

UNDERSTANDING INTRINSICALLY SAFE FIRE DETECTION

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HOCHIKI
WHITEPAPER



What is Intrinsic Safety?

For an electrical product to be ‘Intrinsically Safe’ it must be incapable of igniting an explosive atmosphere by either spark or heat.

This is achieved by ensuring only low currents and voltages enter the hazardous area, and therefore the whole circuit must be considered, not just the device in isolation.

An ‘Intrinsically Safe Circuit’ therefore must restrict the electrical and thermal energy such that ignition of a hazardous atmosphere (explosive gas or dust) cannot occur.

Understanding Hazardous Areas

The **Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR)**, defines a hazardous area as:

“...any place in which an explosive atmosphere may occur in quantities such as to require special precautions to protect the safety of workers.”



EN60079-10-1 explains that Hazardous areas can be classified into zones based on the amount of time explosive gases, vapours and mists can be found in the atmosphere;



An area in which an explosive gas atmosphere is present continuously or for long periods



An area in which an explosive gas atmosphere is likely to occur in normal operation



An area in which an explosive gas atmosphere is not likely to occur in normal operation and, if it occurs, will only exist for a short time.



There is also zone classification for combustible dust:



A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is present continuously, or for long periods or frequently.



A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is likely to occur in normal operation occasionally.

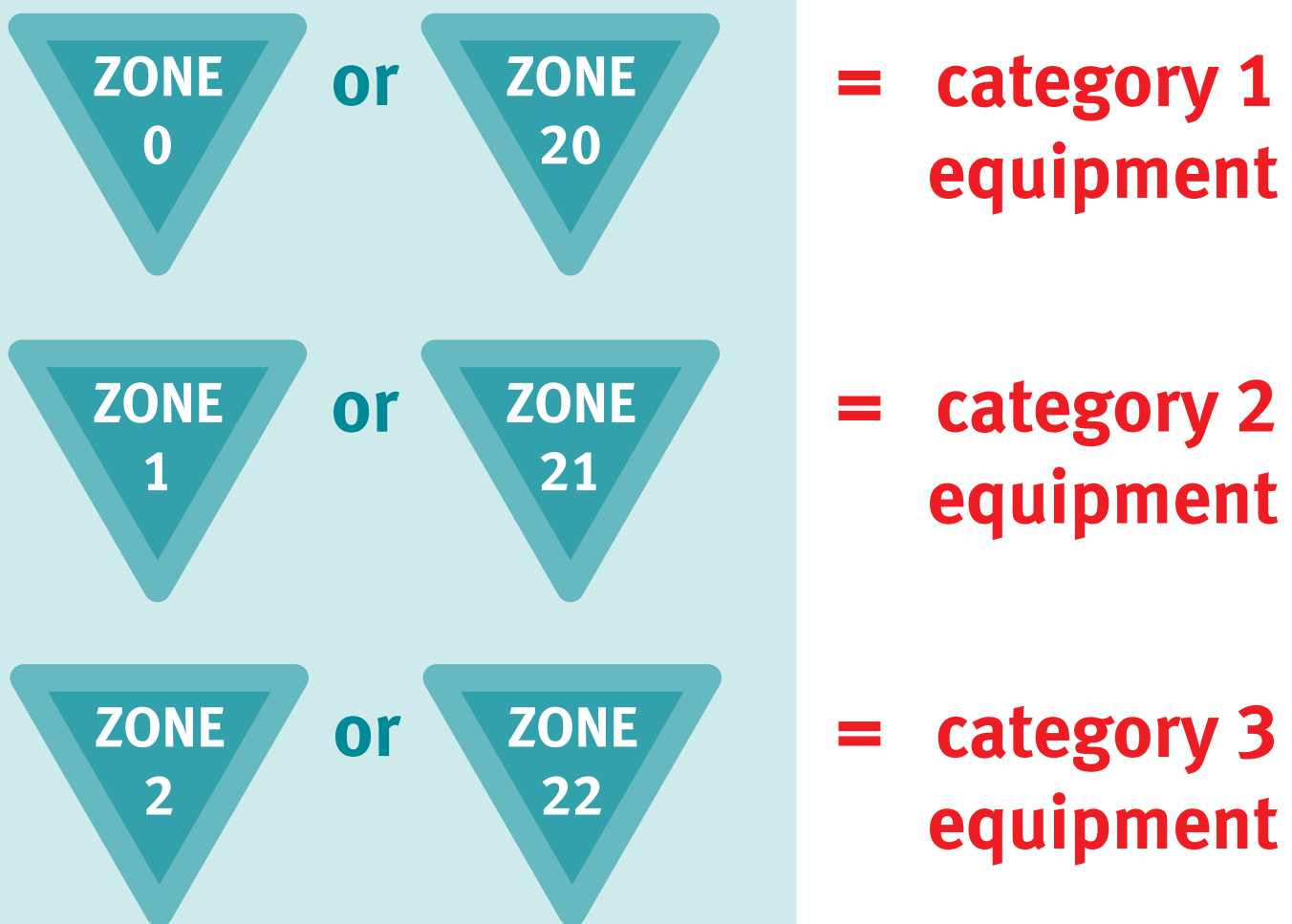


A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is not likely to occur in normal operation but, if it does occur, will persist for a short period only.

