout and macros

As described in the topic Advanced analysis, it is possible to modify the the layout of the analysis result. The layout is defined by text combined with "macros". When the analysis result is shown, the macros are replaced with the appropriate calculated values, set values and measured values. The default layout of text the Dose Profile analysis looks like this:

$Title
$DoseProfileGraph

This text can be modified and more macros can be used to show FWHM and set values. The following macros are available for the Dose Profile analysis:

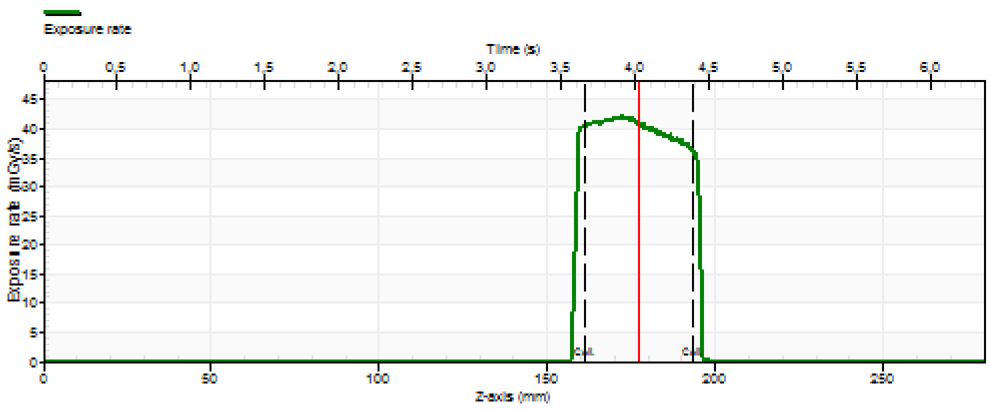
$RowNo (Row number used for the analysis)
$Title (Specified title)
$TargetFilter (Calibration)
$SetkV (Set kVp)
$SetmAs (Set mAs)
$SetPitch (Set pitch)
$SetScanTime (Set value for the scan time (s))
$SetTubeRotTime (Set tube rotation time (s))
$SetCollimationNT (Set value for the collimation)
$SetPhantomType (Set value for phantom type)
$ScanSpeed (Calculated scan speed = Set Pitch * Collimation(NT) / Set Tube Rot Time)
$DoseProfileGraph (The CT dose profile graph)
$BeamWidthFWHM (Beam width from waveform)

Calculations

The CTDI(100,c) is calculated in the following way:

All calculations are done from the dose profile waveform.

Dose Profile (CT Dose Profiler) [Row 1]



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The waveform is an array of samples where the Z-axis (see graph above) represents the position of the sensor and the y-axis represents the exposure rate. The waveform includes a maximum of 1024 samples.

Ocean finds key locations in the waveform in the following way:

1. Find the maximum dose rate that occurred during the scan.
2. Search backward from this point to find where the dose profile goes below 50% of the maximum value and call this position X1 (not shown on graph).
3. Search forward from the point found in step 1 to find where the dose profile goes below 50% of the maximum value and call this position X2 (not shown on graph).

If the points X1 and X2 can't be found automatically the analysis will show a calculation error.

FWHM is calculated as the distance between X1 and X2:

$BeamWidthFWHM = X2 - X1

Recommended columns (or general settings)

The following columns are recommended for a general dose profile (not CT) and use of the Mover.

Parameter	Description
Exposure(Measured)	The measured dose from the CT Dose Profiler detector.
Set kV	The set value for kV
Scan length (Set value)	This specifies the length of the scan (*not required*)
Scan speed (Set value)	This specifies the scan speed.
Measuring time	This is the measuring time for TIMED MODE. THis is a meter setting (a value used by the meter).

For measurement of the dose profile on a CT, the following columns are recommended:

Parameter	Description
Exposure(Measured)	The measured dose from the CT Dose Profiler detector.
Set kV	The set value for kV
CT Phantom type (Set value)	The phantom type, specifies head or body for this analysis(*not required*)
Collimation (Set value)	This column specifies the collimation.
Pitch (Set value)	This column specifies the pitch.
Scan length (Set value)	This specifies the length of the scan(*not required*)
Scan speed (Set value)	This specifies the scan speed.
Measuring time	This is the measuring time for TIMED MODE. THis is a meter setting (a value used by the meter).
Tube rotation time (Set value)	This is the tube rotation time.

8.7.12 AGD(ACR 1999 Film screen Mammo)

The AGD(ACR 1999 Film Screen Mammo) analysis is used to evaluate the average glandular dose according to the ACR protocol(***ACR, Mammography Quality Control Manual, 1999, ISBN 1-55903-142-5***). Supported target/filter combinations are: Mo/30 µm Mo, Mo/25 µm Rh, Rh/25 µm Rh and W/0.5 mm Al. (This analysis is only using one row in your test).

You can read the topic Add analysis to see how you add the analysis to a test.

If you want to modify the standard analysis, see topic Modify analysis and Advanced analysis for more information.

Typical AGD(ACR) test using traditional HVL measurement

This example shows how the template looks like when HVL is evaluated with a traditional HVL measurement (by adding filters until the measured dose is reduced to half).

Set kV (kV)	Compr. paddle
26	Yes

View / Select	#	Calibration	HVL(AGD) (mm Al)	Exposure (norm) (mGy)	Set Added filtr. (mm Al)	AGD (mGy)
	1	Mo/30 µm Mo		3,240	0,00	
	2	Mo/30 µm Mo		2,820	0,10	
	3	Mo/30 µm Mo		2,290	0,20	
	4	Mo/30 µm Mo		1,640	0,30	
	5	Mo/30 µm Mo		1,340	0,40	
	6	Mo/30 µm Mo			0,50	
	7	Mo/30 µm Mo	0,323	5,300		0,9948

Half Value Layer

HVL is 0,323 mm Al

AGD (ACR)

Result: Pass

AGD for Mo/30 µm Mo at 26,0 kV is 0,9948 mGy (Max allowed is 3,000 mGy)

Half value layer: 0,323 mm Al
Entrance surface air kerma (ESAK): 5,300 mGy

Typical AGD(ACR) test using Quick HVL

This example shows how the template looks like when HVL is evaluated by using the Quick HVL (Quick HVL is the HVL value measured one exposure, the "1-shot HVL"). All measured data are acquired with one exposure.

Set kV (kV)	Compr. paddle
26	Yes

View / Select	#	Calibration	Exposure (norm) (mGy)	HVL (mm Al)	HVL(AGD) (mm Al)	AGD (mGy)
	1	Mo/30 µm Mo	4,940	0,323	0,323	0,9272

Half Value Layer

HVL is 0,323 mm Al

AGD (ACR)

Result: Pass

AGD for Mo/30 µm Mo at 26,0 kV is 0,9948 mGy (Max allowed is 3,000 mGy)

Half value layer: 0,323 mm Al
Entrance surface air kerma (ESAK): 5,300 mGy

Default pass/fail criteria

When you add the AGD(ACR 1999 Film Screen Mammo) analysis the following pass/fail criteria is shown:

☑ Maximum average glandular dose (AGD): 3,000 mGy

Default result

AGD (ACR)

Result: Pass

AGD for Mo/30 µm Mo at 27,0 kV is 0,4721 mGy (Max allowed is 3,000 mGy)

Half value layer: 0,323 mm Al
Entrance surface air kerma (ESAK): 2,500 mGy

Result layout and macros

As described in the topic Advanced analysis, it is possible to modify the the layout of the analysis result. The layout is defined by text combined with "macros". When the analysis result is shown, the macros are replaced with the appropriate calculated values, set values and measured values. The default layout of text AGD(ACR 1999 Film Screen Mammo) analysis looks like this:

$Title

Result: $TestResult

AGD for $TargetFilter at $kVp kV is $AGD $AGDUnit (Max allowed is $LimitMaxAGD $AGDUnit)

Half value layer: $HVL mm Al
Entrance surface air kerma (ESAK): $ESAK $ESAKUnit

This text can be modified and more macros can be used to show more calculated results, for example the relative difference. The following macros are available for the AGD(ACR 1999 Film Screen Mammo) analysis:

$RowNo (Row number used for the analysis)
$Title (Specified title)
$Result (Analysis result)
$TestResult (Pass or fail text, the overall result for the test)
$TargetFilter (Calibration)
$AGDUnit (AGD unit)
$AGD (Average glandular dose)
$LimitMaxAGD (Max allowed AGD)
$kVp (Set kVp)
$HVL (Used HVL)
$SSD (Distance to which the AGD is normalized)
$ESAKUnit (ESAK unit)
$ESAK (Measured exposure)
$gFactor (Used g factor)
$SetKV

Calculations

The AGD(ACR 1999 Film Screen Mammo), $AGD, is calculated as:

$AGD = $ESAK * $gFactor

where

$ESAK = normalized entrance air kerma, measured exposure value (from the column "Exposure (norm) (Measured)")

$gFactor is the g-factor from the following tables:

Table 1. GLANDULAR DOSE (IN mrad) FOR 1 ROENTGEN ENTRANCE EXPOSURE TO A 4.2-CM BREAST THICKNESS—50% ADIPOSE-50% GLANDULAR BREAST TISSUE—USING A Mo/Mo TARGET-FILTER COMBINATION*

	X-Ray Tube Voltage (kVp)											W/Al Target -Filter Combination
HVL	23	24	25	26	27	28	29	30	31	32	33	
0.23	116											
0.24	121	124										
0.25	126	129	131									
0.26	130	133	135	138								
0.27	135	138	140	142	143							
0.28	140	142	144	146	147	149						
0.29	144	146	148	150	151	153	154					
0.30	149	151	153	155	156	157	158	159				170
0.31	154	156	157	159	160	161	162	163	164			175
0.32	158	160	162	163	164	166	167	168	168	170	171	180
0.33	163	165	166	168	169	170	171	173	173	174	175	185
0.34	168	170	171	172	173	174	175	176	177	178	179	190
0.35		174	175	176	177	178	179	180	181	182	183	194
0.36			179	181	182	183	184	185	185	186	187	199
0.37				185	186	187	188	189	190	191	191	204
0.38					190	191	192	193	194	195	195	208
0.39						196	197	198	198	199	200	213
0.40							201	202	203	204	204	217
0.41								206	207	208	208	221
0.42									211	212	212	225
0.43										215	216	230
0.44											220	234
0.45												238

To convert from entrance exposure in air in roentgens to mean glandular breast dose in millirads, multiply the entrance exposure by the factor shown in the table for the appropriate kVp and beam quality (HVL) combination. For example, a measured entrance exposure of 0.50 roentgens from a Mo/Mo target/filter system at 30 kVp with a measured HVL of 0.36 mm aluminum yields an average glandular dose of (0.50 R) × (185 mrad/R) = 93 mrad or 0.93 mGy.

* Adapted from: Wu X. Breast dosimetry in screen-film mammography. In: Barnes GT, Frey GD (eds), *Screen Film Mammography: Imaging Considerations and Medical PhysicsResponsibilities.* Madison, Wis: Medical Physics Publishing; 1991;159-175. W/Al conversion factors are derived from fits to data from Stanton L., et al. Dosage evaluation in mammography. *Radiology.* 1984;150: 577-584.

Table 2. GLANDULAR DOSE (IN mrad) FOR 1 ROENTGEN ENTRANCE EXPOSURE TO A 4.2-CM BREAST THICKNESS—50% ADIPOSE-50% GLANDULAR BREAST TISSUE—USING A Mo/Rh TARGET-FILTER COMBINATION*

	X-Ray Tube Voltage (kVp)										
HVL	25	26	27	28	29	30	31	32	33	34	35
0.28	149	151	154								
0.29	154	156	158	159							
0.30	158	160	162	162	162	163					
0.31	163	164	166	166	166	167	167				
0.32	167	169	171	171	171	171	172	172			
0.33	171	173	175	176	176	176	176	177			
0.34	176	178	179	179	180	180	180	181	181		
0.35	180	181	183	183	184	185	185	186	187		
0.36	185	186	187	187	188	188	189	190	191	191	
0.37	189	190	191	191	192	193	193	194	195	195	
0.38	193	194	196	196	197	197	197	198	199	199	200
0.39	198	199	200	200	201	201	202	202	203	203	204
0.40	202	203	204	204	205	205	206	207	208	208	208
0.41	206	207	208	208	209	209	210	211	212	212	212
0.42	211	211	212	212	213	213	214	215	216	216	217
0.43	215	216	217	217	218	218	219	219	220	220	221
0.44	220	220	221	221	222	222	223	223	224	224	225
0.45	224	224	225	225	226	226	227	227	228	228	229
0.46		228	229	229	230	231	231	232	233	233	234
0.47			233	233	234	235	235	236	237	237	238
0.48			238	238	239	240	240	241	241	242	242
0.49				242	243	243	244	244	245	245	246
0.50					247	247	248	248	249	250	251
0.51						251	252	253	254	254	255
0.52							257	257	258	258	259
0.53							261	261	262	263	264
0.54								265	266	267	268
0.55								269	270	271	272
0.56									275	276	276
0.57									279	280	281
0.58										284	285
0.59										288	289
0.60											293

* Adapted from: Wu X, Gingold EL, Barnes GT, Tucker DM. Normalized average glandular dose in Mo/Rh and Rh/Rh target-filter mammography. *Radiology.* 1994;193:83-89.

Table 3. GLANDULAR DOSE (IN mrad) FOR 1 ROENTGEN ENTRANCE EXPOSURE TO A 4.2-CM BREAST THICKNESS—50% ADIPOSE-50% GLANDULAR BREAST TISSUE—USING AN Rh/Rh TARGET-FILTER COMBINATION*

	X-Ray Tube Voltage (kVp)										
HVL	25	26	27	28	29	30	31	32	33	34	35
0.28	150	155	159								
0.29	155	160	164	168							
0.30	160	164	168	172	176						
0.31	165	168	172	174	180	182					
0.32	169	173	177	181	184	186	188				
0.33	174	178	181	185	188	190	192				
0.34	179	183	186	190	193	195	196	199			
0.35	184	187	190	194	197	199	201	203			
0.36	189	192	195	198	201	204	205	207	209		
0.37	193	196	199	202	205	207	209	211	213		
0.38	198	201	204	207	209	211	213	215	217	219	221
0.39	203	206	208	211	214	216	217	219	221	223	224
0.40	208	211	213	216	218	220	221	223	224	226	228
0.41	213	215	217	220	222	224	225	227	228	230	232
0.42	218	220	222	224	226	228	229	231	232	234	236
0.43	222	224	226	228	230	232	233	235	236	238	240
0.44	227	229	231	233	235	237	238	239	240	242	243
0.45	232	234	235	237	239	241	242	243	244	246	247
0.46			239	241	243	245	246	247	248	250	251
0.47					247	249	250	251	252	254	255
0.48					251	253	254	255	256	258	259
0.49						257	258	259	260	261	262
0.50						261	262	263	264	265	266
0.51							266	267	268	269	270
0.52							270	271	272	273	274
0.53							275	276	276	277	278
0.54								279	280	280	281
0.55								283	284	284	285
0.56									288	288	289
0.57										292	293
0.58										296	297
0.59											300
0.60											304

* Adapted from: Wu X, Gingold EL, Barnes GT, Tucker DM. Normalized average glandular dose in Mo/Rh and Rh/Rh target-filter mammography. *Radiology*. 1994;193:83-89.

