

APPLICATION NOTE

Hazardous Area Solutions Using Zener Barriers

Overview

Fire detection and alarm indication is frequently required in hazardous areas. Special techniques are required to ensure safe operation in these areas. These techniques involve the use of either explosion proof equipment or intrinsically safe equipment.

This Application Note provides a brief overview of the intrinsically safe solutions provided by Pertronic Industries.

The intrinsically safe method requires that any spark occurring in a hazardous area is of insufficient energy to cause ignition. This is achieved by using approved intrinsic safety equipment, which limits the energy that can be supplied into the hazardous area and by limiting the energy stored in any device located in the hazardous area (i.e. limited device capacitance or inductance).

Detection Devices

While there is only small number of approved intrinsically safe smoke detectors and heat detectors, which meet the requirements of NZS4512, there are no intrinsically safe indicating Manual Call-Points available which comply with NZS4512:2003. For this reason it is necessary to use non-indicating MCPs in the hazardous area and have the indication in the safe areas.

Detection devices in hazardous areas may be controlled via Zener Barriers and the required interface to the panel.

Alerting Devices

Due to their nature intrinsic Safe Zener Barriers limit the available energy to DC powered Intrinsic Safe Sounders. This is the preferred technique for small installations.

For larger installations where higher sound levels are required we recommend the use of approved Flameproof ("explosionproof") loudspeakers driven by an Evacuation Amplifier. This amplifier must be located in the non-hazardous area.

Features of Zener Diode Safety Barrier

A Zener Safety Barrier may be used as an intrinsic safe solution with Pertronic Analogue Addressable panels (F100 or F120) in conjunction with a System Sensor M512ME Zone monitor Module supplied with an isolated 24V supply.

- **Through connection:** is fused and polarised
- **Voltage and current:** are restricted in Hazardous Area
- **Safety Earth:** connection is provided
- **Earth:** the intrinsically safe circuit must be isolated from Earth within the Hazardous Area

Intrinsic Safety Interface Installation

The interface must be located in the Safe Area and while not a requirement, ideally should be as close as practical to the Hazardous Area. Cables to the Hazardous Area must be run separately from cables within the Safe Area to maintain the integrity of the IS interface. If the IS Barrier is mounted remotely from the Hazardous Area (e.g. in the Fire Panel) the IS cabling must be run so that it is not in close proximity to Safe Area cables.

The recommended colour for IS cabling is blue. Unused cores within the cable (and the cable shield if fitted) should be connected to the Safe Area ground and insulated within the hazardous Area.

Zener Barriers Earthing Requirements

Zener Barriers should be earthed via two independent paths, each connecting directly to an Intrinsic Earth bus-bar, which is directly bonded to the Earth bus-bar at the Electrical Distribution board.

Maximum resistance of each path should be no more than 1.0Ω and ideally be less than 0.1 Ω.

The two connecting Earths wires should be identified - common practice is to bind the two leads together with blue insulating tape at frequent intervals to distinguish them from other similar conductors.

Note: Panel Earth Defect monitoring for needs to be disabled for certain applications when using Zener Safety Barriers – see application diagrams on pages 2 and 3!

