Class I – Gases or Vapors	Class II- Dust	Class III-Fibers
Division 1		
Hazardous Vapors present	Air Suspended	Fibers handled, manufactured, or stored
Division 2		
Hazardous vapors contained, but may be present	Surface accumulated, Non-air suspended	Fiber handled or stored
Group A Atmospheres containing acetylene	**Group E** Atmospheres containing metal dust including aluminum, magnesium, their commercial alloys, and other metals of similarly hazardous characteristics	**No Groups for Class III**
Group B Atmospheres containing hydrogen or gases of vapors of equivalent hazard such as manufactured gas	**Group F** Atmospheres containing carbon black, coal, or coke dust	Atmospheres containing textile, wood or synthetic fibers
Group C Atmospheres containing ethyl-ether vapors, ethylene or cyclo-Propane	**Group G** Atmospheres containing flour, starch, or grain dust	
Group D Atmospheres containing gasoline, hexane, naptha, benzene, butane, propane, alcohol, acetone, benzol, lacquer solvent vapors, or natural gas		

Group Specifics

Group A

acetylene

Group B

acrolein (inhibited) [2)]
arsine
butadiene [1)]
ethylene oxide [2)]
hydrogen
manufactured gases containing more than 30% hydrogen (by volume)
propylene oxide [2)]
propyinitrate

Group C

acetaldehyde
allyl alcohol
n-butyraidehyde
carbon monixide
crotonaldehyde
cyclopropane
diethyl ether
diethylamine
epichlorohydrin
ethylene
ethylenimine
ethyl mercaptan
ethyl sulfide
hydrogen cyanide
hydrogen sulfide
morpholine
2-nitropropane
tetrahydrofuran
unsymmetrical dimethyl hydrazine
(UDMH 1, 1-dimethyl hydrazine)

Group D

Acetic acid (glacial)
acetone
acrylonitrile
ammonia [3)]
benzene
butane
1-butanol (butyl alcohol)
2-butanol (secondary butyl alcohol)
n-butyl acetate
isobutyl acetate
di-isobutylene
ethane
ethanol (ethyl alcohol)
ethyl acetate
ethyl acrylate (inhibited)
ethylene dichloride
ethylene glycol monomethyl

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Group Specifics (continued)

Group D (continued)

ether gasoline
heptanes
hexanes
isoprene
isopropyl ether
mesityl oxide
methane (natural gas)
methanol (methyl alcohol)
3-methyl-1 butanol (isoamyl alcohol)
methyl ethylketone
methyl isobutyl ketone
2-methyl-1 –propanol
(isobutyl alcohol)
2-methyl-2-propanol
(tertiary butyl alcohol)

Group D (continued)

petroleum naphtha [4)]
pyridine
octanes
pentanes
1-pentanol (amyl alcohol)
propane
1-propanol (propyl alcohol)
2-propanol (isopropyl alcohol)
propylene
styrene
toluene
vinyl acetate
vinyl chloride
xylenes

Group E

Containing metal dust, including aluminum, magnesium, and their commercial alloys, and other metals of similarly hazardous characteristics.

Group F

Containing carbon black, coal or coke dust.

Group G

Containing flour, starch or grain dust.

Notes:

1) Group D equipment shall be permitted for this atmosphere if such epuipment is isolated in accordance with section 501-5(a) of National Electric Code by sealing all conduit 1/2 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) of National Electric Code by sealing all conduit 1/2 inch size or larger.

For classification of areas involving ammonia atmosphere:

4) See Safety Code for Mechanical Refrigeration (ANSI/ASHRAE 15-1978) and Safety Requirements for the Storage and Handling of Anhydrous Ammonia (ANSI/CGA G2.1-1972).
5) A saturated hydrocarbon mixture boiling in the range 68-275ºF (20-135ºC). Also known by the synonyms benzene, ligroin, petroleum ether, or naphtha.

Intrinsic Safety

Intrinsic safety prevents instruments and low voltage circuits in hazardous areas from releasing sufficient energy to ignite volatile gases. The excess electrical energy in the form of voltage and current is limited by inserting energy-limiting devices, known as intrinsically safe barriers, in the circuits. To properly select the correct barrier the field device must be known. These field devices are classified as either simple (non-energy storing) or complex, which can store energy. Complex devices must be tested and approved by a third party to be used in intrinsically safe circuits. The entity parameters of approved devices are then compared to the proper safety parameters of the barrier to ensure an intrinsically safe circuit.

- There are three components to an intrinsically safe circuit: the field device, intrinsically safe barrier and field wiring.
- Field devices known as intrinsically safe apparatus are classified as simple or complex.
- Simple apparatus, which do not need to be approved, are non-energy storing devices such as contacts, thermocouples, RTDs, LEDs and resistors.
- Complex apparatus such as transmitters, solenoids, relays and transducers may store excess energy and need to be approved by a third party.
- Contacts, transmitters and temperature sensors are the most commonly used field devices in intrinsically safe applications.
- The intrinsically safe barrier limits the current with a resistor and the voltage with a zener diode.
- Intrinsically safe circuits are designed so that they operate properly under normal conditions, but keep the energy levels below the ignition curves when a fault condition occurs.