Required columns (or general settings)

The following columns are required for the AGD(ACR 1999 Film Screen Mammo) analysis:

Parameter	Description
Exposure (norm) (Measured)	The AGD(ACR) analysis is always using the normalized exposure, th column "Exposure (norm) (Measured)". However it is not required to normalize to any distance and in this case is "normalized exposure" = "measured exposure".
Calibration (Set value)	It is required to have calibration column. The value is used when getting the g-factor for the corresponding target/filter.
HVL (measured)	This column is required if QuickHVL is used instead of a traditional HVL measurement.
HVL(AGD) (Measured)	In this column is the HVL for the AGD calculation specified. The value must be entered manually or linked automtatically from the HVL analysis.
AGD (Calculated)	This is the calculated average glandular dose. This value is compared against the pass/fail criteria you have specified.

8.7.13 AGD(ACR 2018 Digital Mammo)

The AGD(ACR 2018 Digital Mammo) analysis is used to evaluate the average glandular dose according to the ACR protocol ***ACR, 2018 Digital Mammography, Quality Control Manual, November 19, 2018*** . Supported target/filter combinations are: Mo/Mo, Mo/Rh, Rh/Rh, W/Rh, W/Al and W/Ag. (This analysis is only using one row in your test).

You can read the topic Add analysis to see how you add the analysis to a test.

If you want to modify the standard analysis, see topic Modify analysis and Advanced analysis for more information.

Typical AGD(ACR 2016 Digital Mammo) test using traditional HVL measurement

This example shows how the template looks like when HVL is evaluated with a traditional HVL measurement (by adding filters until the measured dose is reduced to half).

Breast thickness (mm)	Set kV (kV)	Compr. paddle
42	30	Yes

View / Select	#	Calibration	HVL(AGD) (mm Al)	Exposure (norm) (mR)	Set Added filtr. (mm Al)	AGD (mGy)
	1	W/50 µm Ag		436	0,000	
	2	W/50 µm Ag		366	0,100	
	3	W/50 µm Ag		322	0,200	
	4	W/50 µm Ag		252	0,300	
	5	W/50 µm Ag		205	0,400	
	6	W/50 µm Ag			0,500	
	7	W/50 µm Ag	0,370	605		1,239

Click to compress

Half Value Layer

HVL is 0,370 mm Al

Average glandular dose

Result: Pass

AGD for W/50 µm Ag at 30,0 kV is 1,239 mGy (Max allowed is 3,000 mGy)

Half value layer: 0,370 mm Al
Entrance surface air kerma (ESAK): 605 mR

Click to compress

Typical AGD(ACR 2016 Digital Mammo) test using Quick HVL

This example shows how the template looks like when HVL is evaluated by using the Quick HVL (Quick HVL is the HVL value measured with each exposure, the "1-shot HVL"). All measured data are acquired with one exposure.

Breast thickness (mm)	Set kV (kV)	Compr. paddle
42	30	Yes

View / Select	#	Calibration	Exposure (norm) (mGy)	HVL (mm Al)	HVL(AGD) (mm Al)	AGD (mGy)
	1	W/50 µm Ag	5,300	0,370	0,370	1,239

Click to compress

Half Value Layer

HVL is 0,370 mm Al

Average glandular dose

Result: Pass

AGD for W/50 µm Ag at 30,0 kV is 1,239 mGy (Max allowed is 3,000 mGy)

Half value layer: 0,370 mm Al
Entrance surface air kerma (ESAK): 605 mR

Click to compress

Default pass/fail criteria

When you add the AGD(ACR 2018 Digital Mammo) analysis the following pass/fail criteria is shown:

☑ Maximum average glandular dose (AGD): 3,000 mGy

Default result

Half Value Layer

HVL is 0,370 mm Al

Average glandular dose

Result: Pass

AGD for W/50 µm Ag at 30,0 kV is 1,239 mGy (Max allowed is 3,000 mGy)

Half value layer: 0,370 mm Al
Entrance surface air kerma (ESAK): 605 mR

Click to compress

Result layout and macros

As described in the topic Advanced analysis, it is possible to modify the the layout of the analysis result. The layout is defined by text combined with "macros". When the analysis result is shown, the macros are replaced with the appropriate calculated values, set values and measured values. The default layout of text AGD(ACR 2018 Digital Mammo) analysis looks like this:

$Title

Result: $TestResult

AGD for $TargetFilter at $kVp kV is $AGD $AGDUnit (Max allowed is $LimitMaxAGD $AGDUnit)

Half value layer: $HVL mm Al
Entrance surface air kerma (ESAK): $ESAK $ESAKUnit

Click to compress

This text can be modified and more macros can be used to show more calculated results, for example the relative difference. The following macros are available for the AGD(ACR 2018 Digital Mammo) analysis:

$MeterUsedType (Meter type)
$MeterUsedSN (Meter S/N)
$MeterUsedCalDate (Meter calibration date)
$ExtDetUsedType (External detector type)
$ExtDetUsedSN (External detector S/N)
$ExtDetUsedCalDate (External detector calibration date)
$RowNo (Row number used for the analysis)
$Title (Specified title)
$Result (Analysis result)
$TestResult (Pass or fail text, the overall result for the test)
$TargetFilter (Calibration)
$AGDUnit (AGD unit)
$AGD (Average glandular dose)
$LimitMaxAGD (Max allowed AGD)
$kVp (Set kVp)
$HVL (Used HVL)
$SSD (Distance to which the AGD is normalized)
$sFactor (Used s factor)
$ESAKUnit (ESAK unit)
$ESAK (Measured exposure)
$RefmAs (Reference mAs to which AGD is normalized)
$SetmAs (Set mAs)
$PhantomThickness (Phantom thickness)
$PhantomUnit (Unit for phantom thickness and breast thickness)
$gcFactor (Used gc factor)

$SetKV
$Phantom

Click to compress

Calculations

The AGD(ACR 2018 Digital Mammo), $AGD, is calculated as:

Exposure values in Roentgen: **$AGD = $ESAK * $g-factor * $c-factor * 8.76 * $sFactor**

or

Exposure values in Gray: **$AGD = $ESAK * $g-factor * $c-factor * $sFactor**

$ESAK = normalized entrance air kerma, measured exposure value (from the column "Exposure (norm) (Measured)")

$g- and c-factor are dependant on HVL and the breast thickness:

g-factor * c-factor * 8.76 mGy/R for Acrylic							
Breast Thickness (cm)	HVL (mm Al)						
	0.3	0.35	0.4	0.45	0.5	0.55	0.6
2	2.944	3.301	3.639	3.945	4.226	4.490	4.720
4	1.672	1.897	2.114	2.348	2.589	2.820	3.071
4.1	1.641	1.863	2.076	2.305	2.545	2.779	3.022
4.2	1.609	1.828	2.037	2.261	2.499	2.736	2.972
4.3	1.576	1.791	1.997	2.215	2.452	2.692	2.920
4.4	1.542	1.753	1.955	2.167	2.403	2.647	2.867
4.5	1.506	1.713	1.911	2.118	2.352	2.600	2.812
6	1.164	1.320	1.471	1.639	1.781	2.015	2.220
8	0.847	0.967	1.087	1.195	1.315	1.483	1.647

Click to compress

$sFactor is the s-factor, it is dependent on the target/filter:

Target/Filter	s-factor
Mo/Mo	1.000
Mo/Rh	1.017
Rh/Rh	1.061
Rh/Al	1.044
Rh/Ag	1.087
W/Rh	1.042
W/Al (0.5 mm)	1.134
W/Al (0.7 mm)	1.082
W/Ag	1.042

Click to compress

Required columns (or general settings)

The following columns are required for the AGD(ACR 2018 Digital Mammo) analysis:

Parameter	Description
Exposure (norm) (Measured)	The AGD(ACR) analysis is always using the normalized exposure, th column "Exposure (norm) (Measured)". However it is not required to normalize to any distance and in this case is "normalized exposure" = "measured exposure".
Calibration (Set value)	It is required to have calibration column. The value is used when getting the g-factor for the corresponding target/filter.
Breast Thickness (Set value)	This is the breast thickness. This column is required. The default name for this column is Phantom Thickness. Use the Phantom Thickness column and rename it to "Breast Thickness".
HVL(Measured)	This column is required if QuickHVL is used instead of a traditional HVL measurement.
HVL(AGD) (Measured)	In this column is the HVL for the AGD calculation specified. The value must be entered manually or linked automtatically from the HVL analysis.
AGD (Calculated)	This is the calculated average glandular dose. This value is compared against the pass/fail criteria you have specified.

8.7.14 AGD(EUREF)

The AGD(EUREF) analysis is used to evaluate the average glandular dose according to the European protocol, ***European Protocol for the Quality Control of the Physical and Technical Aspects of Mammography Screening, Appendices, 2005*** . Supported target/filter combinations are: Mo/30 µm Mo, Mo/25 µm Rh, Rh/25 µm Rh, Rh/1 mm Al, W/50 µm Rh and W/0.5 mm Al. (This analysis is only using one row in your test). You can read the topic Add analysis to see how you add the analysis to a test.

If you want to modify the standard analysis, see topic Modify analysis and Advanced analysis for more information.

Typical AGD(EUREF) test using traditional HVL measurement

This example shows how the template looks like when HVL is evaluated with a traditional HVL measurement (by adding filters until the measured dose is reduced to half).

Set kV (kV)	Compr. paddle	Phantom (mm)
26	Yes	45

View / Select	#	Calibration	HVL(AGD) (mm Al)	Exposure (norm) (mGy)	Set Added filtr. (mm Al)	AGD (mGy)
	1	Mo/30 µm Mo		3,240	0,00	
	2	Mo/30 µm Mo		2,820	0,10	
	3	Mo/30 µm Mo		2,290	0,20	
	4	Mo/30 µm Mo		1,640	0,30	
	5	Mo/30 µm Mo		1,340	0,40	
	6	Mo/30 µm Mo			0,50	
	7	Mo/30 µm Mo	0,323	5,300		0,9689

Half Value Layer

HVL is 0,323 mm Al

Average glandular dose

Result: Pass

AGD for Mo/30 µm Mo at 26,0 kV is 0,9689 mGy (Max allowed is 2,500 mGy)

Half value layer: 0,323 mm Al
Entrance surface air kerma (ESAK): 5,300 mGy

(Calculated for a 53 mm standard breast and a glandularity of 29%.)

Typical AGD(EUREF) test using Quick HVL

This example shows how the template looks like when HVL is evaluated by using the Quick HVL (Quick HVL is the HVL value measured with each exposure, the "1-shot HVL"). All measured data are acquired with one exposure.

Phantom (mm)	Set kV (kV)	Compr. paddle
50	30	Yes

View / Select	#	Calibration	Exposure (norm) (mGy)	HVL (mm Al)	HVL(AGD) (mm Al)	AGD (mGy)
	1	Mo/30 µm Mo	4,820	0,341	0,341	0,8424

Half Value Layer

HVL is 0,341 mm Al

Average glandular dose

Result: Pass

AGD for Mo/30 µm Mo at 30,0 kV is 0,8424 mGy (Max allowed is 3,000 mGy)

Half value layer: 0,341 mm Al
Entrance surface air kerma (ESAK): 4,820 mGy

(Calculated for a 60 mm standard breast and a glandularity of 20%.)

Default pass/fail criteria

When you add the AGD(EUREF) analysis the following pass/fail criteria is shown:

- ○ Enter a maximum [3,000] mGy
- ◉ Auto maximum (based on the phantom thickness)
- ○ No maximum

You can specify your own value or use a value from the table given by the European protocol:

Thickness of PMMA (mm)	Equivalent breast thickness (mm)	Maximum average glandular dose to equivalent breast	
		Aceptable level (mGy)	Achievable level (mGy)
20	21	< 1.0	< 0.6
30	32	< 1.5	< 1.0
40	45	< 2.0	< 1.6
45	53	< 2.5	< 2.0
50	60	< 3.0	< 2.4
60	75	< 4.5	< 3.6
70	90	< 6.5	< 5.1

When "Auto" is used the value "Accepted level" is used.

Default result

AGD

Result: Pass

AGD for Mo/30 µm Mo at 27,0 kV is 0,4176 mGy (Max allowed is 3,000 mGy)

Half value layer: 0,323 mm Al
Entrance surface air kerma (ESAK): 2,500 mGy

(Calculated for a 6,000 cm standard breast and a glandularity of 20%.)

