

Skilled Cleaning Leads to First-Rate Fiber Optic Splices

Author:

Jay Tourigny, MicroCare Senior Vice President

Industry:

Fiber Optics

Published:

Fibre Systems

Cleaning fiber optic splices is essential to network function and reliability. To ensure a robust and long-term reliable fiber optic network, it is important that the fiber is cleaned during fusion splicing. Contamination is the primary cause of network disruption or failure. Splices must be properly cleaned or the splice could be optically defective or mechanically weak. Dirty fiber splices can cause network problems including back reflection, signal-loss and even fiber breakage at the splice, causing complete network failure.

There is a right way to clean fusion splices. Because high heat is generated by arcing electrodes during the fusion splicing process, technicians should always follow the recommended processes supplied with the fusion splicing equipment. This ensures safety for the operator and equipment, and perfectly cleaned fiber for reliable splicing every time.

IPC-8497-1 is the international standard for cleaning fiber optic splices. IPC (Institute of Printed Circuits) and iNEMI (international Electronics Manufacturing Initiative) and other fiber industry organizations recommend cleaning with the wet/dry method since it cleans fibers to meet that cleanliness standard. Plus, wet/dry cleaning helps dissipate static and eliminates any triboelectric charge that could damage the network.

How to Wet/Dry Clean

Wiping a fiber splice with a dry wipe goes only half way in terms of cleaning, and it generates a significant static charge which in turn attracts dust that is extremely difficult to dissipate. Wet/dry cleaning with the right cleaning fluid increases both the surface cleaning performance and the humidity on the fiber to dissipate the surface static. During the wet/dry cleaning process, you use a section of an optic-grade cleaning wipe, dampened with a static dissipative cleaning fluid. You wipe the splice starting at the damp area and move in one direction towards the dry area of the cleaning wipe. This removes the contamination and minimizes the static charge in one step.

Prepare for Cleaning

First, be sure your hands are clean. Clean hands are less likely to transfer dirt and oils that can compromise the cleaning process. However, don't apply a moisturizer or lotion to your hands prior to cleaning the fiber. This attracts more contaminants and causes oils to transfer onto the cleaning wipe, and everything else you touch, including the cable you are trying to clean.

Don't wear gloves when working with fiber. While you may think that wearing gloves will protect the cleaning materials from the oils in your skin, you will actually be adding more particulate compared to clean hands. Gloves are a carrier of all kinds of microscopic particles and oils. It's best to simply wash your hands prior to cleaning the fiber splice.

Then strip the protective polymer coating around the optical fiber using an appropriate hand stripper or thermal stripper. You should refer to your fusion splicer user instructions for specific details on how much of the polymer jacket to remove from each end.





Listen for the squeak indicating the fiber is clean.



Sealed containers won't spill.

Clean Exposed Fibers with the Right Fluid

Once the polymer coating has been stripped from the fiber, it needs to be cleaned. Cleaning the stripped fiber removes any remaining debris from the stripping process, plus any other contaminants that may be on the exposed fiber.

Clean the exposed fiber(s) by folding a lint-free wipe in half and then moisten the wipe with a fiber optic cleaning fluid. Many operators use IPA (isopropyl alcohol) as their preferred cleaning fluid. However, with the recent COVID-19 pandemic, alcohol is sometimes difficult to source. Fortunately, there are other options.

Choose a Better Alternative to Alcohol for Fiber Cleaning

There are better alternatives to IPA for cleaning fiber optic splices. Many of them clean just as well, if not better than alcohol. Operators should look for a high-purity cleaning fluid that cleans the fiber without leaving residue behind. Additionally, IPA alternatives specifically engineered for cleaning fiber typically evaporate much faster than IPA, so it saves on cleaning time.

Look for Better Cleaning Fluid Packaging

For safety out in the field, choose a cleaning fluid that's nonflammable. Also, use a fluid that is in a hermetically-sealed container. A sealed container ensures the cleaning fluid is never contaminated. It also won't spill if it tips over in a tool kit or while in use. If you pre-ship fluids and tools to job sites, choose a fiber cleaning fluid that ships non-hazardous and non-regulated. This saves on shipping costs. In some instances, these cleaning fluids also come in travel-sized containers. So, you'll still meet the TSA 3 oz. or less rule if you take it with you in your carry-on bag when flying to a work site.

