Application Note

Measurements with Tantalum

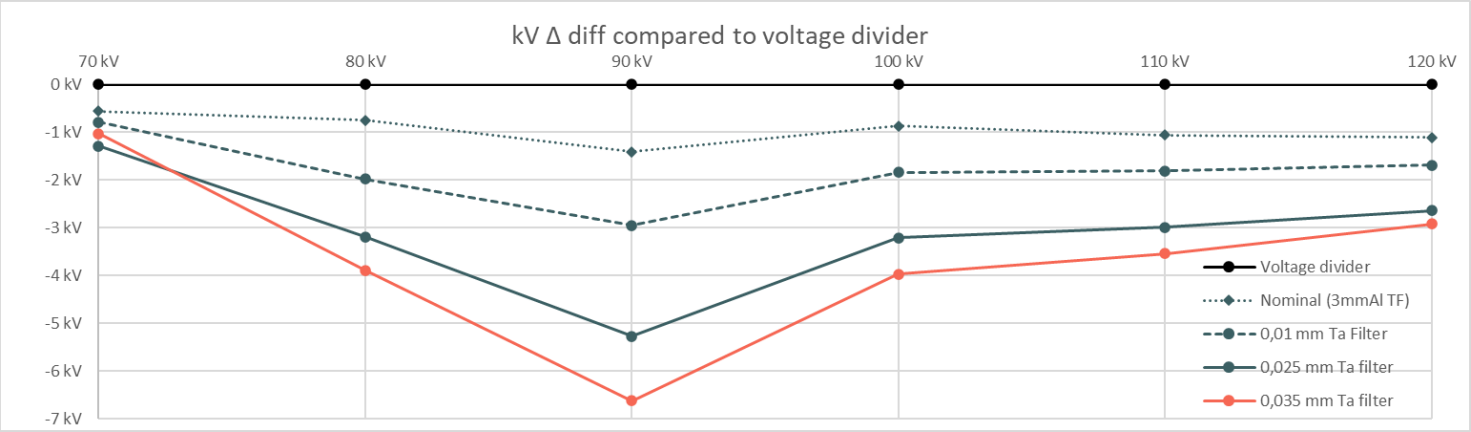
This application note describes the technical issues and limitations when measuring with Ta (Tantalum) filtration with the non-invasive Piranha meter.
Note that the information hereafter is valid for Black Piranha with product version 5.5.
The information is not valid for Red Piranha or Barracuda MPD.

Introduction

Tantalum is a high-density material used in some applications as an additional filter which results in a very different x-ray spectra which causes the measured kV being affected.
The Black Piranha's performance has been evaluated at RTI with various filter thicknesses.

Results

For the data that follows, the voltage divider read out from the reference High Voltage Divider is considered as reference for kV with an expanded uncertainty of less than 0.15%.
The below graph shows the Piranha's performance with various Ta filters added.



0.01 mm Ta Filter

Set kV	Black Piranha correction
70	+0.8
80	+2.0
90	+2.9
100	+1.8
110	+1.8
120	+1.7

0.025 mm Ta Filter

Set kV	Black Piranha correction
70	+1.3
80	+3.2
90	+5.3
100	+3.2
110	+3.0
120	+2.6

