NEMA Enclosure Types and Hazardous Locations

Non-Hazardous NEMA Locations:

- **Type 1:** General Purpose. Protects against dust, light, and indirect splashing but is not dust-tight. Primarily prevents contact with live parts. Used indoors or under normal atmospheric conditions.
- **Types 3, 3X:** Weather Resistant. Protects against weather hazards such as rain and sleet. Used outdoors on ship docks, in construction work, and in tunnels and subways. Type 3X includes corrosion resistance.
- **Types 3R, 3RX:** Weather Resistant and intended for outdoor use. Provides a degree of protection against falling rain and ice formation. Meets rod entry, rain, external icing, and rust-resistance design tests. Type 3RX includes corrosion resistance.
- **Types 4, 4X:** Watertight. Must exclude at least 65 GPM of water from a 1" nozzle delivered from a distance not less than 10ft for 5 minutes. Used outdoors on ship docks, in dairies, and in breweries. Type 4X includes corrosion resistance.
- **Type 5:** Dust tight. Provided with gaskets, to exclude dust. Used in steel mills/cement plants.
- **Types 6, 6P:** Submersible. Design depends on specified conditions of pressure and time. Submersible in either water or oil. Primarily used in quarries, mines, and manholes.
- **Types 12, 12K:** General Purpose. Protects against the corrosive effects of liquids and gases. Meets drip and corrosion resistance tests. Type 12K is intended for indoor use.

Hazardous NEMA Locations:

- **Type 7:** Enclosures constructed for indoor use in hazardous (classified) locations classified as Class I, Division 1, Groups A,B, C, or D as defined in NFPA 70. Designed to contain an internal explosion without causing an external hazard. Deals with gases/vapors.
- **Type 8:** Enclosures constructed for either indoor or outdoor use in hazardous (classified) locations classified as Class I, Division 1, Groups A, B, C, and D as defined in NFPA 70. Prevents combustion through the use of oil-immersed equipment.
- **Type 9:** Enclosures constructed for indoor use in hazardous (classified) locations classified as Class II, Division 1, Groups E, F, or G as defined in NFPA 70. Designed to prevent the ignition of combustible dusts.
- **Type 10:** Enclosures constructed to meet the requirements of the Mine Safety and Health Administration, 30 CFR, Part 18. Designed to contain an internal explosion without causing an external hazard. Used mostly in mining applications.

Hazardous Location Types:

Class I Locations: A Class I Hazardous Location is one in which flammable gases or vapors may be present in the air in sufficient quantities to be explosive or ignitable. There are four Groups in Class I (Groups A, B, C, and D.) Some typical Class I locations are as follows:

- Petroleum refineries, and gasoline storage and dispensing areas
- Dry cleaning plants
- Spray finishing areas
- Utility gas plants

Class II Locations: A Class II Hazardous Location is one in which combustible dust is present. There are three Groups in Class II (Groups E, F, and G.) Some typical Class II locations are as follows:

- Grain elevators
- Flour and feed mills
- Producers of plastics, medicines, starch, candies, and fireworks
- Coal preparation plants

Class III Locations: A Class III Hazardous Location is one in which ignitable fibers are present in the atmosphere. Some typical Class III locations are as follows:

- Textile mills
- Cotton gins or seed mills, flax processing plants
- Plants that shape, pulverize, or cut wood and create sawdust

Division Ratings for Hazardous Locations:

There are two different kinds of conditions under which these hazards are present, known as Divisions:

- Division 1: Explosive Gas or Dust is present during NORMAL conditions.
- Division 2: Explosive Gas or Dust is present during ABNORMAL conditions.

Explosive Materials in each Hazardous Group:

Group	Hazardous Material in Surrounding Atmosphere
Group A	Acetylene
Group B	Hydrogen, fuel and combustible process gases containing more than 30% hydrogen by volume or gases of equivalent hazard such as butadiene, ethylene, oxide, and propylene oxide.
Group C	Carbon monoxide, ether, hydrogen sulfide, morpholine, cyclopropane, ethyl and ethylene or gases of equivalent hazard.
Group D	Gasoline, acetone, ammonia, benzene, butane, cyclopropane, ethanol, hexane, methanol, methane, vinyl chloride, natural gas, naphtha, propane or gases of equivalent hazard.
Group E	Combustible metal dusts, including aluminum, magnesium and their commercial alloys or other combustible dusts whose particle size, abrasiveness and conductivity present similar hazards in connection with electrical equipment.
Group F	Carbonaceous dusts, carbon black, coal black, charcoal, coal or coke dusts that have more than 8% total entrapped volatiles or dusts that have been sensitized by other material so they present an explosion hazard.
Group G	Flour dust, grain dust, flour, starch, sugar, wood, plastic and chemicals.

Hazardous Locations including Classes, Groups, and Divisions:

Summary of Class I, II, III Hazardous Locations			
Classes	Groups	Divisions	
		1	2
I. - Gases, vapors, and liquids	A: Acetylene B: Hydrogen, etc. C: Ether, etc. D: Hydrocarbons, fuels, solvents, etc.	Normally explosive and hazardous.	Not normally present in an explosive concentration (but may accidentally exist).
II. - Dusts	E: Metal dusts (conductive and explosive) F: Carbon dusts (some are conductive, and all are explosive) G: Flour, starch, grain, combustible plastic or chemical dust (explosive)	Ignitable quantities of dust normally are or may be in suspension, or conductive dust may be present.	Dust not normally suspended in an ignitable concentration (but may accidentally exist). Dust layers are present.
III. - Fibers and flyings	Textiles, wood-working, etc. (easily ignitable, but not likely to be explosive)	Handled or used in manufacturing.	Stored or handled in storage (exclusive of manufacturing).