Standard for Splice Loss of Trunk Optical Cables

Overview

The Contractor tasked to perform testing or splicing on any fiber optic cable will follow these testing standards to fulfill their contractual obligations.

Key Takeaways

The standard maximum loss for a single fusion splice in trunk optical cables is 0. 3 dB, with typical field targets often set at 0. 1–0.

15 dB to preserve link budget.

Standard Splice Loss Values

For singlemode fibers, industry standards such as TIA-568. 3-D and Telcordia GR-1093 specify a maximum field splice loss of 0. 3 dB per fusion splice, with an average target of 0.

1 dB across the link. Multimode mechanical splices typically have a maximum loss of 0. 3 dB per splice.

Modern fusion splicers usually achieve 0. 02–0. 05 dB per splice, well below the maximum threshold.

Splices exceeding the maximum should be re-done before sealing the closure to ensure reliable network performance. Impact on Link BudgetEvery splice contributes to the overall optical link loss, which also includes fiber attenuation and connector losses. For example, connectors may add 0.

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15–0. 5 dB each, and fiber attenuation is typically 0. 2 dB/km at 1310 nm and 0.

15 dB/km at 1550 nm. In trunk cables, especially in PON or long-haul networks, even small deviations in splice loss can consume significant portions of the link budget, potentially affecting future network expansion or service quality.

Testing and Verification

Splice loss is verified using: Optical Loss Test Set (OLTS) or Light Source and Power Meter (LSPM) for Tier 1 testing, which measures end-to-end insertion loss including all splices and connectors.

OTD

R (Optical Time Domain Reflectometer) for Tier 2 testing, which identifies individual splice losses and locations.

OTD

R readings may differ slightly from actual loss (0. 03–0. 15 dB) due to launch conditions and fiber geometry, so bidirectional testing is recommended for accurate results.

Proper testing ensures that each splice meets the required loss criteria and that the total link loss remains within the optical power budget of the system.

Practical Field Targets

While standards allow up to 0. 3 dB per splice, many ISP and BEAD-funded projects set stricter targets: Average splice loss: 0. 1 dBMaximum acceptable splice loss: 0.

15 dB These tighter thresholds help maintain sufficient margin in the link budget, particularly for XGS-PON or other high-split networks where the total budget is limited.

Summary

Maximum fusion splice loss: 0. 3 dB (TIA-568. 3-D, Telcordia GR-1093)Typical field target: 0.

1–0. 15 dB per spliceTesting methods: OLTS/LSPM for end-to-end loss, OTDR for splice location and individual lossImportance: Maintaining low splice loss preserves link budget, ensures network reliability, and supports future expansion. By adhering to these requirements and performing proper testing, trunk optical cable installations can achieve reliable, high-performance operation.

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Fiber Optic Testing Standards

The Contractor tasked to perform testing or splicing on any fiber optic cable will follow these testing standards to fulfill their contractual obligations. The Contractor must utilize the correct equipment and

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High quality in splicing is usually defined as low splice loss and tensile strength near that of the fibre proof-test level. Splices shall be stable over the design life of the system under its expected

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important. The OTDR trace can be used for cable acceptance, splice and connector loss, documentation, troubleshooting, fault location, optical return loss, and to measure the length of PM

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