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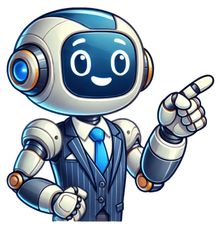

Class ii div ii definition

tolerable concentration levels for some industrial gases. inert vs. A Class 2 Division 2 hazardous location is an area where combustible dust is present under abnormal conditions, such as equipment malfunctions, but is not usually part of regular operations. NFPA 652 (Standard on Fundamentals of Combustible Dust): Outlines the basics of identifying, assessing, and managing combustible dust hazards. Required water for firefighting. Group III equipment is subdivided into three subgroups. Class III Hazardous because ignitable fibers or flyings are present (or may be present) in quantities sufficient to produce explosive or ignitable mixtures. It is unlikely that an explosive dust/air mixture will occur in this location. B Atmospheres containing ethylene, propylene oxide, ethylene oxide, butadiene, cyclopropane, ethyl ether, or gases and vapors of equivalent hazard. Division 2: Applies when the combustible dust is not normally present but may accumulate in quantities sufficient to cause an explosion or fire under abnormal operating conditions. Electrical devices used in these Class II locations must therefore be designed, constructed, and certified in compliance with relevant safety Standards in order to be safe to use in such hazardous locations.As indicated in the Standards, in order to be certified as compliant with Class II, Division 2, electrical products must be protected by one or more of the following protection techniques: dust-tight enclosures, hermetically sealed or sealed devices, non-incendive, and purging and pressurization Type Z. Dust is further classified in three groups in North America. The Zone system has three levels of hazard for gas or dust where the Division system has two. How can businesses comply with OSHA and NFPA standards? Zone System The Zone system is based on Article 505/506 of the National Electrical Code (NEC) and follows the international method of area classification as developed by the International Electrotechnical Commission (IEC). Division Division defines the probability of the hazardous material being present in an ignitable concentration in the surrounding atmosphere. When selecting equipment for Class 2 Division 2 areas, it is essential to consider the following criteria: Temperature rating: Equipment must operate below the ignition temperature of the dust present. Also, equipment that is suitable for use in Class II, Division 1 and Zone 20, 21 or 22 in North America is permitted to be installed in a Class II, Division 2 area. By investing in high-quality dust-proof equipment, implementing effective risk management strategies, and maintaining up-to-date emergency response plans, businesses can minimize the risks associated with Class 2 Division 2 environments. Hazardous Areas - North America Classification - Classes ClassNature of Hazardous Material Class I Hazardous because flammable gases or vapors are present (or may be present) in quantities sufficient to produce explosive or ignitable mixtures. Division 2 The substance referred to by class has a low probability of producing an explosive or ignitable mixture and is present only during abnormal conditions for a short period of time - such as a container failure or system breakdown Group Group defines the type of the hazardous material in the surrounding atmosphere. A Atmospheres containing propane, acetone, benzene, butane, methane, petrol, hexane, paint solvents or gases and vapors of equivalent hazard. Monitoring dust levels: Install sensors and dust monitoring equipment to alert operators when dust levels reach dangerous thresholds. Hazardous locations, as defined by the National Electrical Code (NEC), encompass areas where there is a risk of fire or explosion due to the presence defines hazardous locations as those areas where fire or explosion hazards may exist due to flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers, flakes, flock, or other agglomerating materials. Critical temperatures and concentration parameters for substances like coal, zinc, uranium and more. Dust explosive atmospheres are hazardous due to the presence of combustible dusts, fibres or flyings. HazLoc and UL certified dust control fans: can play a role in handling combustible dust in industrial settings. Zone 21 An area where combustible dusts or ignitable fibers and flyings are likely to occur under normal operating conditions. C Atmospheres containing conductive dust. American National Standards Institutes schedule for safety colors marking physical hazards. Groups A, B, C, and D are for gases (Class I only). Adhering to OSHA, NFPA, UL Solutions, ATEX, and IECEx, standards