

Introduction

This technical note demystifies Permanent Electrical Safety Devices (PESDs®) and their conductors, offering detailed insights to address the most frequently asked questions on this subject. PESDs® serve a crucial role in electrical safety, providing a reliable method of monitoring voltage presence. The accompanying conductors, provided in 8-foot lengths, often provoke questions; we aim to answer these comprehensively in this piece.

Understanding the 8-Foot Length of PESD® Conductors

The 8-foot length of PESD® conductors is guided by the feeder tap rules for non-motor loads as articulated in Paragraph 32.4 of UL 508A. These rules permit conductors to be tapped without overcurrent protection at the tap, as long as the tap conductors do not exceed 10 feet. When PESD® conductors “tap” the line or load side of a disconnect, these feeder tap rules apply. Utilizing the 8-foot length allows for PESD® installation at various locations on the enclosure, even those significantly distant from the voltage monitoring point.

PESD® Conductors as Tap Conductors

Despite PESDs® not containing or terminating in an overcurrent protective device, they are still classified as tap conductors. The PESD® is a high impedance load for the circuit to which it's connected. UL's single component failure evaluation, as specified in Paragraph 6.3.2 of UL 61010-1, ensures the PESD® is power limited and will not fail catastrophically, causing a short circuit between phases. This means that the PESD® is self-protected, which is equivalent to having the PESD® conductors terminate in an overcurrent protective device, satisfying the requirements found in Section 101 of UL 61010-2-030.

The Role of Overcurrent Protective Devices in PESD® Conductors

While there is no requirement stipulated in the NEC or UL 508A to install overcurrent protective devices in the circuit supplying the PESD® conductors, it is highly recommended not to do so. The Exception to Paragraph 66.6.1 covering panels for industrial machinery in UL 508A permits such a setup. Installing overcurrent protective devices could lead to a false reading from the PESD® due to a blown fuse or a tripped circuit breaker, posing a significant risk to individuals relying on the PESD® to determine voltage presence or absence.

Installation Considerations for PESD® Conductors

When installing PESD® conductors, it is critical to protect them from damage that could cause a short circuit or ground fault. This is achieved by ensuring the conductors are routed away from sharp edges, screw threads, burrs, fins, moving parts, and similar parts, as stated in Paragraphs 29.4.2 and 29.4.4 b) of UL 508A. Conductors should also be routed away from heat-producing

components and must be properly cabled, routed, and secured if they could be damaged during the opening or closing of a door or cover.

Appropriate Sizes for PESD® Conductors

PESD® conductors are typically available in sizes ranging from 12 AWG to 18 AWG. The sizing of conductors is generally based on the maximum current the conductor will carry under normal operating conditions, as per Paragraph 29.6.1 a) of UL 508A. Since the PESD® only draws a few milliamps of current under all use conditions, this range of conductor sizes is more than adequate, in line with the maximum ampacity specified in Table 38.1 of UL508A.

Short-Circuit Current Rating (SCCR) and PESDs®

Like other control circuit components, PESDs® aren't required to have a SCCR. As per Paragraph SB4.2.1 of UL 508A, only certain types of devices, such as power circuit components like disconnect switches, branch circuit protective devices, load controllers, and bus bars, are required to have an SCCR. Similar to a load such as a motor or a fixed impedance like a transformer, PESDs® don't fall into this category.

PESDs® are connected to a power circuit but is considered a control circuit component. They typically perform monitoring, diagnostic functions, or send signals to other devices controlling power-consuming loads. Power circuit components, on the other hand, perform functions directly associated with power-consuming loads, such as load switching, overcurrent protection, and transmission/distribution of current.

In the context of PESD® conductors, UL 508A doesn't mandate a conductor to have a SCCR. This is because these conductors are not directly associated with the devices listed in SB4.2.1 that need to have an SCCR.

Conclusion

Understanding the intricacies of PESDs® and their conductors is crucial in the realm of electrical safety. The specifications regarding conductor length, their classification as tap conductors, the application of overcurrent protective devices, conductor installation considerations, appropriate sizing, and the relationship with SCCR all come together to form a comprehensive picture. These aspects, rooted in standards like UL 508A and UL 61010, guide the safe and efficient use of PESDs®. Acting as control circuit components, PESDs® serve a vital role in electrical safety, providing reliable monitoring of voltage presence while maintaining self-protection in various operational conditions. Understanding these components not only ensures their proper installation and usage but also plays a part in safeguarding individuals and systems relying on these devices for accurate voltage readings.