Result layout and macros

As described in the topic Advanced analysis, it is possible to modify the the layout of the analysis result. The layout is defined by text combined with "macros". When the analysis result is shown, the macros are replaced with the appropriate calculated values, set values and measured values. The default layout of text AGD(EUREF) analysis looks like this:

$Title

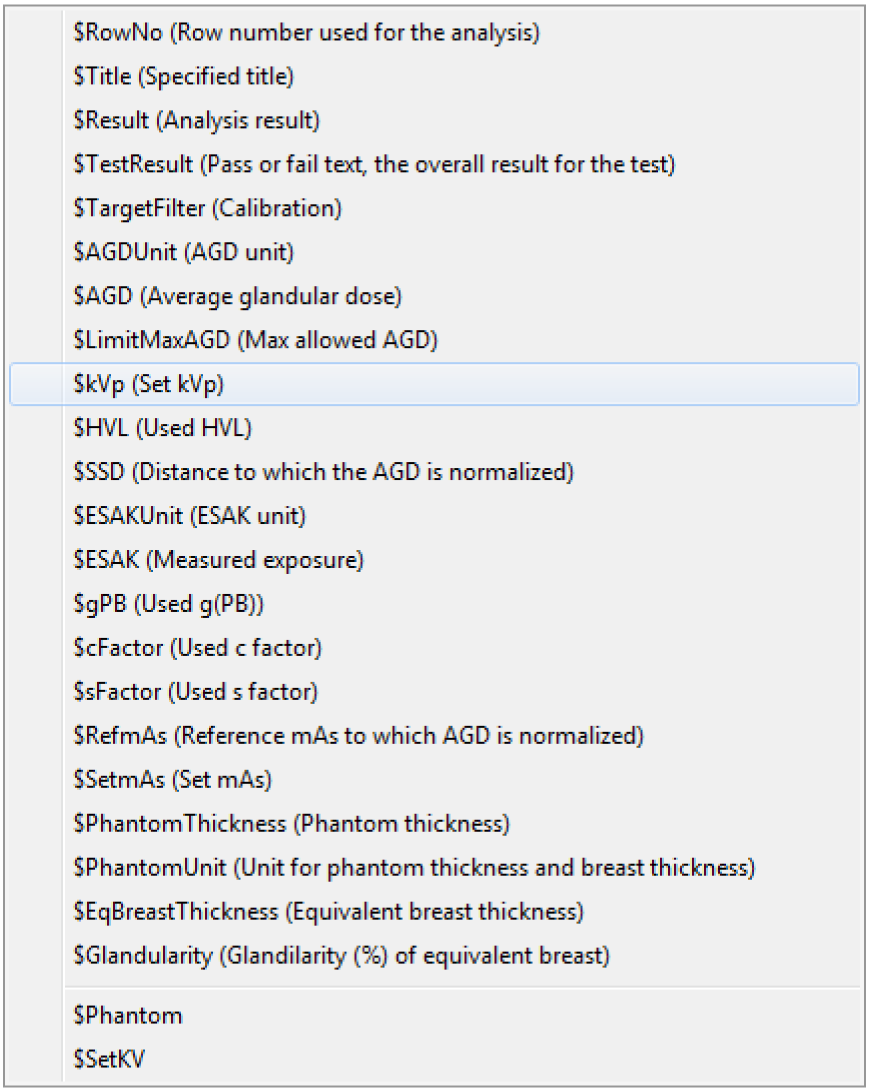
Result: $TestResult

AGD for $TargetFilter at $kVp kV is $AGD $AGDUnit (Max allowed is $LimitMaxAGD $AGDUnit)

Half value layer: $HVL mm Al
Entrance surface air kerma (ESAK): $ESAK $ESAKUnit

(Calculated for a $EqBreastThickness $PhantomUnit standard breast and a glandularity of $Glandularity%.)

This text can be modified and more macros can be used to show more calculated results, for example the relative difference. The following macros are available for the AGD(EUREF) analysis:



Calculations

The AGD(EUREF), $AGD, is calculated as:

$AGD = $ESAK * $gPB * $cFactor * $sFactor

where

$ESAK = normalized entrance air kerma, measured exposure value (from the column "Exposure (norm) (Measured)")

$gPB is the g(PB) factor. It is dependant on HVL and the phantom thickness (corresponds to an equivalent breast thickness):

PMMA thickness (mm)	Equivalent breast thickness (mm)	Glandularity of equivalent breast (%)	g-factor (mGy/mGy) HVL (mm Al) 0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80
20	21	97	0.378	0.421	0.460	0.496	0.529	0.559	0.585	0.609	0.631	0.650	0.669
30	32	67	0.261	0.294	0.326	0.357	0.388	0.419	0.448	0.473	0.495	0.516	0.536
40	45	41	0.183	0.208	0.232	0.258	0.285	0.311	0.339	0.366	0.387	0.406	0.425
45	53	29	0.155	0.177	0.198	0.220	0.245	0.272	0.295	0.317	0.336	0.354	0.372
50	60	20	0.135	0.154	0.172	0.192	0.214	0.236	0.261	0.282	0.300	0.317	0.333
60	75	9	0.106	0.121	0.136	0.152	0.166	0.189	0.210	0.228	0.243	0.257	0.272
70	90	4	0.086	0.098	0.111	0.123	0.136	0.154	0.172	0.188	0.202	0.214	0.227
80	103	3	0.074	0.085	0.096	0.106	0.117	0.133	0.149	0.163	0.176	0.187	0.199

Click to compress

$cFactor is the c-factor, it is also dependant on HVL and the phantom thickness:

PMMA thickness (mm)	Equivalent breast thickness (mm)	Glandularity of equivalent breast (%)	c-factor* HVL (mm Al) 0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80
20	21	97	0.889	0.895	0.903	0.908	0.912	0.917	0.921	0.924	0.928	0.933	0.937
30	32	67	0.940	0.943	0.945	0.946	0.949	0.952	0.953	0.956	0.959	0.961	0.964
40	45	41	1.043	1.041	1.040	1.039	1.037	1.035	1.034	1.032	1.030	1.028	1.026
45	53	29	1.109	1.105	1.102	1.099	1.096	1.091	1.088	1.082	1.078	1.073	1.068
50	60	20	1.164	1.160	1.151	1.150	1.144	1.139	1.134	1.124	1.117	1.111	1.103
60	75	9	1.254	1.245	1.235	1.231	1.225	1.217	1.207	1.196	1.186	1.175	1.164
70	90	4	1.299	1.292	1.282	1.275	1.270	1.260	1.249	1.236	1.225	1.213	1.200
80	103	3	1.307	1.299	1.292	1.287	1.283	1.273	1.262	1.249	1.238	1.226	1.213

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$sFactor is the s-factor, it is dependant on the target/filter:

Table A5.4: *s*-factors for clinically used spectra [Dance et al 2000]

Spectrum	s-factor
Mo/Mo	1.000
Mo/Rh	1.017
Rh/Rh	1.061
Rh/Al	1.044
W/Rh	1.042
W/Al	1.05*

Click to compress

*) the s-factor for W/Al is taken from the IAEA protocol: ***IAEA, Technical Report Series no. 457, Dosimetry in iagnostic Radiology: An International Code of Practice, page 155-163, 2007, ISSN 0074-1914.***

Typical HVL for different tube voltage and target/filter combinations (includes the compression plate)

HVL (mm Al) for target/filter combination							
kV	Mo Mo	Mo Rh	Rh Rh	W Rh	W Ag	W Al (0.5 mm)	W Al (0.7 mm)
25	0.32 ± 0.02	0.38 ± 0.02	0.37 ± 0.02	0.50 ± 0.03	0.51 ± 0.03	0.34 ± 0.03	0.42 ± 0.03
28	0.35 ± 0.02	0.42 ± 0.02	0.42 ± 0.02	0.53 ± 0.03	0.58 ± 0.03	0.39 ± 0.03	0.49 ± 0.03
31	0.38 ± 0.02	0.45 ± 0.02	0.45 ± 0.02	0.56 ± 0.03	0.61 ± 0.03	0.44 ± 0.03	0.55 ± 0.03
34	0.40 ± 0.02	0.47 ± 0.02	0.47 ± 0.02	0.59 ± 0.03	0.64 ± 0.03	0.49 ± 0.03	0.61 ± 0.03
37				0.62 ± 0.03	0.67 ± 0.03	0.53 ± 0.03	0.66 ± 0.03

Click to compress

Required columns (or general settings)

The following columns are required for the AGD(ACR) analysis:

Parameter	Description
Exposure (norm) (Measured)	The AGD(ACR) analysis is always using the normalized exposure, th column "Exposure (norm) (Measured)". However it is not required to normalize to any distance and in this case is "normalized exposure" = "measured exposure".
Calibration (Set value)	It is required to have calibration column. The value is used when getting the g-factor for the corresponding target/filter.
Phantom Thickness (Set value)	This is the phantom thickness (corresponds to a breast thickness). This column is required.
HVL(Measured)	This column is required if QuickHVL is used instead of a traditional HVL measurement.
HVL(AGD) (Measured)	In this column is the HVL for the AGD calculation specified. The value must be entered manually or linked automtatically from the HVL analysis.
AGD (Calculated)	This is the calculated average glandular dose. This value is compared against the pass/fail criteria you have specified.

8.7.15 AGD(IAEA)

The AGD(IAEA) analysis is used to evaluate the average glandular dose according to the European protocol ***IAEA, Technical Report Series no. 457, Dosimetry in Diagnostic Radiology: An International Code of Practice, page 155-163, 2007, ISSN 0074-1914***

and

Further factors for the estimation of mean glandular dose using the United Kingdom, European and IAEA breast dosimetry protocols , 2009, Dance DR, Young KC and van Engen RE

Supported target/filter combinations are: Mo/30 µm Mo, Mo/25 µm Rh, Rh/25 µm Rh, Rh/1 mm Al, W/50 µm Rh, W/0.5 mm Al, W/50 µm Ag and W/75 µm Ag.

This analysis is only using one row in your test. You can read the topic Add analysis to see how you add the analysis to a test.

If you want to modify the standard analysis, see topic Modify analysis and Advanced analysis for more information.

⊟ Typical AGD(IAEA) test using traditional HVL measurement

This example shows how the template looks like when HVL is evaluated with a traditional HVL measurement (by adding filters until the measured dose is reduced to half).

For this analysis you should specify the set mAs and the mAs value shown on the mammographic unit after the exposure should be entered as Ref mAs.

Set kV (kV)	Compr. paddle	Set mAs (mAs)
26	Yes	160

View / Select	#	Calibration	HVL(AGD) (mm Al)	Ref mAs (mAs)	Exposure (norm) (mGy)	Set Added filtr. (mm Al)	AGD (mGy)
	1	Mo/30 µm Mo			3,240	0,00	
	2	Mo/30 µm Mo			2,820	0,10	
	3	Mo/30 µm Mo			2,290	0,20	
	4	Mo/30 µm Mo			1,640	0,30	
	5	Mo/30 µm Mo			1,340	0,40	
	6	Mo/30 µm Mo				0,50	
	7	Mo/30 µm Mo	0,323	172,3	5,707		1,079

Half Value Layer

HVL is 0,323 mm Al

AGD (IAEA)

Result: Pass

AGD for Mo/30 µm Mo at 26,0 kV is 1,079 mGy (Max allowed is 3,000 mGy)

Half value layer: 0,323 mm Al
Incident air kerma (Ki): 5,707 mGy

Typical AGD(IAEA) test using Quick HVL

This example shows how the template looks like when HVL is evaluated by using the Quick HVL (Quick HVL is the HVL value measured with each exposure, the "1-shot HVL"). All measured data are acquired with one exposure.

For this analysis you should specify the set mAs and the mAs value shown on the mammographic unit after the exposure should be entered as Ref mAs.

Set kV (kV)	Compr. paddle	Set mAs (mAs)
26	Yes	160

View / Select	#	Calibration	Ref mAs (mAs)	Exposure (norm) (mGy)	HVL (mm Al)	HVL(AGD) (mm Al)	AGD (mGy)
	1	Mo/30 µm Mo	164,0	5,258	0,367	0,367	1,100

Half Value Layer

HVL is 0,367 mm Al

Average glandular dose

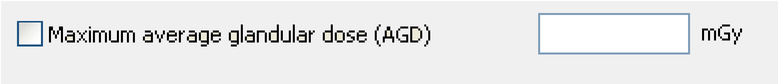
Result: Pass

AGD for Mo/30 µm Mo at 26,0 kV is 1,100 mGy (Max allowed is 3,000 mGy)

Half value layer: 0,367 mm Al
Incident air kerma (Ki): 5,258 mGy

Default pass/fail criteria

When you add the AGD(IAEA) analysis the following pass/fail criteria is shown:



The IAEA Code of Practice doesn't specify any pass/fail criteria, you have to specify them yourself.

Default result

AGD (IAEA)

Result: Pass

AGD for Mo/30 µm Mo at 27,0 kV is 0,4728 mGy (Max allowed is 7,000 mGy)

Half value layer: 0,323 mm Al
Incident air kerma (Ki): 2,500 mGy

Result layout and macros

As described in the topic Advanced analysis, it is possible to modify the the layout of the analysis result. The layout is defined by text combined with "macros". When the analysis result is shown, the macros are replaced with the appropriate calculated values, set values and measured values. The default layout of text AGD(IAEA) analysis looks like this:

$Title

Result: $TestResult

AGD for $TargetFilter at $kVp kV is $AGD $AGDUnit (Max allowed is $LimitMaxAGD $AGDUnit)

Half value layer: $HVL mm Al
Incident air kerma (Ki): $Ki $KiUnit

This text can be modified and more macros can be used to show more calculated results, for example the relative difference. The following macros are available for the AGD(IAEA) analysis:

$RowNo (Row number used for the analysis)
$Title (Specified title)
$Result (Analysis result)
$TestResult (Pass or fail text, the overall result for the test)
$TargetFilter (Calibration)
$AGDUnit (AGD unit)
$AGD (Average glandular dose)
$LimitMaxAGD (Max allowed AGD)
$kVp (Set kVp)
$HVL (Used HVL)
$SSD (Distance to which the AGD is normalized)
$KiUnit (Ki unit)
$Ki (Measured exposure)
$CDG50KiPMMAFactor (Used CDG50, Ki, PMMA factor)
$SFactor (Used s factor)
$RefmAs (Reference mAs to which AGD is normalized)
$SetmAs (Set mAs)

$SetMAS
$SetKV

Calculations

The AGD(IAEA), $AGD, is calculated as:

$AGD = $Ki * $CDG50KiPMMAFactor * $sFactor

where

$Ki = normalized incident air kerma, measured exposure value (from the column "Exposure (norm) (Measured)"). The IAEA Code of Practice says that the incident air kerma should be normalized to the mAs value (Ref mAs) shown after an exposure with the phantom in the beam using AEC. When measuring the incident air kerma a mAs set value is used as close as possible to the Ref mAs value.

$CDG50KiPMMAFactor is the CDG50,Ki,PMMA factor. It is dependant on HVL:

HVL (mm Al)	$C_{DG50,Ki,PMMA}$
0,25	0,149
0,3	0,177
0,35	0,202
0,4	0,223
0,45	0,248
0,5	0,276
0,55	0,304
0,6	0,326
0,65	0,349

$sFactor is the s-factor, it is dependant on the target/filter:

Calibration	s factor
Mo/30 um Mo	1
Mo/25 um Rh	1,017
Rh/25 um Rh	1,061
Rh/1 mm Al	1,044
W/50 um Rh	1,042
W/0.5 mm Al	1,149
W/50 um Ag	1,042
W/75 um Ag	1,042

Required columns (or general settings)

The following columns are required for the AGD(IAEA) analysis:

Parameter	Description
Exposure (norm) (Measured)	The AGD(ACR) analysis is always using the normalized exposure, th column "Exposure (norm) (Measured)". However it is not required to normalize to any distance and in this case is "normalized exposure" = "measured exposure".
Calibration (Set value)	It is required to have calibration column. The value is used when getting the g-factor for the corresponding target/filter.
Ref mAs (Measured)	This is the reference mAs that was used by the generator with the phantom in the field and AEC.
Set mAs (Set value)	This is the mAs set value used when measuring the incident air kerma without using AEC.
HVL(measured)	This column is required if QuickHVL is used instead of a traditional HVL measurement.
HVL(AGD) (Measured)	In this column is the HVL for the AGD calculation specified. The value must be entered manually or linked automtatically from the HVL analysis.
AGD (Calculated)	This is the calculated average glandular dose. This value is compared against the pass/fail criteria you have specified.

