

Intrinsic Safety-vs-Explosionproof

Executive Summary

The phrase “Intrinsically Safe” is typically used generically to describe products destined for use in hazardous (explosive) areas. This paper provides more details of what it means for a product to be “Intrinsically Safe,” and provides an overview of the requirements for certifying a product and a comparison of the Intrinsic Safety and Explosion Protection concepts. Both, Intrinsic Safety and Explosionproof are to prevent a malfunction in electrical process equipment from initiating an explosion or fire through ignition of gases that may be present in the surrounding atmosphere. Both systems do this by keeping the potential energy level below that necessary to start the ignition process in an open atmosphere.

“OleumTech Wireless Transmitters are Intrinsically Safe: They can be operated in a hazardous environment with or without the enclosure without the risk or fear of causing an explosion.”

What is Intrinsic Safety and Explosionproof?

“Intrinsically Safe” is also frequently used to describe any product designed using intrinsically safe circuits. An intrinsically safe circuit in which any thermal effect, produced either normally or in specified fault conditions, is incapable of causing ignition of a mixture of flammable or combustible material in air in the mixture's most easily ignited concentration.

Explosionproof, according to the National Electrical Code, applies to an apparatus enclosed in a case that is capable of withstanding a gas or vapor explosion. It means that, should there be an explosion, it will be contained within an enclosure. This containment is done through careful design of the enclosure so that the resulting energy is not only contained; it is also dissipated through the large surface of the flanges or threads of the enclosure. Consequently, if the integrity of the enclosure is compromised, either because of a scratch across the flange face or threads or incomplete tightening of the cover, the result is a significant increase in the risk of an explosion. The net result is that Explosionproof protection has a higher level of required maintenance than an Intrinsically Safe system.

Therefore, Intrinsically Safe means that an apparatus, such as a temperature transmitter is not capable of causing an explosion. Explosionproof means that should an explosion occur, it will be contained within an enclosure.

What does this mean for you?

OleumTech I.S. products include Liquid Level, Analog Input, Temperature, Pressure and Flow Totalizer Transmitters that can be permanently located within the explosive area. The safety and convenience of the Intrinsic Safety design is that the devices can be configured for use and serviced in the potentially explosive atmosphere. The transmitters are housed in a rugged enclosure and the cover can be removed in an explosive atmosphere for servicing without fear of an explosion. Each self-powered transmitter contains an Intrinsically Safe designed battery pack that can be quickly replaced, even while in operation in an explosive atmosphere, also without the fear of an explosion. An Intrinsically Safe designed and certified product provides the convenience of safety and servicing while in operation in hazardous environments that an Explosionproof designed product cannot provide.

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Certification Standards

To ensure safety and reliability, our Intrinsically Safe products are designed, developed, certified and manufactured to meet the regulations and Quality System requirements of internationally recognized and accepted regulatory standards.

Several of these standards are:

- **CAN/CSA C22.2 No.157-92** - Intrinsically Safe and Non-Incendive Equipment for Use in Hazardous Locations
- **CAN/CSA E60079-11:02** - Electrical Apparatus for Explosive Gas Atmospheres – Part 11: Intrinsic Safety "i"
- **FM 3610** - Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations
- **UL 913** - Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations
- **UL 60079-11** - Explosive Atmospheres: Equipment Protection by Intrinsic Safety "i"

Product Labeling

After verification that OleumTech Division 1 products meet the stringent IS requirements of these standards, we are authorized to label them with the following marking:

INTRINSICALLY SAFE

Class I Division 1 Groups A, B, C, D
Class II Division 1 Groups E, F, G
Class III; Ex ia IIC;
Class I Zone 0 AEx ia IIC

A product bearing CSA and FM marking signifies they have been tested and meet the minimum requirements of the safety standards. Additionally, the mark indicates that the OleumTech production site conforms to a range of compliance measures and is subject to regular facility inspections to verify continued compliance.

Intrinsic Safety (IS) or Explosion Proof (XP) - which is best?

The answer to this question is really a subjective one. The protection concept depends on the design. Devices that require very low amounts of power to operate, and if the construction can be controlled to the component level can use the IS concept. Devices that require a significant amount of power to operate, or if the construction of the device cannot be controlled to a component level, the Explosionproof protection concept must be used. OleumTech products consume very low power, so the IS protection concept was the obvious choice for us.

In addition to being tested for compliance to US and Canadian standards, OleumTech products are designed to meet ATEX Ex ia Zone 0 protection requirements. What is Ex ia Zone 0? Ex ia is an increased safety design with redundancy built in for devices that may be used in enclosed spaces where potentially explosive gases or dust is likely to be present at all times (Zone 0).

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Quality System

Products designed for use in hazardous environments must meet the challenging requirements of regulatory agency standards to receive certification. Achieving the certification is only the beginning. Additionally, the manufacturing facility must also demonstrate a Quality System with quality control methods in place to repeatedly manufacture products that meet the standards to which they have been certified.

Organizations must undergo facility audits on a regular basis for review of manufacturing records and product documentation. These facility audits verify and ensure adequate inspection, testing and acceptance techniques are in use in the manufacturing process, including a well documented quality system. These efforts are used to demonstrate that not only are the products in compliance, but manufactured repeatedly in compliance with approval standards.