



**IEEE 802.3dg
Task Force**

AWG16 and AWG14 Cable
Measurements

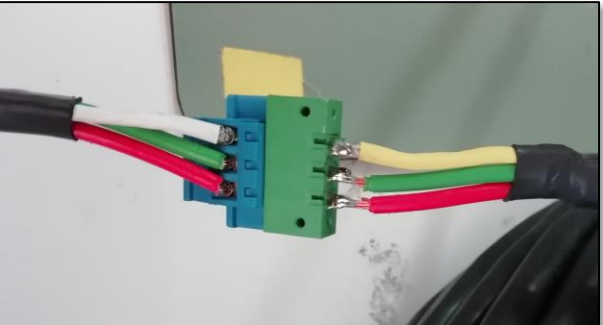
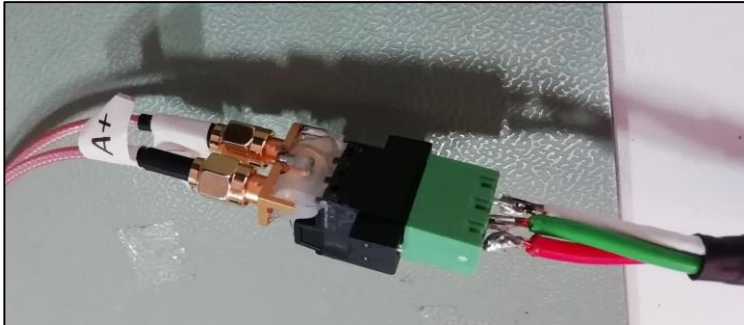
Steffen Graber, Pepperl+Fuchs

Measured Cables

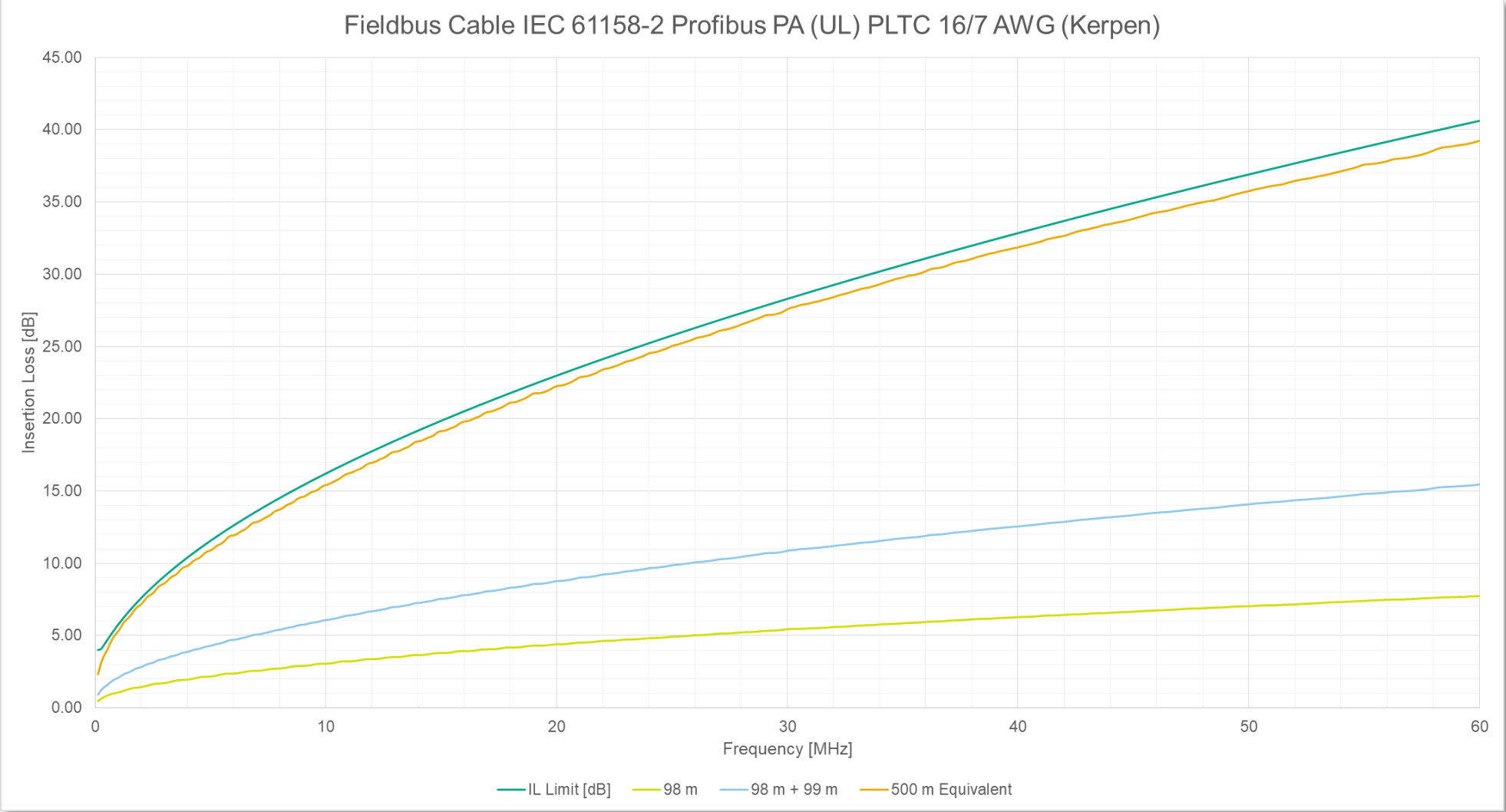
- The following cables have been measured related to insertion and return loss:

