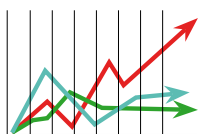


Technical Specification

- Exceeds Telcordia GR-326 & Verizon FOC TPR 9409 requirement
 - Mechanical – GR-326 4.4.3.5 TWAL
 - Material Plastic– Anti fungus proven plastic material,
 - Material Zirconia – GR-326 4.4.4.5 Stabilized Zirconia ferrule
 - Optical – Typical IL of 0.05dB against Master (Premium Super low loss)
- IL Guarantee to meet IEC 61753-1 Random Mating requirement Grade A, B and C
- 6 Direction tuning feature to improve Random Mating IL (for Premium & Standard UPC)

Introduction on Random Mating



(According to IEC 61753-1, Examinations and measurements – Attenuation of random mated connectors)

When an optical loss of a patch cord or a connector is measured, the term insertion loss (IL) is used.

Normally the jumpers are measured at the wavelength of 1310 and 1550nm, and a master jumper and a master adapter is used to determine and guarantee the loss.

It is known that when you mate the connector and check the IL with each other (Random mating), the IL will be higher compared to measuring against a master jumper.

A product such as the “master jumper” and a “master adapter” (which should be a perfect jumper and adapter that has absolute low loss) is used as a base to measure and define the insertion loss of the tested product.

It is commonly misunderstood that the IL you see tested with a master jumper is what you will be getting in the actual usage of the product such as in Racks, on devices and any other finished product.

When you use a master jumper and master adapter you are measuring your connection against a perfect ideal jumper. In actual usage you do not mate your jumper against a master jumper but with a normal jumper.

With this in mind IEC has introduced an insertion loss specification based on Random mating (IEC 61753-1 Attenuation of random mated connectors) which guarantee’s the IL of random mated connectors and categorized it in 4 different grades.

It is also known that you can see much more clearly the difference of a good connector (Jumper) and a bad connector by measuring the IL by the Random mating method

It is known that a connector that has a guaranteed IL of 0.5dB against a master can increase to as high as 1.00dB or higher in random mating.

SENKO has categorized its premium low loss connector, Premium connector and standard connector’s to the insertion loss not just against a Master jumper but also based on the IEC Random mating method to be able to offer a more realistic better performing product out in the field.



Insertion loss IEC specification

IEC specifies Typical Attenuation to be less than 0.5 dB against reference plug using reference adaptor. SENKO has refined its connector designs to perform to a much higher level than that required by both IEC and Telcordia requirements.

Connector type	Insertion Loss against Master Jumper	Insertion Loss Random Mating	Insertion Loss Random Mating Tuned
Unibody Premium Low Loss SM UPC Connector	≤ 0.05dB Mean / ≤ 0.15dB Max	≤ 0.07dB Mean / ≤ 0.15dB Max	≤ 0.02dB Mean / ≤ 0.14dB Max
Unibody Premium SM UPC Connector	≤ 0.08dB Mean / ≤ 0.20dB Max	≤ 0.12dB Mean / ≤ 0.25dB Max	≤ 0.04dB Mean / ≤ 0.17dB Max
Unibody Premium Low Loss SM APC Connector	≤ 0.07dB Mean / ≤ 0.15dB Max	≤ 0.09dB Mean / ≤ 0.20dB Max	N/A
Unibody Premium SM APC Connector	≤ 0.10dB Mean / ≤ 0.25dB Max	≤ 0.14dB Mean / ≤ 0.30dB Max	N/A
Standard 2 pc SM UPC Connector	≤ 0.12dB Mean / ≤ 0.30 dB Max	≤ 0.25dB Mean / ≤ 0.50dB Max	N/A

Telcordia GR-326-CORE Requirement	≤ 0.20dB Mean / ≤ 0.40dB Max	N/A	N/A
IEC / JIS Requirement	≤ 0.25dB Mean / ≤ 0.50dB Max	N/A	N/A

* For Maximum IL, 97% to meet the specification

* For Random mating Grade A, specification is not determined yet. Above spec for Grade A is a proposed spec.

