

Fiber Optic Connector Cleaning – Suggested Practices

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Introduction

With the increase in network data rates, it has become increasingly important to assure that all fiber optic connectors are cleaned before mating. This means that both sides of a connector mating should be inspected and cleaned before making the connection. This applies to test equipment and test jumpers as well as network components. New connectors must be inspected and cleaned as well. Clean and inspect every connection every time is your best assurance of a reliable optical network.

Please note that it is important to remove all removable contaminants. References are made in the cleaning process for users to note if a defect/contaminant has moved on the surface of the end-face. In some cases something that appears to be a contaminant may be a defect in the surface of the glass or ferrule. In these cases (non-removables or defects), we do not have to worry about a potential migration of the contamination toward the core area causing system failure in the future.

Use of Wipes and/or Cleaning Cassettes

Fabric and/or composite material wipes provide combined mechanical action and absorbency to remove contamination. Wipes should be used with a resilient pad in order to avoid potential scratching of the connector end-face. This method is appropriate for cleaning connectors with exposed ferrules or termini but cannot be used to clean connector end-faces within alignment sleeves. The wipe should be constructed of material that is lint free and non-debris producing during the cleaning process. Please note that dry wipes have been shown to leave a static charge on the end-face of the connector which can thereafter attract particulate contamination. Therefore it is recommended that a static dissipative solvent be used with a dry wipe to eliminate this condition.

Technique for Cleaning with Wipes or Cleaning Cassettes

As mentioned above it is recommended to use a lint-free, non-debris generating wipe with a static dissipative solvent. The user should dampen a portion of the wipe with the solvent, place the connector end-face into the damp area of the wipe and draw the connector into the dry area of the wipe. A physical wipe of 2 – 5 cm should be sufficient. This may be repeated in a different area of the wipe if desired, however 1 or 2 strokes should be sufficient for most common contaminants.

Upon inspection, if the connector is not clean after the first cleaning, the process can be repeated perhaps with slightly more pressure on the connector to increase the mechanical action and perhaps making several strokes from the damp to dry sections of the cleaning material.

If the connector is still not clean and contamination has not moved it should be considered non-removable contamination and depending on the location and size of the contamination (See table below) the user should pass or reject use of the connector.

Swabs or Port Cleaning Devices

Use of purpose built swabs or mechanical port cleaning devices provides mechanical action and absorbency to remove contamination. However since the area within a port is very confined and limits mechanical action, it is recommended that a wet/dry cleaning process be utilized for cleaning connector end-faces within alignment sleeves. A static dissipative solvent will add chemical action to the cleaning process as well eliminate any residual static charge that may be on connector. The cleaning end of the swab or cleaning material used in the port cleaning device should be lint free, non-debris generating material.

Select a swab or port cleaning device that is manufactured for the size connector you are cleaning. Do not touch or contaminate the cleaning end of the swab or the port cleaning device. It is recommended that the user dampen the swab or port cleaning device with a static dissipative solvent. The swab or port cleaning device should be damp and not wet. (The process is analogous to wiping a smooth surface with a sponge. A damp sponge will pick up contaminants, whereas a wet sponge will only spread them around.) If a very fast drying solvent is used then a follow-up cleaning with a dry swab or an additional activation of the port cleaning device may not be necessary.

Swab Cleaning Detail: Place the dampened cleaning end of the swab into the port and rotate the swab while applying some pressure to the connector end-face. Usually pushing so that the compression spring in the connector is slightly activated is ideal for 2.5mm connectors. Rotating the swab 6 – 12 times is sufficient. The swab should only be used once and then disposed. If the user is cleaning angled polished connectors – APC (typically color coded with a green connector housing or bulkhead adaptor), then using a ¼ turn back and forth rotation may help the swab end-face conform to the 8 degree angle and thereby clean the entire surface of the connector end-face. If a very fast drying solvent was used, you are now ready to inspect. If not, repeat the above process with a dry swab.

Port Device Cleaning Detail: Insert the solvent dampened device into the alignment sleeve and activate the cleaner to perform the mechanical clean either by pushing the device or by pressing on a button on the device. An additional activation of the device assures that any excess solvent has been removed.

Upon inspection, if the connector is not clean after the first cleaning, the process can be repeated.

If the connector is still not clean and contamination has not moved it should be considered non-removable contamination and depending on the location and size of the contamination (See table below) the user should pass or reject use of the connector.

Notes about Solvents

Solvents used to clean fiber optics should be static-dissipative and residue-free. Many solvents are flammable and/or packaged so that transportation of the solvent is considered a hazardous material increasing cost of shipment and storage of the solvent. However, there are solvents available that are non-flammable and non-hazardous and packaged so that shipping requires no additional fees or paperwork.

Historically, 99% pure isopropyl alcohol (IPA) has been used as a solvent. However, IPA is easily contaminated. The solvent is hygroscopic and therefore absorbs moisture from the atmosphere

including any contaminants present contaminating the solvent and potentially leaving a haze on the connector end-face which can be a problem with higher power laser networks. In addition, IPA is flammable and is considered a hazardous material. Typically IPA must be repackaged for use and is therefore very subject to contamination.

Also, it is important to select a solvent that is compatible with the cleaning wipe, swab, or device. You do not want a solvent will dissolve a binder or glue used in a wipe or swab and generate additional contamination.

Single Mode Connector Acceptance Criteria

Zone	Description	Diameter	Allowed Defects	Allowed Scratches
A	Critical	0-25um	None	None
B	Cladding	24-120um	any <2 um 5 2-5um None > 5 um	None >3um
C	Adhesive	120-130um	Any	Any
D	Contact	130-250um	None >10um	Any

Multi-Mode Connector Acceptance Criteria

Zone	Description	Diameter	Allowed Defects	Allowed Scratches
A	Critical	0-66um	5 <5um None >5um	5 <3um None >3um
B	Cladding	24-120um	Any <2 um 8 2-5um None > 5 um	None >3um
C	Adhesive	120-130um	Any	Any
D	Contact	130-250um	None >10um	Any

Zones are concentric circle about the center of the fiber in the connector end-face.

Defects may include non-removable contaminants.

Size of Defects is defined as its widest dimension.

Size of a scratch is defined as its width.

Other Notes

Cleaning connector end-faces with "canned air" is not recommended.

Do not repackage cleaning wipes, swabs, cassettes, or port cleaning devices.

Do not repackage solvents.

Fast-drying solvents can be used to clean (flush/rinse) adaptor caps used on inspection or test equipment. These adaptors can also be sources of contamination in the optic network.