not only ensures legal compliance but also protects workers and the facility from potentially catastrophic incidents. The ATEX Directive 2014/34/EU covers equipment and protective systems intended for use in potentially explosive atmospheres, in the European Union. Group II equipment is subdivided into three subgroups. Class/Division System The Class/Division/Group system is based on Article 500 of the National Electrical Code (NEC) where Classes - defines the general nature of the hazardous material in the surrounding atmosphere Divisions - defines the probability of hazardous material being present the surrounding atmosphere Groups - defines the type of the hazardous material in the surrounding atmosphere Class Class defines the general nature (or properties) of the hazardous material in the surrounding atmosphere. Hazardous Areas - North America Classification - Divisions DivisionProbability of Hazardous Material Division 1 The substance referred to by class has a high probability of producing an explosive or ignitable mixture due to it being present continuously, intermittently, or periodically or fromthe equipment itself under normal operating conditions. What equipment is required for Class 2 Division 2 areas? Gases, Vapors and Mists Article 505 National Electrical Code (NEC) Hazardous Areas - North America Classification - Gases, Vapors and Mists ZoneNature and Probability of Hazard Material Zone 0 Ignitable concentrations of flammable gases or vapors which are present continuously or for long periods of time. Example - Hazardous Area Classification A room with a propane gas installation will typically be classified with the Class/Division system as: Class I, Division 2, Group D Zone system as: 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 1910 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. Area Classification: According to UL Solutions, hazardous locations are classified by the likelihood of an ignitable concentration of combustible material being present. Locations that would be considered to be Class II include Grain ... In Class II and Class III locations, an installation must be classified using the division classification system meeting paragraphs (c), (d), (e), and (f) of this section. Schram and M. Dust-ignition proof, explosion proof, instrinsically safe and nonincendive protection of hazardous areas. Group F Atmosphere containing carbonaceous dusts, carbon black, coal black, charcoal, coal or coke dusts that have more than 8% total entrapped volatiles or dusts that have been sesitized by other materials so they present an explosion hazard. Class II, Division 2 is defined as a location in which combustible dust may be suspended in the air as a result of infrequent malfunctioning of handling or processing equipment. Understanding how to remove combustible dust from the air safely and effectively, is essential to protect workers, equipment, and the manufacturing facility. Group is divided in three groups where Group I is reserved for mining locations. A Atmospheres containing combustible flyings. Hazardous Areas - North America Classification - Groups GroupType of Hazardous Material and Location of Atmosphere Group I Minessusceptible to firedamp (flammable mixture of gases naturally occurring in a mine). Group II Explosive gas atmosphere other than mines susceptible to firedamp. These combustible dust explosions occur when dust accumulates and becomes airborne, creating a dust cloud that can be ignited by heat sources, such as machinery, electrical sources, sparks, friction, or static electricity. A picture of the OSHA Combustible Dust Poster, and Materials that Create Dust in a Manufacturing Facilities Conclusion Class 2 Division 2 hazardous locations present significant risks due to combustible dust. Online calculator, figures and tables showing density and specific weight of ethanol at temperatures ranging from -25 to 325 °C (-10 to 620 °F) at atmospheric and higher pressure - Imperial and SI Units. One critical classification is Class 2 Division 2, which pertains to environments where combustible dust is not typically present during normal operations but can accumulate under abnormal conditions. National Electrical Code. Hazardous areas protection techniques - explosion proof, flameproof and intrinsically safe. The National Fire Protection Association, (NFPA), NFPA 70 standard, and National Electrical Code, (NEC), are the standard for safe electrical design, installation, and inspection to protect people and property from electrical hazards. Group C Atmosphere containing a flammable gas, a flammable liquid produced vapor or a combustible liquid-produced vapor whose MESG is greater than 0.75 mm or MIC ratio is greater than 0.40 and less than 