Printing on Cable	Cable Length
Fieldbus Cable IEC 61158-2 Profibus PA (UL) PLTC 16/7 AWG (Kerpen)	98 m, 99 m Cable Rings
Icon Fieldbus Cable IEC 61158-2 100 Ω Profibus PA (UL) PLTC 16/7 AWG (Leoni Kerpen)	98 m, 99 m, 99 m Cable Rings
Icon Fieldbus Cable IEC 61158-2 Profibus PA (UL) PLTC 16/7 AWG (Kerpen)	97 m, 81 m Cable Rings
Icon Fieldbus Cable IEC 61158-2 100 Ohm Profibus PA (UL) PLTC 16/7 AWG (Kerpen)	93 m Cable Ring
Icon Fieldbus Cable IEC 61158-2 100 Ω Profibus PA (UL) PLTC 14/7 AWG (Kerpen)	99 m, 99 m Cable Rings

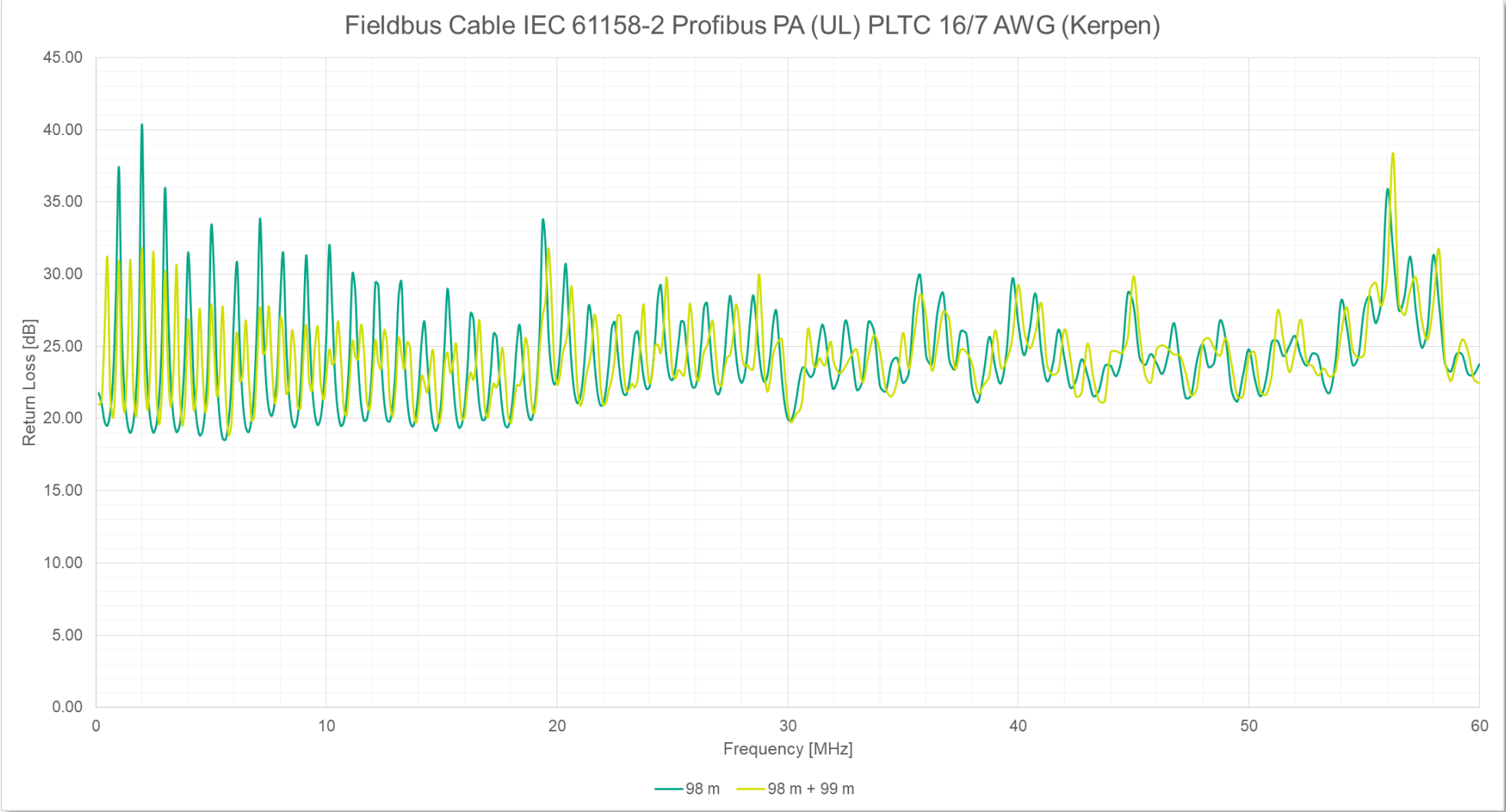
- Where more than one cable ring was available, the different cable rings of the same cable were connected in series using screw terminal connectors, also the VNA had been connected to the cables using screw terminal connectors:



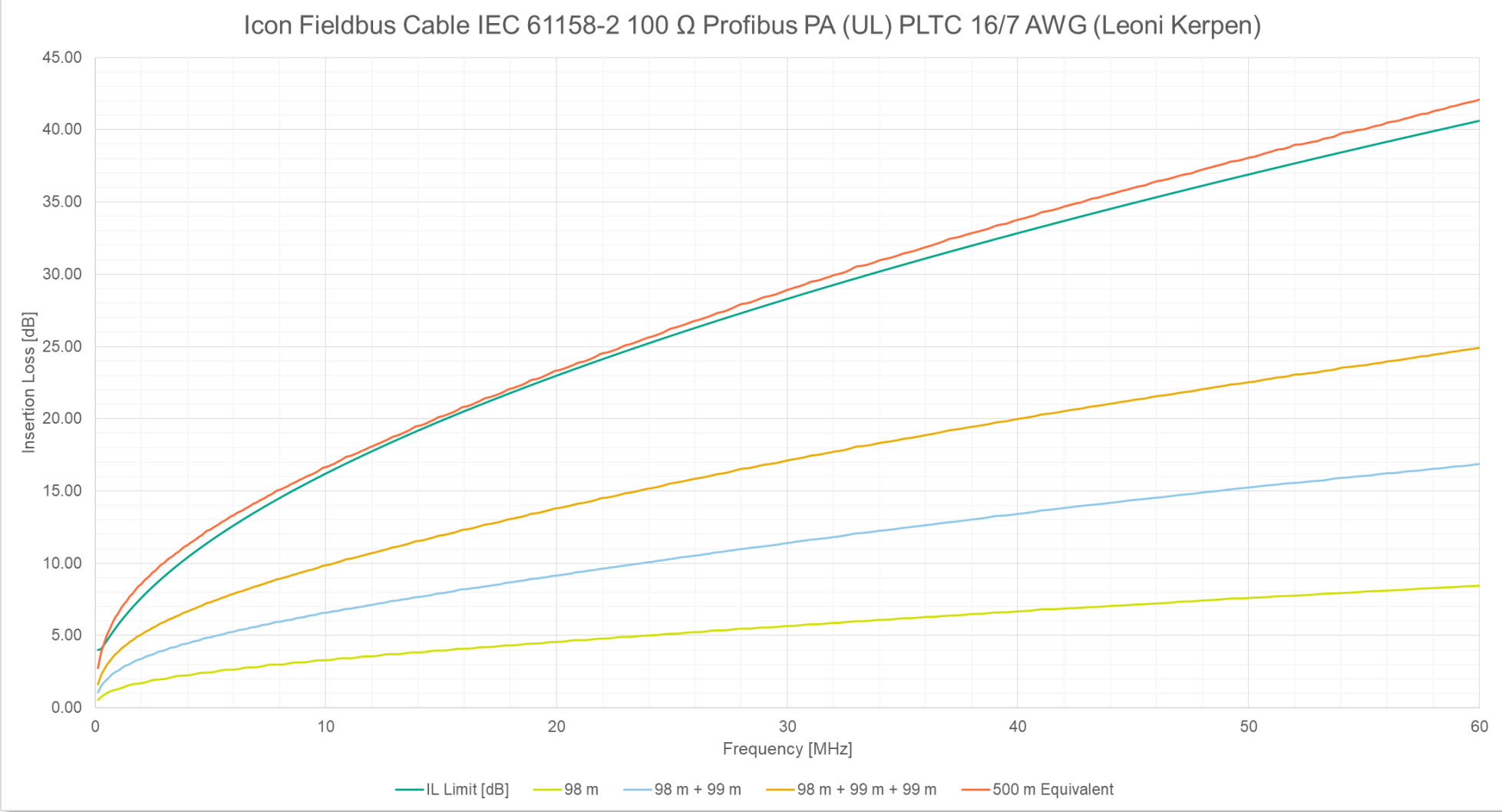
Cable 1 (AWG16/7) Insertion Loss



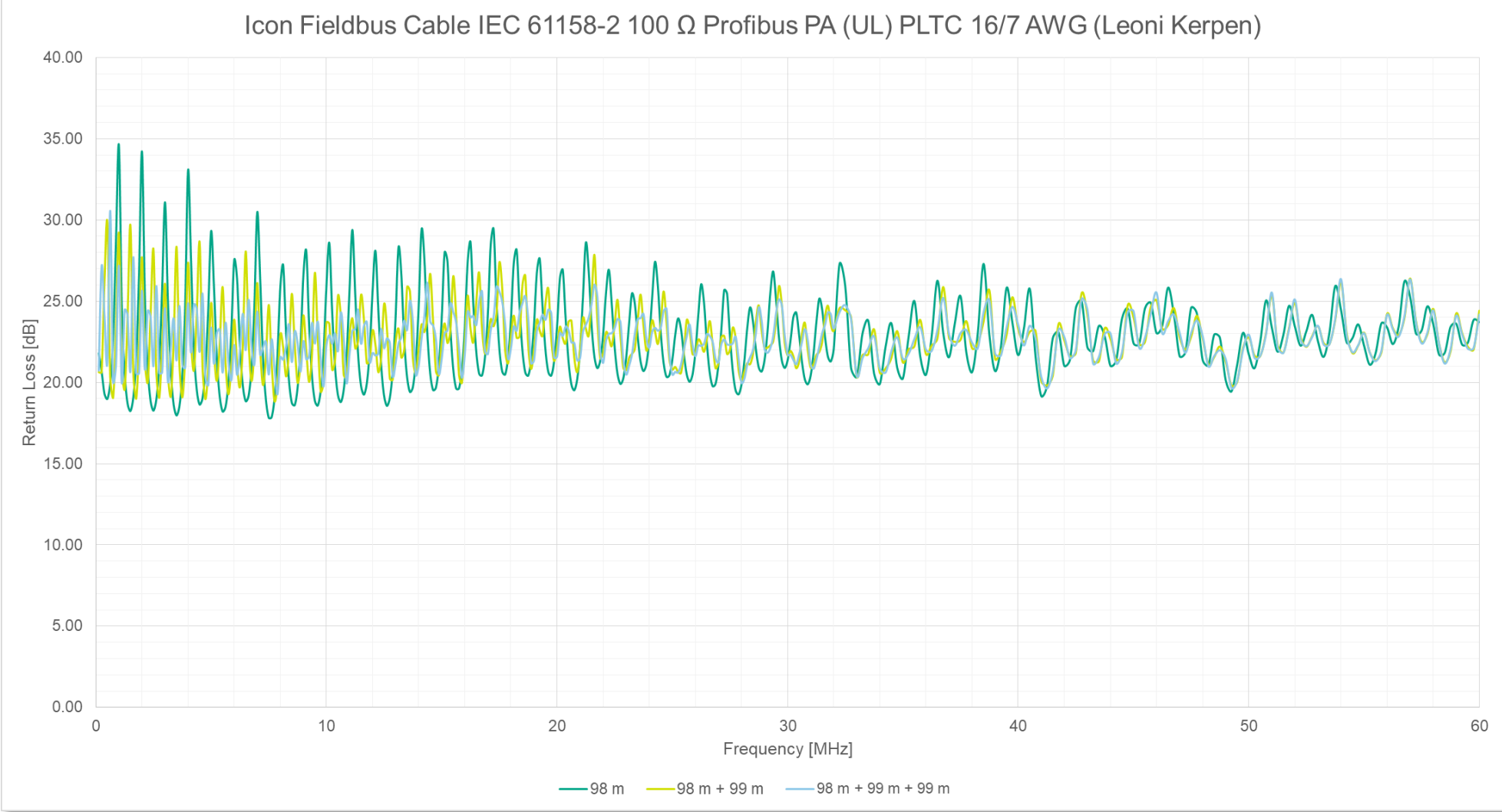
Cable 1 (AWG16/7) Return Loss



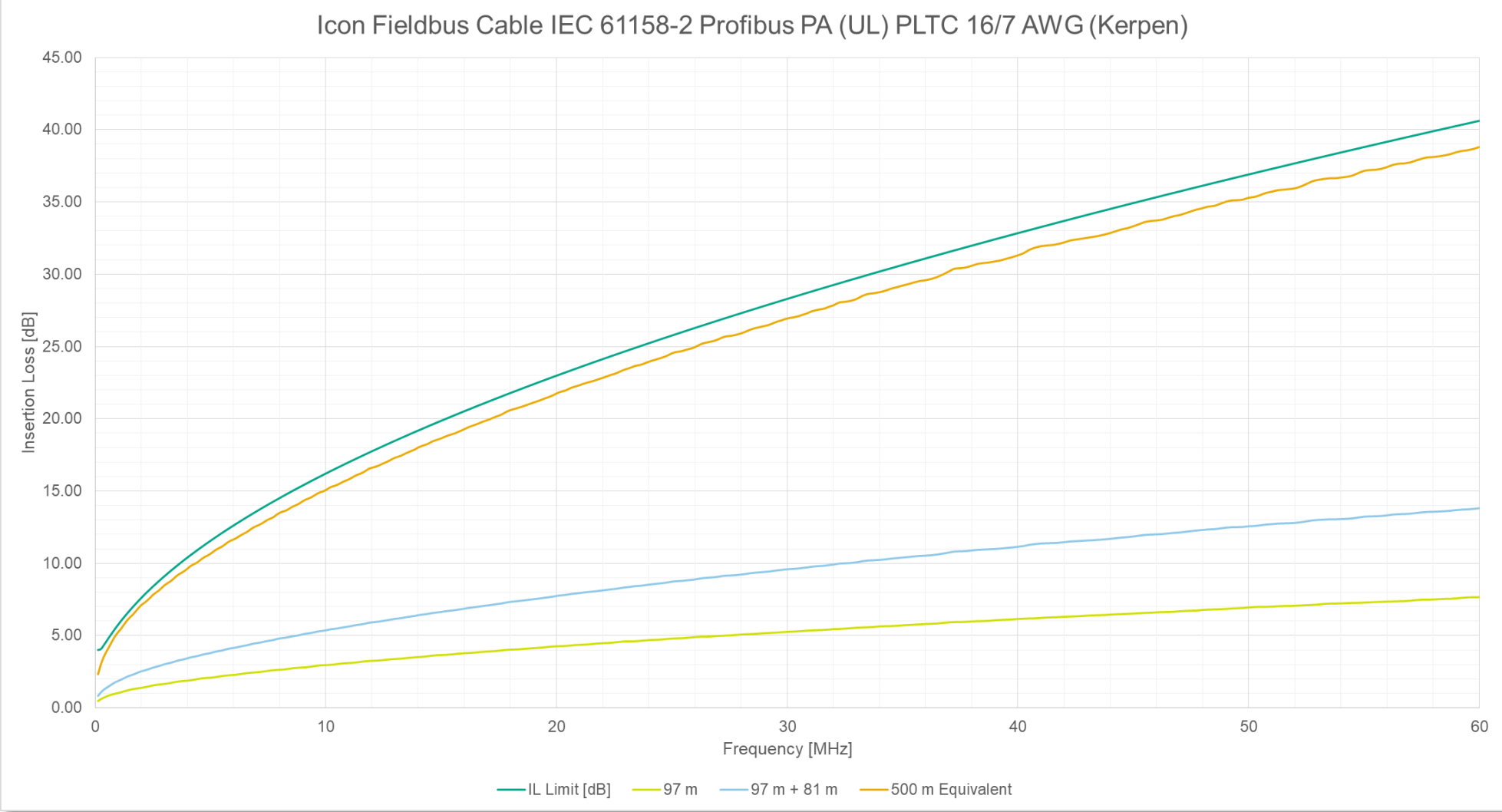
Cable 2 (AWG16/7) Insertion Loss



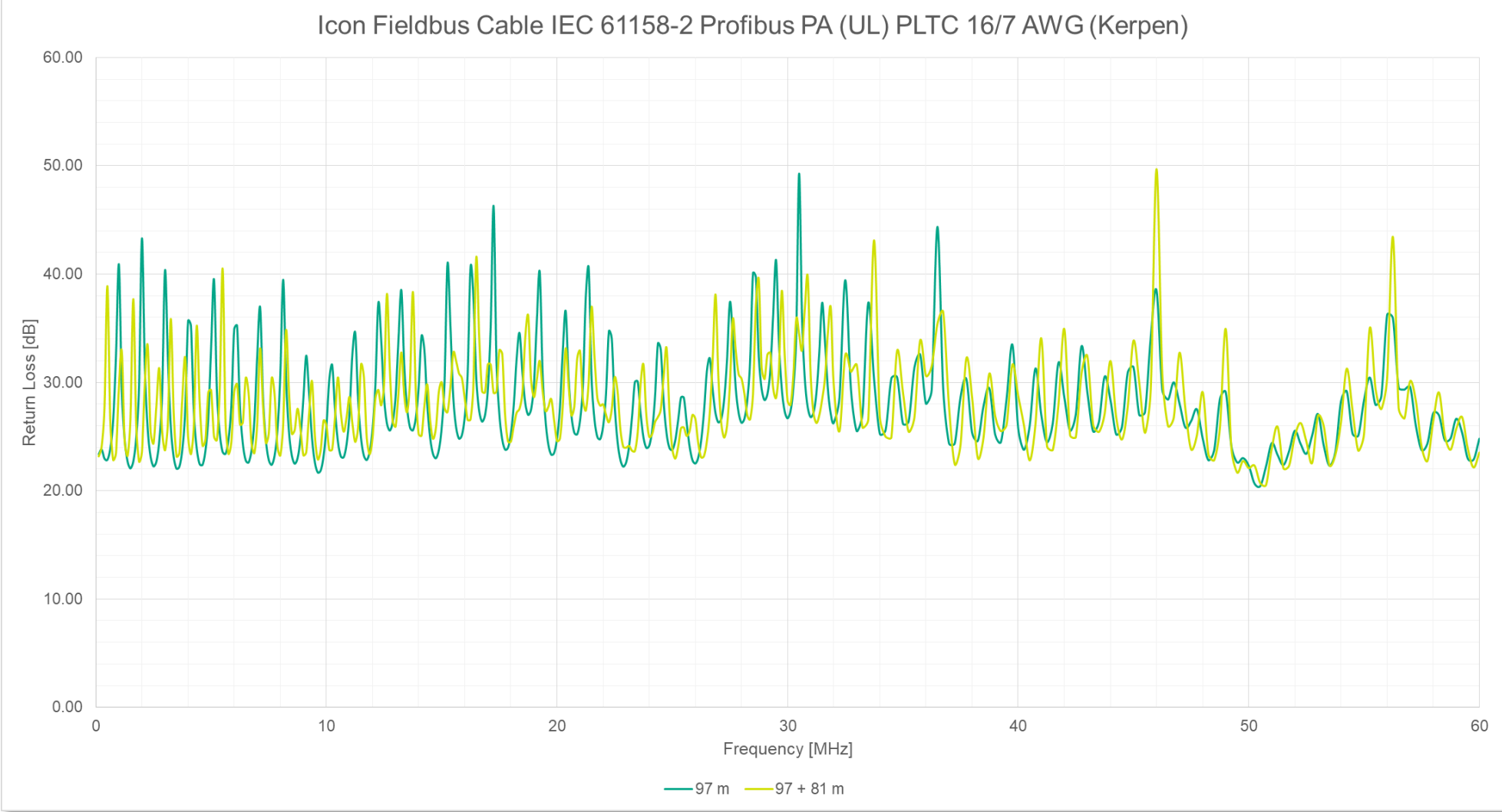