* Insertion loss are only guaranteed when product terminated with SENKO's recommended procedure.

RANDOM MATING IEC VALUE	SENKO UPC Connector	SENKO APC Connector	Typical Competitor
IEC Random Mating Grade A	Premium Low Loss SM UPC Connector	Premium Low Loss SM UPC Connector	Typical High Quality UPC Connector
		Premium Low Loss SM APC Connector	
IEC Random Mating Grade B	Premium SM UPC Connector	Premium SM APC Connector	
		Standard SM APC Connector	
IEC Random Mating Grade C	Standard SM UPC Connector	Standard SM APC Connector	Low cost quality UPC Connector
IEC Random Mating Grade D			

Introduction to GR-326 TWAL TRANSMISSION WITH APPLIED TENSILE LOAD



In many applications and environments stresses are applied to connector assemblies during their working life. But connectors from all manufacturers do not work well under these stresses. Industrial specifications state different parameters that patchcord assemblies must conform too of which SENKO connectors are manufactured to be able to pass all these tests.

Specifically Transmission with Applied Tensile Load TWAL testing is required to determine if connectors perform to specific requirements according to industry standards whilst under a variety of tensile loads both straight pull and side pull tests.

Mostly this test is directed at the performance of the strain relief boot. Insertion Loss and Reflectance is measured at the 1310 nm, 1490 nm, 1550 nm, and 1625 nm wavelengths while applying each combination of load and angle (0° 90° 135°).

As stated in Telcordia GR-326 (4.4.3.5) the required parameters are shown below:

Load	0°	90°	135°
Media Type I			
0.25 kgf (0.55 lbf)	X	X	X
0.7 kgf (1.54 lbf)	X	X	
1.5 kgf (3.3 lbf)	X	X	
2.0 kgf (4.4 lbf)	X	X	
Media Type II			
0.25 kgf (0.55 lbf)	X	X	X
0.7 kgf (1.54 lbf)	X	X	
Media Type III			
0.25 kgf (0.55 lbf)	X	X	
0.5 kgf (1.1 lbf)	X	X	

Reinforced jacketed cable of any diameter used as jumper cordage, this may include simplex, duplex, or quad cable products.

Cable with a 900 µm buffer coating that may or may not be reinforced.

Connectors mounted on fiber with a 250 µm coating.

