

Flood-proof, Future-proof:

Why waterproof Medium Voltage Splices are non-negotiable for today’s Grid resilience

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Summary

Cable joints (splices) are a critical yet often overlooked link in power distribution networks - especially in environments prone to moisture, contamination, and physical stress. Traditional jointing methods frequently fall short under real-world conditions, leading to failures that impact reliability and drive-up operational costs.

This whitepaper examines the underlying causes of joint (splice) failure, particularly the role of moisture ingress, and recommends Lovink’s dual-barrier jointing system as a durable, installer-friendly alternative. By combining Protolin® resin and LoviSil® liquid insulation, the system offers a resilient, long-life solution designed to perform where others fail - helping DNOs extend asset life, reduce outages, and future-proof their networks.

Introduction: The hidden weak point in our power grids

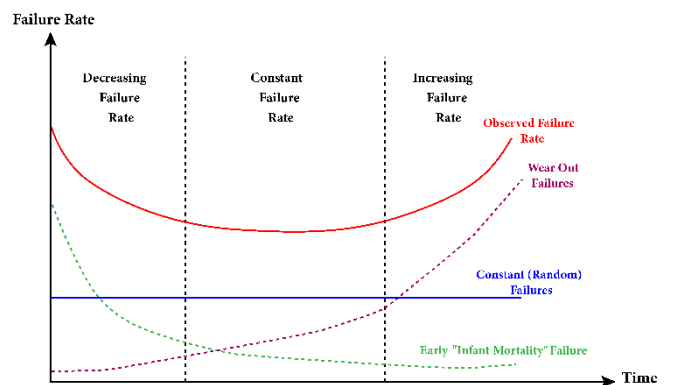
Across Europe’s utility networks, an invisible yet known critical component often determines whether power continues to flow: the cable joint (splice). These underground connectors are expected to perform flawlessly for decades, typically buried in saturated soil, beneath roads, or in contaminated industrial ground. When they fail, the impact is immediate and costly - outages, emergency repairs, reputational damage.

For distribution network operators (DNOs), especially those managing aging networks or operating in challenging environments like the Netherlands, translated as The Lowlands, and the UK, moisture ingress remains a primary cause of cable joint (splice) failure. Traditional jointing (splicing) technologies, like heat shrink, cold shrink, and hybrids, have served the industry for years. Yet they are not without risk, particularly when exposed to real-world stress: shifting soil, mechanical impact, or high groundwater levels.

From Vulnerability to reliability

Failures in cable joints tend to follow a predictable

pattern known as the “bathtub curve.” In the early stages after installation, faults often stem from errors made during assembly. These decline over time during the joint's normal service life, only to rise again toward end-of-life due to material aging and overload.



In both stages, moisture plays a central role. Short-term failures frequently arise from issues during installation.

Heat shrink joints depend on adequate heating to activate adhesive bonds, yet in practice, inconsistent shrinkage or incomplete bonding can leave small voids – allowing ingress of water and contaminants. Cold shrink joints, favored for their speed of installation, come with their challenges.

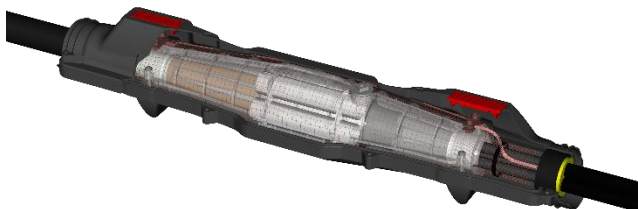
Maintained under constant radial tension, even minor surface damage - such as a cut or scratch from buried debris - can initiate tearing and lead to seal failure.

Over time, both systems face degradation. The mechanical pressure in cold shrink joints can diminish, allowing moisture to seep through. Heat shrink adhesives may lose their grip or form air pockets, which under electrical stress, can initiate partial discharges. Compounding this, neither technology is inherently designed to withstand decades of exposure to aggressive environments like chemically contaminated soils or fluctuating water tables.

These forms of degradation are rarely captured in standard type testing - leaving DNOs exposed to unforeseen risks in the field. A forensic review by EA Technology and NETA on 73 field failures in MV cable joints reported that around one-third were caused by installation errors, while 40% were related to moisture or mechanical damage (EA Technology, 2019). Similarly, recent IEEE research confirms that “moisture at the insulation interface is the main cause for electrical breakdown and insulation failure of cable accessories” (Li et al., 2024).

Lovink’s dual-barrier approach: Sealing out failure

Where conventional systems rely on tension, shrinkage, or adhesion, Lovink takes a fundamentally different approach. Its technology is built around two integrated components: a hard outer shell filled with Protolin® resin, and a unique moisture-activated silicone insulation known as LoviSil®.



Together, they form a cable joint that is resistant to mechanical stress, impervious to moisture, and remarkably forgiving during installation.

Protolin®: A resin that surrounds and protects

At the outer level, the joint is housed in a durable ABS casing filled with Protolin®—a specially formulated polyurethane resin. Once poured and cured, the resin physically encapsulates the cable and the electrical connection, forming a tight seal that adheres strongly to both polymer and lead cable jackets.



In contrast to shrink-based joints that rely on compression or chemical bonding under heat, Protolin® flows around the conductors and hardens into a solid, watertight mass. This eliminates microgaps and drastically reduces the risk of water ingress. In laboratory tests, the Protolin® seal has been shown to withstand water pressures equivalent to a 20-meter depth, a performance level particularly relevant in areas where installations occur below the groundwater table.