Intrinsically Safe Device Categories

When selecting an intrinsically safe device, installers must ensure that the product has the appropriate certification for the zone required.

Equipment categories are different to zones; please refer to how the zones and categories correspond below:



*Please note:
Category 1 equipment is also suitable for Zones 1 and 2 or Zones 22 and 22*

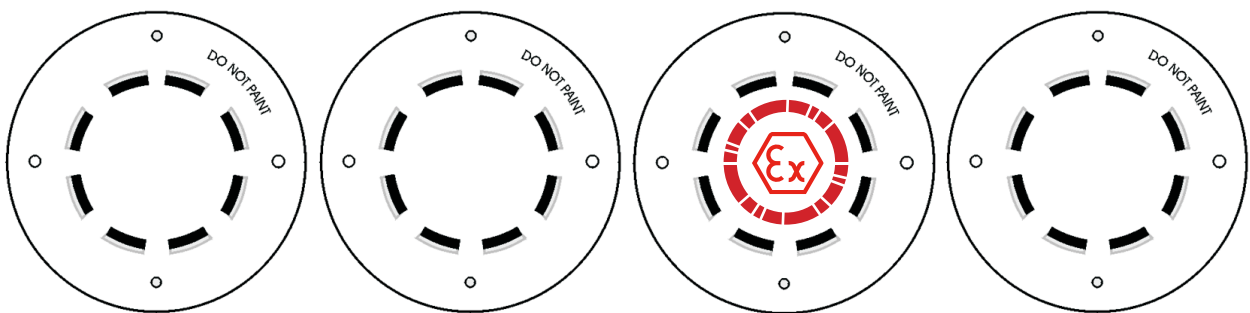
Category 2 equipment is also suitable for Zone 2 or Zone 22

For example, Hochiki's SOC-E-IS and DCD-1E-IS are certified as Category 1 equipment for explosive gas atmospheres. This means they are suitable for use in Zone 0, 1 and 2



The differences between a standard device and an Intrinsically Safe device

Aesthetically, the shape and size of an intrinsically safe smoke detector, heat detector or multi sensor can be very similar to standard devices, however, you will notice additional warning information and zone information printed on an intrinsically safe device.



You might find that some devices are non-pulsing, meaning that the LED will not flash when polled. This is primarily because an intrinsically safe device needs to operate at lower voltage than a standard device in order to eliminate any possibility of igniting the explosive atmosphere. It is important that there is no chance of ignition in normal operation or in fault conditions.

The low power levels also mean that there is no chance of receiving an electric shock due to excess thermal energy and arcing.

And remember, when installing an intrinsically safe device, it is crucial that an intrinsically safe mounting base is used.

The difference between flame proof and intrinsically safe

Flameproof

Flameproof equipment must be contained in a box strong enough to contain an internal explosion without damage to the box or transmittance outside of the box. The surface must also remain cool enough, not to be able to ignite the explosive atmosphere.

In addition, when flameproof equipment is interconnected, flame proof wiring must be used. Flameproof wiring is acceptable if high power is unavoidable, however it is not acceptable to use this method in zone 0 hazardous areas.



Intrinsically Safe

Intrinsically safe devices operate at much lower power; even the quiescent current is much lower. This therefore means that, depending on the certification, an intrinsically safe device can be used in all classifications of hazardous area.

