



Powell Technical Brief #74

Enclosures for Metal-Enclosed Switchgear and Motor Control

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The enclosures which are a part of metal-enclosed switchgear and motor control equipment furnished by Powell serve two major purposes. First, they protect users of this equipment from injury by preventing access to live parts by foreign objects, including parts of the human body. Second, they protect the working parts of the equipment from the effects of the environmental conditions in which the equipment is installed. However, while performing these two duties the enclosures also allow reasonable access to parts for operation and maintenance, and must allow ventilation adequate to keep the equipment within its temperature limitations while operating.

There are three major sources of enclosure information applicable to metal-enclosed switchgear and motor control: ANSI/IEEE, NEMA, and IEC standards.

ANSI/IEEE C37 Series: C37.20.1, C37.20.2, and C37.20.3 are the basic standards for metal-enclosed switchgear. These standards recognize only two types of enclosure, indoor and outdoor.

NEMA 250: This standard lists numerous varieties of enclosures for electrical equipment, but applies only to equipment rated 2000 V maximum. It is the source of the definitions for the familiar NEMA 1, NEMA 3R, NEMA 4, etc., enclosures.

IEC 529: This standard also lists numerous varieties of enclosures for electrical equipment, and there is no voltage limitation. It is often referred to as the "IP Code", because each enclosure type number is preceded by the letters "IP" (for International Protection).

IEC 694: This standard covers high-voltage switchgear and controlgear. It refers to IEC 529, but specifically limits high-voltage switchgear and controlgear enclosures to enclosure types with no degree of protection against harmful ingress of water (second characteristic numeral X). Outdoor equipment uses the suffix W.

Each standard defines its various enclosure types and prescribes appropriate tests to demonstrate the effectiveness of the enclosure. Unfortunately, there is no exact equivalence between the enclosure types in the various standards, but the following table shows a comparison of the closest types in each standard.



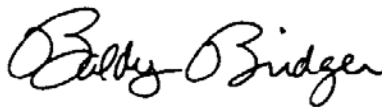
Powell Technical Brief #74

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page 2

ANSI/IEEE C37 Series	NEMA 250	IEC 529	IEC 694
Indoor	NEMA 1	IP20	IP2X
Outdoor	NEMA 3R	IP24	IP2XW

In addition to the standard indoor and outdoor enclosures, Powell offers arc resistant indoor enclosures for PowlVac[®] metal-clad switchgear and weather-proof Power Control Room (PCR[®]) enclosures for all types of equipment.



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