

The Business Case for Flood-Resilient MV Splices

Reducing Outages, Protecting Assets, and Lowering Total Cost of Ownership

Introduction

Flooding, rising groundwater levels, and extreme weather events are no longer isolated incidents for medium-voltage (MV) distribution systems. For many electric utilities, they represent a long-term operating condition that directly affects system reliability, maintenance costs, and public perception.

While technical discussions often focus on cable performance, field experience consistently shows that failures under wet conditions are concentrated at cable splices and cable accessories. This paper translates splice reliability into business impact. It explains how flood-resilient splice designs reduce outages, limit repair activity, and support a lower total cost of ownership (TCO) for MV distribution networks.

Why Splice Failures Drive Outage Costs

When an MV splice fails under flooded conditions, the impact extends far beyond the failed component itself. Splice failures typically result in:

- Unplanned outages
- Emergency repair activities
- Extended restoration times due to excavation and drying operations
- Repeated interventions at the same location

Because splices are installed underground, access is expensive and disruptive. In flood-prone areas, repair conditions are often challenging, further increasing labor costs, safety requirements, and project coordination efforts.

As a result, even a relatively small number of splice failures can have a disproportionate impact on outage statistics and maintenance budgets.

Flooding Changes the Cost Profile of MV Distribution Systems

Under dry operating conditions, small differences in splice performance may appear acceptable. During flood events, however, those differences become critical.

Moisture ingress that might otherwise remain benign can initiate degradation mechanisms that lead to failures months after the flooding event. These delayed outages are often more difficult to diagnose, increasing troubleshooting time and creating the need for repeat repairs.

From a cost perspective, flooding shifts a utility from predictable maintenance programs to reactive recovery efforts, resulting in higher operating expenses and reduced asset availability.

Why Prevention Is More Effective Than Recovery

Repairing a splice after failure addresses the symptom rather than the underlying cause. If the splice design is not suitable for prolonged water exposure, the same location may fail again under similar conditions.

Flood-resilient splices reduce costs by preventing:

- Water ingress under hydrostatic pressure
- Interface degradation that can lead to delayed failures
- Repeated excavation and site restoration work

Investing in robust splice solutions typically involves higher upfront costs, but it significantly reduces lifetime expenditures by lowering both the frequency and severity of outages.

Impact on Asset Life and Replacement Planning

Splice failures often shorten the effective service life of surrounding assets. Moisture-related degradation can spread into adjacent cable sections, accelerating aging and increasing the likelihood of secondary failures.

By maintaining sealing integrity and electrical stability under wet conditions, flood-resilient splices help preserve the intended service life of the distribution system.

For asset managers, this translates into:

- Fewer premature replacements
- More predictable asset renewal planning

- Improved alignment between technical service life and financial depreciation schedules

Grid Resilience and Stakeholder Confidence

Beyond direct financial impacts, splice reliability during flooding affects broader system performance metrics.

Frequent outages reduce customer confidence and increase regulatory scrutiny, particularly in urban areas and critical infrastructure applications. Resilient splices support faster recovery following severe weather events and reduce the likelihood of cascading failures.

In renewable energy applications, where assets are often located in exposed or low-lying areas, reliable splices are essential for maintaining system availability and protecting investment value.

What Utility Decision-Makers Should Focus On

From a utility and asset-management perspective, flood-resilient MV splices should be evaluated based on:

- Proven resistance to long-term water exposure
- Stability of sealing performance and interface adhesion after aging
- Reduction in outage frequency and repair activity
- Contribution to predictable operating costs throughout the asset life cycle

These factors directly influence total cost of ownership and should be evaluated alongside traditional capital cost comparisons.

Conclusion

Flood-resilient MV splices are not simply a technical upgrade—they are a strategic investment.

By preventing water ingress and slowing degradation mechanisms, robust splice solutions reduce outages, lower maintenance and repair costs, and help protect asset life. In flood-prone environments, splice reliability is a key driver of lower total cost of ownership and improved long-term grid resilience.

Continue Exploring

Explore additional technical insights into splice design for waterlogged environments, along with practical selection criteria that help utilities translate reliability requirements into specifications, standards, and procurement decisions.