

Monitoring Detects Failing Joint at Critical Facility



10-Year Reassessment Pinpoints Same Installation Defect Only Now Deteriorated

HIGHLIGHTS

OVERVIEW

IMCORP [Factory Grade® technology](#) is used to trend the performance of critical assets and identify degrading joint before failure

CHALLENGE

Maintain high reliability while balancing maintenance costs

RESULTS

IMCORP's [Factory Grade® technology](#) is used to monitor and direct precise, proactive maintenance to ensure reliability

This case study describes IMCORP's findings during the dissection and root cause analysis of a substandard joint removed from a system feeding a critical facility. The IMCORP [Factory Grade® technology](#) targeted seven of fifty-one joints that had substandard partial discharge (PD) performance per the IEEE 404 standard. Due to cost saving measures, only the worst performing joints were repaired while others with substandard performance were left in service. A dissection of the joints removed during repairs indicated multiple cases of an installation error associated with insufficient mastic surrounding the connector. A reassessment ten years later pinpointed significant degradation in one of the original substandard joints.

A dissection and root cause analysis of this joint revealed the deterioration was due to the same connector area installation problem. Insufficient application of the void filling mastic left a sharp transition over the conductor connector which the inner black stress control layer could not follow. Where the tube did not follow the sudden contour, voids were left behind. Each subsequent layer showed evidence of voids where the material could not follow the contour. Significant voids and stress enhancements in the presence of high voltage stress leads to substandard PD performance, insulation erosion, and eventually causes the insulation system to fail short of the product's design life. Fortunately, the owner of this critical facility used IMCORP's [Factory Grade® assessment](#) to monitor and direct precise, proactive maintenance to ensure reliability.

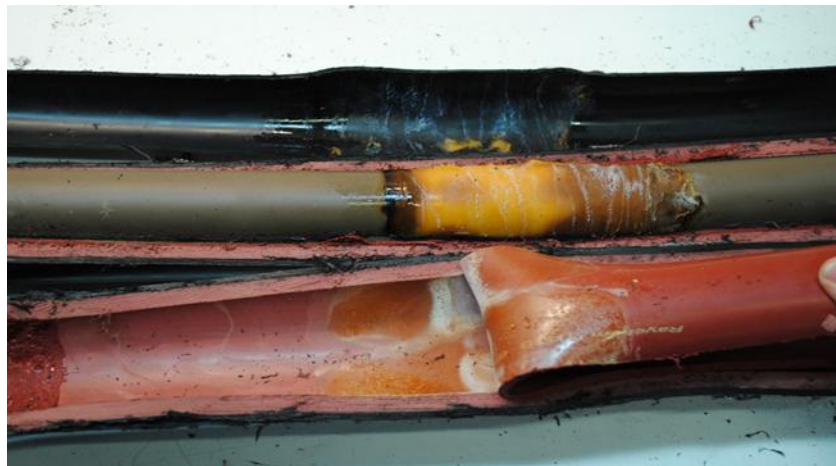


The Manufacturers' Standards



Component Standard	Testing Frequency	Thresholds* Sensitivity	Voltage
Terminations IEEE 48	50/60 Hz	5pC	≤ 1.5 U _o
Joints IEEE 404	50/60 Hz	5pC	≤ 1.5 U _o
Separable Connectors IEEE 386	50/60 Hz	5pC	≤ 1.3 U _o
MV Extruded Cable ICEA S-97/94-682/649	50/60 Hz	5pC	≤ 4.0 U _o ^Δ
HV / EHV Extruded Cable ICEA S-108-720	50/60 Hz	5pC	≤ 2.0 U _o

* No partial discharge should be observable above the sensitivity threshold up to the voltage threshold
^Δ200 V/mil



Multilayer view of heat shrink tubes that show evidence of voids and degradation associated with PD activity over the connector area. (yellow mastic covering connector)