

Bulletin 18-1-20
Classification of hazardous locations
Rules 18-002, 18-004 and 18-066

Issued May 2022
Supersedes Bulletin 18-1-19

Scope

- 1) Background
- 2) Classification of hazardous locations
 - a) Locations where explosive gases may be present
 - b) Locations where explosive dust may be present
 - i) Farms
- 3) Equipment used in hazardous locations
- 4) Descriptive system document
 - a) Sealing requirements in explosive gas atmospheres
- 5) Pre-start health and safety reviews
- 6) How to contact an engineer to perform area classification

1) Background

Section 18 of the Ontario Electrical Safety Code (OESC) provides prescriptive requirements for hazardous locations where explosive atmospheres exist. An explosive atmosphere exists where a mixture of air, atmospheric conditions, and flammable substances (gas, vapour, dust, fibres or flyings) permits self-sustaining propagation after ignition.

Rule 18-004, Classification of hazardous locations, prescribes that hazardous locations be classified according to the nature of the hazard present with regards to explosive gas or dust atmospheres.

Rule 18-002, Special terminology, provides the definitions of explosive gas and dust atmospheres and provides guidance on determining the zones based upon the frequency and likelihood of the explosive gas or dust atmospheres being present.

2) Classification of hazardous locations

New electrical installations in areas where explosive gases or dust are present are required to be classified based on the Zone system of classification. For existing installations where the Class or Division system has been used and additions, modifications, and renovations are made to the electrical installation and equipment, the continued use of the Class or Division system of classification shall be permitted. Where the Division system of classification is permitted the requirements for Class I, II, and III locations found in Annex J18 of Appendix J shall be employed.

a) Locations where explosive gases may be present

Rule 18-002 of the OESC defines locations where explosive gasses may be present, based on likelihood and duration, as Zone 0, Zone 1 and Zone 2.

Locations where gases may be present to the extent defined by the Zone descriptions, include:

areas of garages; service stations; certain dry-cleaning plants; spray-painting establishments; flammable-gas plants; paints and varnish manufacturing plants; distilleries; plants producing industrial alcohol; industries employing processes with flammable volatile liquids; flammable gases; and compounds such as polishing pastes containing flammable ingredients.

b) Locations where explosive dust may be present

Rule 18-002 of the OESC defines locations where explosive dust may be present, based on likelihood and duration, as Zone 20, Zone 21 and Zone 22

Locations where dust may be suspended in the air to the extent that explosive concentrations may be present, as defined by the Zone descriptions, include; grain elevators; flour mills; feed grinding and mixing plants; coal pulverizing plants; starch plants; magnesium processing plants, etc.

i) Farms

Table B1 may be used only as a guide for installation practices and equipment selection for hazardous locations involving grain dusts. The table is divided into two basic categories of installations, which are considered in the tabulation as follows:

Farms - Where the product such as feed, etc., is being produced only for use on the particular farm.

Commercial Farms - Where the product is for resale or as custom preparation for others and where the amount of material handled is large, as compared to what might be processed on the farm.

Table B1 – Farm classification

Item No.	Wiring	Switches	Motors	Luminaires
Farms Grain Grinders Rollers Hammer Mills Feed Mixing	As required by Section 12 and or Section 22	Dust-tight	Totally-enclosed	Dust-tight
Commercial Farms Chopping Mills Feed Mixing Plants Flour Mills Alfalfa Grinding and Processing Mills Terminal Grain Elevators	Rigid Conduit Mineral-Insulated Cable or aluminum sheathed cables as required by Rule 18-202(1)	Group IIIB	Group IIIB	Group IIIB

Note

Rule 18-058 has been used as a basis for allowing some easement from these requirements in the case of offices and other similar areas adjoining various types of processing mills, etc. In practice, it has been found that in many cases the requirements given in Rule 18-058 have not been properly adhered to. Therefore, where there is some doubt that no installation will be properly made or maintained, the use of equipment approved for Group IIIB may be required even in such locations.

