

Why a Fiber Optic Assembly Failed?

All About Fiber

Fiber assemblies are viable for your high speed fiber links, a failed and high dB loss fiber assembly can lead to "Network Down", and nobody wants that! Fiber patchcord termination quality and performance issues can cause you major headaches as they are often difficult to troubleshoot.

What are the problems?

A fiber optic connector failure can be caused by various problems related to fiber optic terminations, issues such as fiber breaks, nicks, microbends, pinches, and micro-fractures in the fiber. Besides all these fiber related issues, failure can also be caused by poor assembly process such as insufficient/excess epoxy, bubbles in the epoxy, and issues with improper stripping, crimping, and so forth.

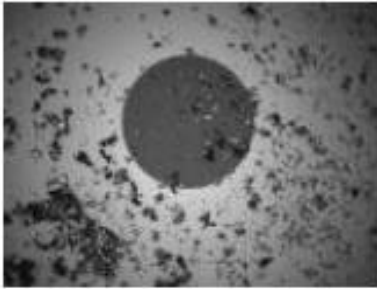
The BIG FIVE things that cause failure

BIG-1: End-face Contamination

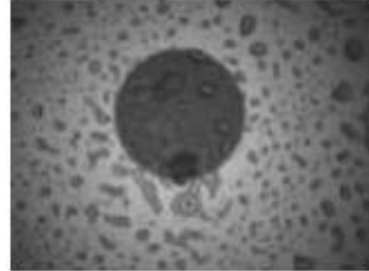
Your troubles:

Trouble #1: Light is transmitted poorly or not at all.

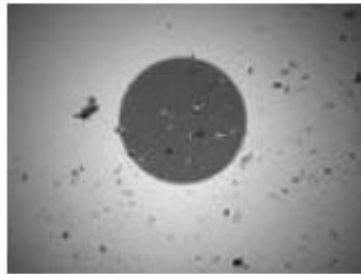
Trouble #2: Light is reflected back at the connection point, returning to the point of transmission and causing equipment breakdown.



Dirts & Dusts



Skin Oils

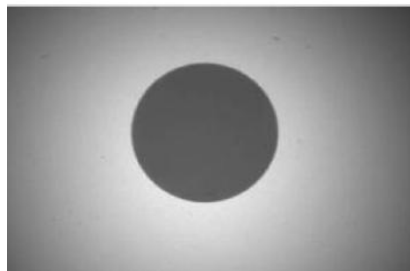


Fiber Residues

When contaminations are on the surface of optical fiber end-face, the light ray may not be able to travel through the line, result in bad optical loss performance.

To deal with it:

You should repeatedly inspect and clean the end-face, make sure it is clean before mating.



A Clean Fiber End-face

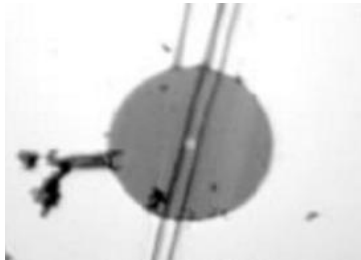
BIG-2: Cracked Fiber

Your troubles:

Trouble #1: Light is transmitted poorly or not at all

Causes:

Some manufacturing production lines do not pay enough attention to control the end-face polishing process consistently; some fibers are polished with over-protruded condition. If a fiber protrudes too much it can crack and splinter when mated with another fiber or into optical device.



To deal with it:

Make sure your optical fiber assemblies supplier inspects the fiber protrusion by using an Interferometer, and to measure it by applying the GR-326-CORE standard.

BIG-3: Pinched Fiber Cable

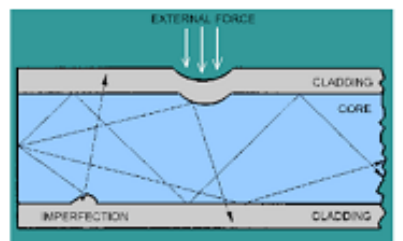
Your troubles:

Trouble #1: Brings microbending thus caused high dB loss

Trouble #2: Badly affect link loss as a whole

Causes:

Many patchcord suppliers or even installers like to use cable ties to keep cable nice and neat. However, it is not good for fiber cable products. The pinches compress the glass and can cause high dB loss due to microbending.



To deal with it:

To use soft magic-tape as cable tie to replace the nylon or metal cable ties.

BIG-4: Exceeding Bend Radius

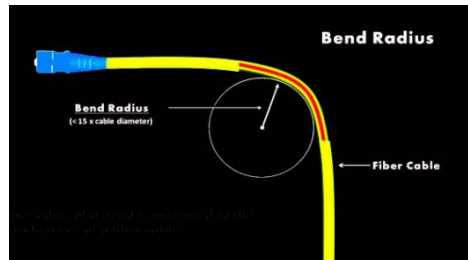
Your troubles:

Trouble #1: High dB loss

Trouble #2: Badly affect link loss as a whole

Causes:

Bending the fiber optic cable too much will cause optical loss, what we called "Macrobending Loss", which typically happened during installation.



To deal with it:

Allow a reasonable bending according to supplier's specification on cable bending tolerance, minimum bend radius for a cable is typically 10 to 20 times the outer diameter of the cable. If cable bending is unavoidable at your installation environment, you may use bend-insensitive fiber cable which typically accepts < 7cm of bending radius.

BIG-5: Misalignment

Your troubles:

Trouble #1: High dB loss

Trouble #2: Badly affect link loss as a whole

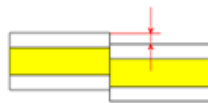
Causes:

Poor insertion loss readings are generally a result of fiber misalignment, and/or the quality of the finishing on the end of ferrule. There are extrinsic & intrinsic factors:

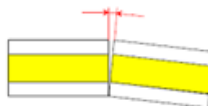
Relative position:



Lateral off-set



Axial tilt



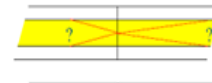
Differences in:



Core diameter



Numerical aperture



Refractive index profile



Extrinsic: Caused by poor termination /assembly procedure

Intrinsic: Caused by materials mis-match

To deal with it:

Ensure you buy quality components from reliable cable assemblies' manufacturers.