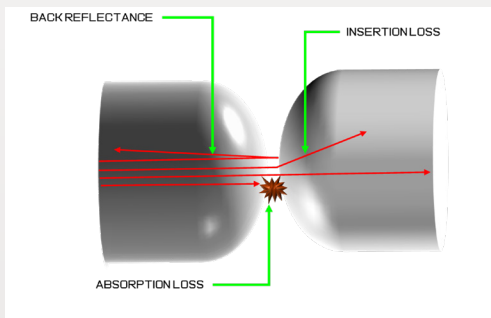


## Tech Article

# Wet to Dry Fiber Cleaning

- **Author:** Rick Hoffman, Sticklers™ National Accounts Manager
- **Industry:** Fiber Optics
- **Published:** *Sticklers Resources*



Contaminated end faces can cause back reflectance, absorption loss and insertion loss



Sticklers Fiber Splice & Connector Cleaner breaks the static bond between the soil and the surface



**Scope:** Based on MicroCare™, LLC and *Sticklers* Lab studies, fiber optic end face cleaning of patch cords, adapters, alignment sleeves and transceivers using wet to dry methods is proven to be most efficient and effective. This document expands on the testing and discusses best practices for fiber cleaning tools and products produced by *Sticklers*.

### Industry Issue

The telecommunications industry has been converting over to fiber optics for years. As the need for speed has driven the expansion of the technology, the need for pristine clean end faces has followed. End faces on fiber optic ferrules are the connection point along the line and thus need to be clean to allow the light to flow uninterrupted. The light should not get absorbed (absorption loss), reflected back to its original source (back reflectance) or refracted (insertion loss), in any way. A microscopic dust particulate, an accidental small touch from a finger, or even the removal of a dust cap (off-gas residue), can attribute to a non-clean ferrule end face causing frequency signal loss if not removed.

Technically speaking, when interference of the frequency or refractive index of the light changes, a phenomenon known as chromatic aberration exists. Thus, changes in the refractive index result in a change in incoming frequency signal. In layman's terms, if the light in the fiber optic line is refracted/reflected, then there is a significant loss of data transmission. All fiber optic lines on a network essentially have an acceptable loss budget. Any contamination on ferrule end faces makes that budget hard to achieve.

Further exacerbating the clean issue is that electrostatic charges are often found on surfaces from wear debris due to contact friction of connector parts, charged particles from test equipment, cooling fans on network gear or internal building HVAC systems. Electrostatic charges, also known as Triboelectric effect, can remain on the ferrule surface if not discharged.

### Ferrule Surface Issues

- Dry cleaning tools combined with atmospheric conditions can add electrostatic energy to the surface. Plastic on plastic insertion wear of the mated connector pair, plastic cleaning tools that do not have ESD safe materials, the rubbing of some dry cloth, for example, polyester, materials across the surface of the ferrule and charged particles from cooling fans all contribute to a charged electrostatic surface with no way to discharge. A charged ferrule surface will attract dust particulate which negatively impacts the insertion loss of the mated connection.

People have seen dust particulate under a microscope “dance” across the ferrule surface. When electrostatic energy exists, it must be dissipated since there is not a method to ground for these charged particles. Cleaning fluid, using the wet to dry cleaning method, will act as a dissipative medium to allow that charge to disappear.

- Wetted materials that are pure in nature can enhance the cleaning capability of the surface. For example, solvents can break the bond of the soil and the surface allowing a cleaning cycle to be minimized. This is true with the *Sticklers* Fiber Splice & Connector Cleaning Fluid. Due to its hermetically sealed container, the purity level of the fluid and its natural ESD properties, this fluid is perfectly engineered to clean ferrule surfaces.

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- Edge cleaning: Ferrule end face cleaning standards IEC 61300-3-35 focuses on cleaning Zones A-D (Core, Cladding, Adhesive, Contact). Production houses are concerned about cleaning outside of the inspection zones. The reason is due to migratory particulate shifting during transit. In other words, particulate outside the four zone regions migrating from the edge inside the core, after testing and packaging, but just before installing. Wet to dry cleaning methods helps get to these zones.