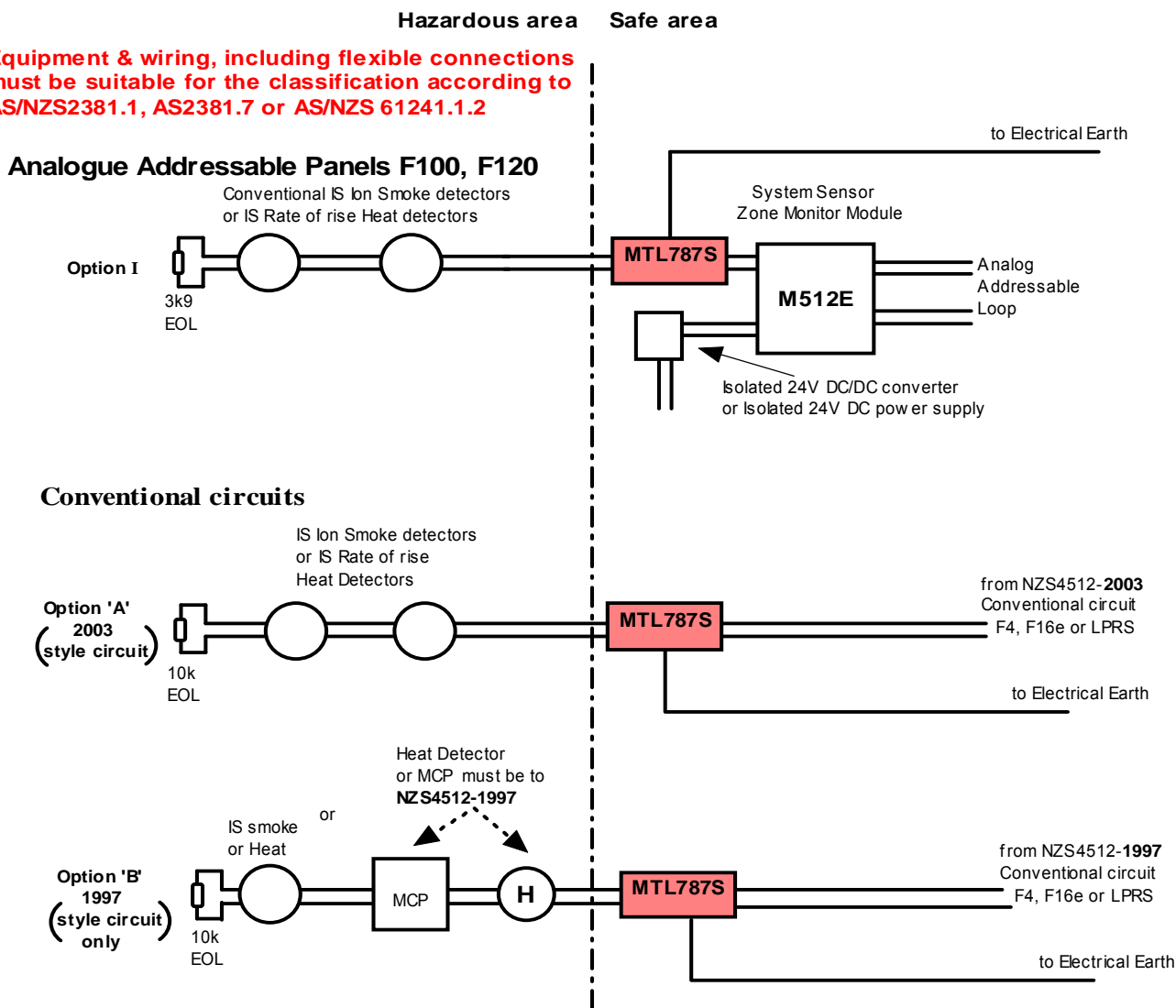
Earth Maintenance

The Zener Barrier bus-bar Earth return path should be checked periodically as part of regular maintenance.

An accurate measurement can be made by disconnecting one earth wire at the time and measuring the loop resistance of the detached conductor. Any instability in measurements should be investigated.