Cable 2 (AWG16/7) Return Loss



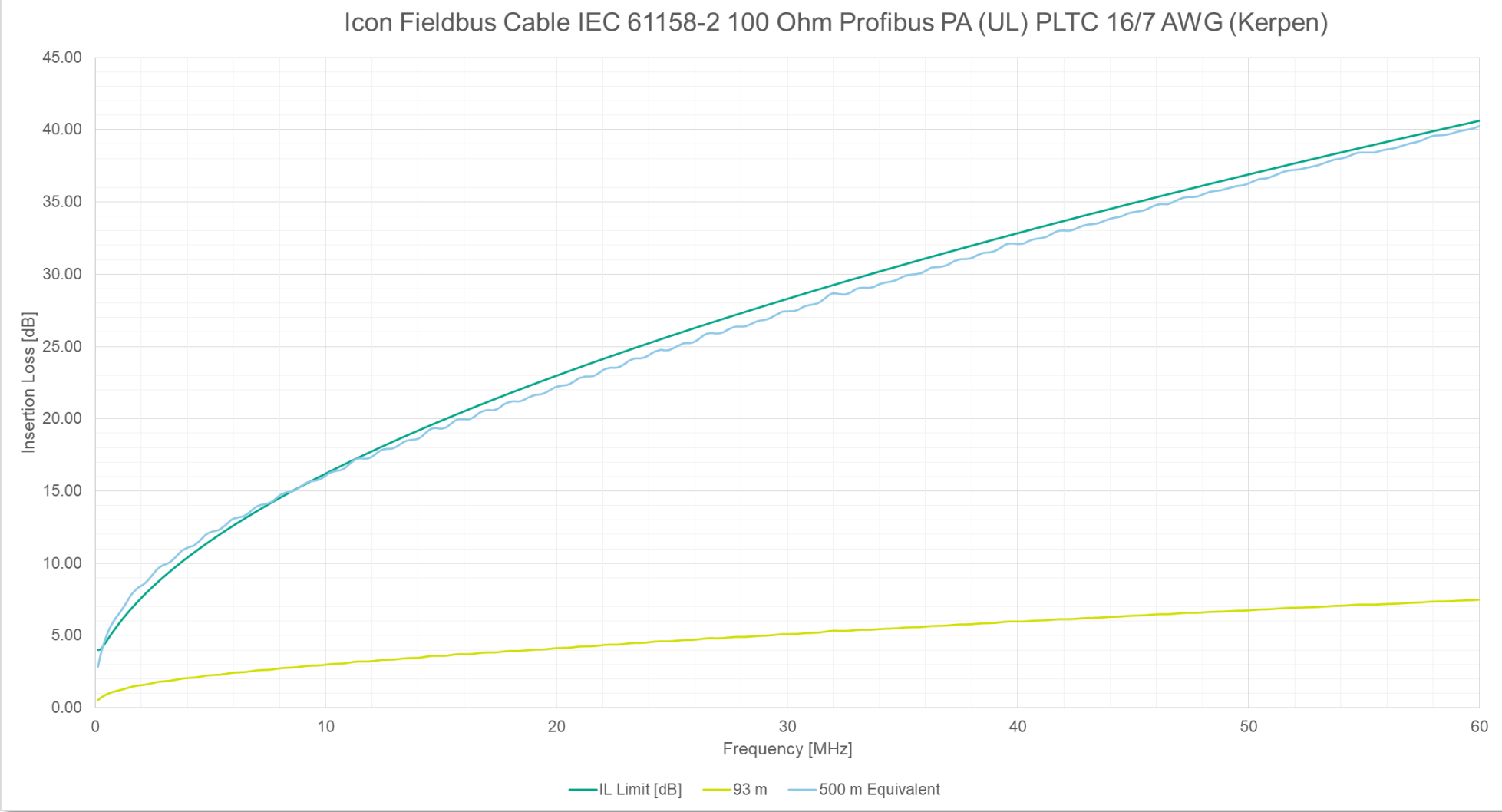
Cable 3 (AWG16/7) Insertion Loss



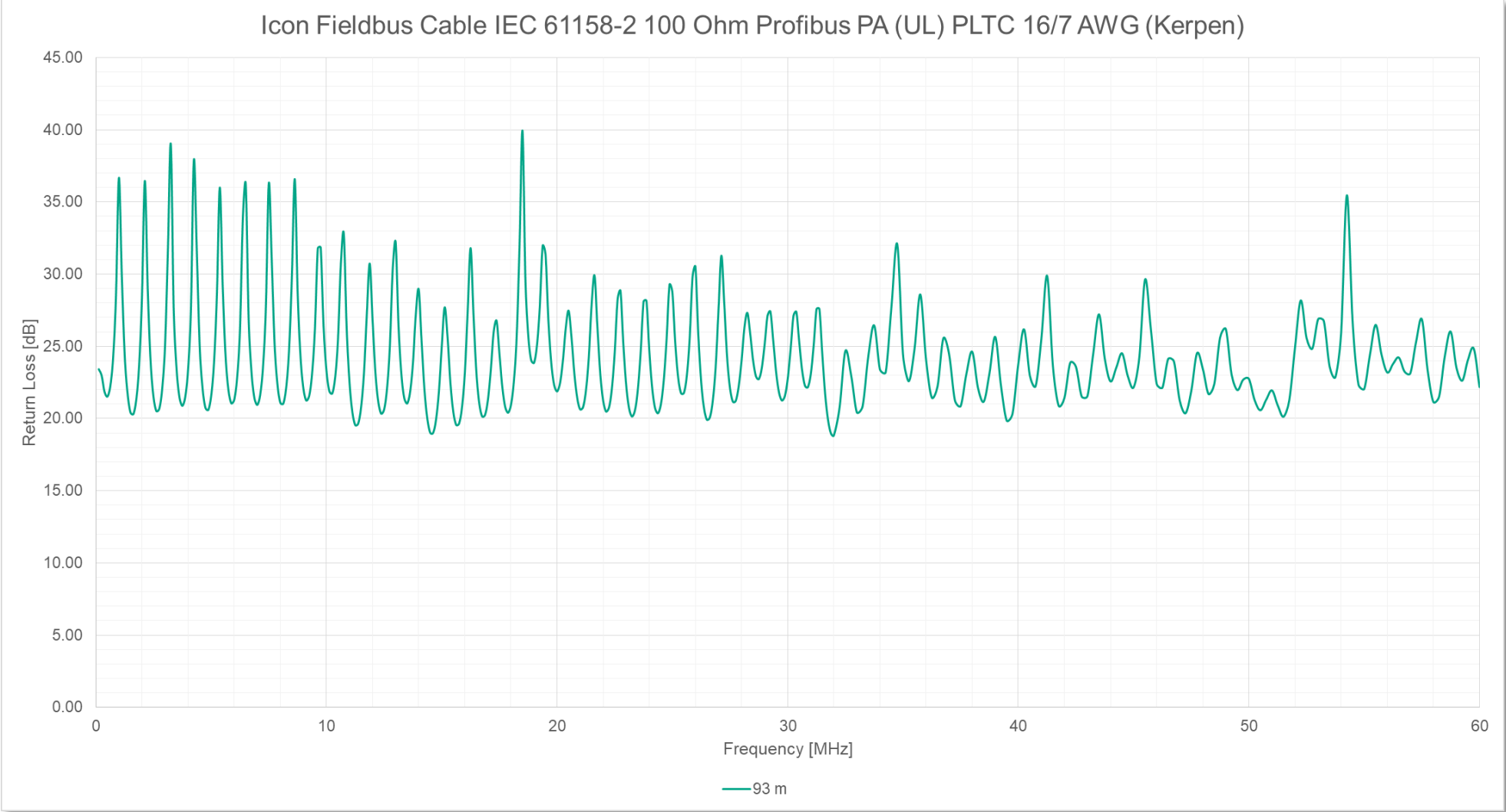
Cable 3 (AWG16/7) Return Loss



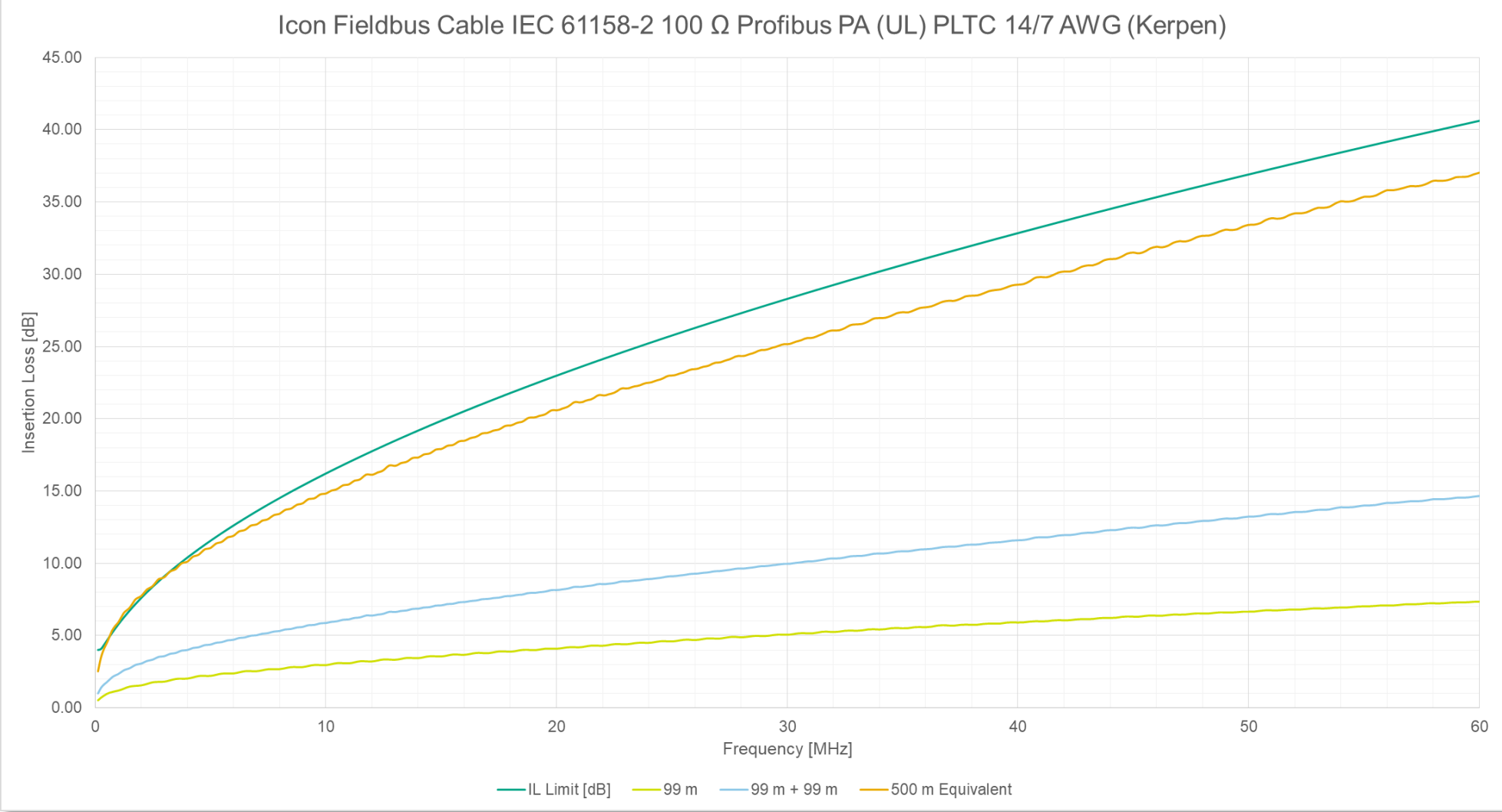
Cable 4 (AWG16/7) Insertion Loss