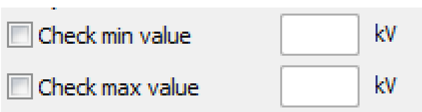
8.7.16 Min/Max

The Min/Max analysis is used to evaluate that a certain parameter is within/above/below a specified limit(s). The parameter analyzed is compared to the specified min and/or max limit. The min/max analysis can be used with all measured parameters and user-defined and user-calculated parameters. You can have multiple instances of this analysis (it is not limited to columns that are set to "Use for analysis"). You can read the topic Add analysis to see how you add the analysis to a test.

If you want to modify the standard analysis, see topic Modify analysis and Advanced analysis for more information.

Default pass/fail criteria

When you add the Min/Max analysis the following pass/fail criteria is shown:



There are no defaults, you must always specify the limits you want to have when you add a Min/Max analysis.

Default result

Tube voltage Min/Max check
Result: Pass

Result layout and macros

As described in the topic Advanced analysis, it is possible to modify the the layout of the analysis result. The layout is defined by text combined with "macros". When the analysis result is shown, the macros are replaced with the appropriate calculated values, set values and measured values. The default layout of text Min/Max analysis looks like this:

$Title
Result: $TestResult

This text can be modified and more macros can be used to show more calculated results, for example the relative difference. The following macros are available for the Min/Max analysis:

$Title (Specified title)
$TestResult (Pass or fail text, the overall result for the test)
$Result (Analysis result)
$GraphRel (Graphical representation of the results as %)
$GraphAbs (Graphical representation of the results)
$MaxRelDiff (Maximum relative difference)
$AbsDiffAtMaxRelDiff (Maximum absolute relative difference)
$SetValueAtMaxRelDiff (The set value for where maximum relative difference occur)
$HiLimitMaxRelDiff (High acceptance limit for the value where maximum difference occur)
$LoLimitMaxRelDiff (Low acceptance limit for the value where maximum difference occur)
$MaxAbsDiff (Maximum absolute difference)
$SetValueAtMaxAbsDiff (The set value for where maximum absolute difference occur)
$HiLimitMaxAbsDiff (High acceptance limit for the value where maximum difference occur)
$LoLimitMaxAbsDiff (Low acceptance limit for the value where maximum difference occur)
$Unit (The current unit)

Calculations

The following evaluation is done:

$MinLimit ≤ measured value ≤ $MaxLimit

If either of min or max limit is not specified the corresponding comparison is not performed.

Required columns (or general settings)

The following columns are required for the Accuracy analysis:

Parameter	Description
Measured value or User-calc value	A measured value or a user-calculated value is required for this analysis.

8.7.17 Checklist

A checklist is uatomatically analysed and the result is shown on the summary page. To add an analysis is optional. The Checklist analysis is used to evaluate a checklist. The checklist analysis looks at the number of warnings and failings in a checklist.

You can read the topic Add analysis to see how you add the analysis to a test or checklist.

If you want to modify the standard analysis, see topic Modify analysis and Advanced analysis for more information.

Typical checklist

View / Select	#	Question	Answer	Recommendation
	1	**OPERATOR PROTECTION**		
	2	Exposure switch mounted properly?	Yes	
	3	Gloves and aprons available	Yes	
	4	Gloves and aprons in good condition?	No	
	5	**PATIENT PROTECTION**		
	6	Gonadal protection provided?	Yes	
	7	Technique charts available?	Yes	
	8	Filter permanently installed?	Yes	
	9	**AREA SURVEY**		
	10	Approved warning sign on door(s)?	Yes	
	11	**EQUIPMENT**		
	12	Collimation functioning properly?	Yes	
	13	Audible exposure signal?	Yes	
	14	X-Ray warning sign on unit?	Yes	
	15	All controls, meters, lights and indicators working?	Yes	

Click to compress

Default pass/fail criteria

There are no pass/fail criteria for this analysis.

Default result

Checklist

Result: Pass

Total of 0 question(s) failed.
There were 0 warning(s).

Result layout and macros

As described in the topic Advanced analysis, it is possible to modify the the layout of the analysis result. The layout is defined by text combined with "macros". When the analysis result is shown, the macros are replaced with the appropriate calculated values, set values and measured values. The default layout of text Checklist analysis looks like this:

$Title

Result: $TestResult

Total of $NoOfFails question(s) failed.
There were $NoOfWarnings warning(s).

This text can be modified and more macros can be used to show more calculated results, for example the relative difference. The following macros are available for the Checklist analysis:

$Title (Specified title)
$TestResult (Pass or fail text, the overall result for the test)
$Result (Analysis result)
$TotalNoOfQuestions (Total number of questions)
$NoOfFails (Number of failed questions)
$NoOfWarnings (Number of warnings)

Calculations

No calculations are done.

Required columns (or general settings)

The following columns are required for the analysis:

Parameter	Description
Answer	This column is required.

8.7.18 AEC kV compensation

The AEC kV compensation analysis is used to test the performance of the automatic exposure control. You can use exposure values or optical density (O.D.) for the evaluation. This analysis can calculate the deviation from mean value, mean value and standard deviation. You can specify pass/fail criteria for these parameters. You can read the topic Add analysis to see how you add the analysis to a test.

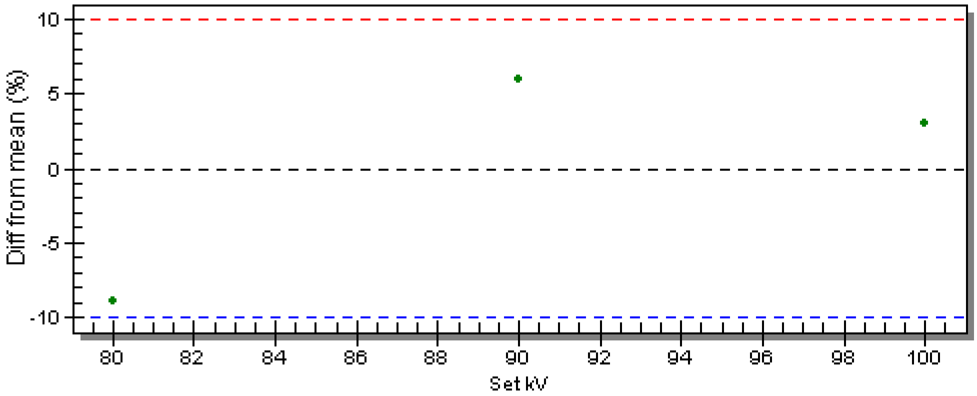
By default, deviation from mean value, mean value and standard deviation are calculated. If you want to include the standard deviation also, you must modify the standard analysis. See topic Modify analysis and Advanced analysis for more information.

Typical AEC kV compensation test (Exposure)

View / Select	#	Set kV (kV)	Exposure (mGy)	Exposure diff from mean (%)
	1	80,0	1,530	-8,9
	2	90,0	1,780	6,0
	3	100,0	1,730	3,0

AEC kV compensation

Result: Pass



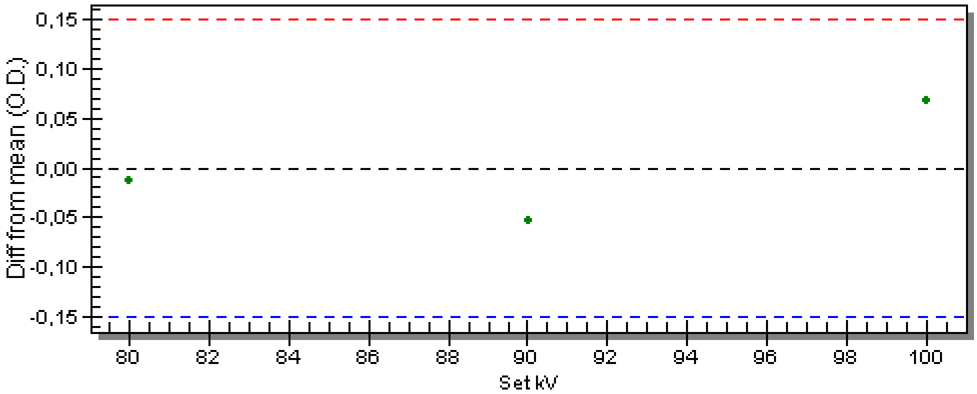
Largest deviation from mean (%): 8,9
Mean value: 1,680 mGy
Standard deviation: 0,1323 mGy

Typical AEC kV compensation test (O.D.)

View / Select	#	Set kV (kV)	Meas O.D.	Diff from mean (O.D.)
	1	80,0	0,45	-0,01
	2	90,0	0,41	-0,05
	3	100,0	0,53	0,07

AEC kV compensation

Result: Pass

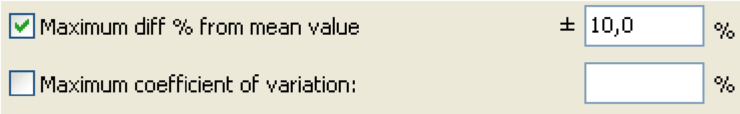


Largest deviation from mean (O.D.): 0,07
Mean value: 0,46 O.D.
Standard deviation: 0,06 O.D.

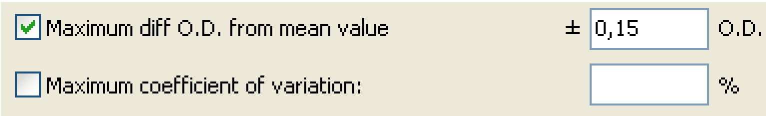
Default pass/fail criteria

When you add the AEC kV compensation analysis the following pass/fail criteria is shown. By default is only maximum difference from the mean value tested:

If Exposure is used:



If O.D. is used:

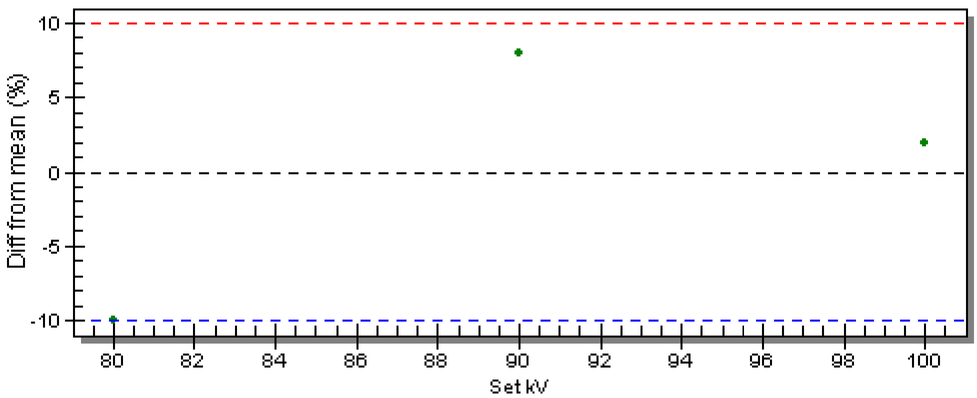


You must modify the layout to see the results of the additional parameter Coefficient of variation.

Default result (Exposure)

AEC kV compensation

Result: Pass



Largest deviation from mean (%): 10,0
Mean value: 1,667 mGy
Standard deviation: 0,1528 mGy

Result layout and macros

As described in the topic Advanced analysis, it is possible to modify the the layout of the analysis result. The layout is defined by text combined with "macros". When the analysis result is shown, the macros are replaced with the appropriate calculated values, set values and measured values. The default layout of text AEC kV compensation analysis looks like this:

$Title

Result: $TestResult

$Graph

Largest deviation from mean ($UnitForDeviation): $MaxDevFromMean
Mean value: $MeanValue $Unit
Standard deviation: $StandardDeviation $Unit

This text can be modified and more macros can be used to show more calculated results, for example the relative difference. The following macros are available for the AEC kV compensation analysis:

```
$Title (Specified title)
$Result (Analysis result)
$TestResult (Pass or fail text, the overall result for the test)
$Graph (Graphical representation of the results)
$TargetFilter (Calibration for first exposure used in analysis)
$CoeffOfVariation (Coefficient of variation)
$LimitForCoeffOfVariation (Limit for Coefficient of variation)
$UnitForDeviation (% or O.D. depending on method used)
$Unit (The current unit (O.D. or used Exposure unit))
$MaxDevFromMean (Maximum deviation from mean value)
$LimitForMaxDevFromMean (Maximum allowed deviation from the mean)
$MeanValue (Mean value)
$StandardDeviation (Standard deviation)
$FieldSelectionForMaxDev (Field selection where maximum deviation occurred)
```

Calculations

The mean ($MeanValue) is calculated as:

$MeanValue = (Value$_1$ + Value$_2$ + ... + Value$_n$) / n (based on rows included in the AEC kV compensation analysis)

for each row included in the analysis the following is calculated:

If Exposure is used:
Exposure diff from mean (%) = 100 * (Exposure value - Mean value) / Mean value

If optical density (O.D.) is used:
Diff from mean (O.D.) = 100 * (Meas O.D. - Mean value) / Mean value

The macro $MaxDevFromMean is set to the maximum of these values.

Coefficient of variation is calculated as:

$CoeffOfVariation = $StandardDeviation / $MeanValue

where the Standard deviation is calculated as:

$StandardDeviation = √ [((X$_1$ - $MeanValue)^2 + (X$_2$ - $MeanValue)^2 + ... + (X$_n$ - $MeanValue)^2)/n]

Required columns (or general settings)

The following columns are required for the AEC kV compensation analysis:

Parameter	Description
Measured value or Exposure or O.D.	The measured values are used to calculate the difference from mean value, coefficient of variation and standard deviation.
diff from mean (%) or diff from mean(O.D.)	This is the calculated relative difference between the each individual measured value and the mean value of all measured values. This column is optional, however, it is recommended to have this column if this parameter is evaluated since the indication of failing exposures is made in this column.

8.7.19 AEC mA compensation

The AEC mA compensation analysis is used to test the performance of the automatic exposure control. You can use exposure values or optical density (O.D.) for the evaluation. This analysis can calculate the deviation from mean value, mean value and standard deviation. You can specify pass/fail criteria for these parameters. You can read the topic Add analysis to see how you add the analysis to a test.

