The Rapid Guide to

Field^IT
Control^IT
Inform^IT
Industrial^IT

The New Hazardous Area Standards

– ATEX/CENELEC, FISCO – with Enclosure Environmental Protection Classifications and Industrial^IT

As a world-leading manufacturer of electrical equipment used where safety is critical, ABB offers this guide to the latest Hazardous Area standards, FISCO – the new Fieldbus Intrinsically Safe Concept, SIL safety equipment reliability classifications, IEC/NEMA enclosure classifications and, Industrial^IT, ABB's new open data/control communications standard.

Hazardous Area Classifications

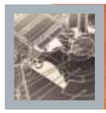
Presence of hazard	Europe		
	IEC/CENELEC		ATEX
	Gases	Dusts	Gases and Dusts
Continuous >1000 hrs/yr	Zone 0	Zone 20	Cat. 1 (very high protection)
Intermittent 10 - 1000 hrs/yr	Zone 1	Zone 21	Cat. 2 (high protection)
Abnormal only 0.1 - 10 hrs/yr	Zone 2	Zone 22	Cat. 3 (normal protection)

General Relationships between European Hazardous Area Practices

Method	CENELEC/IEC Zone	ATEX Category	CENELEC EN	IEC 60079 -
General electrical requirements			50014	0
Oil immersion Ex o	1, 2	2, 3	50015	-6
Pressurisation Ex p	1, 2	2, 3	50016	-2
Powder filling Ex q	1, 2	2, 3	50017	-5
Flameproof Ex d	1, 2	2, 3	50018	-1
Increased Safety Ex e	1, 2	2, 3	50019	-7
Intrinsic Safety Ex ia	0, 1, 2	1, 2, 3	50020	-11
Intrinsic safety Ex ib	1, 2	2, 3	50020	-11
Intrinsically safe systems			50039	-25
Type n	2	3	50021	-15
Encapsulation Ex m	1, 2	2, 3	50028	-18
Special Ex S	(0), 1, 2			

Hazardous Area Equipment Markings CENELEC/IEC

E	Ex	d	IIB	T6	T-amb
Conformity with European Standard (CENELEC)	Explosion Protection Symbol	Method of Protection Code	Gas Group (ignitability of gas/air mixture)	Temperature Class (Group II gases)	Specified ambient temperature range where different from –20°C to +40°C
		o = oil immersion	Typical inflammable gases	Max. surface temperature	
		p = pressurised	I = methane (mining only)	T1 = 450°C	
		q = powder filled	IIA = propane	T2 = 300°C	
		d = flameproof enclosure	IIB = ethylene	T3 = 200°C	
		e = increased safety	IIC = hydrogen, acetylene	T4 = 135°C	
		ia = intrinsic safety	II = no classification available	T5 = 100°C	
		ib = intrinsic safety			
		m = encapsulated		T6 = 85°C	
		n = non-sparking and restricted breathing			
		S = not covered by above but accepted explosion protected			



Reading Typical Equipment Label Markings

ATX Markings	CENELEC Markings
Ex II 1 GD T50°C	EEx ia IIC T6 (-40°C ≤ Ta ≤+40°C)

IP 67

II 1 GD T50°C EEx ia IIC T6 (-40°C ≤ Ta ≤+40°C)
II 1 GD T50°C EEx ia IIC T5 (-40°C ≤ Ta ≤+40°C)
II 1 GD T95°C EEx ia IIC T4 (-40°C ≤ Ta ≤+85°C)

CE 0600 BAS 99 ATEX 1180

600 T EN SERIES Pressure Transmitter

ATX Markings	CENELEC Markings
Ex II 2 (1) G	EEx me [ia] IIC T4

ABB
63754 Alzenau
Multibarriere/Multi Barrier MB 204-Ex

Profibus (PA) and Fieldbus Foundation (H1)
Bus: EEx e 1=4, 2=5, 3=6(s) 16,5...30V

