

The Fastest Path to Capacity: Up-rate Existing ACSS Lines



Unlock an estimated
275GW of latent
power capacity



Generate an estimated
\$48 billion in
annual revenue increases,
paying for itself in months



Unlocking 275 GW of Grid Capacity: The Hidden Hardware Risk of FERC 881

We applaud organizations like FERC, PJM, and MISO for their proactive efforts to maximize our existing power grid. The recent push for Grid-Enhancing Technologies (GETs), Dynamic Line Ratings (DLRs), and the implementation of FERC Order 881 for ambient-adjusted transmission ratings are essential steps forward.

Combined with the DOE's recent \$1.9 billion SPARK funding initiative and the NERC 2025 Long-Term Reliability Assessment's urgent call to bridge the "capacity gap," it is clear we must unlock capacity on our existing rights-of-way.

However, as we champion these ampacity-increasing programs, we must address a critical technical vulnerability and a widely misunderstood limitation: the N-1 contingency.

Driving increased ampacity rates on existing transmission lines means pushing significantly higher current flows through aging infrastructure. When you combine this with strict N-1 contingency requirements, where the grid must instantly absorb rerouted power from a failed companion circuit, these lines are forced to carry loads they have rarely, if ever, experienced.

The N-1 Reality Check: Why 180°C Isn't Enough

Under N-1 reliability standards, transmission lines must maintain reserve capacity to instantly absorb the load of a failed shared line. Because conductor temperature rises non-linearly with current, calculating this reserve isn't straightforward. Factoring in Dynamic Line Rating (DLR) variables, such as wind, solar absorptivity, and also conductor construction, further complicates the math. As a result, the 85°C and 120°C figures used in the subsequent analysis are practical illustrations, not exact calculations.

