Field-Proof vs. Lab-Proof

Why MV Cable Splices Fail in the Real World (and What Utilities Can Do About It)

Executive Summary

Medium-voltage (MV) cable splices are expected to perform reliably for decades in saturated soil, beneath roadways, and in contaminated industrial environments. When they fail, the consequences are immediate: outages, emergency repairs, and reputational impact. While many splice systems perform well under laboratory conditions, real-world stressors such as high groundwater levels, soil movement, mechanical damage, and long-term aging can expose failure mechanisms that are not always captured by standard qualification testing. Field failure investigations consistently show that installation errors and moisture- or mechanically induced damage are major contributors to splice failures. The practical takeaway is clear: utilities need splice solutions that are not only compliant in testing but also proven to perform in real-world operating conditions with less dependence on flawless installation.

Section 1 — The Hidden Weak Point Underground

- Cable splices often determine whether power continues to flow through an underground distribution network.
- In moisture-prone environments, including areas with high groundwater levels and flood-prone terrain, moisture ingress remains one of the leading causes of splice failure.

Section 2 — What Laboratory Testing Doesn't Always Capture

Real-world distribution networks are exposed to conditions that can accelerate splice degradation, including:

- Soil shifting and ground movement.
- Mechanical damage or abrasion caused by buried debris.
- Fluctuating groundwater levels and prolonged wet exposure.
- Chemically contaminated soils.

Over time, these conditions can result in seal degradation, trapped air pockets, and the initiation of partial discharge activity—even when splice systems meet standard testing requirements.

Section 3 — Evidence from the Field

Field failure investigations reveal a consistent pattern. A forensic review conducted by EA Technology and NETA covering 73 MV cable splice failures found that approximately one-third were caused by installation errors, while roughly 40% were associated with moisture-related or mechanical damage. Research published by the IEEE also identifies moisture at the insulation interface as a primary cause of dielectric breakdown and cable accessory failure.

Section 4 — Practical Takeaways for Utility Decision-Makers

- Treat **field resilience** as a procurement criterion, not an afterthought.
- Reduce dependence on perfect installation wherever possible by selecting installer-forgiving splice technologies.
- Specify sealing systems that maintain performance under fluctuating groundwater conditions and mechanical stress.

Learn More

Explore the **"Splices for Renewable Energy"** resource hub for additional insights into splice reliability in challenging environments.

Talk to a Specialist

Discuss field-proven MV splice solutions for wet, flood-prone, or contaminated environments with a cable accessory specialist.