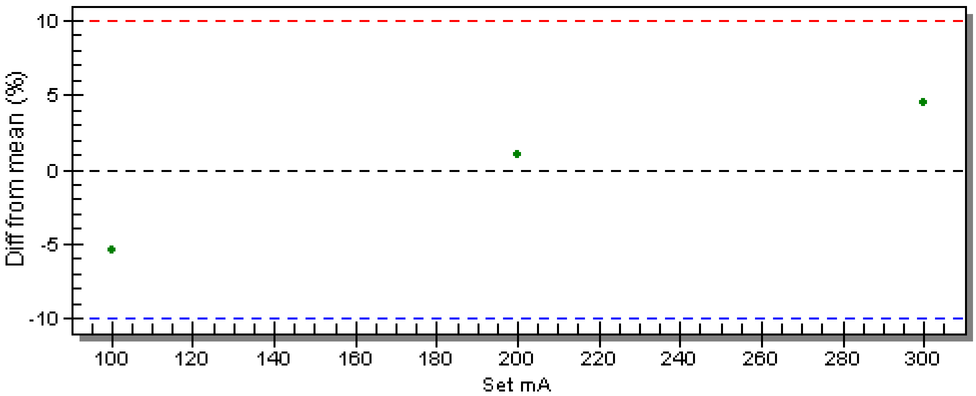
By default, deviation from mean value, mean value and standard deviation are calculated. If you want to include the standard deviation also, you must modify the standard analysis. See topic Modify analysis and Advanced analysis for more information.

Typical AEC mA compensation test (Exposure)

View / Select	#	Set mA (mA)	Exposure (mGy)	Exposure diff from mean (%)
	1	100,0	16,30	-5,4
	2	200,0	17,40	1,0
	3	300,0	18,00	4,4

AEC mA compensation

Result: Pass



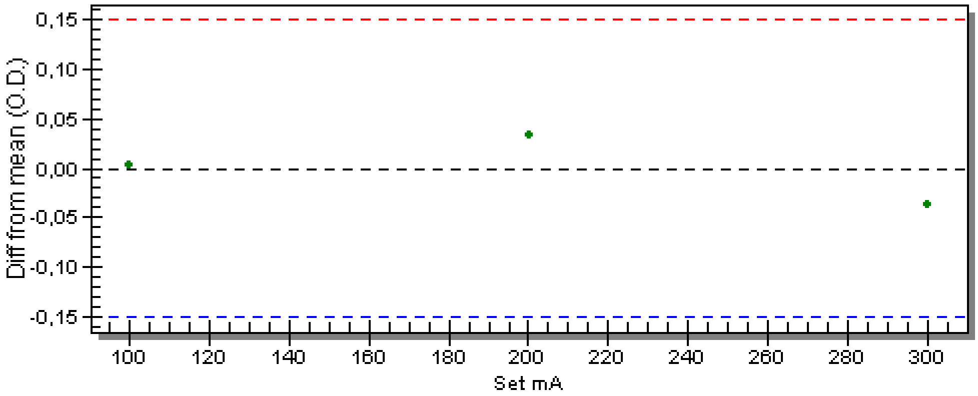
Largest deviation from mean (%): 5,4
Mean value: 17,23 mGy
Standard deviation: 0,8622 mGy

Typical AEC mA compensation test (O.D.)

View / Select	#	Set mA (mA)	Meas O.D.	Diff from mean (O.D.)
	1	100,0	0,56	0,00
	2	200,0	0,59	0,03
	3	300,0	0,52	-0,04

AEC mA compensation

Result: Pass

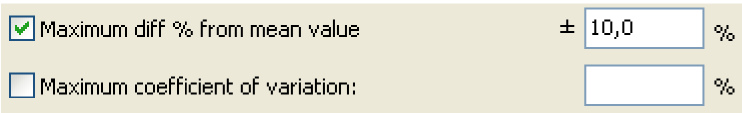


Largest deviation from mean (O.D.): 0,04
Mean value: 0,56 O.D.
Standard deviation: 0,04 O.D.

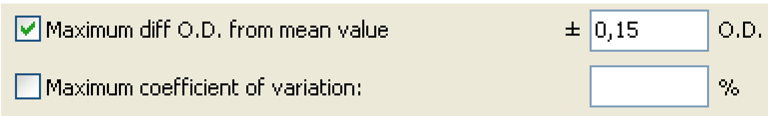
Default pass/fail criteria

When you add the AEC mA compensation analysis the following pass/fail criteria is shown. By default is only maximum difference from the mean value tested:

If Exposure is used:



If O.D. is used:

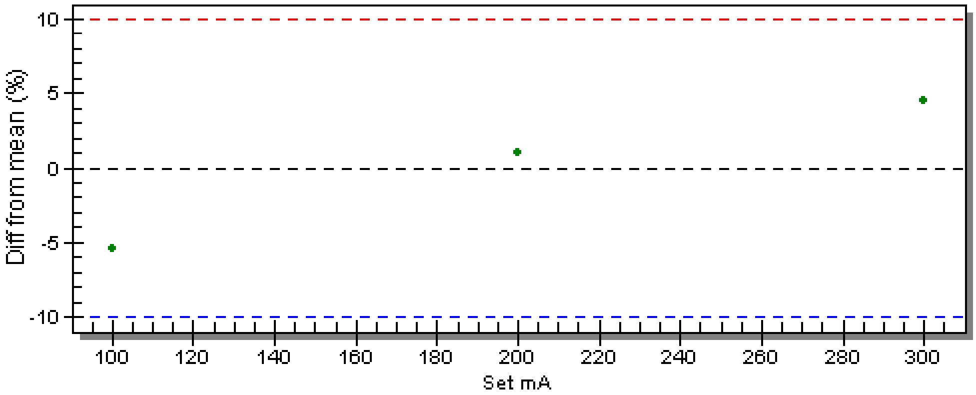


You must modify the layout to see the results of the additional parameter Coefficient of variation.

Default result (Exposure)

AEC mA compensation

Result: Pass



Largest deviation from mean (%): 5,4
Mean value: 17,23 mGy
Standard deviation: 0,8622 mGy

Result layout and macros

As described in the topic Advanced analysis, it is possible to modify the the layout of the analysis result. The layout is defined by text combined with "macros". When the analysis result is shown, the macros are replaced with the appropriate calculated values, set values and measured values. The default layout of text AEC mA compensation analysis looks like this:

$Title

Result: $TestResult

$Graph

Largest deviation from mean ($UnitForDeviation): $MaxDevFromMean
Mean value: $MeanValue $Unit
Standard deviation: $StandardDeviation $Unit

This text can be modified and more macros can be used to show more calculated results, for example the relative difference. The following macros are available for the AEC mA compensation analysis:

$Title (Specified title)
$Result (Analysis result)
$TestResult (Pass or fail text, the overall result for the test)
$Graph (Graphical representation of the results)
$TargetFilter (Calibration for first exposure used in analysis)
$CoeffOfVariation (Coefficient of variation)
$LimitForCoeffOfVariation (Limit for Coefficient of variation)
$UnitForDeviation (% or O.D. depending on method used)
$Unit (The current unit (O.D. or used Exposure unit))
$MaxDevFromMean (Maximum deviation from mean value)
$LimitForMaxDevFromMean (Maximum allowed deviation from the mean)
$MeanValue (Mean value)
$StandardDeviation (Standard deviation)
$FieldSelectionForMaxDev (Field selection where maximum deviation occurred)

Calculations

The mean ($MeanValue) is calculated as:

$MeanValue = (Value$_1$ + Value$_2$ + ... + Value$_n$) / n (based on rows included in the AEC mA compensation analysis)

for each row included in the analysis the following is calculated:

If Exposure is used:
Exposure diff from mean (%) = 100 * (Exposure value - Mean value) / Mean value

If optical density (O.D.) is used:
Diff from mean (O.D.) = 100 * (Meas O.D. - Mean value) / Mean value

The macro $MaxDevFromMean is set to the maximum of these values.

Coefficient of variation is calculated as:

$CoeffOfVariation = $StandardDeviation / $MeanValue

where the Standard deviation is calculated as:

$StandardDeviation = √ [((X$_1$ - $MeanValue)^2 + (X$_2$ - $MeanValue)^2 + ... + (X$_n$ - $MeanValue)^2)/n]

Required columns (or general settings)

The following columns are required for the AEC mA compensation analysis:

Parameter	Description
Measured value or Exposure or O.D.	The measured values are used to calculate the difference from mean value, coefficient of variation and standard deviation.
diff from mean (%) or diff from mean(O.D.)	This is the calculated relative difference between the each individual measured value and the mean value of all measured values. This column is optional, however, it is recommended to have this column if this parameter is evaluated since the indication of failing exposures is made in this column.

8.7.20 AEC reproducibility

The AEC reproducibility analysis is used to test the performance of the automatic exposure control. You can use exposure values or optical density (O.D.) for the evaluation. This analysis can calculate the deviation from mean value, mean value and standard deviation. You can specify pass/fail criteria for these parameters. You can read the topic Add analysis to see how you add the analysis to a test.

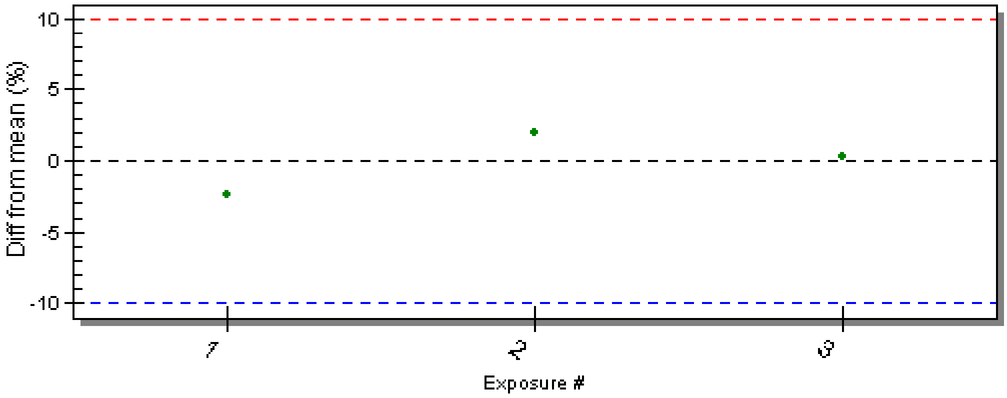
By default, deviation from mean value, mean value and standard deviation are calculated. If you want to include the standard deviation also, you must modify the standard analysis. See topic Modify analysis and Advanced analysis for more information.

Typical AEC reproducibility test (Exposure)

View / Select	#	Exposure (mGy)	Exposure diff from mean (%)
	1	3,193	-2,3
	2	3,335	2,0
	3	3,281	0,3

AEC reproducibility

Result: Pass



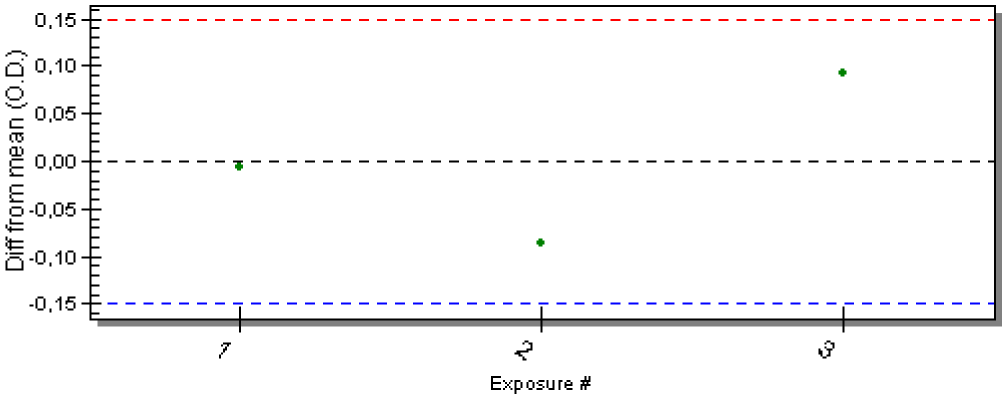
Largest deviation from mean (%): 2,3
Mean value: 3,270 mGy
Standard deviation: 0,07168 mGy

Typical AEC reproducibility test (O.D.)

View / Select	#	Meas O.D.	Diff from mean (O.D.)
	1	0,56	-0,01
	2	0,48	-0,09
	3	0,66	0,09

AEC reproducibility

Result: Pass

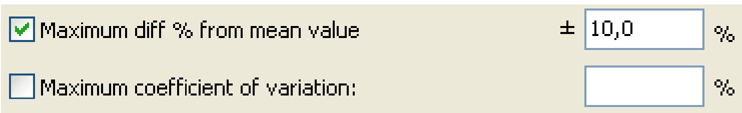


Largest deviation from mean (O.D.): 0,09
Mean value: 0,57 O.D.
Standard deviation: 0,09 O.D.

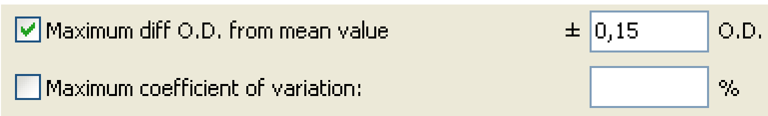
Default pass/fail criteria

When you add the AEC reproducibility analysis the following pass/fail criteria is shown. By default is only maximum difference from the mean value tested:

If Exposure is used:



If O.D. is used:

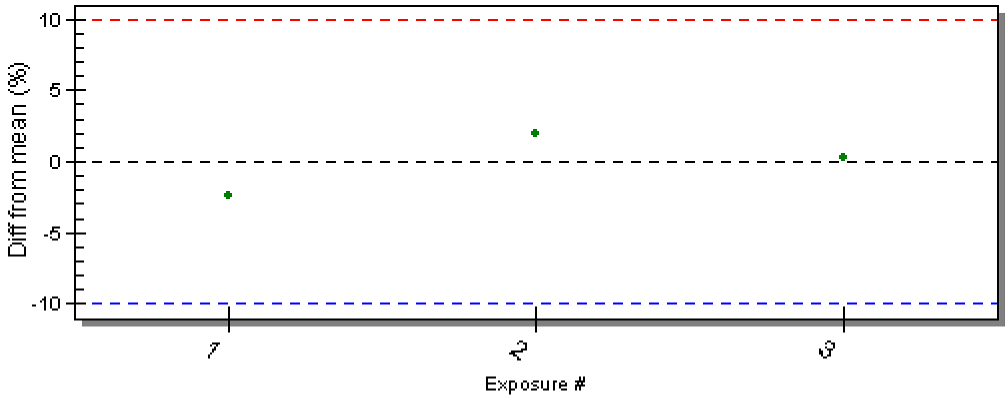


You must modify the layout to see the results of the additional parameter Coefficient of variation.