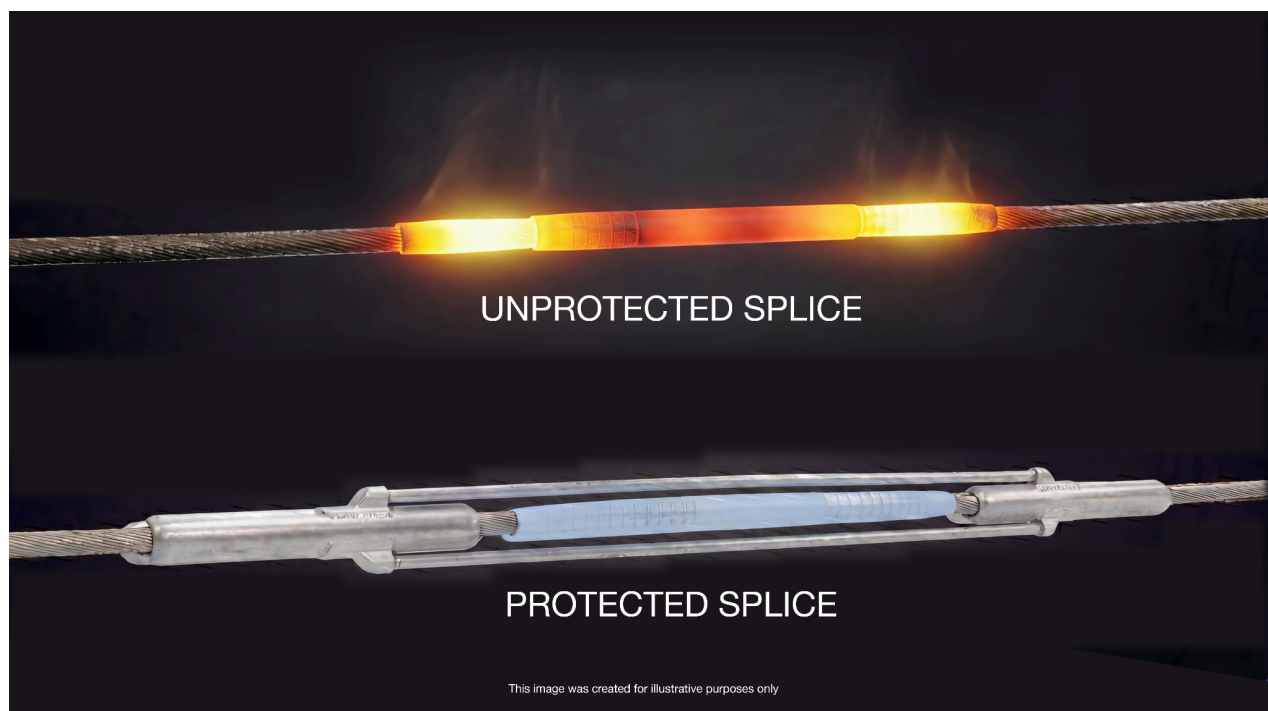


For example, if you are looking at lines with a maximum rating of 180°C, N-1 dictates that their continuous, everyday usable capacity is severely throttled back, often hovering around just 85°C.

On the other hand, advanced lines, such as ACSS/TW rated for 250°C, can comfortably operate continuously around 120°C. When the industry hears about new technologies pushing 180°C, it sounds perfectly reasonable on the surface. But without factoring in the severe N-1 penalty, operators are caught off guard when their usable capacity drops drastically, leading straight to grid congestion and skyrocketing congestion rents. To put the cost of congestion rents into perspective, U.S. utilities spent upward of \$8.3 billion on them in 2024.

The Immediate Danger to Physical Hardware

Even if you have lines capable of operating at 250°C, legacy connectors, including splices, deadends, and suspension clamps, are typically only rated for 100°C to 125°C. When an N-1 event pushes that 120°C continuous load up toward the 250°C limit, the risk of catastrophic connector failure and subsequent line drops increases significantly.



The Push for New Standards

The industry is already working to mitigate these thermal challenges, with rigorous, ongoing tests at NEETRAC (National Electric Energy Testing, Research and Applications Center) and EPRI (Electric Power Research Institute) to develop the new ANSI C119.7 standard for high-temperature, high-stress conditions. But to safely realize the benefits of FERC Order 881 today, grid modernization policy must account for the physical limits of our existing hardware.

The Solution: Engineered Electrical / Mechanical Shunts

The most logical, rapid, and highly reliable solution for these anticipated thermal problems is the installation of engineered electrical/mechanical shunts, such as ClampStar®. These shunts permanently bypass aging and degrading connections, creating a parallel electrical path of lower resistance that carries the load around the limiting connector and keeps the original hardware cool.

Crucially, because they safely increase the power-carrying capacity and efficiency of existing transmission lines, ClampStar engineered electrical/mechanical shunts directly meet the definition of a Grid-Enhancing Technology (GET). By resolving thermal bottlenecks and maximizing the usable ampacity of the current infrastructure, they serve as a vital, hardware-based GET that enables the grid to handle more power without the cost or delay of full reconductoring.

Consider the immediate impact of deploying this technology:

- **Unlocking 275 GW of Latent Capacity:** By upgrading the roughly 30,000 circuit miles of artificially throttled ACSS on the U.S. grid with engineered shunts, we can instantly unlock an estimated 275 GW of latent power capacity, without pulling a single foot of new conductor. This is based on an analysis of 2,920 circuit miles, which represents 10% of the total existing ACSS conductor.
- **Massive Economic Benefits:** By relieving grid congestion and avoiding exorbitant congestion rents, this technology can generate an estimated \$48 billion in annual revenue increases.
- **The Ultimate Thermal Headroom:** While ClampStar units are engineered and tested to survive temperatures up to 390°C, we know operators aren't running lines at that temperature daily. The real value is the thermal headroom. It ensures that when an N-1 event forces your 250°C rated lines to spike to their absolute limit, the connectors won't be the weak link that brings the grid down. ClampStar runs up to 126.3°C cooler than the conductor itself.
- **Flawless Reliability:** With over 18 years of global deployment and several hundred thousand units installed, ClampStar has a flawless track record with no known failures.

We cannot squeeze more power out of our existing grid without first ensuring the hardware holding it together won't succumb to thermal runaway. Engineered shunting and connector reinforcement must be included in standard grid optimization strategies; it is the fastest, most cost-effective path to safely powering our digital economy.

Call 800-269-1462 today to schedule a technical briefing on maximizing your N-1 operating capacity. <https://classicconnectors.com/>