0.80 - such as carbon monoxide,ether, hydrogen sulfide, morphline, cyclopropane, ethyl, isoprene, acetaldhyde and ethylene or gases of equivalent hazard. Autoignition temperatures and flash points (°C and °F) of different types of hydrocarbons with varying carbon numbers up to C12. Assessing and Mitigating Risks in Class 2 Division 2 Locations Effective risk management in Class 2 Division 2 locations involves regular assessment of dust hazards. Division 2 refers to the entire area where dusts may be suspended in the air if processing equipment malfunctions. There are two systems in place, including the traditional North American Division system and the alternative Zone system. Please see our other videos to learn more about other classified areas, as well as the protection techniques that are specific to them.If you are a product designer, or a buyer, and need an electrical device that has been certified for Class II, Division 2, the Hazloc Directory website can help!Hazloc Directory is the world's most trusted source of information about hazardous location products & manufacturers.A Class II, Division 2 location is defined by specific conditions related to the presence of combustible dust. Group B Atmosphere containing a flammable gas, a flammable liquid produced vapor, or a combustible liquid produced vapor mixed with air that may burn or explode, having either a MESG (Maximum Experimental Safe Gap)1) value less than or equal to 0.45 mm or a MIC (Minimum Igniting Current)2) ratio less than or equal to 0.40 - such as hydrogen or fuel and combustible process gases containing more than 30% hydrogen by volume - or gases of equivalent hazard such as butadiene, ethyleneoxide, propylene oxide and acrolein. In Europe and the rest of the world - but also more and more in North America - the Zone system is used. OSHA’s Combustible Dust National Emphasis Program, (NEP): Highlights inspection and enforcement procedures to ensure businesses comply with safety requirements related to combustible dust. 1) MESG (Maximum Experimental Safe Gap) - The maximum clearance between two parallel metal surfaces that has been found under specified test conditions to prevent an explosion in a test chamber from being propagated to a secondary chamber containing the same gas or vapor at the same concentration. Additionally, employees must be trained in hazard recognition, proper equipment use, and emergency procedures. C Atmospheres containing acetylene, hydrogen, carbon disulphide or gases and vapors of equivalent hazard. Regular housekeeping: Frequent cleaning is crucial to prevent dust accumulation, especially on high surfaces and hard-to-reach areas. Machine Learning enhances these capabilities by analyzing historical data from Class 2 Division 2 environments and improving predictive models over time. Formulas and trading names for some common chemicals. Dust Group F, combustible dusts other than metal, are found where lumber and wood products are stored. Group Group define the type of hazardous material and (partly) the location of the surrounding atmosphere. Group II is for explosive gases (Zone 0, 1 and 2) and Group III is for explosive dusts (Zone 20, 21 and 22). Maximum fire sprinkler protected area vs. Identifying colors used for fluid piping systems. Textile mills: Cotton dust can pose a fire risk in processing plants. Get Support Today!) Visit Dust Safety Journal for the Dust Safety Science Monthly Journal Subscribe to our FREE, Dust Safety Science Newsletter at Dust Safety Science Newsletter Visit the Dust Safety Science blog for written articles on combustible dust safety including the latest research, expert opinions, and state-of-the art in fire and explosion protection. Dust-Proof and Explosion-Proof Equipment Operating safely in Class 2 Division 2 locations requires specialized equipment designed to withstand the harsh conditions posed by combustible dust. ML algorithms can identify previously unnoticed correlations between different risk factors, providing more accurate risk assessments and allowing companies to implement more effective preventive measures. Ventilation systems: Adequate ventilation ensures that dust is continuously removed from the environment and reduces the concentration of combustible dust in the air. Groups E, F, and G are for dusts and flyings (Class II or III). Small combustible dust particles can burn easily and rapidly; a sufficient quantity of them can cause an explosion. Autoignition points for fuels and chemicals like butane, coke, hydrogen, petroleum and more. This tragic incident underscores the importance of dust control and proper safety measures in preventing disasters. One example is the 2008 sugar dust explosion at the Imperial Sugar refinery in