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Understanding Hazardous Area Guide to NFPA 70 Location Classes, Divisions & GroupsA hazardous area guide is essential for simplifying hazardous location classes, divisions & groups as defined in the National Electrical Code (NEC), or NFPA 70. This guide helps ensure that anyone entering a potentially hazardous area understands the risks and takes necessary precautions.NFPA stands for the National Fire Protection Association, and its NFPA 70 is widely accepted as the standard guide for safe electrical work in all 50 US states. The code aims to protect people and property from electrical hazards and covers installations & removal of electrical equipment on land-based locations & floating buildings.Hazardous area classifications are crucial for protecting employees, businesses, and the work environment from harm. A hazardous area guide helps decision makers choose equipment that meets specific standards for each location class & division. For instance, certain equipment might be safe for use in a Class 1 Div 1 environment but not suitable for a Class 2 Div 1 environment with combustible metal dusts.The Michelli Weighing & Measurement team can assist with equipment selection, ensuring that chosen equipment is safe for the environment and provides reliable results. It's essential to follow hazardous location guidelines to prevent bodily harm or destruction of property.The classification of hazardous areas in North America employs the Class/Division system, which is based on Article 500 of the National Electrical Code (NEC). This system categorizes locations into different classes and divisions, depending on the type and severity of the hazardous material present. Classes define the general nature or properties of the hazardous material, such as flammable gases or vapors. Class I includes areas where these materials are present in quantities sufficient to produce explosive or ignitable mixtures. Class II covers locations with combustible dusts, while Class III involves ignitable fibers or flyings. Division determines the probability of a hazardous material being present in an ignitable concentration. Division 1 applies to substances that continuously or intermittently produce explosive or ignitable mixtures due to normal operating conditions. In contrast, Division 2 pertains to materials whose presence is unlikely to produce explosive or ignitable mixtures except during short periods of abnormal conditions. Groups identify the type of hazardous material present in a particular atmosphere. Group A contains atmospheres with acetylene, while Group B includes gases, liquids, or vapors that have a high potential for burning or exploding. These can range from hydrogen to combustible process gases and even equivalent hazards like butadiene and ethyleneoxide. Groups C and D encompass environments where gases, liquids, or vapors may burn or explode under specific conditions. Group E pertains specifically to atmospheres containing combustible metal dusts, while Group F includes carbonaceous dusts with high total entrapped volatiles or those that have been sensitized by other substances. The selection of a Class/Division grouping is vital in determining the necessary safety precautions and protection techniques for electrical installations. By understanding these classifications and corresponding risks, individuals can ensure compliance with relevant safety standards while minimizing potential hazards.Flammable materials are categorized into groups based on their potential for explosion, with Group G including combustible dusts such as flour, grain, starch, sugar, wood, plastics, and chemicals.The maximum safe gap between two parallel metal surfaces is defined by the MESG (Maximum Experimental Safe Gap), which prevents an explosion from being propagated to a secondary chamber containing the same gas or vapor at the same concentration. The MIC ratio, on the other hand, measures the minimum current required to ignite a gas or vapor versus methane under the same test conditions.There are four groups of gases: A, B, C, and D, which classify Class I gases only. In contrast, Groups E, F, and G encompass dusts and flyings (Class II or III), with specific hazardous materials listed in Article 500 of the National Electrical Code and NFPA 497.The Zone System is based on Article 505/506 of the National Electrical Code and adheres to international standards for area classification as set by the International Electrotechnical Commission. This system categorizes zones based on gas or dust properties, with three levels of hazard and two divisions.The classification of gases, vapors, and mists is outlined in Article 505, while those involving combustible dusts are described in Article 506. The Zone System assigns hazardous areas to specific groups and locations, ensuring safe working conditions for personnel.Exequivalent vapors hazards Group III Explosive dust atmosphereGroup III equipment is subdivided into three subgroups A Atmospheres containing combustible flyings B Atmospheres containing non-conductive dust C Atmospheres containing conductive dust Example - Hazardous Area Classifications room with a propane gas installation will typically be classified with the Class/Division system as: Class I, Division 2, Group D Zone system Zone 2, Group IIA Protection Techniques for Hazardous Areas North America Recommended reading for this topic National