Gel Sealing Could Help Connect the Next Billion Broadband Subscribers

Fiber-dense applications such as 5G and FTTH require changes in the outside plant that can be solved with new gel sealing technology.

By Kristof Vastmans / *CommScope*

Network connectivity has often been called the fourth utility of the 21st century. But even in the U.S., there's a long way to go in providing fast, reliable, affordable internet access for everyone. This became strikingly clear during the coronavirus pandemic, when one in five school-aged children lacked the high-speed connection required to access lessons and other learning materials during stay-at-home orders.

A 2020 study by the National Association of Counties (NACo) estimated that 65 percent of U.S. counties have average connection speeds lower than the FCC's definition of broadband. The lack of accessible, affordable high-speed broadband is global. According to Internet World Stats, 42 percent of the world was not yet connected to any type of broadband, as of mid-2019.

Surprisingly, the key to solving this deficit – on a global scale – could be a small, overlooked component in fiber network deployments: gel sealing technology.

New gel sealing technology will simplify and accelerate fiber installation and maintenance and allow global operators without specialized personnel training to perform installations.

CONNECTING THE NEXT BILLION

Building out the infrastructure to connect most of the world's population will involve a massive amount of new fiber. An analysis by the consulting firm Deloitte estimates that the U.S. requires an investment of $130 to $150 billion in fiber infrastructure over the next five to seven years to adequately support broadband competition, rural coverage and wireless densification.

The focus on connecting unserved and underserved areas and preparing for fiber-dense applications means significant changes in the outside plant. New topologies, such as distributed access architectures and fiber indexing drop strategies, are leading to increases in deployment and application diversity. But at the same time, the labor pool of skilled fiber technicians able to execute these new strategies is drying up. The bottom line is that building a fiber broadband backbone for the 21st century requires more than addressing the "what" – operators must tackle the "how."

SPLICING IS KEY

As operators plan their fiber networks of the future, they contend with the following questions: How can they roll out more infrastructure faster and more reliably? How can they ensure it is agile and easily expandable

In CommScope's Octopus Gel sealing system, the sealant by itself acts as a barrier to fluid (aggressive) media and the system embeds features to control the compression and unwanted gaps.

and upgradable? How do they make it easier to repair when needed?

Wherever fibers need to be aggregated, branched or accessed in the outside plant, fiber splice closures are used to house and protect the splices and manage fiber cables. As networks extend farther out in the last mile, they require a great deal of flexibility and accessibility to connect to homes, buildings, wireless base stations and other nodes.

These splice points must support a significant number of fiber connections, access points and flexibility nodes and allow operators to test and diagnose their networks and make frequent alterations. The design of the fiber splice closure and the way it is sealed have the power to revolutionize the extensibility of this vital connection in the network.

GEL UNLOCKS GROWTH

As global operators push fiber deeper, and the performance of fiber technology grows increasingly sensitive to splice closure contamination, reliable cold sealing technology is becoming a crucial focal point of new deployments.

Until very recently, there were three main types of seal technologies applied in harsh environments: heat shrink, rubber seals (or grommets), and thermoplastic elastomer (TPE) gel. Each of these has distinct trade-offs, but their goal is to allow multiple wiring configurations and enable repeated entry, as simply as possible, while providing a robust, reliable seal. Also, because of restrictions governing the use of heat – for example, heat shrink applied with a torch – near utility infrastructure, as well as the cost and training associated with these hot applied sealing methods, cold sealing technologies are the preferred method to enable broader deployments.

In 2020, CommScope material scientists announced a fourth technology – silicone gel – that is even more conformable and resilient than TPE. The silicone gel allows a single seal to cover a wider diameter range of cables. CommScope offers this gel sealing system compound under the brand name Octopus Gel. The Octopus Gel sealing system is part of the NOVUX ecosystem and product architecture.

The new technology also addresses an important challenge for installers and network operators: installation expertise. Traditional rubber and some TPE gel sealing systems rely on an installer's experience to achieve the right amount of compression – closing gaps to cover extremes of the cable diameter range – to create barriers for minimizing sealant exposure against aggressive media when activating the seal. The process adds time to the installation and maintenance process, but more importantly requires specialized personnel training to ensure it's done correctly. With the Octopus Gel sealing system, the sealant by itself acts as a barrier to fluid (aggressive) media and the system embeds features to control the compression and unwanted gaps.

It can be deployed throughout the feeder/distribution and drop network and can accommodate a wide variety of cable sizes and jacket thicknesses. The design also makes it suitable for aerial, ground level and below-grade applications.

With spliced network connections around the world set to skyrocket, this new gel sealing technology will simplify and accelerate new fiber installation and maintenance and allow global operators without specialized personnel training to perform installations. This benefits operators with reduced total cost of ownership coupled with enhanced quality standards across the network.

Today, there are more sealing options than ever, and each has an important role to play in safeguarding the entire network. ❖

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