Georgia, which resulted in 14 deaths and numerous injuries. This technology enables businesses to detect abnormal conditions before they escalate into hazardous situations. B Atmospheres containing non-conductive dust. Electrical equipment is often installed in locations where there are explosive dusts present. Fine particles, such as combustible dust, can easily ignite and lead to dust explosions, which are often catastrophic. Dusts Article 506 National Electrical Code (NEC) Hazardous Areas - North America Classification - Dusts ZoneNature and Probability of Hazard Material Zone 20 An area where combustible dusts or ignitable fibers and flyings are present continuously or for long periods of time. Material compatibility: Equipment should be constructed from materials that resist corrosion and wear, especially in environments where abrasive or corrosive dust is present. Oxidizers vs. Safety Audits and Employee Training Conducting routine safety audits ensures compliance with combustible dust safety standards and identifies potential areas of improvement. Areas with possible fire or explosion risks due to explosive atmospheres and/or mixtures - are called hazardous (or classified) locations or areas. A picture of Underwriter Laboratories Class, Zone, and Division Marking Label Class 2 Division 2 Requirements The Occupational Safety and Health Administration (OSHA), the National Fire Protection Association (NFPA), UL Solutions, ATEX, and IECEx, provide standards and stringent guidelines for businesses operating in Class 2 Division 2 locations. J. Class II, Division 2 is defined as a location in which combustible dust may be ... This section outlines the classification and requirements for electrical and electronic equipment in hazardous locations, specifically Classes I, II, and III, and Divisions 1 and 2. This includes: Dust hazard analysis (DHA): Required by NFPA 652, a DHA identifies areas where combustible dust is present and evaluates potential risks. The specific hazardous materials within each group and their automatic ignition temperatures can be found in Article 500 of the National Electrical Code and in NFPA 497. Food processing plants: Dust from sugar, flour, and spices can present explosive risks. The Role of Combustible Dust in Class 2 Division 2 Environments Dust accumulation, particularly combustible dust, poses significant hazards that can lead to devastating explosions and fires. Non-compliance with OSHA and NFPA standards can lead to citations, fines, and legal liabilities. Dust explosive atmospheres are classified in North America, using two different classification systems: the Class-division and the Zone system.There are three classified areas in the Zone system that relate to dust explosive areas: Zone 20, 21 and 22. About Dust Safety Science Dr. Chris Cloney, of Dust Safety Science, provides additional information on Hazardous Area Classification Assessment for Combustible Dust, with a Podcast. classification and construction. Business shutdowns: Persistent non-compliance could result in temporary or permanent closures. Group G Atmosphere containing combustible dust not included in Group E & F - such as flour, grain, starch, sugar, wood, plastics and chemicals. Flame and explosion limits for gases like propane, methane, butane, acetylene and more. Implementing Dust Control Measures Implementing dust control systems is a key step in reducing the risk of combustible dust explosions: Dust collection systems: These systems remove airborne dust particles and prevent them from accumulating on equipment or surfaces. Verifies that a product is designed to the appropriate standards according the European Machine Directive. Zone 22 An area where combustible dusts or ignitable fibers and flyings are not likely to occur under normal operating conditions and do so only for a short period of time. Group D Atmosphere containing flammable gas, flammable liquid produced vapor, or combustible liquid produced vapor mixed with air that may burn or explode, having either a MESG value greater than 0.75 mm or a MIC ratio greater than 0.80 - such as gasoline, acetone, ammonia, benzene, butane, ethanol, hexane, methanol, methane, vinyl chloride, natural gas, naphtha, propane or gases of equivalent hazard. 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 and Coke. The flash point of a chemical indicates how easy it may ignite and burn. Legal Implications of Non-Compliance Failure to meet the requirements set by OSHA or NFPA for Class 2 Division 2 locations can result in severe consequences, including: Fines and penalties: OSHA may issue hefty fines for non-compliance. Note that the dust must be present in sufficient quantities for a fire or explosion hazard to exist. Legal action: Companies could face lawsuits from injured employees or affected communities. 