Default result (Exposure)

AEC reproducibility

Result: Pass



Largest deviation from mean (%): 2,3
Mean value: 3,270 mGy
Standard deviation: 0,07168 mGy

Result layout and macros

As described in the topic [Advanced analysis](), it is possible to modify the the layout of the analysis result. The layout is defined by text combined with "macros". When the analysis result is shown, the macros are replaced with the appropriate calculated values, set values and measured values. The default layout of text AEC reproducibility analysis looks like this:

$Title

Result: $TestResult

$Graph

Largest deviation from mean ($UnitForDeviation): $MaxDevFromMean
Mean value: $MeanValue $Unit
Standard deviation: $StandardDeviation $Unit

This text can be modified and more macros can be used to show more calculated results, for example the relative difference. The following macros are available for the AEC reproducibility analysis:

$Title (Specified title)
$Result (Analysis result)
$TestResult (Pass or fail text, the overall result for the test)
$Graph (Graphical representation of the results)
$TargetFilter (Calibration for first exposure used in analysis)
$CoeffOfVariation (Coefficient of variation)
$LimitForCoeffOfVariation (Limit for Coefficient of variation)
$UnitForDeviation (% or O.D. depending on method used)
$Unit (The current unit (O.D. or used Exposure unit))
$MaxDevFromMean (Maximum deviation from mean value)
$LimitForMaxDevFromMean (Maximum allowed deviation from the mean)
$MeanValue (Mean value)
$StandardDeviation (Standard deviation)
$FieldSelectionForMaxDev (Field selection where maximum deviation occurred)

Calculations

The mean ($MeanValue) is calculated as:

$MeanValue = (Value$_1$ + Value$_2$ + ... + Value$_n$) / n (based on rows included in the AEC reproducibility analysis)

for each row included in the analysis the following is calculated:

If Exposure is used:
Exposure diff from mean (%) = 100 * (Exposure value - Mean value) / Mean value

If optical density (O.D.) is used:
Diff from mean (O.D.) = 100 * (Meas O.D. - Mean value) / Mean value

The macro $MaxDevFromMean is set to the maximum of these values.

Coefficient of variation is calculated as:

$CoeffOfVariation = $StandardDeviation / $MeanValue

where the Standard deviation is calculated as:

$StandardDeviation = √ [((X$_1$ - $MeanValue)^2 + (X$_2$ - $MeanValue)^2 + ... + (X$_n$ - $MeanValue)^2)/n]

Required columns (or general settings)

The following columns are required for the AEC reproducibility analysis:

Parameter	Description
Measured value or Exposure or O.D.	The measured values are used to calculate the difference from mean value, coefficient of variation and standard deviation.
diff from mean (%) or diff from mean(O.D.)	This is the calculated relative difference between the each individual measured value and the mean value of all measured values. This column is optional, however, it is recommended to have this column if this parameter is evaluated since the indication of failing exposures is made in this column.

8.7.21 AEC reciprocity

The AEC reciprocity analysis is used to test the performance of the automatic exposure control. You can use exposure values or optical density (O.D.) for the evaluation. This analysis can calculate the deviation from mean value, mean value and standard deviation. You can specify pass/fail criteria for these parameters. You can read the topic Add analysis to see how you add the analysis to a test.

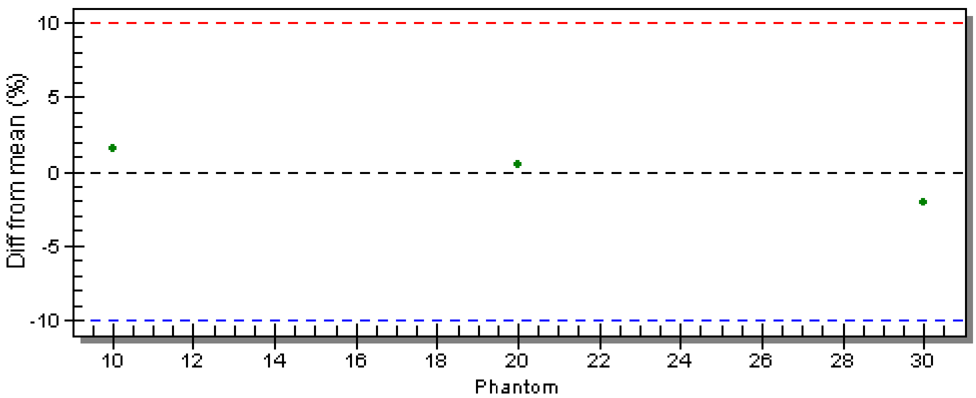
By default, deviation from mean value, mean value and standard deviation are calculated. If you want to include the standard deviation also, you must modify the standard analysis. See topic Modify analysis and Advanced analysis for more information.

Typical AEC reciprocity test (Exposure)

View / Select	#	Phantom (cm)	Exposure (mGy)	Exposure diff from mean (%)
	1	10	2,782	1,6
	2	20	2,751	0,5
	3	30	2,681	-2,1

AEC reciprocity

Result: Pass



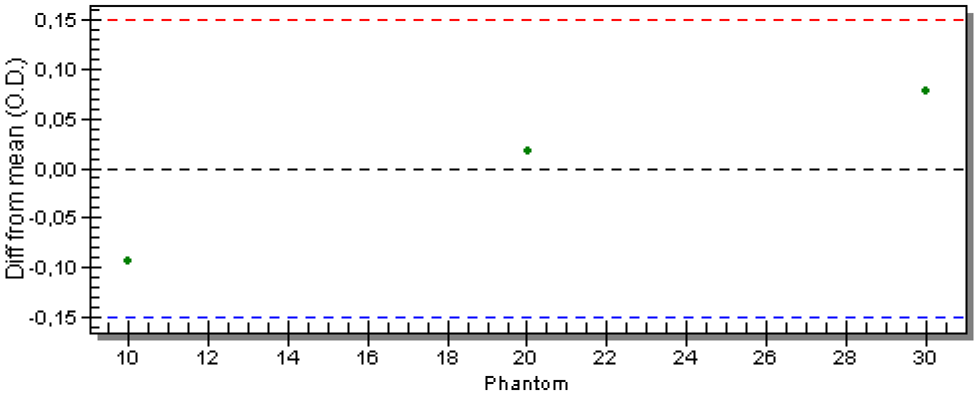
Largest deviation from mean (%): 2,1
Mean value: 2,738 mGy
Standard deviation: 0,05174 mGy

Typical AEC reciprocity test (O.D.)

View / Select	#	Phantom (cm)	Meas O.D.	Diff from mean (O.D.)
	1	10,00	0,45	-0,09
	2	20,00	0,56	0,02
	3	30,00	0,62	0,08

AEC reciprocity

Result: Pass

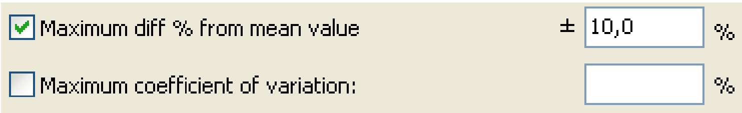


Largest deviation from mean (O.D.): 0,09
Mean value: 0,54 O.D.
Standard deviation: 0,09 O.D.

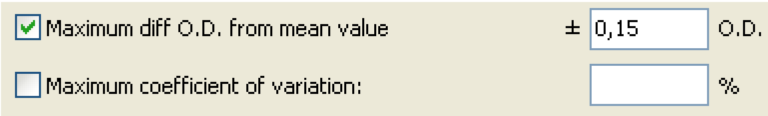
Default pass/fail criteria

When you add the AEC reciprocity analysis the following pass/fail criteria is shown. By default is only maximum difference from the mean value tested:

If Exposure is used:



If O.D. is used:

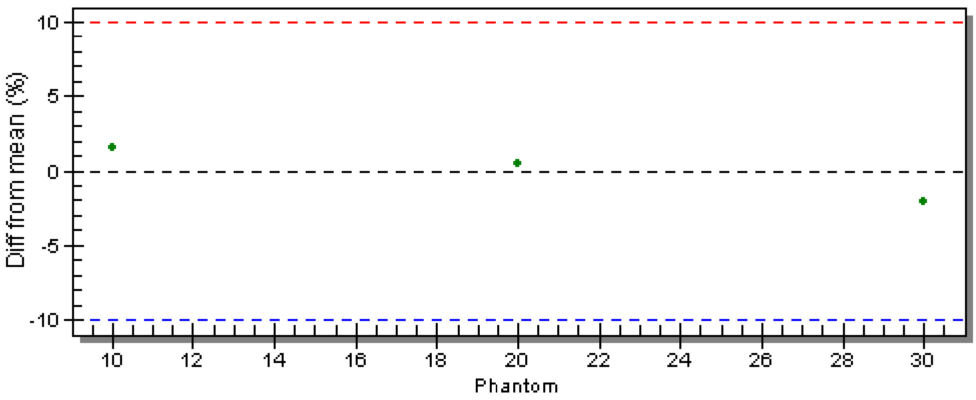


You must modify the layout to see the results of the additional parameter Coefficient of variation.

Default result (Exposure)

AEC reciprocity

Result: Pass



Largest deviation from mean (%): 2,1
Mean value: 2,738 mGy
Standard deviation: 0,05174 mGy

Result layout and macros

As described in the topic Advanced analysis, it is possible to modify the the layout of the analysis result. The layout is defined by text combined with "macros". When the analysis result is shown, the macros are replaced with the appropriate calculated values, set values and measured values. The default layout of text AEC reciprocity analysis looks like this:

$Title

Result: $TestResult

$Graph

Largest deviation from mean ($UnitForDeviation): $MaxDevFromMean
Mean value: $MeanValue $Unit
Standard deviation: $StandardDeviation $Unit

This text can be modified and more macros can be used to show more calculated results, for example the relative difference. The following macros are available for the AEC reciprocity analysis:

$Title (Specified title)
$Result (Analysis result)
$TestResult (Pass or fail text, the overall result for the test)
$Graph (Graphical representation of the results)
$TargetFilter (Calibration for first exposure used in analysis)
$CoeffOfVariation (Coefficient of variation)
$LimitForCoeffOfVariation (Limit for Coefficient of variation)
$UnitForDeviation (% or O.D. depending on method used)
$Unit (The current unit (O.D. or used Exposure unit))
$MaxDevFromMean (Maximum deviation from mean value)
$LimitForMaxDevFromMean (Maximum allowed deviation from the mean)
$MeanValue (Mean value)
$StandardDeviation (Standard deviation)
$FieldSelectionForMaxDev (Field selection where maximum deviation occurred)

Calculations

The mean ($MeanValue) is calculated as:

$MeanValue = (Value$_1$ + Value$_2$ + ... + Value$_n$) / n (based on rows included in the AEC reciprocity analysis)

for each row included in the analysis the following is calculated:

If Exposure is used:
Exposure diff from mean (%) = 100 * (Exposure value - Mean value) / Mean value

If optical density (O.D.) is used:
Diff from mean (O.D.) = 100 * (Meas O.D. - Mean value) / Mean value

The macro $MaxDevFromMean is set to the maximum of these values.

Coefficient of variation is calculated as:

$CoeffOfVariation = $StandardDeviation / $MeanValue

where the Standard deviation is calculated as:

$StandardDeviation = √ [((X$_1$ - $MeanValue)^2 + (X$_2$ - $MeanValue)^2 + ... + (X$_n$ - $MeanValue)^2)/n]

Required columns (or general settings)

The following columns are required for the AEC reciprocity analysis:

Parameter	Description
Measured value or Exposure or O.D.	The measured values are used to calculate the difference from mean value, coefficient of variation and standard deviation.
diff from mean (%) or diff from mean(O.D.)	This is the calculated relative difference between the each individual measured value and the mean value of all measured values. This column is optional, however, it is recommended to have this column if this parameter is evaluated since the indication of failing exposures is made in this column.

8.7.22 AEC field balance

The AEC field balance analysis is used to test the performance of the automatic exposure control. You can use exposure values or optical density (O.D.) for the evaluation. This analysis can calculate the deviation from mean value, mean value and standard deviation. You can specify pass/fail criteria for these parameters. You can read the topic Add analysis to see how you add the analysis to a test.

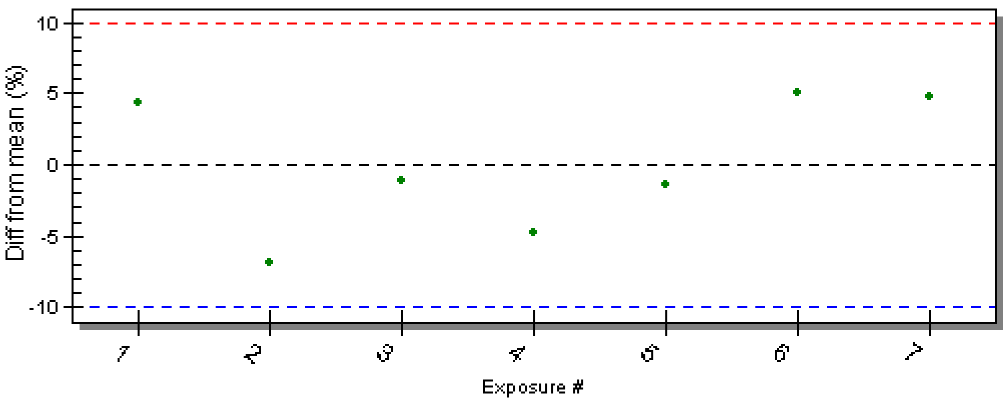
By default, deviation from mean value, mean value and standard deviation are calculated. If you want to include the standard deviation also, you must modify the standard analysis. See topic Modify analysis and Advanced analysis for more information.

Typical AEC field balance test (Exposure)

View / Select	#	Field selection	Exposure (mGy)	Exposure diff from mean (%)
	1	Left	2,871	4,4
	2	Center	2,561	-6,9
	3	Right	2,721	-1,1
	4	Left+Center	2,621	-4,7
	5	Center+Right	2,712	-1,4
	6	Left+Right	2,891	5,1
	7	Left+Center+Right	2,881	4,7

AEC field balance

Result: Pass



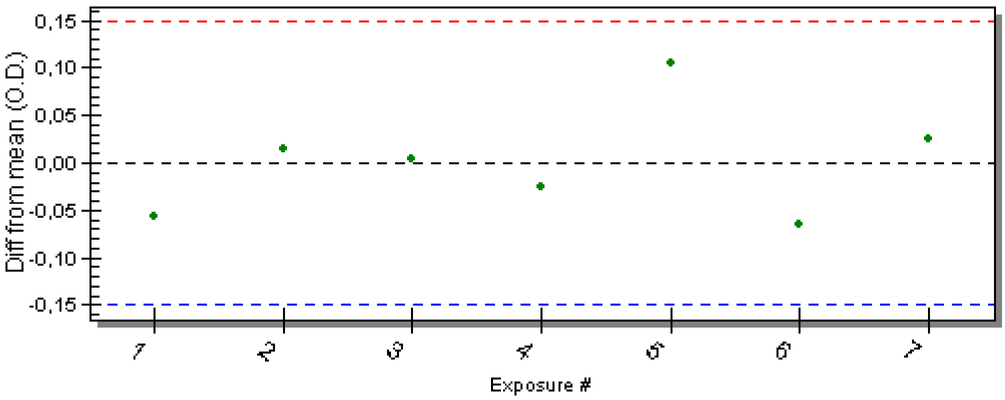
Largest deviation from mean (%): 6,9
Mean value: 2,751 mGy
Standard deviation: 0,1331 mGy

Typical AEC field balance test (O.D.)