TWAL 1.5Kg (3.3lbf) / 90°



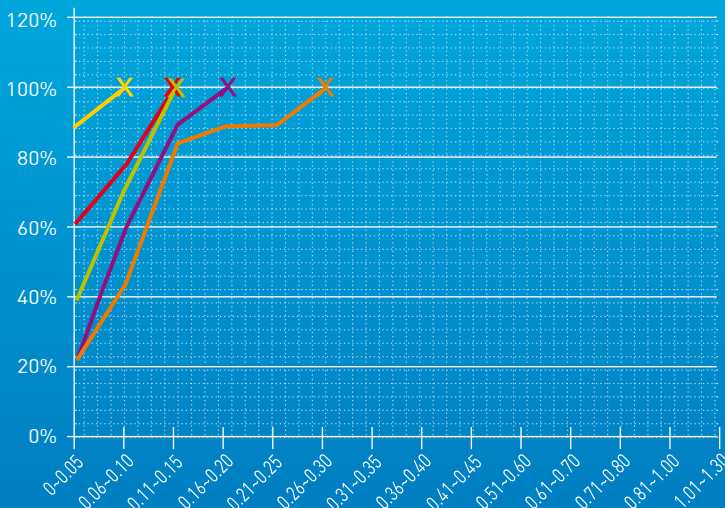
TWAL 0.25Kg (0.55lbf) / 135°



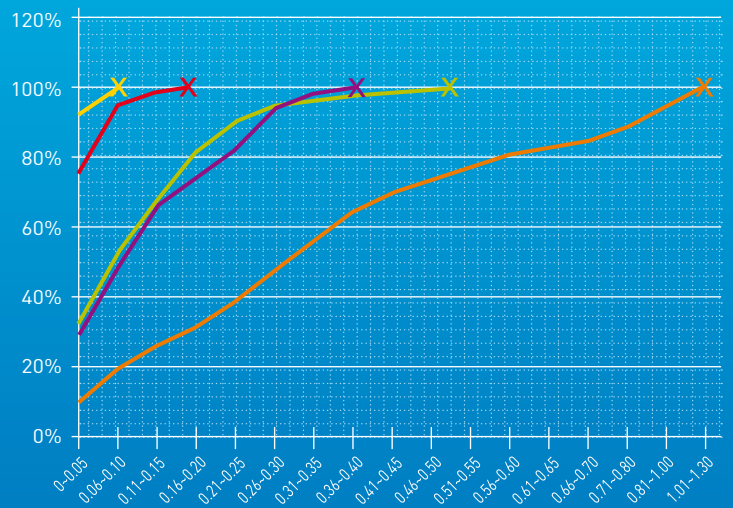
Random Mating Testing

■ SENKO Low Loss
 ■ SENKO Premium
 ■ SENKO Standard
 ■ High quality Competitor
 ■ Low quality Competitor

