

The Impact of Materials Science Analysis on an Alleged Electrical Causation

A fire incident occurred at a residence, and the alleged cause was identified as one of two Electrical Distribution Panels located in the garage of the structure. NEC's investigation into the cause of the fire incident did not commence until three (3) years subsequent to the date of the incident, and after multiple Site Inspections and Artifact Examinations had been performed by other investigators. The alleged cause of the fire incident was described as a defect within the subject Electrical Distribution Panel which resulted in an explosive nature that forced the cover off and the resultant thermal energy igniting nearby combustibles.



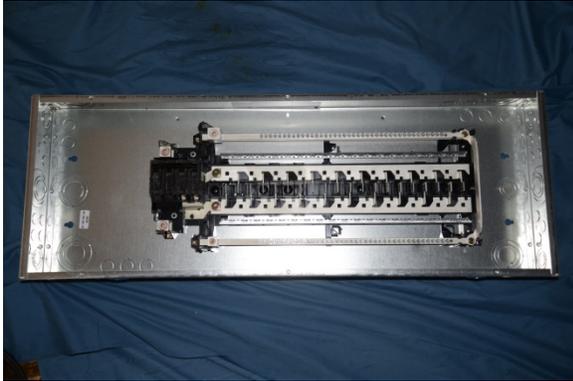
The two (2) Electrical Distribution Panels were similar in design and construction, and were positioned next to each other; however, the internal structure of the subject Electrical Distribution Panel was more heavily damaged than the adjacent panel subsequent to the fire incident. The alleged defect was an inadequate circuit breaker clip / bus bar stab connection. The bus bar was comprised of Copper based material and exhibited a melted portion of the bus bar in a specific location within the structure of the subject Electrical Distribution Panel. The alleged clip for the subject circuit breaker was not recovered.



The Plaintiff's experts alleged that the melt at the specific location of the bus bar was due to electrical fault activity at the circuit breaker clip / bus bar stab connection. One of the

Defendant's experts inclined to agree with the formation of the melt being attributed to electrical fault activity.

However, upon further examination of the subject Electrical Distribution Panel and an exemplar Electrical Distribution Panel, it was noted that the Neutral Bus Bar, which was comprised of Aluminum, was positioned in close proximity to the melted portion of the subject bus bar within the structure of the subject Electrical Distribution Panel.



In the present case, the subject Neutral Bus Bar had melted during the fire incident due to heat from an external fire. Materials Analysis, utilizing the techniques of Scanning Electron Microscopy and Energy Dispersive Spectroscopy (SEM/EDS), was performed on the melted portion of the subject bus bar from the subject Electrical Distribution Panel; and revealed Cu material in the melted sections as well as Al material. As such, the cause of the melt damage on the subject bus bar was attributed to alloying between Al and Cu, and not due to electrical fault activity.

In addition, the mounting screws for the cover for the subject Electrical Distribution Panel did not exhibit mechanical fracture as would be anticipated had the cover been explosively blown off from an internal electrical fault event, as opined by the Plaintiff's experts. Further, the cover of the subject Electrical Distribution Panel exhibited openings due to electrical fault activity from an internal energized electrical cable as a result of an arcing through char process. The mounting screws for the cover of the subject Electrical Distribution Panel had actually melted off from high electrical current flow to ground from the main feed cable which had electrically faulted to the enclosure of the subject Electrical Distribution Panel during the fire incident. It had been established that the grounding connection at the site of the structure for the residence was improperly formed prior to the fire incident.



The discrepancy of the amount of interior damage between the subject Electrical Distribution Panel and the adjacent Electrical Distribution Panel was due to the cover of the subject Electrical Distribution Panel falling off early in the fire incident and exposing the internal components of the subject Electrical Distribution Panel directly to the heat from an external fire.