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Fiber Testing Best Practices

Pocket Guide

This fiber testing best practices pocket guide was designed by Fluke Networks to educate about important optical fiber handling best practices, including:

- *Fiber inspection and cleaning*
- *Loss-length fiber testing (Tier 1 certification)*
- *Fiber plant characterization and troubleshooting (Tier 2 certification)*

Whether you handle fiber on a regular basis or just occasionally, this pocket guide will serve as a useful tool to ensure you never miss a critical step during your fiber testing or troubleshooting.

Why are fiber testing best practices so important?

With 40G/100G infrastructure deployments in the datacenter quickly becoming reality, the shrinking loss budgets of optical fiber cabling due to increasing bandwidth demands mean that reliable and efficient initial installations are now more important than ever. The infrastructure becomes highly dependent upon certification and maintenance tools to ensure fiber reliability. To minimize callbacks, troubleshooting time and unnecessary network downtime, fiber-handling best practices should always be followed by all network engineers, storage area network designers and cabling installers.

Best Practice:
Fiber Inspection and Cleaning

When should you do it?
Prior to any fiber connection

Why should you do it?
Dirty end-faces are the #1 cause of fiber link failure, but are the easiest to prevent. Damaged end-faces, in the form of scratches, pits, cracks, or chips, can also bring a fiber network down, and are often the result of poor terminations or mated contamination. Finding and eliminating any area of reflectance will help high bandwidth performance.

What instruments should you use?
- Video microscope for clear and thorough inspection
- Non-IPA fiber-optic solvent for effective, residual-free cleaning
- Lint-free, non-static wipes for end-face cleaning or swabs for port-cleaning

Inspection and Cleaning Procedure
- ❑ Inspect the fiber end-face (or port) using a video microscope to identify contamination.
- ❑ For wet cleaning: Dab the contaminated end-face with a solvent-dampened wipe (or swab). Then rub the fiber end-face perpendicularly against a dry wipe or use a OneClick cleaner.
- ❑ For dry cleaning: Use the IBC™ OneClick cleaner by inserting the wand into the bulkhead or endface and use a pushing motion to engage tool—an audible CLICK will alert you when the tool is fully engaged and the endface is clean.
- ❑ Re-inspect the fiber end-face (or port) with the video microscope to ensure that all the debris has been removed.
- ❑ If contamination is still observed, repeat the cleaning process until all contamination is removed.

To watch a demo please visit:
http://www.flukenetworks.com/fibercleaning

Fluke Networks' Fiber Inspection and Cleaning Solutions

Fiber Optic Cleaning Kits

FiberInspector™ Mini

FiberInspector™ Pro

Best Practice: Loss-Length Fiber Testing (Tier 1 Certification)

When should you do it?

After any fiber-link installation to ensure the job meets the fiber-loss budgets as specified by the standards

Why should you do it?

It is required by TIA-568-C, ISO-11801 and IEC 14673-3 to ensure a quality installation.

What instruments should you use?

- Optical Loss Test Set (preferred) - or -
- Power Meter/Light Source Set and Visual Fault Locator

Tier 1 Fiber Certification Procedure

- ❑ Verify polarity with a visual fault locator (VFL).
- ❑ Before conducting the loss-length test, connect the main and the remote units with a pair of test reference cords.
- ❑ Set and record a reference power level from the source as the baseline for the subsequent power-loss measurement.
- ❑ Connect the main and remote units onto opposite ends of the fiber link to be tested.
- ❑ Use the main unit to measure the level of optical power being transmitted by the source on the remote unit.
- ❑ The display on the main unit will automatically calculate the fiber loss and link length before comparing it to the appropriate standards and returning a “Pass” or “Fail” result.

Note: *It is technically feasible to conduct a Tier 1 certification of fiber using a power meter and light source. However, it requires the utilization of a visual fault locator, fiber length meter, and manual calculations. To eliminate the potential for error to minimize instrument use, Fluke Networks recommends certifying fiber cabling using an Optical Loss Test Set.*

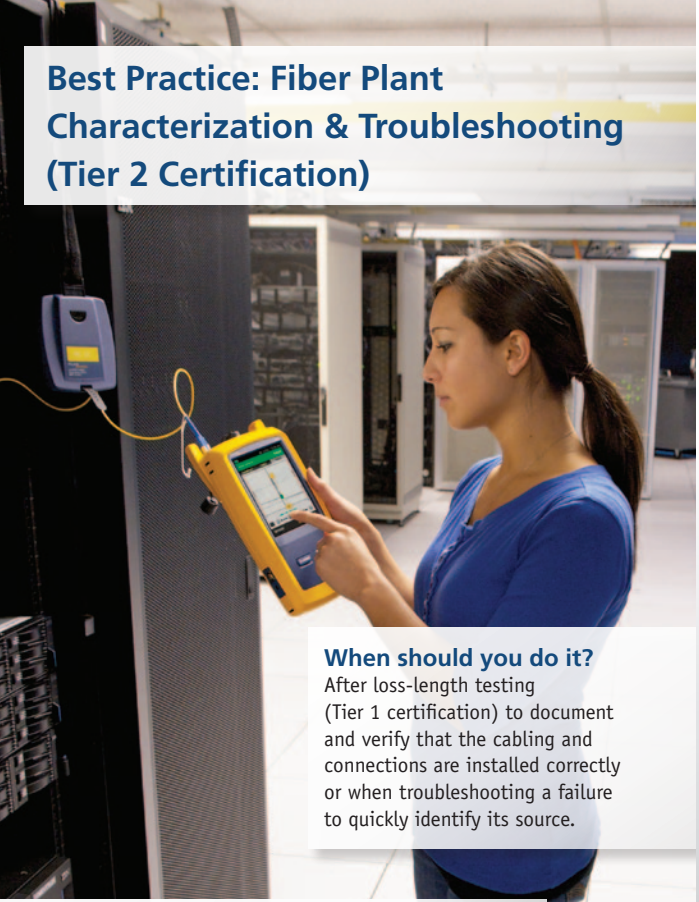
Fluke Networks’ Loss-Length Fiber Testing (Tier 1 Certification) Solutions

