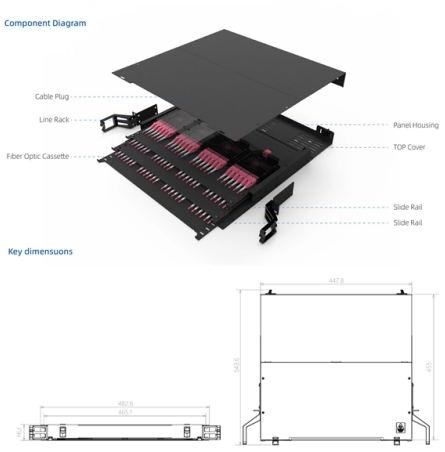
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Fiber splicing principle of optical cable terminal box



Overview

This FOA virtual hands-on (VHO) tutorial on fiber optics covers fiber optic cable splicing using a typical portable fusion splicer.

Key Takeaways

Fiber splicing in terminal boxes involves preparing, aligning, joining, protecting, and testing optical fibers to ensure low-loss, reliable connections.Overview

Fiber splicing is the process of joining two optical fibers end-to-end to allow light signals to pass with minimal loss. In terminal boxes or fiber enclosures, splicing is performed to protect the fibers, manage excess cable length, and ensure long-term stability. There are two main splicing methods: fusion splicing, which permanently welds fibers together, and mechanical splicing, which aligns fibers using a mechanical device and index-matching gel for temporary or quick connections .

Step-by-Step Process1. Cable Preparation
• Strip the Fiber Jacket: Remove the outer jacket and protective coating using a fiber stripper to expose the bare fiber cores .

• Clean the Fibers: Use lint-free wipes and isopropyl alcohol to remove dust, oils, or contaminants from the fiber ends .

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• Cleave the Fibers: Employ a precision fiber cleaver to create a smooth, perpendicular end face. A clean cleave is critical for low splice loss .
2. Fiber Alignment and Splicing
• Mechanical Splicing: Insert the prepared fibers into a mechanical splice connector. Use an alignment device and index-matching gel to ensure light passes seamlessly across the joint. Typical insertion loss is around 0.3 dB .

• Fusion Splicing: Place fibers in a fusion splicer, which uses an electric arc to weld the fiber ends together. This produces a permanent joint with very low loss (around 0.01 dB) and minimal back reflection .
3. Splice Protection
• Place the spliced fibers into a fiber splice tray within the terminal box or enclosure. Use protective sleeves to shield the splice from environmental factors and mechanical stress .
4. Fiber Verification and Testing
• Test the spliced fibers using an OTDR (Optical Time Domain Reflectometer) or a power meter to verify signal integrity and ensure optimal performance .
Best Practices
• Always handle fibers carefully to avoid breakage or contamination .

• Maintain a bending radius greater than 30 mm during handling to prevent microbends .

• Use manufacturer-recommended consumables and protective sleeves to ensure long-term reliability .

• For singlemode fibers, fusion splicing is preferred due to lower loss and higher stability, while mechanical splicing is often used for multimode fibers or temporary connections .
Conclusion

Splicing fibers in optical cable terminal boxes requires meticulous preparation, precise alignment, and proper protection. Following these steps ensures low insertion loss, high mechanical strength, and long-term reliability, whether using mechanical or fusion splicing methods. Proper testing and verification complete the process, guaranteeing optimal network performance .

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An optical fiber patching cabinet. The yellow cables are single-mode fibers; the orange and blue cables are multi-mode fibers:

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