Understanding Lack of Maintenance: Critical Circuit Breakers/ Switchgear

Operation

Circuit breakers or switchgear have three primary functions:

- Most of the time a circuit breaker is nothing more than a conductor, carrying current from the source of energy to equipment.
- A circuit breaker is used to control equipment (on/off).
- Its most critical function, a circuit breaker serves as a safety device designed to protect the electrical distribution system and its components from excessive current.

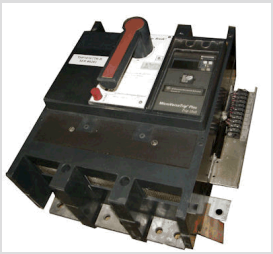
Science of the Hazard

Circuit breakers are used to control electrical equipment and protect electrical equipment by interrupting electrical faults. Failure of a circuit breaker due to misapplication, overheating, degradation of insulation, and loss or performance can result in an electrical explosion due to arcing or extended arcing. This will destroy the circuit breaker, and possibly adjacent circuit breakers, resulting in loss of power to the facility or key equipment. If combustibles are in the area, hot arcing products generated by the failure or by the extended arcing may also be the ignition source of a fire following event.

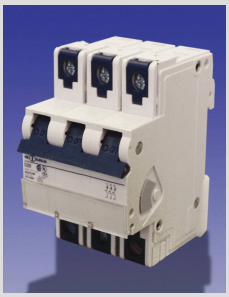
Safety Device Operation

In its most critical function as a safety device, a circuit breaker limits the damage by promptly removing the fault from the system limiting damage to downstream equipment and protects upstream equipment from fault conditions by this same action.

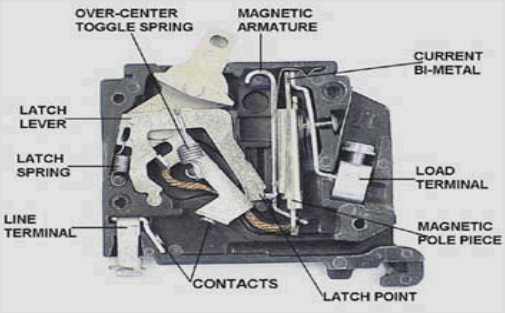
Although ususally thought of as an electrical component, a circuit breaker function depends on many mechanical components that are subject to wear, abrasion, distortion, misalignment, corrosion, or cracking that can lead to binding resulting in failure to clear the fault or partial movement resulting in extended arcing.



600V/1600A
Main Breaker



Branch Circuit Breaker
480V/20A



Linkage - Branch Circuit Breaker

Recommended Maintenance

Conduct infrared scanning on an annual basis with prompt correction of deficiencies found. Every 10°C rise above the rated temperature of electrical insulation will cut the life on the insulation in half. Operating above the rated temperature will cause insulation to deteriorate quickly and will lead to electrical arcing and even fire.

Mechanically inspect and exercise circuit breakers at least once a year. Functionally test the circuit breaker's control system by initiating an open-and-close operation at least once a year. Lubricate the circuit breaker in accordance with the manufacturer's recommendations using only the manufacturer's recommended lubricant.

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