Insertion Loss data against Master



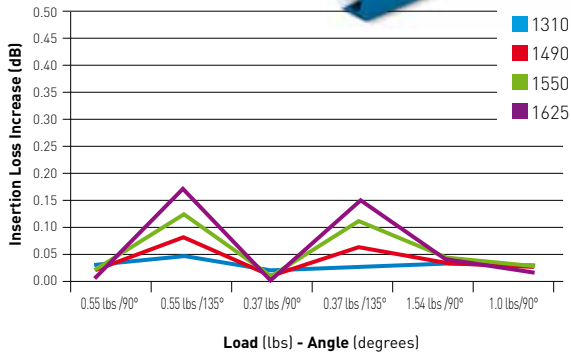
Random mating Insertion Loss



LC Connectors

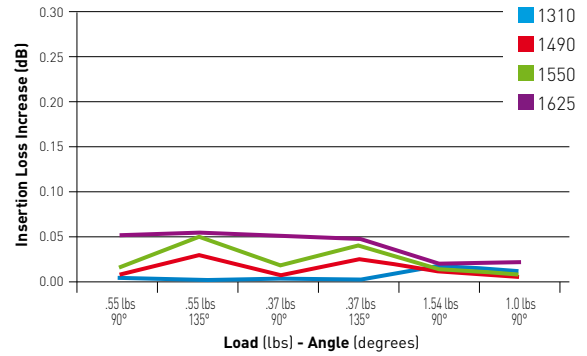
LC Mini BOOT 900 μm

with G657-A2 (R-7.5) Fiber TWAL



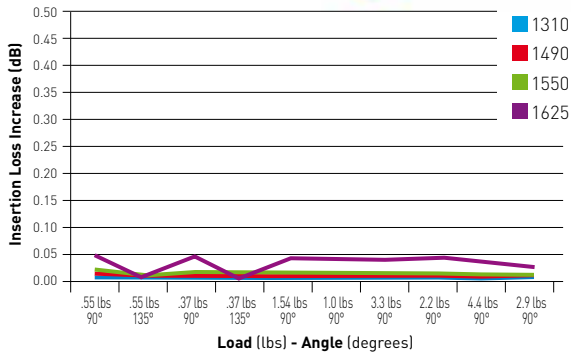
LC Standard Mini Boot 900 μm

with G657-A1 (R-15) Fiber TWAL



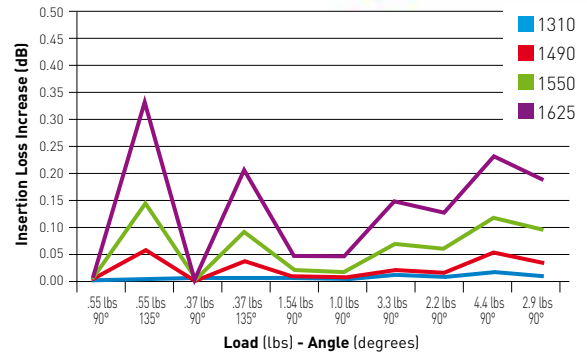
LC Mini BOOT 2mm

with G657-A2 (R-7.5) Fiber TWAL



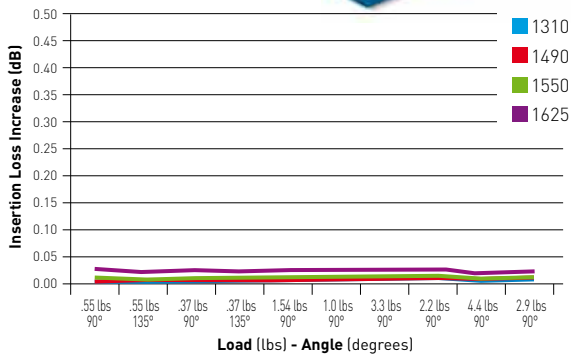
LC Mini BOOT 2mm

with G657-A1 (R-15) Fiber TWAL



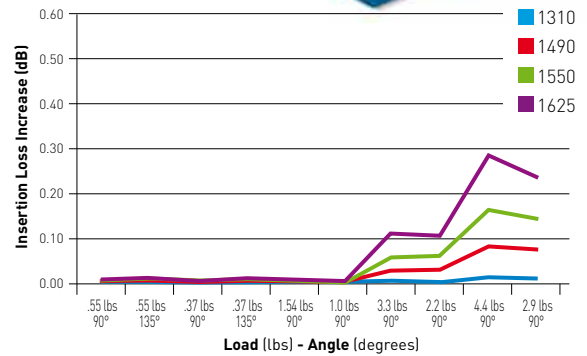
LC Mini BOOT 3mm

with G657-A2 (R-7.5) Fiber TWAL



LC Mini BOOT 3mm

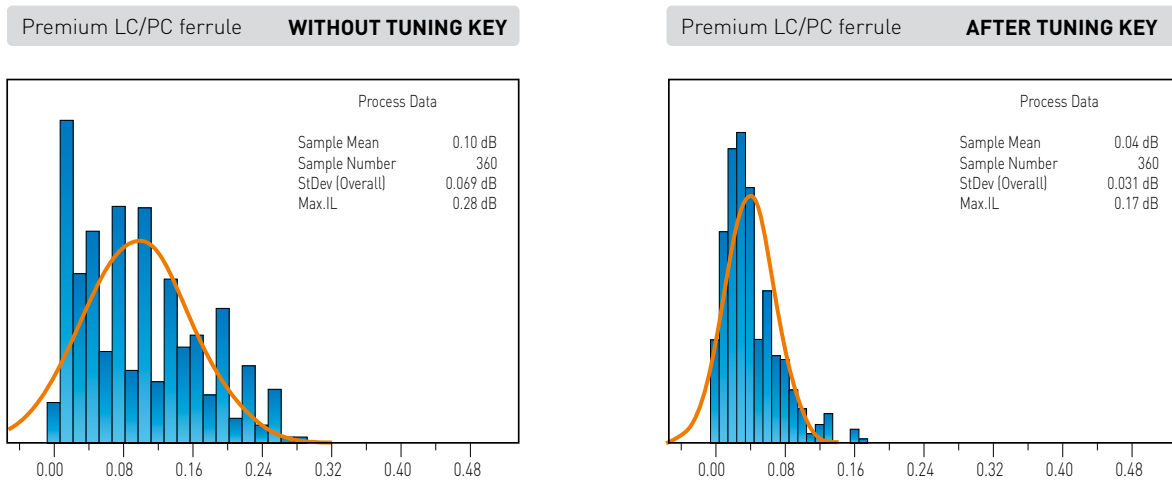
with G657-A1 (R-15) Fiber TWAL



Tuning feature

Tuning feature for LC is available on Premium and Standard. Also for the LC it is in 6 different position tuning. Tuning the ferrule can improve Insertion Loss with Random Mating.