DTX-CLT CertiFiber® Optical Loss Test Set

DTX CableAnalyzer™ with Fiber Modules Optical Loss Test Set

SimpliFiber® Pro & VisiFault™

Best Practice: Fiber Plant Characterization & Troubleshooting (Tier 2 Certification)



When should you do it?

After loss-length testing (Tier 1 certification) to document and verify that the cabling and connections are installed correctly or when troubleshooting a failure to quickly identify its source.

Why should you do it?

Fiber networks have very tight loss budgets and less room for error, so network owners and designers are setting not only overall loss budgets, but also loss budgets for individual splices and connectors. Optical Loss Test Sets and power meters do not have visibility in and cannot test at this level.

What instrument should you use?

- OTDR - Optical Time Domain Reflectometer (preferred) - or -
- Fiber Troubleshooter

Tier 2 Fiber Certification Procedure (OTDR only)

- ❑ Connect the OTDR to one end of the fiber link-under-test using a launch fiber. Connect a second launch fiber to the far end of the link-under-test. (Launch fibers are test leads that enable the tester to overcome dead zone limitations to measure the loss and reflectance of the first and last connections in the channel.)
- ❑ Configure or select the appropriate limits to test against.
- ❑ Shoot a trace of the fiber link-under-test.
- ❑ Review the testing results for any pass or failure events. Correct any failure event before re-testing.
- ❑ Compare to the limits being tested against to ensure that the component measurements are within the specified limits.

Fiber Plant Troubleshooting (OTDR or Fiber Troubleshooter)

- ❑ Connect an OTDR or Fiber Troubleshooter to one end of the fiber link-under-test using a launch fiber.
  To measure the far end connector, connect a second launch fiber to the far end of the link-under-test.
- ❑ If necessary, define the limits to test against in order to "flag" incidents of high loss or high reflectance.
- ❑ Test the fiber channel.
- ❑ Review the results, locate the failure events and fix the problems accordingly.

OptiFiber® Pro OTDR

DTX CableAnalyzer™ with DTX Compact OTDR Module

Fiber QuickMap™ - Multimode
Fiber OneShot™ PRO - Singlemode
Troubleshooters

Fluke Networks' Fiber Test and Troubleshooting Solutions

	Inspection & Cleaning		Loss Length Testing (Tier 1 Certification)			Plant Characterization & Troubleshooting (Tier 2 Certification)				
	 FiberInspector Pro/Mini Video Microscopes	 Fiber Optic Cleaning Kits	 MultiFiber Pro	 DTX-CLT CertiFiber Optical Loss Test Set	 DTX CableAnalyzer with Fiber Modules	 VisiFault Visual Fault Locator	 Fiber QuickMap Troubleshooter	 Fiber OneShot PRO Troubleshooter	 DTX Cable-Analyzer w/ Compact OTDR Module	 OptiFiber Pro OTDR
Check for fiber end-face contamination or damage	✓									✓
Clean contamination		✓								
Check connectivity			✓ MPO	✓	✓	✓	✓	✓	✓	✓
Check polarity			✓	✓	✓	✓				
Verify loss over entire link to ensure loss budget not exceeded			✓	✓	✓				✓	✓
Dual-fiber loss testing				✓	✓					
Tier 1 certification				✓	✓					
Locate faults						✓	✓	✓	✓	✓
Locate multiple connections & loss events							✓	✓	✓	✓
Measure event loss			✓						✓	✓
Reflectance measurements							✓	✓	✓	✓
Tier 2 certification									✓	✓
Pass/fail results			✓	✓	✓				✓	✓
Document test results			✓	✓	✓				✓	✓
Fiber types supported	Multimode Singlemode	Multimode Singlemode	Multimode	Multimode Singlemode	Multimode Singlemode	Multimode Singlemode	Multimode	Singlemode	Multimode Singlemode	Multimode Singlemode
Source type			LED	LED, FP Laser, & VCSEL	LED, FP Laser, and VCSEL	Laser	FP Laser	FP Laser	LED, FP Laser	LED, FP Laser

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Ensure the fiber-based network goes up and stays up!

Visit **www.flukenetworks.com/FiberBP** for additional resources to help you establish Fiber Testing Best Practices.

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Fluke Networks operates in more than 50 countries worldwide. To find your local office contact details, go to **www.flukenetworks.com/contact**.

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