Specifying an Explosion Resistant Electrical Enclosure

CLASSIFICATION OF HAZARDOUS ATMOSPHERES† (Based on National Electrical Code and UL)

Class	Divison	Group	Typical atmosphere/ignition temps.	Devices Covered	Temperature Measured	Limiting Value
I Gases, vapors	1 Normally hazardous	A	acetylene (305°C,581°F)	All maximum electrical devices and wiring	See external temperature in 40°C ambient	sect. 500-2 of NEC
		B	butadiene[1] (420°C, 788°F) ethylene oxide[2] (429°C, 804°F) hydrogen (400°C, 752°F) manufactured gases containing more than 30% hydrogen (by volume) propylene oxide[2] (449°C, 840°F)			
		C	acetaldehyde (175°C, 347°F) cyclopropane (500°C, 923°F) diethyl ether (160°C, 320°F) ethylene (490°C, 914°F) unsymmetrical dimethyl hydrazine (UDMH 1, 1-dimethyl hydrazine) (249°C, 480°F)			
		D	acetone (465°C, 869°F) acrylonitrile (483°C, 898°F) ammonia[3] (651°C, 1204°F) benzene (560°C, 1040°F) butane (405°C, 761°F) 1-butanol (butyl alcohol) (365°C, 689°F) 2-butanol (secondary butyl alcohol) (405°C, 761°F) n-butyl acetate (425°C, 797°F) isobutyl acetate (421°C, 490°F) ethane (515°C, 959°F) ethanol (ethyl alcohol) (356°C, 689°F) ethyl acetate (472°C, 800°F) ethylene dichloride (413°C, 775°F) gasoline (56-60 octane: 280°C, 536°F) (100 octane: 456°C, 853°F) heptanes (280°C, 536°F) hexanes (225°C, 437°F) isoprene (220°C, 428°F) methane (natural gas) (482 to 632C, 900 to 1170°F) methanol (methyl alcohol) (385°C, 725°F) 3-methyl-1-butanol (isoamyl alcohol) (350°, 662°F) methyl ethyl ketone (516°C, 960°F) methyl isobutyl ketone (460°C, 860°F) 2-methyl-1-propanol (isobutyl alcohol) (427°C, 800°F) 2-methyl-2propanol (tertiary butyl alcohol) (480°C, 896°F) petroleum naphtha[3]* (288°C, 550°F) octanes (220°C, 428°F) pentanes (260°C, 500°F) 1-pentanol (amyl alcohol) (300°C, 572°F) propane (450°C, 842°F) 1-propanol (propyl alcohol) (440°C, 824°F) 2-propanol (isopropyl alcohol) (399°C, 750°F) propylene (460°C, 860°F) styrene (490°C, 914°F) toluene (480°C, 896°F) vinyl acetate (427°C, 800°F) vinyl chloride (472°C, 882°F) xylenes (530°C, 986°F)	[1]Group D equipment shall be permitted for this atmosphere if such equipment is isolated in accordance with Section 501-5(a) by sealing all conduit ½-inch size or larger [2]Group C equipment shall be permitted for this atmosphere if such equipment is isolated in accordance with Section 501-5(a) by sealing all conduit ½-inch size or larger [3]For Classification of areas involving ammonia atmosphere, see Safety Code for Mechincal Refrigeration (ANSI B9.1-1971) and Safety Requirments for the Storage and Handling of Anhydrous Ammonia (ANSI K61.1-1982) r [3]*A saturated hydrocarbon mixture boiling in the rang 20-135°C (68-275°F). Also known by synonyms benzene, ligroin, petroleum ether or naphtha. ***†For a complete list noting properties of flammable liquids, gases and solids refer to the latest edition of NFPA No. 325M***		

Class	Divison	Group	Typical atmosphere/ignition temps.	Devices Covered	Temperature Measured	Limiting Value
I Gases, vapors	2 Not normally hazardous	A B C D	Same as Division 1 Same as Division 1 Same as Division 1 Same as Division 1 (Not normally hazardous means that the gases aren't normally present.)	Lamps resistors, coil, etc., other than arcing devices (see Div. 1)	Max. internal or external temp. not to exceed the ignition temperature in degrees Celsius (°C) of the gas or vapor involved	See Sect. 500-2 of NEC
II Combustible dusts	1 Normally hazardous	E	Metal dust, including aluminum, magnesium, and their commercial alloys, and other metals of similarly hazardous characteristics.	Devices not subject to overloads (switches, meters).	Max. external temp. in 40C ambient with a dust blanket	No overload: E-200C (392F) F-200C (392F) G-165C (329F)
		F	Carbon black, coal, coke dust with more than 8% volatile material.	Devices subject to overloads (motors, transformers)		Possible overload: E,F,G-120C (248°F) but not to exceed no overload values at overload
		G	Flour, starch, grain dusts.			
	2 Not normally hazardous	G	Same as Division 1	Lighting fixtures	Max. external temp. under conditions of use	Group: G-165C (329F)
III Easily ignitible fibers and flyings	1, 2			Lighting fixtures	Max. external temp. under conditions of use	165C (329F)

Explosion resistant & combination mositure tight, explosion resistant terminal enclosures for use in hazardous locations

CSA LR55274-24

NRTL/C - Certified to U.S. Standards

Class I, Groups B, C, and D

Class II, Groups E, F, and G

Class III

Special requirements for electric heaters and terminal enclosures in hazardous locations:

WIRING—The proper use of terminal enclosures (see above) on electric heaters located in hazardous areas requires that all electrical wiring comply with National Electrical Code (NEC) requirements for hazardous locations.

MAXIMUM TEMPERATURES— Safe operation in a hazardous location requires the maximum operating temperatures of all exposed surfaces of the heater including temperatures on the outside of the vessel, piping, flanges, pipe plugs, enclosures and other heat conduction parts be limited. The maximum surface temperature permitted in any hazardous location is determined by the flammable liquids, vapors or gases present. The end user or purchaser of the electric heating equipment is responsible for determining the proper classification of an area and for providing STS with hazardous area specifications and requirements for proper equipment design. (NEC Articles 500 and 501 provide guidelines for evaluating and classifying hazardous locations.)

SAFETY DEVICES—Approved pressure and/or temperature limiting controls must be used on electric heaters and heating elements to ensure safe operation in the event of system malfunctions.

Note 1: Class I Group B locations include Hydrogen gas. These areas require additional conduit seals and thread engagement. Contact STS for heaters and terminal enclosures suitable for Class I Group B hazardous locations.

Maximum Rating for Approval:

Pipe Plug Immersion Heaters — 225kw 600V

Flanged Immersion Heaters — 225kw 600V

Circulation Heaters — 70kw 600V

Round elements only.

Terminal Enclosure Descriptions:	
(NEMA 1)	General Purpose
(NEMA 4)	Moisture Resistant
(NEMA 7)	Explosion Resistant
(NEMA 12)	Dust/Drip Resistant
(NEMA 4/7)	Moisture/Explosion Resistant