

# Application Considerations

## NEMA Enclosures

### Enclosure Selection Criteria

#### Enclosures for Nonhazardous Locations

For a Degree of Protection Against:	Designed to Meet Tests No. ❶	Type							
		For Indoor Use			Outdoor Use		Indoor or Outdoor		
		1	12	13	3R	3	4	4X	6P
Incidental contact with enclosed equipment	6.2	✓	✓	✓	✓	✓	✓	✓	✓
Falling dirt	6.2	✓	✓	✓	✓	✓	✓	✓	✓
Rust	6.8	✓	✓	✓	✓	✓	✓	✓	✓
Circulating dust, lint, fibers and flyings ❷	6.5.1.2 (2)		✓	✓		✓	✓	✓	✓
Windblown dust	6.5.1.1 (2)					✓	✓	✓	✓
Falling liquids and light splashing	6.3.2.2		✓	✓		✓	✓	✓	✓
Rain (Test evaluated per 6.4.2.1)	6.4.2.1				✓	✓	✓	✓	✓
Rain (Test evaluated per 6.4.2.2)	6.4.2.2					✓	✓	✓	✓
Snow and sleet	6.6.2.2				✓	✓	✓	✓	✓
Hosedown and splashing water	6.7						✓	✓	✓
Occasional prolonged submersion	6.11 (2)								✓
Oil and coolant	6.3.2.2		✓	✓					
Oil or coolant spraying and splashing	6.12			✓					
Corrosive agents	6.9				✓	✓		✓	✓

❶ See below for abridged description of NEMA enclosure test requirements. Refer to NEMA Standards Publication No. 250 for complete test specifications.

❷ Nonhazardous materials, not Class III ignitable or combustible.

### Selection Criteria

#### Enclosures for Hazardous Locations (Division 1 or 2) ❸

For A Degree of Protection Against Atmospheres Typically Containing: ❹	Designed to Meet Tests: ❺	Class (National Electrical Code)	Type							
			7, Class I Group:				9, Class II Group:			
			A	B	C	D	E	F	G	
Acetylene	Explosion Test	I	✓							
Hydrogen, Manufactured Gas	Hydrostatic Test	I	✓	✓						
Diethyl Ether, Ethylene, Hydrogen Sulfide		I			✓					
Acetone, Butane, Gasoline, Propane, Toluene	Temperature Test	I			✓	✓				
Metal dusts and other combustible dusts with resistivity of less than 10 <sup>5</sup> ohm-cm.	Dust Penetration Test	II					✓			
Carbon black, charcoal, coal or coke dusts with resistivity between 10 <sup>2</sup> - 10 <sup>8</sup> ohm-cm.		II						✓		
Combustible dusts with resistivity of 10 <sup>5</sup> ohm-cm or greater.	Temperature Test with Dust Blanket	II								✓
Fibers, flyings	❻	III								✓

❸ For indoor locations only unless cataloged with additional NEMA Type enclosure number(s) suitable for outdoor use as shown in table on page 2-19. Some control devices (if so listed in the catalog) are suitable for **Division 2** hazardous location use in enclosures for non-hazardous locations. For explanation of CLASSES, DIVISIONS and GROUPS, refer to the National Electrical Code.

**Note: Classifications of hazardous locations are subject to the approval of the authority having jurisdiction. Refer to the National Electrical Code.**

❹ See abridged description of test requirements below. For complete requirements, refer to UL Standard 698, compliance with which is required by NEMA enclosure standards.

❺ For listing of additional materials and information noting the properties of liquids, gases and solids, refer to NFPA 497M-1991, Classification of Gases, Vapors, and Dusts for Electrical Equipment in Hazardous (Classified) Locations.

❻ UL 698 does not include test requirements for Class III. Products that meet Class II, Group G requirements are acceptable for Class III.

### IEC Enclosure Classification

The degree of protection is indicated by two letters (IP) and two numerals. International Standard IEC 529 contains descriptions and associated test requirements that define the degree of protection each numeral specifies. The following table indicates the *general* degree of protection—refer to Abridged Descriptions of IEC Enclosure Test Requirements below. **For complete test requirements refer to IEC 529.**

FIRST NUMERAL ①	SECOND NUMERAL ①
Protection of persons against access to hazardous parts and protection against penetration of solid foreign objects.	Protection against ingress of water under test conditions specified in IEC 529.
<b>0</b> Nonprotected <b>1</b> Back of hand; objects greater than 50mm in diameter <b>3</b> Finger; objects greater than 12.5mm in diameter <b>5</b> Tools or objects greater than 2.5mm in diameter <b>7</b> Tools or objects greater than 1.0mm in diameter <b>9</b> Dust-protected (dust may enter during specified test but must not interfere with operation of the equipment or impair safety) <b>11</b> Dusttight (no dust observable inside enclosure at end of test)	<b>0</b> Nonprotected <b>2</b> Vertically falling drops of water <b>4</b> Vertically falling drops of water with enclosure tilted 15° <b>6</b> Spraying water <b>8</b> Splashing water <b>10</b> Water jets  <b>12</b> Powerful water jets <b>13</b> Temporary submersion <b>14</b> Continuous submersion
<b>Example:</b> IP41 describes an enclosure that is designed to protect against the entry of tools or objects greater than 1mm in diameter and to protect against vertically dripping water under specified test conditions.	
<b>Note:</b> All first numerals and second numerals up to and including characteristic numeral <b>6</b> , imply compliance also with the requirements for all lower characteristic numerals in their respective series (first or second). Second numerals <b>7</b> and <b>8</b> do <b>not</b> imply suitability for exposure to water jets (second characteristic numeral <b>5</b> or <b>6</b> ) unless dual coded; e.g., <b>IP_5/IP_7</b> .	

① The IEC standard permits use of certain supplementary letters with the characteristic numerals. If such letters are used, refer to IEC 529 for the explanation.