Feld/Field: EEx ia IIC
10+, 11–, 12s, 13s >=11,7V 15mA / >=10,6V 27mA
14+, 15–, 16s, 17s >=11,7V 15mA / >=10,6V 27mA
18+, 19–, 20s, 21s >=11,7V 15mA / >=10,6V 27mA
22+, 23–, 24s, 25s >=11,7V 15mA / >=10,6V 27mA
PA,s
∑ I <= 100mA
Uo=16,28V, Io=207mA, Po=840mW, R=78,8 Ohm
For additional Details refer to ATEX Certification
PTB 00 ATEX 2064 X TA<=55°C

II 2 (1) G EEx me [ia] IIC T4
F.–Nr.:xxx
Part.–Nr.:63611 – 15xx
0102

Hazardous Area Equipment Markings ATEX – (EU Directive 94/9/EC)

CE	Ex	11	1	G	
CE Marking	EU Explosive Atmosphere Symbol	Equipment Group	Equipment Category (in presence of explosive atmosphere)	Type of explosive atmosphere	
				G = gas, vapour mist	D = dust
		I mining	MI - energised		
			M2 - de-energised		
		II non-mining	1 = very high protection	Zone 0	Zone 20
			2 = high protection	Zone 1	Zone 21
			3 = normal protection	Zone 2	Zone 22

European Environmental Protection Classification – IP System

The IP rating system for enclosures containing moving and electrical equipment is recognised in most European countries, meeting a number of British and European standards. It is usually quoted as two digits, in the form IP11.

Relevant standards to which this rating system applies include: IEC 529:1976; BS 5490:1977; DIN 40050.

IEC Enclosure Ingress Classification			
Solid Object Protection	Rating	Liquid Protection	Rating
None	0	None	0
Over 50mm dia.	1	Vertical drips	1
Over 12.5mm dia.	2	Angled drips to 15° from vertical	2
Over 2.5mm	3	Spray or rain to 15° from vertical	3
Over 1.0mm	4	Splash/spray, any angle	4
Dust limited	5	Low pressure jetting	5
Dust excluded	6	Strong jets/heavy seas	6
		Limited immersion to 1m	7
		Indefinite immersion to stated depth	8

NEMA Equivalents of IP Ratings

The NEMA and IP Ratings (IEC) differ due to the parameters measured and, to some extent, the methods used. NEMA 250 tests for external environmental conditions such as corrosion, rust, oil and coolants, which are not specified in the IEC standards (IEC 529:1997).

Note: as many of the NEMA standards meet or exceed the equivalent IP ratings, it is incorrect to use this table to determine IP equivalents of NEMA Ratings.

NEMA Enclosure Type No. Equivalent	IEC Enclosure approximation
2 - Drip tight indoor use	IP11
3 and 3S - Outdoor weather resistant to rain, sleet, ice and blown dust	IP54
3R - as 3/3S except dust	IP14
4 and 4X - Indoor/outdoor rain, ice, splashing and hosed water, blown dust. 4X - also corrosion	IP56
5 - Dust tight indoor use	IP52
6 and 6P - Outdoor/indoor, occasional limited immersion, ice	IP67
12 and 12K - Indoor, dust/falling dirt/non-corrosive liquid drips	IP52
13 - Indoor, dust, spraying water, oil and non-corrosive coolant	IP54

FISCO – Fieldbus Intrinsically Safe Concept

FISCO provides a model for easy and fast design and operation of PROFIBUS PA or FOUNDATION Fieldbus-H1 installations in hazardous areas. It was developed by ABB in conjunction with the PTB Institute in Germany and PROFIBUS International, and is also actively supported by the Fieldbus Foundation.

For further information on ABB's FISCO certified devices and on the FISCO model, please call the number below

Hazardous area benefits with FISCO
Plug and play versatility with FISCO certified devices, no new calculation when devices changed
System certification not required
Simple application expansion
Maximum choice of connecting devices
Reduced costs – no IS audit trail requirements for IS Fieldbus segments, rapid system design cuts time to start up in hazardous areas

FISCO System Requirements
Field Devices certified acc. to FISCO (EC-Type-Examination certificate) Certification institutes: e.g. PTB, BVS, KEMA, FM, CSA
Field Device Parameters Ui, Ii, Pi, must be greater than or equal to the Protecting Device Parameters Uo, Io, Po. i.e. Ui≥Uo : Ii≥Io : Pi≥Po
Field Device Capacitance Ci ≤ 5nF
Field Device Inductance L ≤ 10 mH
Bus cable to be of Type A or B with the following characteristics: Resistance 15 -> 150 Ohm/km (Loop resistance) Inductance 0.4 ... 1 mH/km Capacitance 80 ... 200 nF/km inclusive shield
Correct line terminations
Total Max. line length 1000m. PROFIBUS PA/FOUNDATION Fieldbus-H1, including spurs up to 30m.