2) MIC (Minimum Igniting Current) Ratio - The ratio of the minimum current required from an inductive spark discharge to ignite the most easily ignitable mixture of a gas or vapor, divided by the minimum current required from an inductive spark discharge to ignite methane under the same test conditions. European hazardous area classification with zones, protection types, temperature codes and codes. Class II location groups are determined by: the ignition temperature of the dust, the electrical conductivity of the dust, and the thermal ... Class II locations consist of locations where combustible dusts may exist that have the potential to become flammable or ignitable. Compliance involves conducting a dust hazard analysis, maintaining dust control systems, and regularly training employees on dust safety and emergency procedures. It details the scope of ... Additionally, these technologies help optimize maintenance schedules by predicting when equipment failures might occur, reducing the likelihood of malfunction-related dust accumulation. IP - Ingress Protection rating is used to specify the environmental protection - or electrical enclosure - of electrical equipment. Grounding and bonding equipment: Properly grounded equipment helps prevent static electricity buildup, a common ignition source for dust explosions. Zones - defines the general nature (or properties) of the hazardous material - if its gas or dust, and the probability of the hazardous material in the surrounding atmosphere Groups - defines the type of the hazardous material and (partly) the location of the surrounding atmosphere Zone 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. Dust Group E, electrically conductive, combustible metal dust, may be found where metals are processed, for example. NFPA 654 (Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids): Focuses on preventing fire and dust explosions in facilities where combustible dust is handled. Essential equipment includes dust-tight enclosures, explosion-proof lighting, and properly grounded systems to prevent static electricity buildup. Dangerous vs. FAQ Section What defines a Class 2 Division 2 hazardous location? Hazardous Areas - North America Classification - Groups GroupType of Hazardous Material Group A Atmosphere containing acetylene. Online calculators, figures and tables showing thermal conductivity of liquid and gaseous butane, C4H10, at varying temperature and pressure, SI and Imperial units. Understanding the hazards specific to Class 2 Division 2 locations is essential to maintaining workplace safety, protecting employees, and adhering to regulatory compliance. Key equipment includes: Dust-tight enclosures: Electrical enclosures must be built to prevent dust ingress and avoid sparks that could ignite airborne particles. For example, IoT-connected dust sensors can provide continuous data on particulate levels, allowing AI algorithms to identify patterns, predict potential dust explosions, and trigger automatic alerts or shut down systems to prevent incidents. Common examples include: Grain handling and storage: Combustible dust from grains like wheat or corn can ignite if not managed properly. These include requirements for: The National Fire Protection Association, (NFPA), NFPA 70 standard, and National Electrical Code, (NEC), the standard for safe electrical design, installation, and inspection to protect people and property from electrical hazards. UL Solutions: UL and C-UL Hazardous Areas Certification for North America. Zone 1 Ignitable concentrations of flammable gases or vapors which are likely to occur under normal operating conditions. NEMA enclosure standard for electrical motors. Housekeeping Practices: Regular cleaning to minimize combustible dust accumulation. Pharmaceutical manufacturing: Powders used in drug production can create hazardous conditions if dust accumulates. Group III Explosive dust atmosphere. Group E Atmosphere containing combustible metal dusts, including aluminum, magnesium, bronze, chromium, titanium, zinc and their commercial alloys or other combustible dusts whose particle size, abrasiveness and conductivity present similar hazards in connection with electrical equipment. These areas are in North America (United States and Canada) historically classified with the Class/Division system. Definition and Criteria for Class 2 Division 2 Classification Class 2 Division 2 hazardous locations are defined by combustible dust that can accumulate or become airborne, creating an explosive or flammable atmosphere under certain conditions. AI-driven systems, combined with IoT sensors, can continuously monitor dust