View / Select	#	Field selection	Meas O.D.	Diff from mean (O.D.)
	1	Left	0,45	-0,06
	2	Center	0,52	0,01
	3	Right	0,51	0,00
	4	Left+Center	0,48	-0,03
	5	Center+Right	0,61	0,10
	6	Left+Right	0,44	-0,07
	7	Left+Center+Right	0,53	0,02

AEC field balance

Result: Pass



Largest deviation from mean (O.D.): 0,10
Mean value: 0,51 O.D.
Standard deviation: 0,06 O.D.

Default pass/fail criteria

When you add the AEC field balance analysis the following pass/fail criteria is shown. By default is only maximum difference from the mean value tested:

If Exposure is used:

☑ Maximum diff % from mean value	±	10,0	%
☐ Maximum coefficient of variation:			%

If O.D. is used:

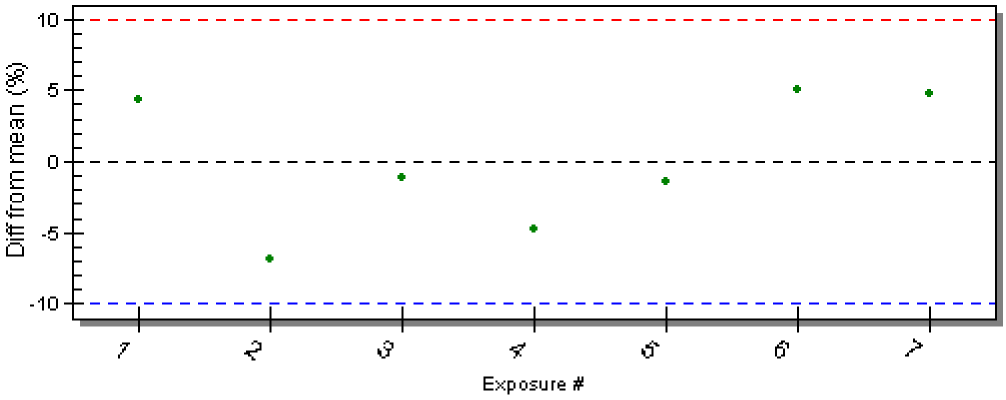
☑ Maximum diff O.D. from mean value	±	0,15	O.D.
☐ Maximum coefficient of variation:			%

You must modify the layout to see the results of the additional parameter Coefficient of variation.

Default result (Exposure)

AEC field balance

Result: Pass



Largest deviation from mean (%): 6,9
Mean value: 2,751 mGy
Standard deviation: 0,1331 mGy

Result layout and macros

As described in the topic [Advanced analysis](), it is possible to modify the the layout of the analysis result. The layout is defined by text combined with "macros". When the analysis result is shown, the macros are replaced with the appropriate calculated values, set values and measured values. The default layout of text AEC field balance analysis looks like this:

$Title

Result: $TestResult

$Graph

Largest deviation from mean ($UnitForDeviation): $MaxDevFromMean
Mean value: $MeanValue $Unit
Standard deviation: $StandardDeviation $Unit

This text can be modified and more macros can be used to show more calculated results, for example the relative difference. The following macros are available for the AEC field balance analysis:

$Title (Specified title)
$Result (Analysis result)
$TestResult (Pass or fail text, the overall result for the test)
$Graph (Graphical representation of the results)
$TargetFilter (Calibration for first exposure used in analysis)
$CoeffOfVariation (Coefficient of variation)
$LimitForCoeffOfVariation (Limit for Coefficient of variation)
$UnitForDeviation (% or O.D. depending on method used)
$Unit (The current unit (O.D. or used Exposure unit))
$MaxDevFromMean (Maximum deviation from mean value)
$LimitForMaxDevFromMean (Maximum allowed deviation from the mean)
$MeanValue (Mean value)
$StandardDeviation (Standard deviation)
$FieldSelectionForMaxDev (Field selection where maximum deviation occurred)

Calculations

The mean ($MeanValue) is calculated as:

$MeanValue = (Value$_1$ + Value$_2$ + ... + Value$_n$) / n (based on rows included in the AEC field balance analysis)

for each row included in the analysis the following is calculated:

If Exposure is used:
Exposure diff from mean (%) = 100 * (Exposure value - Mean value) / Mean value

If optical density (O.D.) is used:
Diff from mean (O.D.) = 100 * (Meas O.D. - Mean value) / Mean value

The macro $MaxDevFromMean is set to the maximum of these values.

Coefficient of variation is calculated as:

$CoeffOfVariation = $StandardDeviation / $MeanValue

where the Standard deviation is calculated as:

$StandardDeviation = √ [((X$_1$ - $MeanValue)^2 + (X$_2$ - $MeanValue)^2 + ... + (X$_n$ - $MeanValue)^2)/n]

Required columns (or general settings)

The following columns are required for the AEC field balance analysis:

Parameter	Description
Measured value or Exposure or O.D.	The measured values are used to calculate the difference from mean value, coefficient of variation and standard deviation.
diff from mean (%) or diff from mean(O.D.)	This is the calculated relative difference between the each individual measured value and the mean value of all measured values. This column is optional, however, it is recommended to have this column if this parameter is evaluated since the indication of failing exposures is made in this column.

8.7.23 AEC densitiy correction

The AEC density correction analysis is used to test the performance of the automatic exposure control. You can use exposure values or optical density (O.D.) for the evaluation. This analysis doesn't have any pass/fail criteria, you must decide if the test fails or passes.

You can read the topic Add analysis to see how you add the analysis to a test.

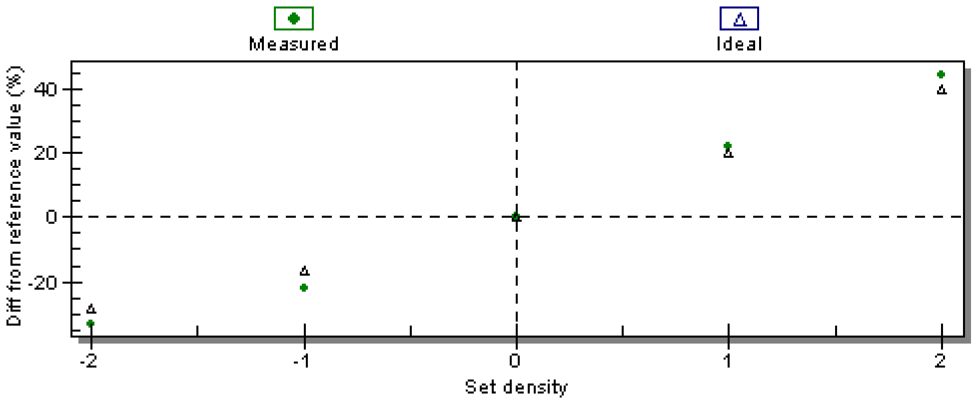
By default the measured exposure or optical density is plotted in a graph and compared to an ideal curve. If you want to include the standard deviation also, you must modify the standard analysis. See topic Modify analysis and Advanced analysis for more information.

Typical AEC density correction test (Exposure)

View / Select	#	Set density	Exposure (mGy)	Diff from ref. val. (%)
▶	1	-2	6,000	-33,3
	2	-1	7,000	-22,2
	3	0	9,000	0,0
	4	+1	11,00	22,2
	5	+2	13,00	44,4

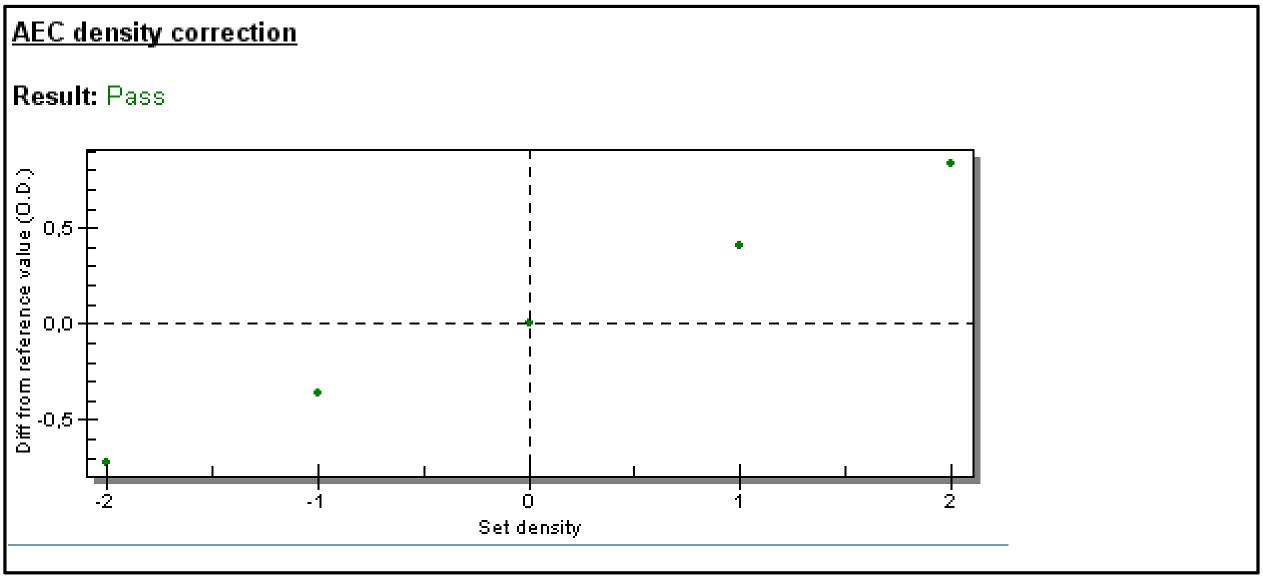
AEC density correction

Result: Pass



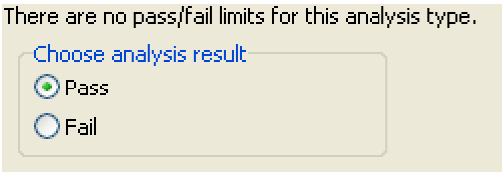
Typical AEC density correction test (O.D.)

View / Select	#	Set density	Meas O.D.	Diff from ref. val (O.D.)
	1	-2	0,36	-0,72
	2	-1	0,72	-0,36
	3	0	1,08	0,00
	4	+1	1,49	0,41
	5	+2	1,91	0,83

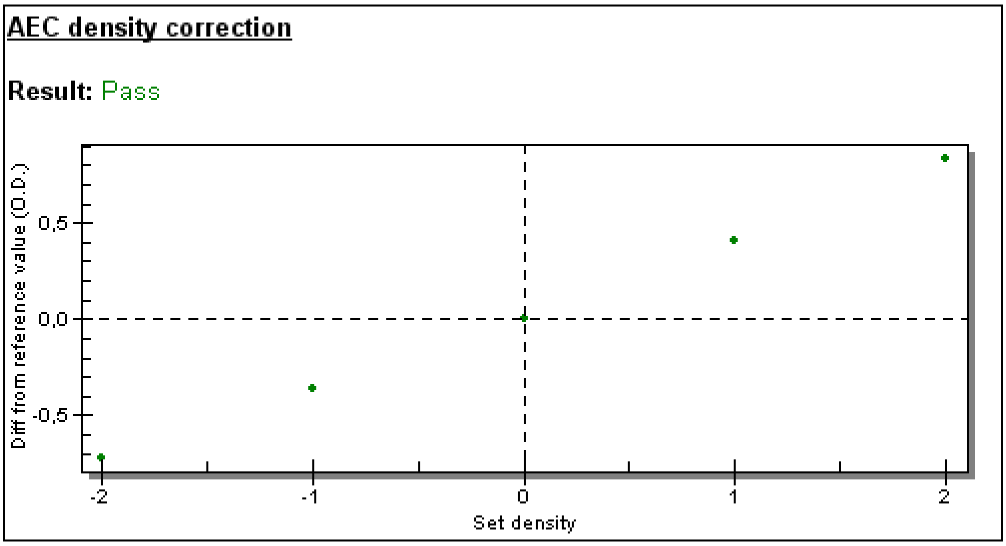


Default pass/fail criteria

There are no pass/fail criteria for this analysis. You must decide this.



Default result (Exposure)



Result layout and macros

As described in the topic Advanced analysis, it is possible to modify the the layout of the analysis result. The layout is defined by text combined with "macros". When the analysis result is shown, the macros are replaced with the appropriate calculated values, set values and measured values. The default layout of text AEC density correction analysis looks like this:

$Title

Result: $TestResult

$Graph

This text can be modified and more macros can be used to show more calculated results, for example the relative difference. The following macros are available for the AEC density correction analysis:

$Title (Specified title)
$Result (Analysis result)
$TestResult (Pass or fail text, the overall result for the test)
$Graph (Graphical representation of the results)
$TargetFilter (Calibration for first exposure used in analysis)
$Unit (The current unit (O.D. or used Exposure unit))
$UnitForDeviation (% or O.D. depending on method used)

Calculations

There are no calculations.

Required columns (or general settings)

The following columns are required for the AEC density correction analysis:

Parameter	Description
Measured value or Exposure or O.D.	The measured values are used to calculate the difference from mean value, coefficient of variation and standard deviation.
Set density	This is the density setting.

8.7.24 mA linearity (Obsolete)

NOTICE!
This section describes the **mA linearity** analysis that exists in releases before June 2018. In Releases from June 2018 and later it is replaced by a new analysis mA and mAs linearity. All legacy measurements and templates that are using this "old" analysis continue to work as before.

The mA linearity analysis is used to evaluate the linearity of an X-ray system. The analysis can check the exposure/mAs between adjacent stations, difference between highest/lowest and the deviation from average. You can specify pass/fail criteria for these parameters. You can read the topic Add analysis to see how you add the analysis to a test.

By default, only the difference between adjacent stations are evaluated. If you want to include the standard deviation also, you must modify the standard analysis. See topic Modify analysis and Advanced analysis for more information.