Field experience backs this up. Utilities such as National Grid Energy Distribution (UK) have reported significantly lower post-installation failure rates after switching to Lovink’s resin-sealed solutions. As a result NGED had the lowest customer minutes lost. This not only results in lower operational costs but also in a financial reward from the Ofgem system. ([Energy network indicators | Ofgem](#))

LoviSil®: Liquid insulation with built-in resilience

Inside the joint, Lovink employs LoviSil®, a silicone-based liquid dielectric that undergoes a transformation when exposed to moisture, forming into a rubber-like material. What sets LoviSil® apart is that its electrical properties—such as its dielectric constant—remain stable both before and after curing. This ensures a consistent, homogeneous and predictable electric field throughout the joint’s lifespan.

Unlike fixed solid insulation materials, which may leave air pockets or struggle to adapt to irregularities, LoviSil® flows into every contour, filling voids and minimizing the potential for partial discharge. Should moisture penetrate the joint due to an installation error, the presence of LoviSil® prevents direct contact with the conductor by curing in place, sealing off the affected area.



Moreover, LoviSil® demonstrates several advanced characteristics that extend joint longevity. It generates fewer thermal hotspots during peak loading—helping reduce material aging. It is compatible with the oils used in older PILC cables, helping to retain paper moisture and thus extending the life of the surrounding cable. Even in the unlikely event of a partial discharge. The liquid phase of LoviSil® ensures that discharge traces disappear within minutes without leaving a carbonized path, which would otherwise be a starting point for a complete electrical failure.

Experimental tests have confirmed this behavior. In one study replicating 10 kV XLPE–SiR interfaces under moisture conditions, partial discharge behavior increased significantly at wet boundaries, confirming the link between joint failure and water ingress (Wang et al., 2024).

Reducing risk at the source

A key strength of Lovink’s design lies in its low dependency on installation precision. Traditional jointing technologies often require perfect surface preparation, exact heating, and flawless technique. A single misstep—an under-heated shrink sleeve, a misaligned layer—can create vulnerabilities that may not reveal themselves until years later.



Lovink’s dual-barrier system is far more forgiving.

The Protolin® resin eliminates the need for tight mechanical pressure or precise shrink fitting. LoviSil®, being liquid, automatically conforms to the geometry of the joint and cures in place without external intervention. This property significantly reduces the influence of installer error, making the system especially suited to environments where time, conditions, or access are constrained—such as urban networks or emergency response scenarios.



Built for the real world

While many jointing systems perform adequately in the lab, Lovink’s strength lies in real-world durability. It is designed for the very conditions that accelerate failure in traditional joints: high water tables, ground movement, thermal cycling, and chemical exposure.

Neither Protolin® nor LoviSil® is compromised by the acids, hydrocarbons, or fluctuating temperatures often found in industrial or urban soil. In such environments, where shrink-based joints may fail prematurely due to stress cracking or adhesive degradation, Lovink’s components maintain their integrity over time.

As utilities move toward smarter, more heavily loaded grids with increased switching activity and harmonic interference, insulation performance becomes even more critical. The homogeneous field distribution enabled by LoviSil® ensures continued performance under these dynamic conditions.

Future-ready compatibility

Modern power grids are increasingly hybrid, containing both old and new cable types. Lovink’s technology is compatible with a wide range of cable constructions, including XLPE and PILC, and offers reliable performance even under changing network loads or environmental pressures.

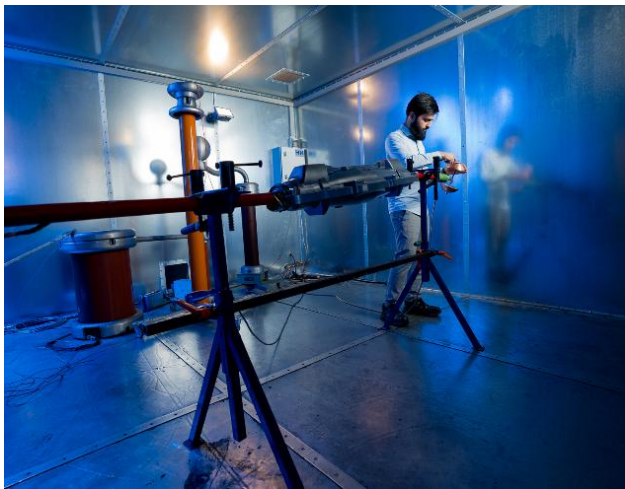
This adaptability is key as DNOs seek to extend the life of existing assets while integrating new technologies and energy sources. A cable joint that performs equally well in traditional and modern settings is no longer a luxury—it's a necessity.

Conclusion: Rewriting the standard for cable joints

In a world where network reliability is under constant scrutiny, and where field conditions are rarely ideal, Lovink offers a solution that breaks away from conventional thinking. By combining an encapsulating resin with a moisture-activated liquid insulator, it provides not just a joint—but a safeguard against failure.

Where others rely on mechanical pressure or perfect technique, Lovink relies on chemistry, flow, and field-proven resilience. The result is a system that doesn't merely survive in difficult conditions—it is designed for them.

For DNOs and utility engineers seeking long-term performance, minimal maintenance, and robust protection against moisture, the choice is clear: cable joints that seal themselves, adapt to their environment, and stand the test of time.



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