ABB Intrinsically Safe solution features
Flexibility of connection with MultiBarrier MB 204-Ex - up to 31 PROFIBUS PA / FOUNDATION Fieldbus-H1 field devices and/or cascade connection with 16 Multi Barrier units
Rapid critical signal transmission up to 1.5M Baud with devices like ABB Sensyflow iG Transmitter
Benefits of decentralisation achieved with ABB's remote I/O families - S800 (Zone 2/ Class 1, Div.2); - S900 (Zone 1/ Class 1, Div.1)

Industrial^IT enabled

Industrial^IT is the new ABB initiative towards complete open integration of data and control communication at field device, plant and enterprise level, to maximise asset effectiveness.
User interfaces, at the control systems, are set for a revolution in the way information is made available. ABB's Industrial^IT system is at the forefront, providing the tight integration required from the field up to the higher applications of plant management and beyond. For Field^IT devices, such as pressure transmitters, this tight integration has created the requirement to ensure that all the information is available in an accessible format. The result is the Industrial^IT Enabled™ testing for compliance, of which there are four incremental levels:

Level 0	Information
Level 1	Connectivity
Level 2	Integration
Level 3	Optimisation

For simple devices, the Industrial^IT Enabled™ mark indicates that the device has all the information components to assist with optimising performance. For more complex devices a higher level of Industrial^IT Enabled™ testing ensures devices can interact with other components of the control system.

For further information on Industrial^IT and its advantages in your business please call the number below.

Fieldbus Foundation PROFIBUS

How Safe are your Safety Systems? – Safety Integrity Levels

The functional safety of Electrical, Electronic and Programmable Electronic (EEPE) safety-related systems - IEC 61508 - is primarily concerned with safety-related systems, the failure of which could have an impact on the safety of persons and/or the environment. The standard may also be used to specify EEPE systems used for the protection of equipment or products.

IEC 61508 adopts a comprehensive approach to a generic standard for EEPE systems, covering all elements of a protective system and the entire Safety Critical Loop. It is a risk-based approach that leads to the determination of Safety Integrity Levels (SILs).

These indicate the criticality of any item of process or equipment, its reliability and the failure rate that can be tolerated. They define the redundancy designed into the equipment and the testing and maintenance required. All parts of the procedures are fully documented.

The table below gives an overview of the requirements.

IEC 61508 Protective Systems – Safety Integrity Levels

	Probability of Failure on Demand	Protective System Technology	Protective Systems Design, Maintenance and Testing
SIL 1	0.1 - 0.01	Standard components, single channel or twin non-diverse channel system.	Relatively inexpensive to design, build and maintain. Test interval unlikely to be less than 3 months.
SIL 2	0.01 - 0.001	Standard components, 1 channel out of 2 or 2 channels out of 3, possible need for some diversity in the system. Allowance for common cause failures needed.	Moderately expensive to design, build and maintain. Test Interval unlikely to be greater than 3 months.
SIL 3	0.001 - 0.0001	Multiple channel system with diversity on sensing and actuation. Common cause failures a major consideration. Should rarely be required in industry.	Expensive to design, build and maintain. Test interval likely to be 1 month.
SIL 4	0.0001 - 0.00001	Specialist design. Should only be required in high hazard industries.	Extremely expensive to design, build and maintain. Test interval as for SIL 3.

For **technical advice** and further information call:
0870 600 6122

ABB

ABB Instrumentation alliance

visit us at www.abbiap.co.uk www.abb.co.uk/instrumentation

ABB Limited, Howard Road, St Neots, Cambridgeshire, PE19 8EU, UK. Tel: 0870 600 6122

WP/CERTS Issue 1 (03.04)