Typical mA linearity test

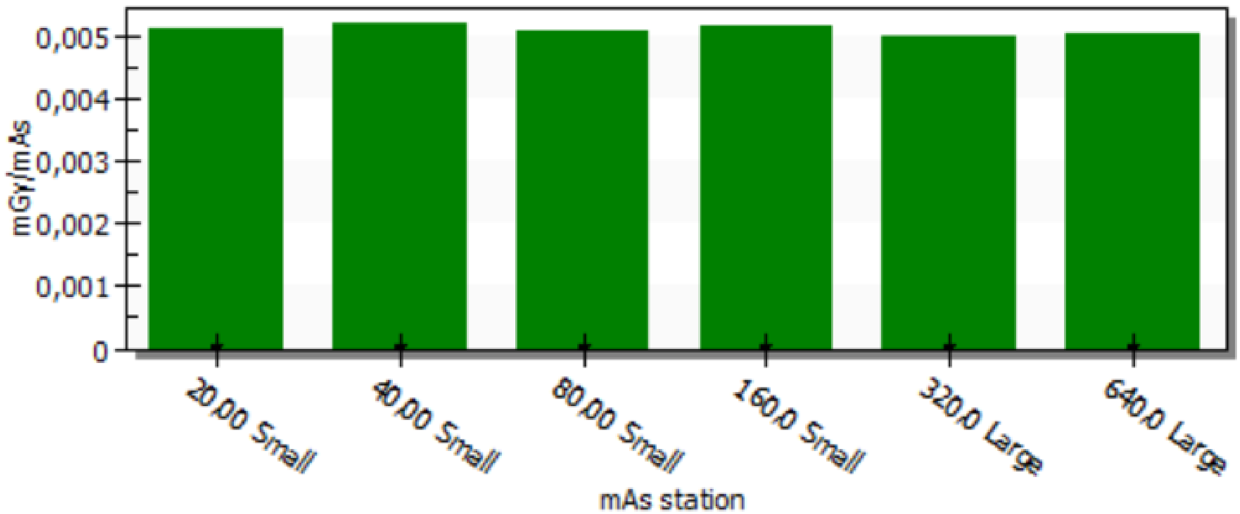
Set kV (kV)
80

View / Select	#	Set mAs (mAs)	Focal spot	Exposure (mGy)	Exposure/mAs (mGy/mAs)	Result
	1	20	Small	0,1030	0,005150	
	2	40	Small	0,2090	0,005225	
	3	80	Small	0,4060	0,005075	
	4	160	Small	0,8270	0,005169	
	5	320	Large	1,599	0,004997	
	6	640	Large	3,230	0,005047	

mAs linearity

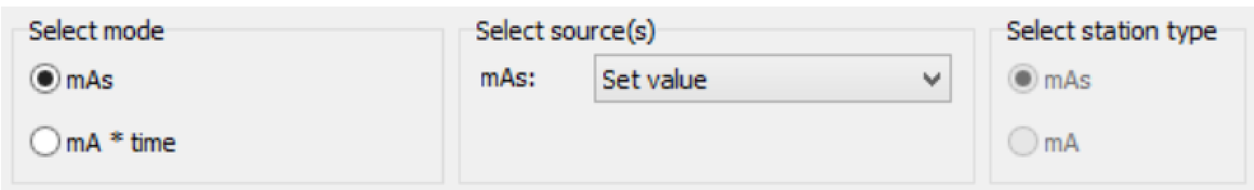
Result: Pass

Maximum difference in mGy/mAs between adjacent stations: 1,7 % (limit 10,0 %)

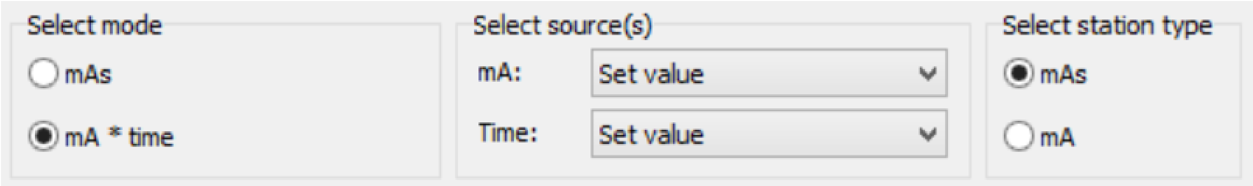


Select parameters

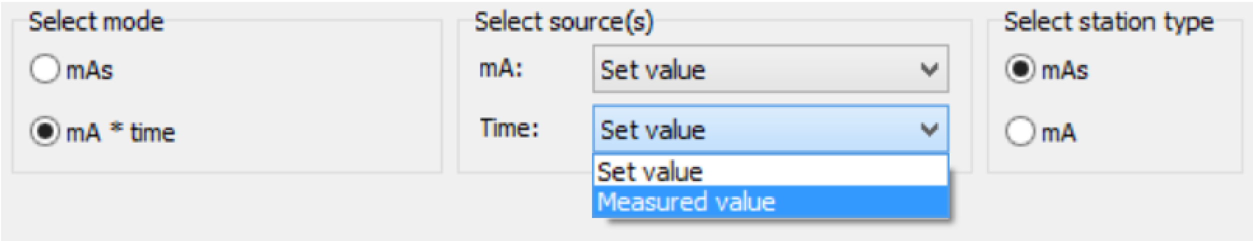
You can chose between measured or set values and between mAs , mA and time or only mA when you do the linearity evaluation.



or

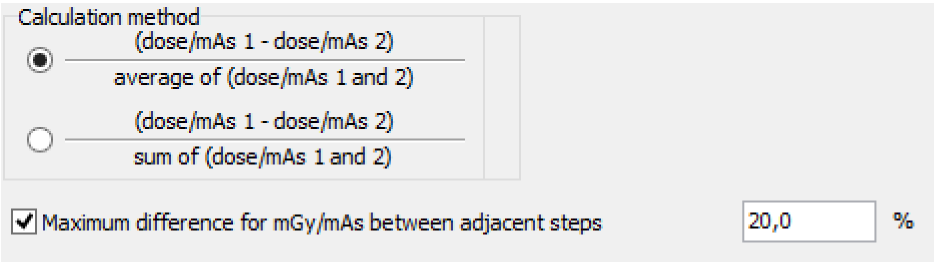


or

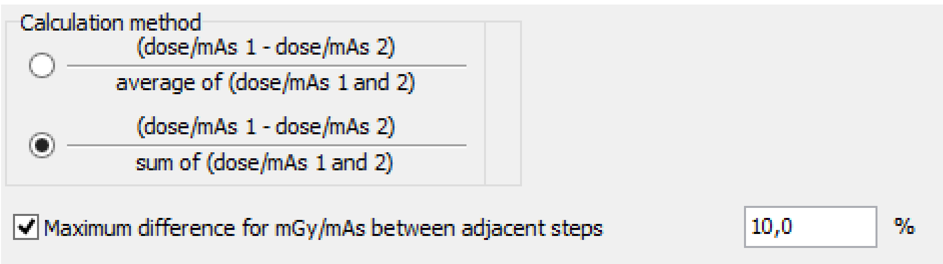


Default pass/fail criteria

There are two different calculations methods to chose from:

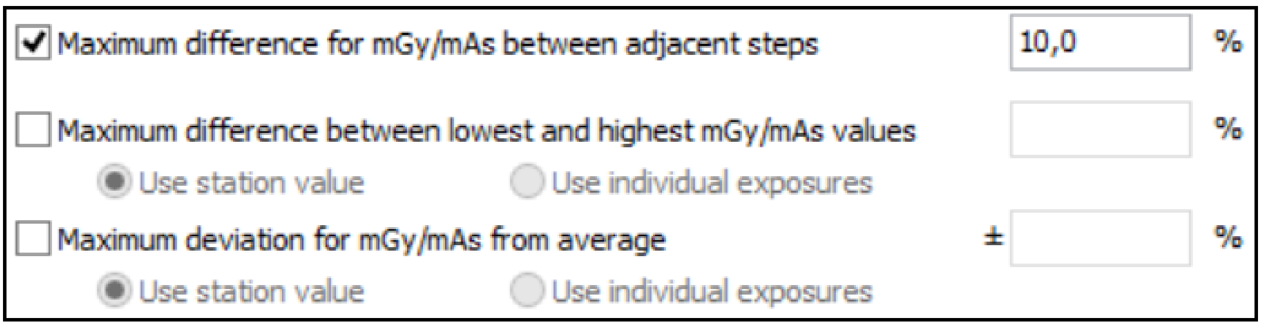


or



The first method is default and is most common method used. Note: Both methods give exactly the same result with the pass/fail limits shwon in the pictures above.

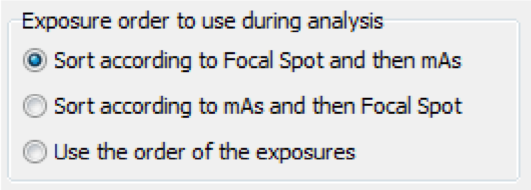
When you modify an mA linearity analysis, all pass/fail criteria is available:



You must modify the layout to see the results of the additional parameters.

Select sort order

You can decide how you want the exposures sorted before the analysis is performed.

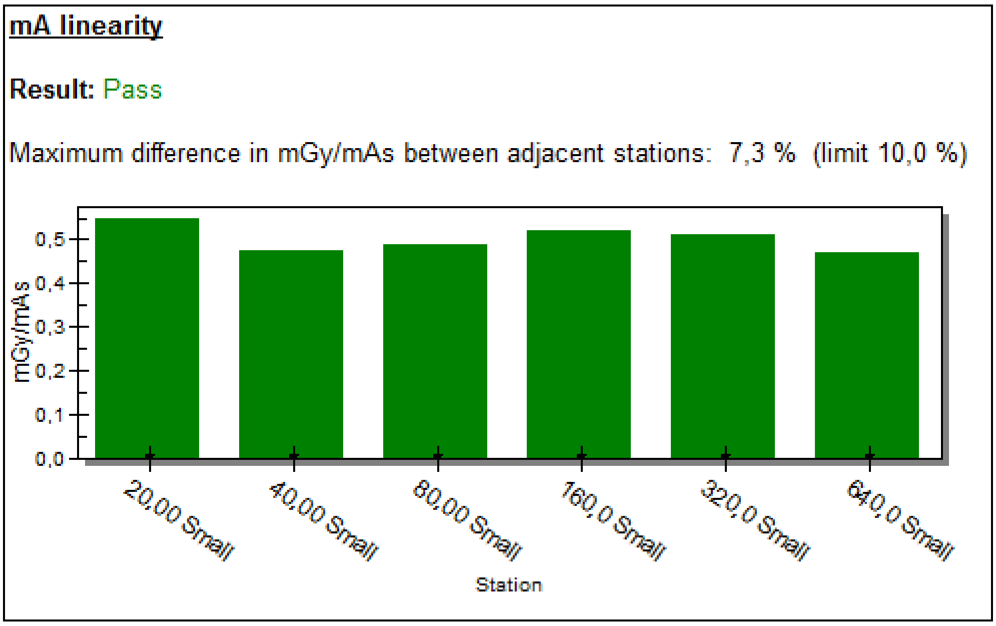


Sort according to Focal Spot and then mAs
Exposure are sorted based on the Focal Spot size information you have provided in this column. For each focal spot size used, the exposures are sorted based on mAs. The calculations will be done after the sorting is completed.

Sort according to mAs and then Focal Spot
Exposure are sorted based on mAs. For each mAs station used, the exposures are sorted based on focal spot size. The calculations will be done after the sorting is completed.

Use the order of the exposures
No sorting is performed. The evaluation of linearity is done on the exposures exactly in the same order as they where measured.

Default result



Result layout and macros

As described in the topic Advanced analysis, it is possible to modify the the layout of the analysis result. The layout is defined by text combined with "macros". When the analysis result is shown, the macros are replaced with the appropriate calculated values, set values and measured values. The default layout of text mA linearity analysis looks like this:

$Title **Result:** $TestResult Maximum difference in $Unit between adjacent stations: $MaxDiffAdjSteps % (limit $LimitMaxDiffAdjSteps %) $GraphAbs

This text can be modified and more macros can be used to show more calculated results, for example the relative difference. The following macros are available for the mA linearity analysis:

$MeterUsedType (Meter type)
$MeterUsedSN (Meter S/N)
$MeterUsedCalDate (Meter calibration date)
$ExtDetUsedType (External detector type)
$ExtDetUsedSN (External detector S/N)
$ExtDetUsedCalDate (External detector calibration date)
$Title (Specified title)
$Result (Analysis result)
$TestResult (Pass or fail text, the overall result for the test)
$GraphRel (Graphical representation of the results as %)
$GraphAbs (Graphical representation of the results)
$TargetFilter (Calibration for first exposure used in analysis)
$Unit (The current unit)
$SetKV (Set value for kV for the lowest mAs value (or from general settings))
$FocalSpot (Focal spot for lowest mAs value (or from general settings))
$MaxExpPermAs (Maximum value)
$MinExpPermAs (Minimum value)
$AverageExpPermAs (Average value)
$MaxDevFromAverage (Maximum deviation from average (%))
$LimitMaxDevFromAverage (Limit for maximum deviation from average (%))
$DiffHighLow (Difference between the highest and lowest Exp/mAs value (%))
$LimitDiffHighLow (Limit for difference between the highest and lowest Exp/mAs value (%))
$MaxDiffAdjSteps (Maximum difference between adjacent steps (%))
$LimitMaxDiffAdjSteps (Limit for maximum difference between adjacent steps (%))
$LimitMinExpPermAs (Limit for min. value)
$LimitMaxExpPermAs (Limit for max. value)

Calculations

<table>
<tr><td>

- The exposure/mAs differences between adjacent stations are calculated as:

Diff between adjacent steps = **100 * | ValueA - ValueB | / (ValueA + ValueB)**

The macro $MaxDiffAdjSteps is set to the maximum of these values and compared against the limit you specify for "Maximum difference between adjacent stations"

- The exposure/mAs difference between highest and lowest is calculated as:

diff between high and low = **100 * (Highest - Highest) / (Highest + Lowest)**

The macro $DiffHighLow is set to the maximum of these values and compared against the limit you specify for "Maximum difference between highest and lowest"

- The mean value is calculated as:

$MeanValue = (Exposure/mAs**$_1$ **+ Exposure/mAs$_2$ **+ . . . . . + Exposure/mAs**$_n$ **) / n**

for each row included in the mA linearity is the following calculated:

diff from mean (%) = 100 * (Exposure/mAs - Mean value) / Mean value

The macro $MaxDevFromAverage is set to the maximum of these values and compared with the limit you set for "Maximum deviation from average"

</td></tr>
</table>

Required columns (or general settings)

The following columns are required for the mA linearity analysis:

Parameter	Description
Set mAs (Set value) or Tube mAs (Measured)	For a **mAs generator** the set mAs or the measured mAs is required to evaluate the linearity. One of these columns are required for mAs generators.
Set mA (Set value) or Tube mA (Measured)	For a **mA-time generator** the set mA and the is always required. If measured mA is used to evaluate the mA linearity this column is required as well.
Set Time (Set value) or Exposure time (Measured)	For a **mA-time generator** the set Time and the is always required. If measured Time is used to evaluate the mA linearity this column is required as well.
Exposure (Measured) or Exposure (norm)	The measured exposure value is required for the evaluation of linearity. You can use the measured exposure or the normalized (normalized to a certain distance). One of these columns is required for mA-time generators.
Exposure/Set mAs or Exposure/mAs (Measured)	This is the calculated "exposure/mAs" value. This column is optional, however, it is recommended to include this column since the indication of failing values is done in this column.

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