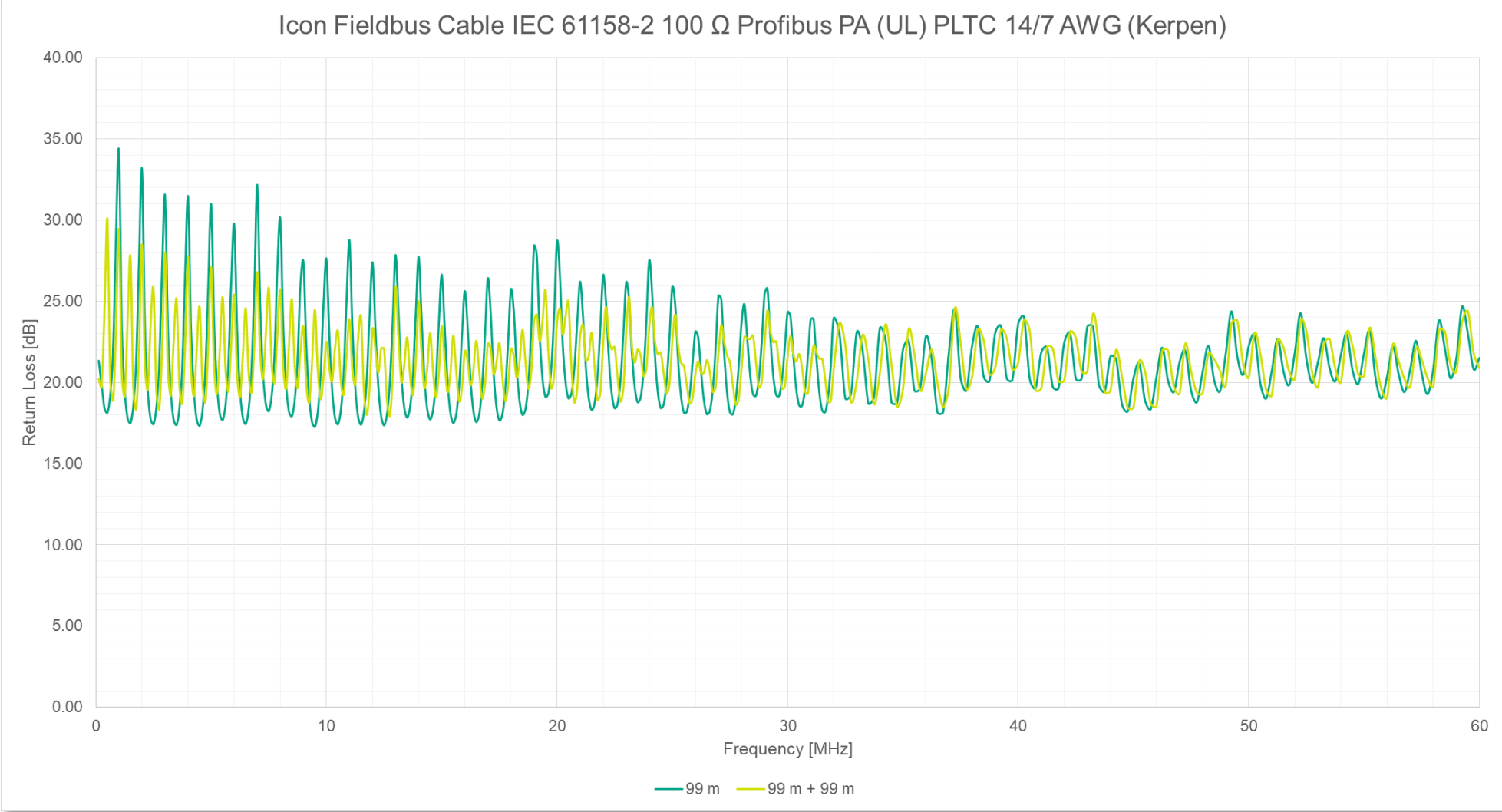
Cable 4 (AWG16/7) Return Loss



Cable 5 (AWG14/7) Insertion Loss



Cable 5 (AWG14/7) Return Loss



Results

- The suggested insertion loss limit fits to two of the cables, while the other three measured cables are slightly above the limit line, interestingly especially in the lower frequency range.
- Therefore it might be reasonable to adjust the limit line by allowing a higher insertion loss in the frequency range below about 10 MHz (to also allow the third AWG16/7 and the AWG14/7 cables to be used over the full 500 m length).
- Cable 2 has a higher insertion loss throughout the frequency range and either we would need to allow for an additional 1.5 dB of insertion loss or this cable would not support the full length.
- For the AWG16 cables the return loss looks similar as for the cables specified for 10BASE-T1L. For the AWG14/7 cable the return loss is slightly (about 1 dB) worse compared to the AWG16 cables.
- The connectors between the cable rings do not seem to have a significant impact on the return loss.

Thank you!