Electrical Code NFPA 70 Chapter 5 Article 500 29 CFR Subpart S Electrical 1910.307 NFPA 497 Classification of Gases Vapors and Dusts for Electrical Equipment in Hazardous Classified Locations NFPA Handbook Electrical Installations in Hazardous Locations by P J Schram and M W Earley NFPA 70E Chapter 5 Hazardous Classified Locations NFPA Fire HAZ-10 Fire Protection Guide to Hazardous Materials ANSI/UL 913 Intrinsically Safe Apparatus NFPA 496 Purged and Pressurized Enclosure for Electrical Equipment in Hazardous Locations.An overview of ASTM Section 5 Petroleum Products Lubricants and Fossil Fuels Volume 05.06 Gaseous Fuels Coal Coke Online calculators figures tables showing thermal conductivity liquid gaseous butane C4H10 varying temperature pressure SI Imperial units Verifies product designed to appropriate standards according European Machine Directive Formulas trading names common chemicals National Fire Protection Association NFPA hazard system chemical materials Oxidizers vs inert flammable gases Critical temperatures concentration parameters substances coal zinc uranium more Online calculator figures tables showing density specific weight ethanol temperatures ranging -25 325 C -10 620 F atmospheric higher pressure Imperial SI Units Required water firefighting Identifying colors fluid piping systems Autoignition points fuels chemicals like butane coke hydrogen petroleum more Dangerous tolerable concentration levels industrial gases Flame explosion limits gases propane methane butane acetylene more.European hazardous area classification zones protection types temperature codes codes Hazardous areas protection techniques explosion proof flameproof intrinsically safe Dust-ignition proof explosion proof instrinsically safe nonincendive protection Hazardous areas protection techniques explosion proof flameproof and intrinsically safe Autoignition temperatures flash points C F hydrocarbons varying carbon numbers C12 IP Ingress Protection rating used specify environmental protection electrical equipment National Electrical Code NEMA enclosure standard electrical motors American National Standards Institutes schedule safety colors marking physical hazards Maximum fire sprinkler protected area vs classification construction.Explain Classification of Hazards by Class and DivisionAll the time; Class I just means they can have them. This is where the Divisions come in. Div 1 means that these ignitable elements can exist during normal operations, as opposed to Div 2 which means its possible, but not likely. A good example of the difference here might be a paint booth: inside a paint booth, normal operation is DEFINED as volatile liquid (paint) being discharged into the atmosphere in a spray of fine droplets hence, that would be Class I, Div 1. The area adjacent to the paint booth should only have that spray of fine droplets in the air if, say, the exhaust hood of the paint booth failed, or if an operator inadvertently sprayed paint outside the booth, etcany event or condition thats possible, but not likely hence, that would be Div 2. Not only are hazardous areas classified by Class (nature of the hazardous material,) and Division (likelihood of existence of it,) but theyre further delineated by the type of hazardous material, and these are sorted into Groups. For Class I (gases, vapors or airborne liquids,) four Groups are applicable. Materials fall into these groups (with one exception) based on two properties: Maximum Experimental Safe Gap (MESG) this is a standardized measurement of how easily a gas flame (produced by the ignition of the material) will pass through a narrow gap, bordered by heat-absorbing metal. Minimum Igniting Current (MIC) ratio, which is the ratio of the minimum electrical current required to ignite the material, by the minimum current required to ignite methane under the same conditions. Group A is the above mentioned exception. Because acetylene, of all hazardous materials detailed across the different groups, results in the most violent explosion when ignited, it gets a group all to itself. Group B is for flammable gases, liquids, and vapors with a MESG less than 0.45mm, and a MIC ratio of 0.40 or less. Hydrogen, butadiene, ethylene oxide, propylene oxide, and acrolein are popular examples of such materials. Group C materials have a MESG less than 0.75mm and a MIC ratio less than 0.80 (but greater than 0.40, which would put it in Group B.) Carbon monoxide, ether, hydrogen sulfide, morphline, cyclopropane, ethyl, isoprene, acetaldhyde and ethylene are some good examples. Group D consists of all other flammable gases, vapors & liquids with MESGs over 0.75mm and MIC ratios greater than 0.80. Gasoline, acetone, ammonia, and benzene are common examples. Methane is also in Group D, which gives perspective on the materials in the other Groups, which all have a fractionally lower Minimum Igniting Current than methanethe lower the MIC ratio, the lower the current needed for ignition, and therefore, the placement in a more restrictive Group. EXAIR HazLoc Cabinet Cooler Systems are engineered and approved for use in Class I, Div 1, Groups A, B, C, or D environments. If you have an electrical panel that needs heat protection in such an area, give me a call. 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Class 2 division 1 definition. Class 1 div 2 group definition. Class 2 division 1 group g. Class 1 division 2 group d. Class 2 division 1. Class 1 division 1 group d.