TECHNICAL ANNEX

EQUIPMENT EVALUATION

In the event of a bolted fault, a large amount of thermal energy and magnetic force can be produced. In accordance with various standards, protective devices and current carrying components are to be properly rated to withstand and interrupt the fault.

As seen in Figure 8.1, fault current can "flow" down or up a circuit when a short is created. The current flowing from the utility (the larger amount) is represented by the arrows pointing in the direction of the motor, and the contribution returning from the motor (the smaller amount) can been seen in the arrows pointing back toward the utility. The reason for this back contribution is the spinning rotor of the motor will not instantaneously stop, and the magnetic field will remain for a short number of cycles. This occurs even though voltage in the event of a bolted fault would theoretically equal zero (0).

The danger is that if equipment is not properly rated for the available fault current, catastrophic failure can occur. Through the use of specialized software and the associated equipment libraries, Electrical Power and Safety Company can help advise if your existing electrical infrastructure is rated to handle a worst-case scenario bolt fault. Please keep in mind that with an ever-changing electrical grid and utility power supply, the worst-case bolted fault can vary over time.

Short-Circuit Current Rating. The prospective symmetrical fault current at a nominal voltage to which an apparatus or system is able to be connected without sustaining damage exceeding defined acceptance criteria. [**70:**100]

The short-circuit current rating is marked on equipment, such as the one shown in Exhibit 100.16. Wire, bus structures, switching, protection and disconnect devices, and distribution equipment will be damaged or destroyed if their short-circuit ratings are exceeded.

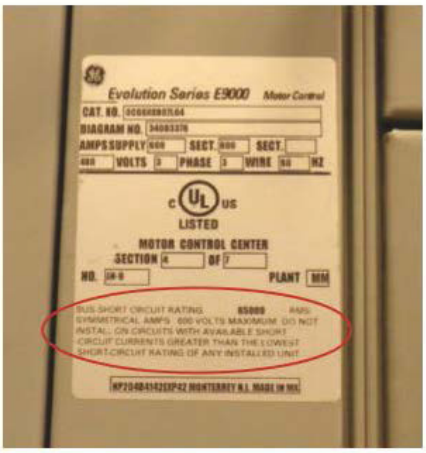

EXHIBIT 100.16

Short-circuit rating clearly labeled on equipment.

The basic purpose of overcurrent protection is to open the circuit before equipment and conductors or conductor insulation is damaged when an overcurrent condition occurs as the result of an overload, a ground fault, or a short. But merely providing overcurrent protective devices with sufficient interrupting ratings does not ensure adequate short-circuit protection for the equipment. Overcurrent protective devices should be selected to ensure that the short-circuit current rating of the components are not exceeded should a short circuit or high-level ground fault occur. The overcurrent protective device must limit the let-through energy to within the short-circuit current rating of the electrical components. Adequate short-circuit protection can be provided by fuses, molded-case circuit breakers, and low-voltage power circuit breakers, depending on specific circuit and installation requirements.

The short-circuit current rating (SCCR) is based on the actual symmetrical (rms) fault current not exceeding the SCCR, the period of time the device was tested for, or the X/R ratio of the test circuit. The SCCR is the rms current that can be withstood for a period of time where the X/R of the fault circuit does not exceed that of the test circuit. It could be 3 cycles, 15 cycles, 30 cycles or some other time period depending upon the standard to which the equipment or component was tested.

Utility companies usually determine and provide information on available short-circuit current levels at the service equipment. Literature on how to calculate short-circuit currents

NFPA 70E (2015) Handbook Article 100