

Information Sheet # 06

Your Reliable Guide for Power Solutions

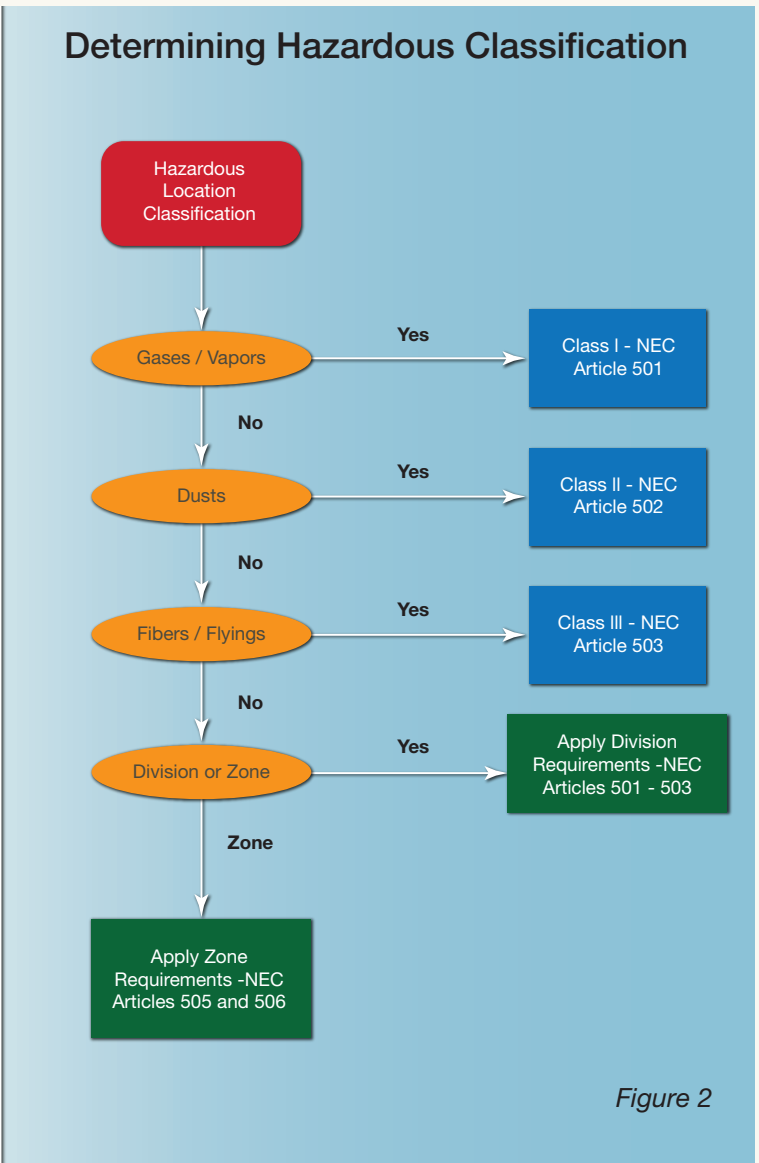
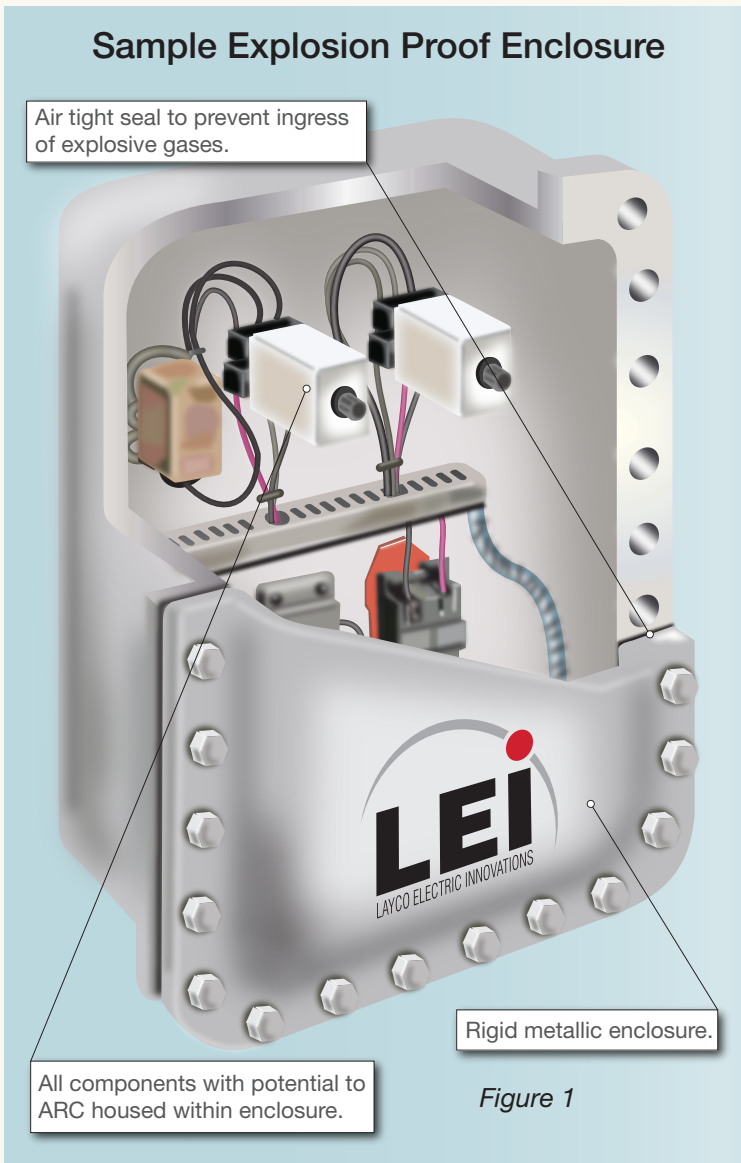
HAZARDOUS AREA CLASSIFICATIONS