levels, temperature, humidity, and other environmental conditions in real time. And Dust Group G, solid particles including fibres, may be found where food and grain are handled. Real-World Incidents in Class 2 Division 2 locations Several high-profile incidents in Class 2 Division 2 locations have highlighted the need for strict safety protocols. W. However, with the right equipment, rigorous safety protocols, and ongoing employee training, businesses can maintain safe and compliant operations. Zones compares to classes and divisions in the Class/Division system. The National Fire Protection Association (NFPA) hazard system for chemical materials. An explosive atmosphere might only be expected in the event of malfunctions such those which result in whirled-up dust. International Electrotechnical Commission System for Certification to Standards Relating to Equipment for Use in Explosive Atmospheres, (IECEx System): IEC 60079-10-2:2015 RLV is concerned with identifying and classifying areas where there are explosive dust atmospheres and combustible dust layers. Together, AI, IoT, and ML are creating smarter, more proactive safety management systems, reducing human error, and enhancing overall workplace safety in hazardous environments. In the Class-division system, Class II Division 1, and Class II Division 2 are both used to classify dust explosive areas. Unlike Division 1 areas, where combustible dust is present during normal operations, Division 2 locations only see dust buildup under abnormal conditions such as equipment malfunctions or poor housekeeping. Examples of Class 2 Division 2 Environments, in Industries and Operations Class 2 Division 2 environments and atmospheres can be found in a variety of industries that process, store, or handle materials prone to creating combustible dust. Electrical equipment installation in atmosphere with flammable gases or vapors, flammable liquids, combustible dusts, ignitable fibers or flyings represents a risk for fire and explosion. Zone 2 Ignitable concentrations of flammable gases or vapors which are not likely to occur under normal operating conditions and do so only for a short period of time. In another words, under normal operating conditions, there would not be sufficient dust present to interfere with the operation of electrical or other equipment. Employers are responsible for identifying dust hazards, ensuring the installation of dust collection systems, and maintaining dust-tight enclosures for electrical equipment. Class II locations are divided into three groups E,F,G. flammable gases. Key criteria include: Class 2: Pertains to combustible dust hazards. Explosion-proof motors and lighting fixtures: These safety features are essential to prevent electrical arcs or heat from igniting combustible dust. The hazardous area classification system determines required protection techniques and methods for electrical installations in the location. Technology Advances, with the Integration of Artificial Intelligence, (AI), and Machine Learning, (ML), in Class 2 Division 2 Hazardous Locations Technological advancements in Artificial Intelligence (AI), the Internet of Things (IoT), and Machine Learning (ML) are transforming safety management in Class 2 Division 2 hazardous locations. (ATEX): Equipment for potentially explosive atmospheres. Ingress Protection (IP) rating: Choose equipment with a high IP rating to prevent dust from entering enclosures. Click on the latest Podcast Links: Steps to Completing a Hazardous Area Classification Assessment for Combustible Dust A picture of Dr. Chris Cloney, an Expert on Combustible Dust Hazard Analysis Resources: Visit: Fire and Explosion Protection Equipment Providers Visit: Risk Assessment & Dust Hazard Analysis Providers Visit: Combustible Dust Testing Providers Visit Dust Safety Science (Global Incident Tracking) Visit Dust Safety Academy (Resources, Training, and Events) Visit Dust Safety Professionals (Need Help? The purpose of this standard is to allow for the proper assessment of ignition sources in these areas. Published September 17, 2024, Authored by Dr. Chris Cloney and Jon Barrett of Dust Safety Science A picture of The National Fire Protection Association, (NFPA), NFPA 70 standard, and National Electrical Code, (NEC) What Are Class 2 Division 2, Hazardous Locations? Class II Hazardous because combustible or conductive dusts are present (or may be present) in quantities sufficient to produce explosive or ignitable mixtures. Compliance Obligations Companies must implement comprehensive dust management programs, including regular housekeeping, equipment maintenance, and employee training, to mitigate risks in Class 2 Division 2 locations.

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