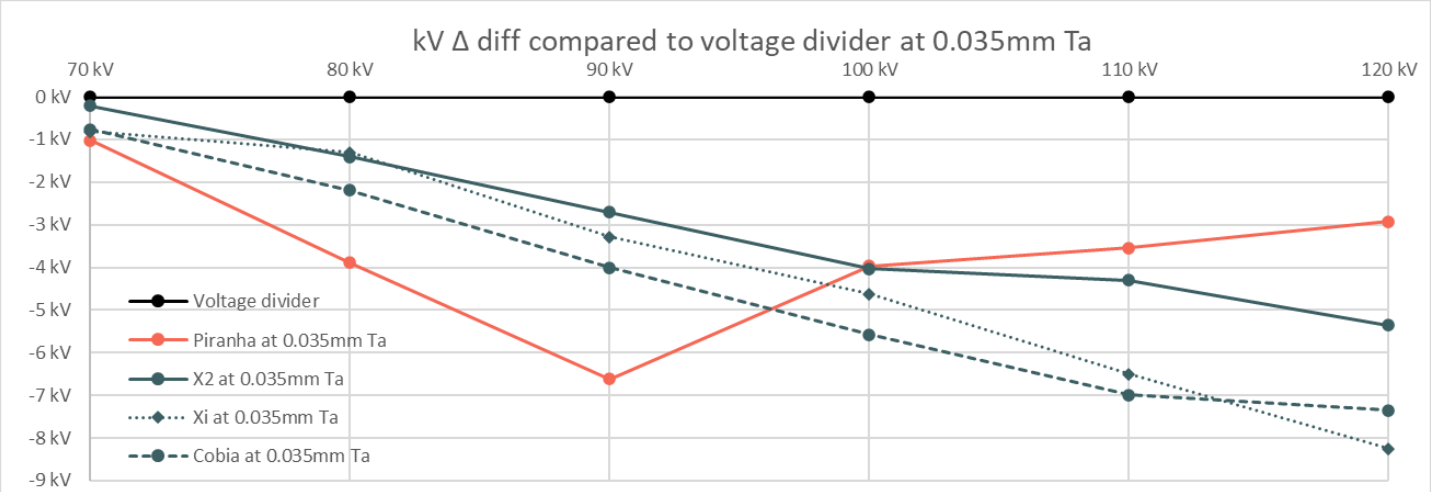
0.035 mm Ta Filter

Set kV	Black Piranha correction
70	+1.0
80	+3.9
90	+6.6
100	+4.0
110	+3.5
120	+2.9

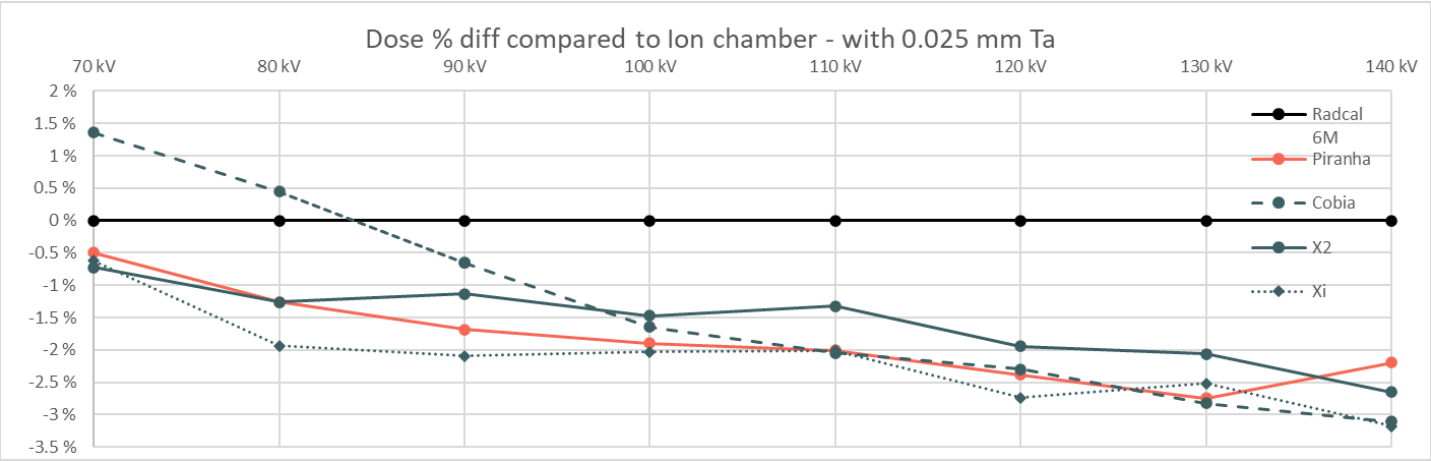
Correction table to use for the Piranha

Application Note

The graph below shows the Piranha's performance compared with other non-invasive meter measuring with 0.035 mm Ta.



For the data that follows, the dose reading from a Radcal 6M ion chamber is used as reference. In the below graph, we can see that the Piranha and other non-invasive meters have a slight underestimation on the dose reading.



Conclusion

The auto compensation for dose performance fairs well with the comparisons we have seen. On kV a manual correction can be applied if a kV value is sought after.

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