

Low Capacitance CSA/ATEX Intrinsic Safety Overview

Regulatory Standards for Intrinsic Safety

For AC91X Series

In the many industrial processes where flammable materials are handled, any leak or spillage may give rise to an explosive atmosphere. To protect both personnel and the plant, precautions must be taken to ensure that this atmosphere cannot be ignited. The areas at risk are known as 'hazardous areas' and the materials that are commonly involved include crude oil and its derivatives, natural and man-made process gases, alcohols, metal dusts, carbon dust, flour, starch, grain and fibers.

Intrinsic Safety (IS) is based on the principle that the electrical energy in hazardous-area circuits is deliberately restricted such that any electrical sparks or hot spots that may occur are too weak to cause ignition. This is achieved by inserting an energy-limiting interface in the wiring between safe and hazardous areas. The interface passes signals in either direction as required but limits the voltage and current that can reach the hazardous area under fault conditions. It may be integral with the safe-area equipment or separate for greater flexibility.

Intrinsic Safety Standards

Each sensor that is approved for intrinsic safety must meet or exceed the requirements for standards recognized by the countries that would use the sensors. Below is a breakdown of the standards and the marks that must be present on the sensors in order to be certified as intrinsically safe.



US & Canadian Standards: Division 1, Class I, Groups A, B, C, D; Class II, Groups E, F, and G; Class III

CSA C & US Mark: United States and Canada Safety Standards

An electrical, mechanical or electro-mechanical product bearing the North American CSA Listed mark signifies that it was tested and meets the minimum requirements of prescribed product safety standards. Moreover, the mark indicates that the manufacturer's production site conforms to a range of compliance measures and is subject to periodic follow-up inspections to verify continued conformance. A CSA Listed with both "US" and "C" identifiers at the 4 o'clock and 8 o'clock positions respectively, signifies that the product bearing the mark complies with both U.S. (Factory Mutual - FM 3610 - Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II & III Division 1 Hazardous Locations) and Canadian (Canadian Standards Association - CSA C22.2 NO 157-92-CAN/CSA - Intrinsically Safe and Non-Incendive Equipment for Use in Hazardous Locations General Instructions No 1) product safety standards.

In the United States, Article 500 of the National Electrical Code (NFPA 70) defines the following divisions:

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|-------------------|--|-----------|-----------------|---------------------|---------------|
| Division 1 | Hazardous concentrations of flammable gases, vapors - or combustible dusts in suspension - continuously, intermittently, or periodically present under normal conditions. | | | | |
| Division 2 | Volatile flammable liquids or gases are present, but are normally contained within closed containers or the flammable vapors are normally prevented by positive mechanical ventilation and from which they can escape only under abnormal operating or fault conditions. Combustible dusts are not normally, nor likely, to be thrown into suspension. | | | | |
| Class I | Group A | Acetylene | Class II | Conductive Dust | (metal dusts) |
| | Group B | Hydrogen | | Carbonaceous Dust | (coal dusts) |
| | Group C | Ethylene | | Non-Conductive Dust | (grain dusts) |



United Kingdom & Europe Zones 0, 1, 2, Groups as noted

In Europe, the Zones are broken down as follows:

| | |
|---------------|--|
| Zone 0 | Hazardous gas atmosphere is continuously present or is present for long periods of time (ia apparatus only). |
| Zone 1 | Hazardous gas atmosphere is likely to occur during normal operation (ia or ib apparatus only). |
| Zone 2 | Hazardous gas atmosphere is not likely to occur during normal operation, or will only occur for short periods of time (ia or ib apparatus only). |

Following are specific flammable gases, vapors, mists and ignitable dusts, fibers and fillings. They are classified according to the spark energy required to ignite the most easily ignitable mixture with air.

| | | | |
|------------------|---------------------|------------------|--------------------|
| Group IIC | Acetylene, Hydrogen | Group IIA | Propane |
| Group IIB | Ethylene | Group I | Methane (firedamp) |

United Kingdom & Europe - ATEX

A product bearing the EX mark signifies that it was tested and meets the minimum requirements of prescribed product safety standards.

- ATEX EN60079-0 - Electrical Apparatus for Potentially Explosive Atmospheres - General Requirements.
- ATEX EN60070-11 - Electrical Apparatus for Potentially Explosive Atmospheres - Intrinsic Safety "I".

The above tables show the individual standards and the details of the standard.

CTC's intrinsically safe product line meets the following standards:

- CSA Standards: Division 1, Class I, Groups A, B, C, D; Class II, Groups E, F, and G; Class III
- ATEX Standards: (Note: Ex ia represents explosion protection maintained with up to two components or other faults)