

Classification of Explosive Environments

Class/Division/Group (NEC Article 500)	Zones/Groups (NEC Article 505 & IEC 60079)
<p>Type of fuel:</p> <ul style="list-style-type: none"> CLASS I: Gases or vapors CLASS II: Dusts CLASS III: Fibers or flyings 	<p>Possibility of ignitable concentrations of fuel being present:</p> <ul style="list-style-type: none"> ZONE 0: Present continuously, frequently, or for long periods of time ZONE 1: Likely to be present for short periods of time, occasionally, or as a result of maintenance ZONE 2: Not likely to be present under normal operation, but possible due to equipment failure or abnormal operation for a short time duration
<p>Possibility of ignitable concentrations of fuel being present:</p> <ul style="list-style-type: none"> DIVISION I: Present or likely to be present in normal operation, during maintenance, or under fault conditions that may cause ignition DIVISION II: Contained or not present in normal operation. Could be present due to rupture of containment, abnormal operation of equipment, failure of ventilation system, or close proximity of CLASS I /DIV I location 	
<p>Specific types of fuel and ignition capabilities:</p> <ul style="list-style-type: none"> GROUP A: Acetylene GROUP B: Hydrogen GROUP C: Acetaldehyde, ethylene, methyl ether GROUP D: Acetone, gasoline, methanol, propane GROUP E: Metal dust GROUP F: Carbon dust GROUP G: Grain dust 	<p>Location and specific type of fuel/ignition capabilities:</p> <ul style="list-style-type: none"> GROUP I: Equipment in mining operations where methane might be present GROUP II C: All other explosive atmospheres where acetylene and hydrogen might be present GROUP II B: All other explosive atmospheres where acetaldehyde, ethylene, and methyl ether might be present GROUP II A: All other explosive atmospheres where acetone, gasoline, methanol, and propane might be present

Methods For Preventing Explosions

<p>1. Isolate Fuel</p> <ul style="list-style-type: none"> Purged and Pressurized Enclosures Encapsulation Oil Immersion Powder Filling 	<p>2. Limit Energy</p> <ul style="list-style-type: none"> Intrinsically Safe Fiber Optics Nonincendiary Equipment or Circuits Pneumatic Systems 	<p>3) Contain Explosion</p> <ul style="list-style-type: none"> Explosion Proof Enclosures
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Definitions

Explosive Environments

Environments or atmospheres that have sufficient concentrations of **fuel** or flammable material plus an **oxidizer** that may produce an explosion or fire if combined with a source of **ignition**.

Fuel + Oxidizer + Igniter = Explosion

Fuel

- Gas
- Airborne Particulates
- Vapors

Oxidizer

- Air
- Oxygen

Ignition

- Thermal Energy
- Electrical Spark

Standards

National Electrical Code (NEC) Articles 500 and 505

EN1127-1, *Explosive Atmospheres – Explosion Prevention and Protection, Electrical Equipment for Use in Hazardous (Classified) Locations*

IEC 60079, *Electrical Apparatus for Explosive Gas Atmospheres*

IEC 61241, *Electrical Apparatus for Use in the Presence of Combustible Dust*

ISA12.1, *Definitions and Information Pertaining to Electrical Instruments in Hazardous (Classified) Locations*

NFPA 497, *Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas (supersedes ANSI B185.1)*

NFPA 499, *Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas*

UL913, *Intrinsically Safe Apparatus and Associated Apparatus for Use in CLASS I, II, and III, DIVISION 1, Hazardous Explosive Environments Locations*