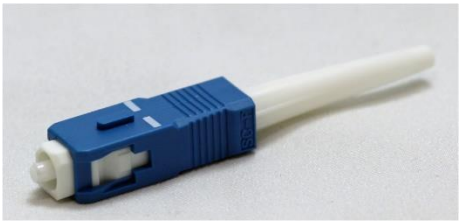
Trending Towards Splice-on Connectors



The splice-on connector is a new type of connector technology combining the benefits of fusion splicing with the simplicity of a field-installable connector to expand our options for field-termination. Technicians are embracing the splice-on connector for outside plant environments, data center installations and multi-dwelling unit (MDU) networks.

A splice-on connector uses a fusion splicer to permanently join a fiber stub inside the connector with a fiber cable. The splice is protected within the boot of the connector, replacing the need for traditional pigtails because the splice is contained within the connector. The connector can be directly terminated using the patch panel's existing cable management features.

As splice-on connectors become more popular, here are several reasons why you may want to consider them for your network.

Fewer Materials and Components Required

As mentioned above, splicing traditional pigtails with a fusion splicer requires a technician to use a splice tray to hold the protection sleeve. With a splice-on connector, the pigtail is eliminated because the fiber stub inside the connector is permanently joined with a fiber cable. The splice is protected within the connector boot.

Because a traditional pigtail isn't necessary, there are no long lengths of fiber cable attached to the connector. There is no need for slack management of fiber strands in tight spaces and high-density environments, such as data center racks and outdoor enclosures. Connector assemblies enclose and protect the splice, eliminating the need for an external splice holder, tray or other accessory.

Better Insertion Loss and Return Loss Performance over Mechanical Splice Connectors

Splice-on connectors have better insertion loss and return loss performance as compared to a mechanical splice. Because it uses a fusion splicer, a splice-on connector creates a continuous connection in the glass by "welding" cores together. This results in better performance at the splice, and is then combined with a factory-terminated connector end-face. The result is more robust performance as compared to a mechanical splice, which simply aligns two fiber stubs as precisely as possible with index matching gel.

Performance Between Splice-on Connectors & Mechanical Connectors

Performance	Splice-on Connector	Mechanical Splice
Product Example	**FiberFox FOX SOC**	**Corning Unicam**
Insertion Loss (db)	**0.1 – 0.25(MM) / 0.15-0.3 (SM)**	**0.3-.75(MM) / 0.2-0.5 (SM)**
Return Loss (db)	**<-35(MM); <-65(SM)**	**<-20(MM); <-55(SM)**
Reliability	**Best**	**Good**
Connector Cost ($)	**$7**	**$12**
Tools Cost ($)	**$3500 - $7500**	**$2000**
Termination Time (min)	**2**	**2**

Installation Flexibility

By combining fusion splicing with a field-installable connector, a splice-on connector gives installers greater flexibility. In the field, technicians can attach a connector to a cable via fusion as an alternative to standard mechanical splicing. With splice-on connectors, you can run drop cables to an end-user, cut the length you need, attach the splice-on connector and plug it in – no shorts or excess slack. Fusion splicing is the ONLY method recommended for drop cables if factory cables are not an option. The nature of drop cables is long distance, high power singlemode fiber. This scenario requires low Back Reflections (ORL) and attenuation and the only way to get that is by fusion splicing your connectors.

There is very little (if any) installation time difference between splice-on connectors and mechanical connectors. A fusion splicer will allow you to prepare a complete, durable, high-performance connections in the same amount of time it takes to complete a mechanical splice.

Generic Requirements (GR) for Outdoor Environments

Published by Telcordia Technologies (now Ericsson), **Generic Requirements (GR's)** are high-quality, vendor-neutral technical specifications for new and existing technologies or services. They provide an unbiased view of proposed generic criteria for telecommunications equipment, systems or services, evaluating telecommunications equipment for safety, performance, reliability and impact on telecommunications facility environments. GRs assist with product design, network planning and equipment purchasing in harsh environments.

Most splice-on connectors carry GR ratings – generally meaning that they can be used in outdoor environments. Their permanent, robust connections hold up well in outdoor enclosures. They can remain stable through a wide range of temperatures and other harsh conditions. Typically, mechanical splices must be used indoors, and only carry TIA ratings.

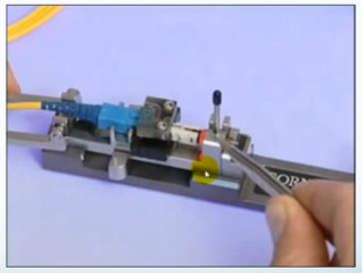
5. Successful-Splice Notification

As automated tools, most fusion splicers can notify the technician when a successful splice has been achieved. This removes much of the "craft sensitivity" or installer skill that is required for mechanical splicing, making it easy for novices and experts alike to use splice-on connectors. This feature allows

for successful splice notification as each splice-on connector is being terminated. No longer does the technician need to deal with multiple failures at the end of a project.

Tooling Costs: Significant Price Decreases on Fusion Splicers

Fusion-splicing tooling costs have stood in the way of broad adoption of fusion splicing. In recent years, however, the industry has experienced significant decreases in splicer prices, coupled with the proliferation of low-cost rental options. This has accelerated the popularity of fusion splicing and allows more installers to take advantage of splice-on connectors for deployments.



Summary

There are really only three ways to install a fiber optic connector and all of them have their pros and cons. Connectors can be field installed in one of three ways. These include the epoxy and polish method, a quick term (mechanical) connector, or fusion splicing a factory made pigtail or Splice On Connector (SOC). I have never hidden the fact that I support fusion splicing as the best method for field installing a connector.

The traditional connector installation using epoxy and a polish method may have the advantage of low initial tooling costs but that is about where the advantages end. This method tends to be labor intense with high connector scrap rates, the use of numerous consumables and requires a higher skill level than other options. The epoxy and polishing method though still utilized is used less and less for field installations.

The mechanical connector option while quick and efficient does also present its challenges. Initial kit cost for this type of connector can be as high as $2000 and the connectors themselves are much more expensive. The draw to these connectors is the speed at which they can be installed with a lower skill level. When using a mechanical connector you are sacrificing quality, specifically in regards to higher attenuation and ORL (Optical Return Loss). When considering your specific situation (drop cables and singlemode) the disadvantages of the mechanical connector should rule out its use. However, If you're dealing with small numbers of indoor connections, where loss budgets may not be a major concern, mechanical-splice connectors can still play an important role

Fusion splicing is the single best way to install an optical connector. Gone are the days of a fusion splicer being unaffordable and difficult to use. These days a cladding alignment splicer is selling for as low as $3,500 and the utilization of removable chucks has made fusion more appealing than ever. Let's not forget the other advantages of using a factory made Splice-On Connector (SOC) that includes better insertion loss and return loss, excellent reliability, better cost, and successful splice notification. Every advantage swings to the use of a fusion splicer to install connectors in the field.