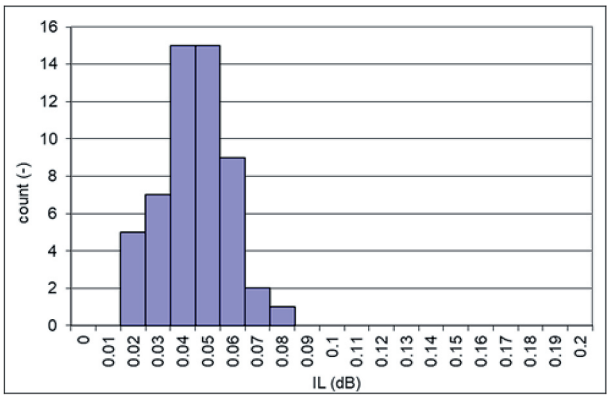
Losone, January 2024

ULTRA-LOW LOSS FIBER OPTIC CONNECTORS

DIAMOND SA is developing a process to manufacture ultra-low loss connectors. This process will utilize our state-of-the art Active Core Alignment technology to reduce losses caused by lateral and angular misalignment of the fiber.

The following is some initial test data that we have surmised using our advanced technology.



Based on our experience with SMF-28 fiber at 1550 nm an average IL of 0.045 dB on random mating can be expected, with a max value of 0.06 dB on 95% of the connections. At 1310 nm the IL values are higher due to the smaller mode field diameter. An average IL of 0.055 dB on random mating can be expected, with a max value of 0.10 dB on 95% of the connections.

Fig. 1 - IL distribution histogram using SMF-28 fiber at 1550 nm

We also have some experience using Fujikura's 1550 nm PM fiber. With such fiber, it was possible to manufacture APC connectors with an average IL of 0.050 dB on random mating and a max value of 0.09 dB on 95% of the connections. PC connectors on the same fibers had a slightly higher IL (averagely 0.01 dB higher) but may be due to measurement issues.

Low wavelength fiber is more critical regarding IL, as the smaller mode field diameters would need even more precise positioning of the fiber core within the ferrule. By interpolating the results that we achieved at higher wavelength, we estimate that following distributions could be achieved:

- 630 nm: mean of 0.15 dB on random mating, with a max value of 0.25 dB on 95% of the connections;
- 780 nm: mean of 0.11 dB on random mating, with a max value of 0.18 dB on 95% of the connections.

Insertion Loss values using ULL connectors are in the order of magnitude of the measurement uncertainty now technically applicable. As such, the performance of these products, differently from the usual individual connector IL value against reference, is explicitly represented by statistical gatherings - histograms - of measured IL values by randomly mated connectors for each manufactured batch.
For this reason, the measurement of repeatability and absolute IL of connectors should be considered only as a qualitative indicator, attesting to the ultra-low-loss global performance aimed for Ultra Low Loss (ULL) connectors.

Please understand that this is just preliminary data derived from first prototypes. Based on this data, we can offer you to select a few configurations that you are interested in developing (fiber, wavelength, polishing angle, connector type) and we can discuss manufacturing some prototypes for your evaluation.