Too Much of a Good Thing

When wetting the cleaning wipe with cleaning fluid, do not over saturate the wipe. Putting too much cleaning fluid on the fiber increases the chance that the fiber ends will be re-contaminated as the fluid absorbs dust, exhaust fumes and other impurities from the air. Choose a cleaning fluid in a package that delivers the cleaning fluid in metered doses. This controls the amount of cleaning fluid on the fiber and ensures the surfaces are dry after cleaning. It also limits operator exposure and cleaning fluid waste.

Pay Attention to Your Wipe

Wipes are an essential tool for successful splice cleaning. For the best results, opt for an optical-grade fabric wipe engineered for cleaning fiber. Fabric wipes are highly absorbent to effectively wick the contamination away from the splice while not generating lint.

Remember to use just one wipe per splice. It is commendable that you want to save your company money by reusing wipes to control costs or to protect the environment. However, by reusing wipes, you run the risk of cross-contaminating the network resulting in more time on the job or a costly call back. Used wipes will most likely redeposit particulate or oils back onto the splice.





Metered doses limit operator exposure and cleaning fluid waste.



Travel-sized containers are easy to transport in a carry-on bag.

Listen for the Squeak

After wetting the wipe, fold the moistened wipe around the fiber strand(s) and gently pinch the fiber. Pull pull the fiber through the folded wipe 1-2 times or until you hear the fiber “squeak” indicating it is clean. The cleaning fluid completely evaporates in seconds leaving the fiber clean and dry.

Cleave the Fibers

If you are splicing ribbon fiber, gently flair the fiber strands with your index finger to ensure they are dry and don’t cross. Using a precision fiber cleaver and appropriate fixtures, cleave the fiber(s) so the end(s) are perpendicular and smooth across the axis. The cleaved end(s) should be kept in the fixtures. Use care to keep the end(s) clean up to the point of splicing and be certain to properly dispose of fiber shards so they don’t become an impossible to find splinter in your finger.

Do Not Clean Again

There is nothing cleaner than the end-face of a newly-cleaved fiber, so do not clean again after cleaving. If you do, the fiber ends will become contaminated. This creates extra work for the fusion splicer in the pre-burn phase and may shorten the lifespan of the unit’s electrodes. Contamination will also degrade the mechanical strength of the splice in the form of non-linear splices with imperfections, and will ultimately cause excess signal losses.

Complete the Splice

The fiber(s) are now ready to join together by placing the fixtures with the clean, cleaved fiber into the fusion splicer’s “V” groove fixtures. This process involves the alignment of the two opposing ends of the fibers, and the splicer uses an electric arc across the opposing fiber ends to precisely melt and permanently join the ends.

The Best Tools and Methods

There is no doubt that reliable, trouble-free fiber optic networks are the key to our interconnected future. But one of the biggest threats to fiber signals today is contamination. Dirty fiber splices can cause network problems including weak signals or a complete network shut-down. Therefore, properly cleaning fiber optic splices during installation or maintenance is essential to keeping your network operating reliably. By using the correct cleaning methods and selecting the best tools, you can help assure your fiber splicing success. When in doubt, seek the help of an experienced supplier. One that specializes in fiber cleaning supplies to advise you on which tools and methods will work best for you.

About the Author:

Jay Tourigny is Senior Vice President at MicroCare which offers precision cleaning, lubricating and debinding solutions. He has been in the industry more than 30 years and holds a BS from The Massachusetts College of Liberal Arts. Tourigny holds numerous U.S. patents for cleaning-related products that are used on a daily basis in medical, fiber optic and precision cleaning applications. For more information, visit microcare.com.

ISO 9001:2015 Registered

© 2020 MicroCare. All Rights Reserved. “MicroCare”, “Sticklers”, the Sticklers logo and “When you need perfectly clean splices & connectors” are trademarks or registered trademarks of MicroCare, LLC. Rev. 20240

