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Fire investigation into high-rise apartment fire

In the fall of 2004, the Electrical Safety Authority (ESA) was asked to assist the Office of Fire Marshal (OFM) with an electrical fire investigation in an Eastern Ontario high-rise apartment complex. Fortunately there were no associated fatalities or life-threatening injuries, however, the fire left more than a thousand people homeless and resulted in millions of dollars of damage. The fire was so severe that the building remained unoccupied 4 weeks after.

The fire involved one of the apartment building's main electrical distribution risers (busway), and originated from the main electrical panel board located in the basement, then ran up the building through electrical closets located on each floor. The busway supplies power to the electrical closets, which in turn supplies power to the electric heating located in every individual apartment.

Preliminary investigations of the site identified that a water leak on a higher floor migrated into an electrical closet. The water entered the busway and caused a short circuit. The overcurrent and ground fault protection failed to clear the fault, resulting in catastrophic failure of the busway. The failure resulted in an electrical fire, spreading to multiple floors throughout the building.

Following further investigation, ESA and the OFM determined the busway protection failure was due to a malfunction in the busway protective device. The switch mechanism did not work freely, causing the operating linkage to bind, preventing the switch from opening to clear the fault.

Rule 2-300(1) of the Ontario Electrical Safety Code requires that "All operating electrical equipment shall be kept in safe and proper working condition."

The fire investigation identified that regular testing, calibration and maintenance of the protective systems and related switches in the main distribution switchgear should have identified and corrected the problem.

Recommendations

ESA strongly recommends all owners, condominium associations and rental management companies involved in high-rise buildings initiate a program of regular testing, calibration, and maintenance of electrical systems to ensure the electrical systems in buildings function properly and safely. Testing, calibration and maintenance must follow the manufacturer's recommendations.