## Wet to Dry Cleaning Processes

(See *Wet to Dry Cleaning* document for visual)

So, what do we mean by wet to dry? Most fiber cleaning products have a mechanical action to them. A dry wipe, specific filaments and a ribbon material which agitates the soil and allows for removal are examples of materials that are used for mechanical cleaning. Wet to dry is the action of adding a small amount of solvent onto that medium to aid in removal of the soil more efficiently.

## Sticklers Fiber Splice & Connector Cleaning Fluid: The Wet in Wet to Dry

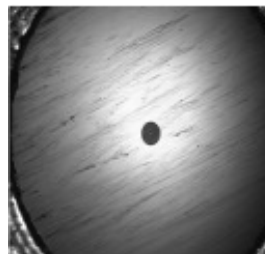
Sticklers Fluid, for short, is the main ingredient for wet to dry fiber end face cleaning. It is a non-flammable formulation that evaporates off the glass, ceramic, composite and plastic lens surfaces extremely fast. The fluid dissipates electrostatic charged dust as well as cleans dirt, fingerprints, oils and moisture. With its Triton™ top, it allows the technician to add a small amount to a targeted surface.

## Sticklers CleanWipes™

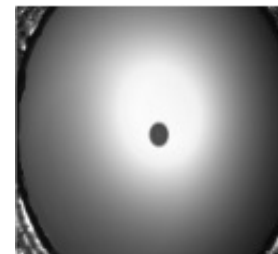
The *Sticklers* parts WCS100 and WCS640 are both slotted channel box wipes to maximize the use of the wipe without the user repeating a swipe on the same section. Each wipe is broken into separate channels so the technician can clean the male fiber optic jumper, one jumper per channel. The technician adds a small amount of the *Sticklers* Fiber Splice & Connector Cleaner, one half of a cap depression provides enough fluid, to the top part of the wipe slotted channel. The technician starts the clean in the wet area of the wipe and then slides down to the dry portion of the wipe, rotating the connector portion during the slide. This method cleans the core, and outside of the inspection zones. Never reuse the same channel to avoid cross contamination from a previous swipe.

**SC 2.5mm – Oil soil, cleaned with *Sticklers CleanWipes* (WCS100) and *Sticklers* Fiber Splice & Connector Fluid (POC03M) – 1 time clean.**

**Notice the outer edge and core are clean!**



**Pre-Cleaning**



**Post-Cleaning**

*Courtesy of the MicroCare Critical Cleaning Lab*



*Wet to dry cleaning dissipates electrostatic charged dust and cleans dirt, fingerprints, oils and moisture*



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## Sticklers CleanStix™

For transceivers and bulkheads, a *Sticklers* appropriately sized *CleanStix*, for example a 2.5mm or 1.25mm, can be used to clean the adapter sidewalls, sleeves, and the female end faces. The *Sticklers* Fiber Splice & Connector Cleaner has a *Triton* cap top that allows a *CleanStix* to enter its port opening. Add the stick into the port and press down on the top about a ½ depression. Take the wetted stick and place into the bulkhead, rotate in same direction 6 to 8 times. The *CleanStix* will absorb particles into itself and “buff” any residues off during the rotation. A second stick might be needed to absorb remaining cleaning fluid.

## Sticklers™ CleanClickers™

As previously outlined, a mechanical action united with cleaning solvent will enhance the cleaning, breakdown of the soil, and eliminate electrostatic charges if present. A mechanical clicker for fiber optic end faces is no different. The *Sticklers CleanClickers*, the MCC-CCU125 1.25mm size clicker for example, can clean both dry and wet to dry. The only difference in methods is you do not apply the fiber cleaning fluid directly onto the clicker tip end. The ribbon material present has a capillary action, meaning it will wick the fluid up and into the internal spool. This will make the dry cleaning difficult. Instead, apply a small amount of fiber cleaning fluid on a *CleanWipe* and then touch the wet spot with the tip of the *CleanClicker*. Then use the *CleanClicker* to clean the bulkhead or patch cord ferrule end face. A second click may be necessary to wick up remaining fiber cleaning fluid if not fully evaporated.

### About the Author:

*Rick Hoffman is the Sticklers National Accounts Manager. He has been in the industry more than 20 years and specializes in educating fiber optic designers, engineers and technicians about cleaning-related products that are used on a daily basis in fiber optic cleaning applications. For more information, visit [www.microcare.com](http://www.microcare.com).*

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