PESD SHORT CIRCUIT CURRENT RATING (SCCR) APPLICATION NOTE

Do PESDs require Short Circuit Current Ratings (SCCR) Marking for UL 508A?

NFPA 70: National Electrical Code (NEC) mandates that industrial control panels must be marked with an appropriate short circuit current rating (SCCR). The SCCR rating marked on an electrical cabinet in kilo Amps (kA) at a defined voltage is an indication and assurance that the maximum fault current an equipment can withstand in the event of short circuit without causing significant damage to itself. According to NEC 2017, Articles 409.22 and 409.110, industrial control panels must be documented and marked with the SCCR ratings. Note, Article 409.110(4) exception states that SCCR markings are NOT required for industrial control panels containing only “control circuit components”. Control circuits and components carry the electrical signals that direct the performance of the controller but does not carry the main power current. The SCCR ratings can be assigned based on one of the following methods.

1. Use the SCCR of a listed and labeled assembly, which re quires testing the individual panel design and then recording the test results for each panel design.
2. Utilizing an approved method. This means applying the method described in UL 508A Supplement SB for calculating the SCCR for Industrial Control Panels.

Since the first method requires pretty significant testing for each panel design and subassembly, many manufactures use the UL 508A Supplement SB approved method for calculating the SCCR rating of the panels. Utilizing the approved method for the determination of SCCR for industrial control panels involve three essential steps:

1. First, establishing the short circuit current ratings of the individual power circuit components SB4.2;
2. Second, Applying current limiting components as specified in SB4.3 when applicable; to modify the SCCR within a portion of a circuit in the panel.
3. Third, Determining the overall SCCR rating to the industrial control panel as specified in SB4.4

It is critical to understand the relevance of various types of components inside an industrial control panel while determining the SCCR rating. For example, in a typical motor control center (MCC), the circuits can be classified into two types.

A. Feeder circuit
B. Branch circuit
   I. Power circuit
   II. Control circuit

Feeder Circuit: The conductors and circuit parts on the line side of the branch circuit overcurrent protection device
Power Circuit Components: Feeder protection fuses, Circuit breakers, fused/non-fused disconnect switches, main power contactors, and thermal overload relays.

Control Circuit Components: Push buttons, selector switches, timers, pilot lights, indication lamps, aux. relays, annunciators, and alarms etc.

Power circuit components carry the load current in the MCC example shown and the current flows through them. In the event of a short circuit fault, the fault current will flow through these devices and hence they must be rated for to handle this current. These components are normally connected in series to the load as shown in the figure. Control circuit components such as push buttons, selector switches, and timers on the other hand are typically connected across the power circuit or in other words parallel to the load and they do not carry the load current. PESDs fall under control circuit component category for determining the SCCR ratings, technically however they do not control any circuit or a device. PESDs are connected parallel to the circuit in a similar fashion as door-mounted power monitor or a voltmeter used for voltage monitoring. Although PESDs are connected to the three-phase power circuit, the current from the power circuit does not flow through the PESDs and hence does not require a short circuit current rating. This exception is defined in the UL 508A standard under SB4.2.1, Exception No. 1. Among other exceptions, it states that devices

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such as voltmeters, power transformers, current transformers, resistors, varistors and dry-type capacitors etc. are not required to have short circuit current ratings, nor are they considered in calculating the SCCR of a system.

Grace Permanent Electrical Safety Devices (PESDs) have built-in high impedance protected, potted circuitry and these devices are further tested and listed under UL 61010 standards with CAT III and IV ratings. R-3W series voltage indicators verify the voltage presence through flashing or solid on LEDs and R-3MT series safe-test points with 102kΩ high impedance allows the qualified personnel to perform the Absence of Voltage Test (AVT) from outside the door with the use of an adequately rated hand held Digital Multi Meter (DMM). Voltage Portals (R-1A, R-T3 series) are devices with the extension leads that are brought to the door of a grounded electrical cabinet to verify the voltage using a Non-contact voltage detector pen (NCVD).