In many instances, good housekeeping can be the key to safe installations. Frequent and regular removal of dust accumulations from equipment structure, etc., will assist in keeping the fire and explosion hazards at a minimum. The use of suitable dust collecting systems will be found to be of value, particularly where equipment approved for use in the particular hazardous location cannot be obtained.

3) Equipment used in hazardous locations

Based on Rule 18-050, electrical equipment used in hazardous locations where explosive gas or dust may be present must be approved and marked as being suitable for the Zone in which it is used. Subrule 7) of Rule 18-050 explains that where equipment is marked for use in Class/Division locations, it may be used in locations classified according to the Zone system and shall correspond to the equivalent Group within the Zone system as specified in Table 18A.

For installations of electrical equipment in hazardous locations where explosive gasses are present and the selection of equipment is made through the use of Rule 18-070, Combustible gas detection, the location of the gas detection sensors must be on the stamped drawings.

Equipment used in installations where explosive dust is present is sometimes erroneously referred to as explosion-proof but is simply "dust-tight" that excludes dust and is also tested for the safe dissipation of heat when blanketed with dust. Since it excludes dust, no explosive mixture is likely to occur within the enclosure.

4) Descriptive system document

The “Descriptive system document” is integral to the safety of the installation, and is required for:

- Intrinsically safe electrical systems and non-incendive field wiring circuits.
- Ensuring the safety of such systems, qualified persons should be provided with sufficient information for installation, verification, and maintenance.

The minimum requirements that should be included in the Descriptive System Document are detailed in

Appendix F, including but not limited to:

- a block diagram of the system
- a statement of the group subdivision (Zone, Class, Division)
- the level of protection for each part of the system
- the temperature class or maximum surface temperature of the equipment

A descriptive system document and all supporting calculations should be

- Maintained on file with the owner/operator
- Stored at the facility for the life of the facility

These records should be available, upon request by installers, inspectors, operations personnel, safety, and maintenance personnel

a) Sealing requirements in explosive gas atmospheres

Background

A conflict appears to exist regarding sealing requirements for cables and conduits that terminate in explosive gas atmospheres. Those containing intrinsically safe and non-incendive circuits have different sealing requirements than those that contain other circuits.

Question 1

Where a wiring system that contains conductors of an intrinsically safe or non-incendive circuits enters the intrinsically safe enclosure in a Zone 1 or Zone 2 area, is explosion seal required to be installed?

Answer 1

No. Flammable fluid migration seal is required as per rule 18-066 5) and associated Appendix B Note.

Note: If intrinsically safe or non-incendive circuits enters “XP”, or “d” or “db” enclosure, where there could be arcing/sparking devices, explosion seal may be required.

Rationale 1

Based on the Appendix B Note to 18-066 5), intrinsically safe and non-incendive field wiring systems are not required to prevent the transmission of an explosion and therefore the only concern is the transmission of flammable fluids. Migration of flammable fluids at atmospheric pressure can be prevented by the use of conduit and cable seals. Other alternatives for cables include the use of a compound such as silicone rubber applied around the end of the connector to prevent flammable fluids from entering the end of the cable. Where the flammable fluids could be operating at pressures above atmospheric pressure, the provisions of Rule [18-072](#) should be applied,

5) Pre-start health and safety reviews

Code users should be aware that Regulation 851 (Section 7 (11)) for Industrial Establishments made under the Occupational Health and Safety Act, provides requirements for the protection of workers when working within classified areas by a professional engineer.

6) How to contact an engineer to perform area classification

Classifications of hazardous locations is required to be done by a qualified, licensed professional engineer. Association of Consulting Engineers of Ontario is an industry association that can refer you to qualified engineering firms who can perform Area Classifications.

Use the Member Directory on their website (<https://acecontario.ca/member-directory/>) to locate a suitable electrical or occupational health and safety engineering firm in your geographic area.