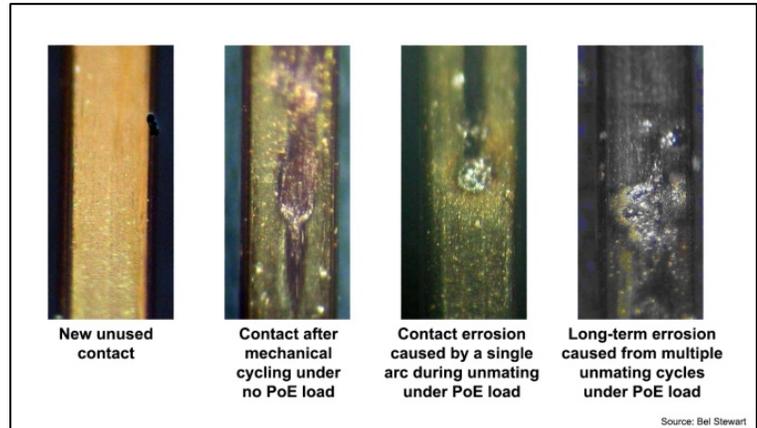


The Effects of Spark Gap Erosion Caused by Unmating Under PoE Load

Contacts in network connecting hardware such as RJ-45 jacks and plugs are carefully engineered and plated (typically with gold or palladium) to ensure a reliable, low resistance mating surface. Unmating a jack-plug connection while transmitting PoE power (i.e., unmating under PoE load) produces an arc within the spark gap as the current transitions from flowing through conductive metal to air before becoming an open circuit.

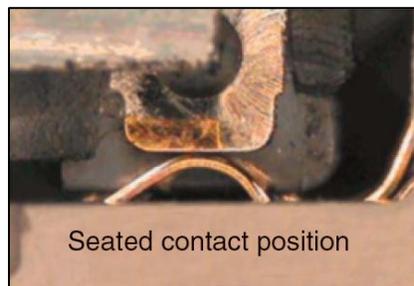
While the level of current associated with the arc possess no risk to humans, the arcing creates an electrical breakdown of gases in the surrounding environment that erodes the plated jack-plug contact surfaces at the arcing location. The graphic to the right shows an unused contact, a contact after mechanical cycling only, erosion caused by a single arc and long-term erosion caused by subsequent arcs.

When spark gap erosion occurs in the area of the fully mated position on an RJ-45 connector, the result is an unreliable connection due to the contact surface damage. This can cause degraded network performance and increased bit error rates.



Some connecting hardware manufacturers have succeeded in ensuring that arc location during the unmating cycle is separate from the fully mated position. While this may hold true for jack contacts, their contact geometry does not ensure that erosion on plug contacts is also away from the fully mated position. Erosion on either the jack or plug contacts results in an unreliable connection.

Siemon's patented crowned jack contact shape for its Z-MAX®, MAX® and TERA® jacks ensures that arcing will occur in the initial contact "wipe" area on *both* jack and plug contacts and will not affect mating integrity in the fully mated contact position. The image below depicts the actual crowned contact geometry that features a distinct "make-first, break-last" zone separated by at least 2mm from the fully mated contact zone. Note that any potential damage due to arcing occurs well away from the final contact mating position on both the jack and the plug. This makes Siemon's connecting hardware immune to the effects of unmating under PoE load.



To ensure reliable performance and contact integrity, Siemon's Z-MAX and TERA connecting hardware has been independently certified for compliance to the IEC-60512-99-001¹ standard, which was specifically developed to ensure reliable connections for remote powering applications deployed over balanced twisted pair cabling. It specifies the maximum allowable resistance change that mated connections can exhibit after being subjected to 100 insertion and removal cycles under a load condition of 55V dc and 600mA applied to each of the eight separate plug/outlet connections.

¹ IEC 60512-99-001, "Connectors for Electronic Equipment - Tests and Measurements - Part 99-001: Test Schedule for Engaging and Separating Connectors Under Electrical Load - Test 99A: Connectors Used in Twisted Pair Communication Cabling with Remote Power", 2012