How They Affect Enclosures

1.0 Introduction:

When considering the dangers towards personnel in their working environment, one principal area of concern is the risk of fire and explosions. This is one area that receives the highest attention from regulatory bodies. Electrical equipment when switched or in operation has the potential to produce an electrical arc and arcs in a combustible ambient can initiate a fire or explosion. Standards for electrical installations have been established and are governed by a variety of organizations throughout the world to ensure safe electrical systems in hazardous locations.

This information sheet discusses the regulations governing electrical controls in hazardous locations, governing organizations, equipment specifications, and the definition of a hazardous environment.



To fulfill our commitment to be the leading supplier, the Layco Electric Innovations team ensures they are always up-to-date with the current industry standards as well as industry trends. As a service, our **Information Sheets** are circulated on a regular basis to existing and potential power customers to maintain their awareness of changes and developments in standards, codes and technology within the power and motor control industry.

2.0 US Hazardous Location Classification System:

Within the US the hazardous location classification is defined by two bodies, the National Fire Protection Association (NFPA) and National Electric Code (NEC). Electrical equipment manufacturers, installers, and users have to meet the requirement NFPA and NEC codes set for the intended operating environment.

NFPA and NEC for hazardous location classification system produced a combined code. **NFPA 70 NEC** uses the familiar Class/Division system and has added an Americanized version of the International Electrochemical Commission's (IEC) IEC Zone system which maintains the NEC wiring methods and protection techniques.

2.1 NFPA 70 NEC Articles 500 through 503:

This covers the requirements for electrical/electronic equipment and wiring for all voltages in Class I, Divisions 1 and 2; Class II, Divisions 1 and 2; and Class III, Divisions 1 and 2 locations.

2.2 NFPA 70 NEC Articles 505 through 506:

This covers the requirements for the Americanized Zone classification system as an alternative to the Class and Division classification system.

3.0 NFPA 70 NEC Classes, Divisions and Groups:

NFPA 70 NEC establishes area classifications based on Classes, Divisions and Groups that when combined delineate the hazardous conditions of a specific area -

3.1 Classification Method:

This classification method provides a description of the hazardous material that may be present, and the probability that it is present, so that the appropriate equipment may be selected, and safe installation practices followed. The class defines the type of explosive or ignitable substances which are present in the atmosphere.

3.2 Division:

Division defines the likelihood of the hazardous material being present in an explosive or ignitable concentration. Class I flammable gases and vapors are grouped into one of four groups (Groups A, B, C or D) based on their physical properties and the ease in which they can be ignited.

3.3 Groups

Class II combustible dusts are grouped into one of three (3) groups: E combustible metal dusts, F combustible carbonaceous dusts or G other combustible dusts.

4.0 The Occupational Safety and Health Administration (OSHA) adoption of Classifications:

OSHA adopted these hazardous classifications and all except "Groups" are defined in 29 Code of Federal Register (CFR) 1910.399. In 29 CFR 1910.307(c)(2)(ii), OSHA requires all equipment used in a hazardous location to be marked with the class, group, and operating temperature or temperature range for which it is approved.

Although OSHA does not provide a definition of group classifications in 29 CFR 1910.307 or 399 they do provide a note under 29 CFR 1910.307(c)(1) that states: "NFPA 70, the National Electrical Code, lists or defines hazardous gases, vapors, and dusts by "Groups" characterized by their ignitable or combustible properties." To meet OSHA's marking requirement, the marking must include the hazardous group the equipment is approved to operate in.

5.0 NFPA 70 NEC Zone Classification System:

The Zone Classification System is offered as an alternative to the Class and Division system. It is an Americanized version of the International Electrochemical Commission's (IEC) Zone system which maintains the NEC wiring methods and protection techniques.

Zone defines the general nature – if it is a gas or dust – and the probability of hazardous material being present in an ignitable concentration in the surrounding atmosphere. The Zones are based on how often the hazard is present rather than upon normal versus abnormal conditions.

6.0 Explosion Proof Control Panels

It is not always practical to isolate individual electrical components. The solution for most hazardous environments is to house electrical components within a control system/panel in an explosion proof controller, see *Figure 1*.

7.0 Conclusions:

Determining the Class, Division and Group or Zone and Group is critical to correctly apply the requirements for a given hazardous location. Comparisons between the two systems are not easily accomplished. Which system is preferred depends on the user's preference, how the areas are classified, and the wiring system used. The Zone system has wider use in the chemical and petrochemical industries.

Figure 2 is a summary of the applicable NEC Articles to reference to ensure the proper requirements are applied.



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