



Hazardous Area Classifications

In any manufacturing environment, one of the major safety concerns is the risk of a fire or explosion. Therefore, OSHA and many other regulating bodies have established systems to classify products and locations that could result in a hazardous situation for workers. OSHA Publication 3073 defines a hazardous location as:

Hazardous locations are areas where flammable liquids, gases or vapors or combustible dusts exist in sufficient quantities to produce an explosion or fire. In hazardous locations, specially designed equipment and special installation techniques must be used to protect against the explosive and flammable potential of these substances.

The National Electrical Code (NEC) defines hazardous areas as:

An area where a potential hazard (e.g. a fire, an explosion, etc) may exist under normal or abnormal condition because of the presence of flammable gasses or vapors, combustible dusts or ignitable fibers or flyings.



Once an area is identified and classified as hazardous, any electrical equipment in these areas should be specially designed and tested to ensure it does not initiate an explosion due to arcing or high surface temperature of equipment. In the sanitary industry, these areas can be found in distilleries, bakeries, pharmaceutical and personal care plants to name a few.

Hazardous Area Classification

In North America, the most widely used classification system for identifying hazardous areas is defined by NFPA Publication 70, NEC and CEC. It defines 3 terms that succinctly describe an environment:

- Class – the general nature of the hazard
- Division – the probability of the hazard being present
- Group – the type of hazard

The **Class** defines the general nature of hazardous or ignitable substances present in the atmosphere:

- Class I – flammable vapors and gases
- Class II – combustible dust
- Class III – ignitable fibers or particulates

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The **Division** defines the probability of the hazardous material being present in a flammable concentration:

- Division 1 - hazards exist under normal operating conditions and/or hazard caused by frequent maintenance or repair work – **high probability**
- Division 2 - hazards are handled, processed or used but which are normally in closed containers or closed systems from which they can only escape through rupture or breakdown of the container system – **low probability**

Class	Division	Group	Flammable Material	Maximum Experimental Safe Gap (MESG)	Minimum Igniting Current Ratio (MIC)
Class I	Division 1 & 2	A	Acetylene	—	—
Class I	Division 1 & 2	B	<ul style="list-style-type: none"> • Hydrogen • Butadiene • Ethylene Oxide • Propylene Oxide 	≤ 0.4 mm	≤ 0.4
Class I	Division 1 & 2	C	<ul style="list-style-type: none"> • Ethylene • Cyclopropane • Ethyl Ether 	> 0.45 mm ≤ 0.75 mm	> 0.4 ≤ 0.8
Class I	Division 1 & 2	D	<ul style="list-style-type: none"> • Propane • Acetone • Ammonia • Benzene • Butane • Ethanol • Gasoline • Methanol • Natural Gas 	≥ 0.75 mm	> 0.8

The **Group** defines a substance by rating its flammable nature in relation to other known substances. Materials are placed in groups based on their ignition temperature and explosion pressure. The table shows a few examples. Temperature classes also exist to designate the permissible surface temperature of electrical equipment which allows them to operate normally in the surrounding atmosphere.

For example, ethanol is used as an ingredient in a batch formulation for a pharmaceutical product. The reactor itself would be a Class I, Division 1. The remainder of the production area would be rated as a Class I, Division 2 hazard area. Therefore, any control panels or other electrical equipment in that room would need to meet the requirements of a Class I, Div 2, Group D hazardous area. An office or work station in a separate room would be classified as a Non-hazardous location.

Our Newell Automation team can help you identify the hazards in your plant and design the control panels and software that allow you to safely produce. To learn more, email us at sales@mgnewell.com or call us at 336-393-0100 or visit the Newell Automation website at www.newellautomation.com.