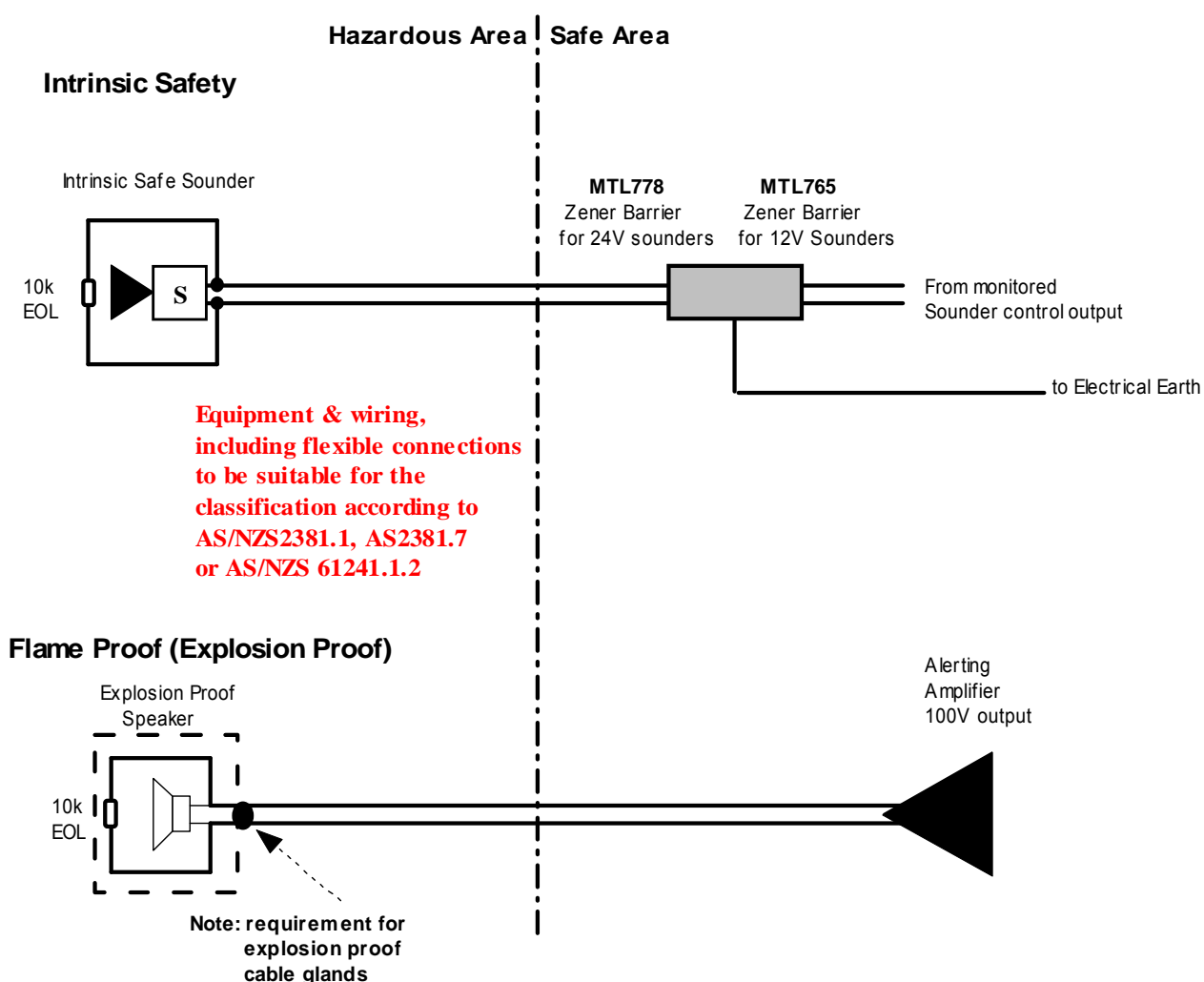
IS Installation Methods for Detection in Hazardous Areas

Equipment & wiring, including flexible connections must be suitable for the classification according to AS/NZS2381.1, AS2381.7 or AS/NZS 61241.1.2



Note: earth monitoring must be disabled on panels with connected intrinsic safe barriers

Installation Methods for Alerting devices in Hazardous Areas



Note: earth monitoring must be disabled on panels with connected intrinsic safe barriers for sounder applications

Product Codes

Description	Product Code	IS Rating
Low Profile Ionisation Smoke Detector – Intrinsically Safe	1151EIS	II 1G EEx ia IIB T5
5451EIS Heat Detector Rate of Rise – Intrinsically Safe	5451EIS	II 1G EEx ia IIB T5
Intrinsically Safe 49 tone Sounder 16V to 28V	E2SA105N-IS	II 1G EEx ia IIC T4
15W ATEX Approved (Zone 2 Only) Speaker 100V Line	E2SxL15EG	II 3G EEx nA II T4
Intrinsic Safe Zener Barrier MTL787S Safety description: 28V 300R, 93mA	ISBMTL787S (dc)	II(1)GD EEx ia IIC
Intrinsic Safe Zener Barrier MTL778 Safety description: 28V 600R, 47mA	ISBMTL778 (ac)	II(1)GD EEx ia IIC
Intrinsic Safe Zener Barrier MTL765 Safety description: 15V 100R, 150mA	ISBMTL65 (ac)	II(1)GD EEx ia IIC
DC:DC Converter : 19-32Vdc to 24Vdc	PB12H-24	
MCP Pertronic Snapglaze	CPP	
Heat Detector Blue, 57°C (Non-Indicating)	HDB	
Conventional Zone Monitor Module	M512ME	
Pertronic Clean Contact Interface	CCI	
Cable for hazardous area installations	Depends on installation requirement	

Please contact Pertronic Technical Support on (04) 567 3229 Option 2 for further assistance