

BEST PRACTICES IN OPTICAL TESTING

Reference Poster

OPTRONICS

CONNECTOR AND FIBRE TYPES

Single-Fibre Connectors

APC	UPC
SC Simplex (singlemode/multimode)	
SC Duplex (singlemode/multimode)	
FC Simplex (singlemode/multimode)	
ST Simplex (singlemode/multimode)	
E2000 Simplex (singlemode/multimode)	
E2000 Duplex (singlemode/multimode)	
LX-5 Simplex (singlemode/multimode)	
LX-5 Duplex (singlemode/multimode)	
LC Simplex (singlemode/multimode)	
LC Duplex (singlemode/multimode)	
MU Simplex (singlemode/multimode)	
MU Duplex (singlemode/multimode)	

* APC: angled polished connector (8°) – UPC: ultra-polished connector

Multifibre Connectors

MT-RJ (2 fibres) (singlemode/multimode)	MTP/MPA/MPO (4, 8, 12, 24, 36 or 72 fibres) (singlemode/multimode)

Ribbon Fibre and Cables

Ribbon fibre 4/B/12 SM MM	Ribbon fibre Cable 4/B/12 SM MM
●●●●●●●●●● — Buffered fibre Ribbon	●●●●●●●●●● — Buffered fibre Ribbon ●●●●●●●●●● — Strength Yarns ●●●●●●●●●● — Outer Jacket

Fibre Types**

Singlemode (9/125µm)	
Multimode (50/62.5/125µm)	
Multimode OM3 (10 GigE ready; 50/125 µm)	

** Note: These are the most common fibre jacket colors on the market. Different colors may be used.

THE BASIC RULES FOR SAFE AND EFFICIENT TESTING

Thorough connector/adaptor care and cleaning is where accurate testing starts, as dirt or damage can lead to erroneous test results, poor transmission and even permanent harm to the link, especially in the case of high-power transmission. So before performing a connection, ensure that connectors/adapters are clean and exempt of any defect.

- Always turn off any laser source before inspecting or cleaning connectors, components or bulkheads. Invisible radiation can seriously damage your eyesight.
- Always wear the appropriate safety glasses whenever required in the work environment.
- Always keep a protective cap on unused connectors, and store unused protective caps in sealed container, to prevent contamination.
- Always use appropriate optical cleaning tools (see below).
- Never use alcohol, solvent or wet cleaning without a way to ensure that it does not leave a residue on the endface, as such a residue can harm the equipment.
- Never reuse any tissue, swab or cleaning reel. Always discard used tissues and swabs properly.
- Never pull or twist any fibre or test jumper.

THE DOs AND DON'Ts OF OPTICAL TESTING

DOs

- Whenever you are dealing with connectors, cleanliness is key. Before performing a connection, **inspect connectors and clean them only if needed.** See procedures in the righthand sidebar.
- Connecting APC to UPC connectors will damage the ferrules. Make sure to connect compatible connectors or to connect them using a hybrid test jumper.
- Use proper fibre storage supplies and **keep bending/pinching in check** (around the back or over the rackmount). Use the appropriate installation supplies, ensuring that nothing is hanging or tangled.
- Regularly update the fibre labeling and record keeping. This saves you time and money, making for more efficient maintenance operations. Remove old/unused patchcords.
- Protect unused patchcord connectors and connector ports with a cap.
- Use a connector saver. You will wear out this accessory, and not the connector of your unit.
- To ensure repeatable results, **allow for a warmup period** consistent with manufacturer recommendations.

DON'Ts

- Do not perform a connection without first inspecting connectors. **Do not touch a connector ferrule** used for light transmission.
- Do not connect an APC connector to a UPC connector.
- Do not leave fibres hanging between rackmount units, and do not overcompress them. **Do not use tie wraps** to group fibres. Be careful not to create a macrobend, as this induces power loss.
- Do not neglect the proper identification and tracking of fibres. **Do not leave disconnected patchcords mixed with currently used patchcords.**
- Do not leave unused patchcord connectors or connector ports uncovered.
- Do not overuse your connectors.
- Do not use instruments that have not been warmed up.

Cleaning Tools

It is important to select cleaning accessories designed for optics, since most optical devices are not very resistant to abrasion.

Cartridge cleaning tools (dry clean)

- Expose a new cleaning area, following the manufacturer's instructions.
- For flat connectors, clean against the cleaning material, using a slow turning motion, following the arrows on the cleaning tool.
- For APC connectors, draw a straight line on the cleaning material, using the same angle as the ferrule endface.

Cotton swabs or lint-free wipes

Preferably use clean-room quality swabs and wipes. It is not recommended to use cleaning tips with metallic core as they may damage optical devices. Use care when cleaning and apply as little pressure as possible to prevent damaging or scratching the surface. Discard used swabs and wipes.

Specialized/specific alcohol and solvents used for wet cleaning

Whenever using alcohol or solvent to perform "wet cleaning", make sure you have at hand all the tools needed to ensure that the solvent will be completely removed from the connector. Alcohol that has evaporated from (or was adsorbed on) the ferrule will leave residue that is very difficult to remove—usually more difficult to remove than the original contaminant—without a second wet cleaning.