Process Capability of Random mating test:



Material

Ferrule degradation

- Zirconia ferrule degradation can happen in high temperature and high humidity conditions.
- This issue was addressed in Telcordia GR-326 section 4.4.4.5 Immersion / Corrosion.
- Two major issues addressed in Telcordia GR-326 section 4.4.4.5 Immersion / Corrosion. Ferrule flattening and Ferrule surface roughening.

Example of ferrule roughening from water immersion Test 85 Deg C, distilled water

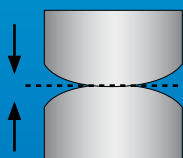


No ferrule roughening can be seen

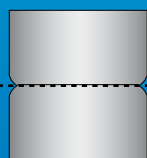


After the test, surface roughening can be seen

Flattening Mating Pressure



Normal ferrule condition



Flattening caused by degradation when using bad quality ferrules

Plastic Fungus testing

Fungus Resistance

Over a period of time it is possible that Polymeric materials can grow fungus on the surface, (see image below of a Polymeric sample with fungus growth present) but according to the requirements of Telcordia GR-326 it stipulates that samples shall not support fungus growth per ASTM G21-96. A rating of 0 (zero) is required.

NOTE: This requirement applies to the connector (including boots) and adapter plastic components. SENKO premium connectors are manufactured using materials that do not support this fungus growth, after independent testing of SENKO connectors are rated at 0 (zero).



New LC MINI Boot



900µm, 2mm and 3mm

The NEW LC MINI boot reduces overall connector length by 30% while maintaining superior cable support and bend radius as compared to traditional boot design. The short, flexible and compact design supports industry demanding GR-326 TWAL standards.

LC Mini Boot 900 µm



LC Mini Boot 2mm



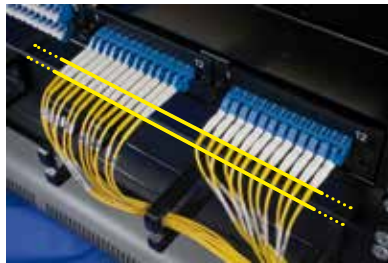
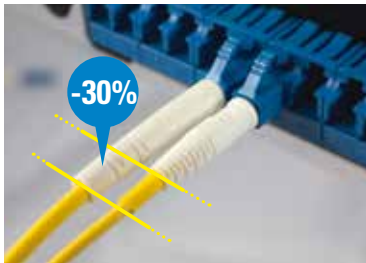
LC Mini Boot 3mm



LC Uniboot+Mini Boot



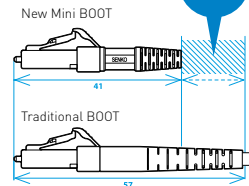
LC Mini Boot VS Traditional Boot



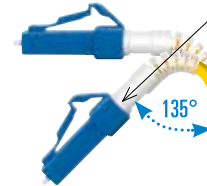
FEATURES

Reduction in size

Compared to traditional LC



Super Bending Strength



LC Universal fit

to LC 2pc Standard, LC Unibody and LC Uniboot



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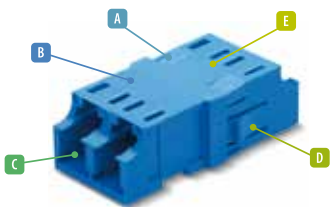
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FEATURES



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