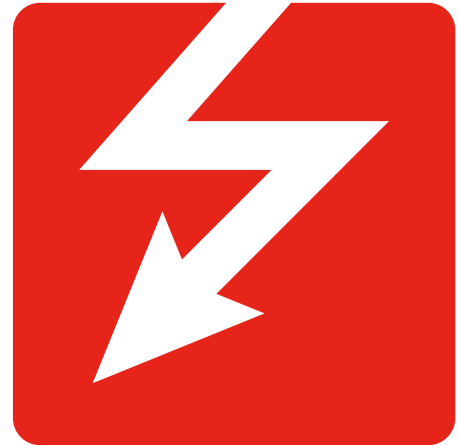


Barriers and Modules

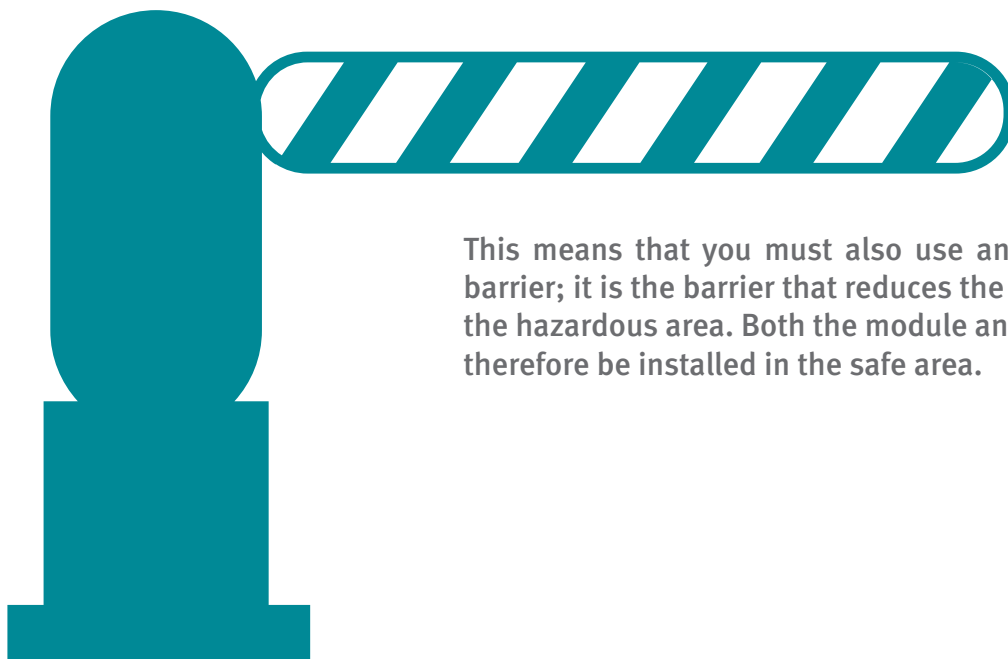
We have established that standard devices cannot be used in hazardous areas as there is a risk of ignition; therefore low current intrinsically safe devices must be used instead.

Of course, buildings do not tend to be completely hazardous; they will have safe areas that require standard devices and hazardous areas that require intrinsically safe devices.

Therefore, an intrinsically safe compatible module is designed to interface between the two. Some modules also provide line monitoring for open or short circuits on the wiring connected to both the safe and hazardous areas.



It is important to note that a module does not reduce the current in any way, a module is simply used to interface between standard devices and intrinsically safe devices.



This means that you must also use an intrinsically safe barrier; it is the barrier that reduces the power that enters the hazardous area. Both the module and the barrier must therefore be installed in the safe area.

SIL Approved Products

It is important to note that SIL approved products are not the same as Intrinsically Safe Products. SIL approved products are for use in high risk industries, Intrinsically Safe products are for use in classified hazardous areas. However you may find that some manufacturers, such as Hochiki, offer products that have both SIL and IS certification.




SIL is the acronym for 'Safety Integrity Level'.

This is a system used to quantify and qualify the requirements for safety instrumented systems. There are four different SIL levels; SIL1, SIL2, SIL3 and SIL4.

The international Electro-technical Commission (IEC) introduced the following industry standards to assist operators with quantifying the safety performance requirements for hazardous operations:



 IEC 61508 Functional Safety of Electrical/ Electronic/ Programmable Electronic Safety-Related Systems

 IEC 61511 Safety Instrumented Systems for the Process Industry Sector

These standards have been widely adopted in the hydrocarbon, oil and gas, petrochemical, transport and process controlled industries as a means of improving safety and availability of Safety Instrumented Systems. As such, these industries are increasingly specifying the requirement for SIL approved fire detection equipment.

Compliance

There are a number of Intrinsically Safe fire detection products on the market. To remain legally compliant, please ensure that the products you select have been certified under the following directives:



EU 305/2011



ATEX Directive 2014/34/EU



IECEx

For further information about intrinsically safe certification, you can visit the following websites:



www.baseefa.com

www.brecertification.com

www.iecex.com

Other Resources

The HSE website contains some very useful information about hazardous areas: www.hse.gov.uk

Further information about hazardous areas can be found in BS EN 60079 part 10, please visit the British Standards website for more information: www.bsigroup.com

To learn more about Hochiki's intrinsically safe products visit our I.S. product pages on our web site: www.hochikieurope.com/is

To learn more about Hochiki's SIL approved range, please visit our SIL2 landing page: www.hochikieurope.com/sil