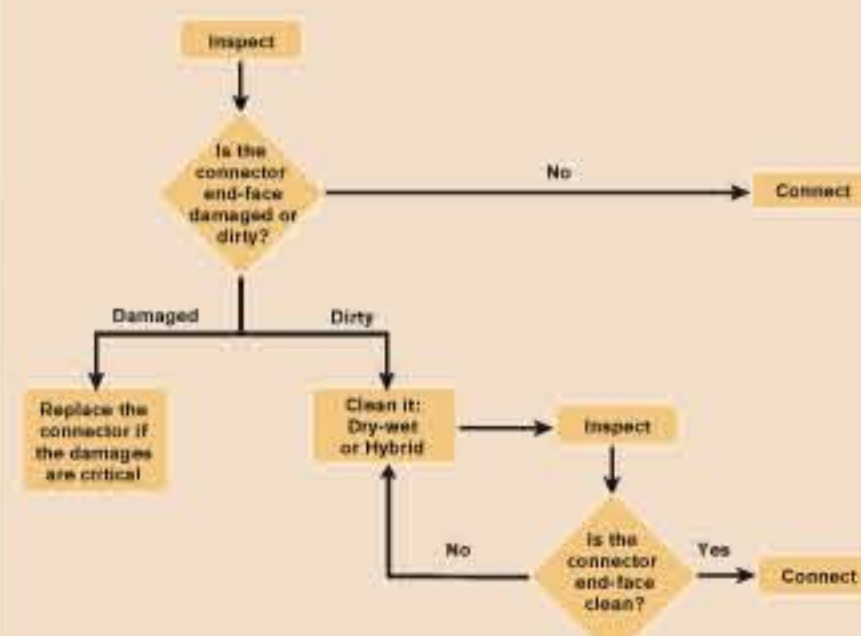
Never use wet cleaning on multifibre, E-2000 or F-3000 connectors, as the guide pins and connector cap can trap some alcohol and recontaminate the connector.

Gently wipe the ferrule in this portion of the tissue, with a "figure 8" motion. Immediately perform a similar wiping action on the dry portion of the tissue, to remove any residual liquid.

Compressed air

Whenever using compressed air, make sure that it is certified to be clean and exempt of any traces of water or oil. It is recommended to send the first spray in the air, as it can contain condensation or propellant, which would leave a residue on the surface to be cleaned. Always apply a very gentle air spray, with an angle, as the pressure may be high enough to damage fragile devices. Compressed air is only good for dust, not grease, and care must be taken not to trap dust into small crevices in the surface to be cleaned.

Suggested Cleaning Process

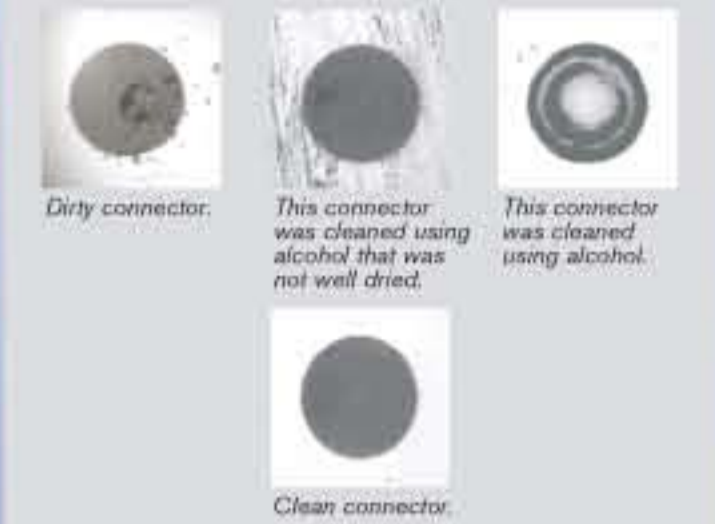


INSPECTION

Using a fibre inspection probe is the safest way to inspect a connector since it protects your eyes from live fibre signals. NEVER look directly into a live fibre or connector as the light signal can be very harmful to your eyes.

Specific adapters are needed to properly inspect different connectors (1.25 mm, 2.5 mm, APC, UPC). Make sure that the adapter is well cleaned before use.

Focus and magnification may be adjusted using controls (200x minimum).



CLEANING

Bulkhead Cleaning

First inspect and, if needed, use a clean dry swab to remove any debris that may be inside. For removable connector adapters that need to be turned and pulled out before inspection, make sure that any test jumper is disconnected, as it may damage both connectors. This applies to the EXFO Universal Interface (EUI) (see picture 1).

Lightly press and turn the swab to clean the ferrule endface or the inside portion of the bulkhead adapter (see picture 2).



1- Cleaning the EUI. 2- Cleaning bulkhead connectors.

When wet cleaning is required, make sure to use as little liquid as possible and rapidly dry the remaining alcohol or solvent with another dry swab.

Connector Cleaning



Cleaning a connector with a dry wipe.

When wet cleaning is required, make sure to use as little liquid alcohol as possible and rapidly dry the remaining alcohol or solvent with another dry wipe.

Detector Cleaning

You should clean detector windows only when it is absolutely necessary, as it is very difficult to remove any residue that may be trapped in a glass-housing interface. To remove debris, you may use a clean, dry swab (see picture 1) (1.25 mm may be appropriate for small surfaces), with a very gentle rotating movement, ensuring that you are not leaving any other debris. Follow with a gentle spray of clean compressed air (see picture 2).



1- Cleaning detector port(s) with a dry swab.

2- Cleaning detector port(s) with compressed air.

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SALES@OPTRONICSNET.COM

+44(0) 1908 441 104