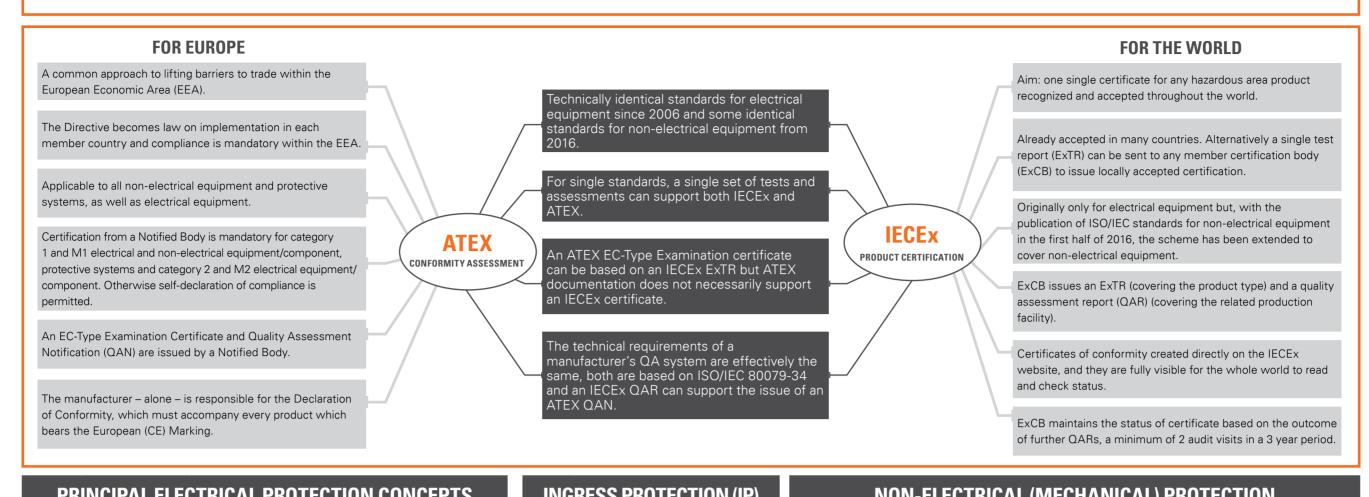
ELECTRICAL AND NON-ELECTRICAL EQUIPMENT: GUIDANCE FOR MANUFACTURERS





PRINCIPAL ELECTRICAL PROTECTION CONCEPTS							
STANDARD IEC/EN		CODE		PROTECTION CONCEPT	ZONE		
Gas	Dust	Gas	Dust		Gas	Dust	
60079-0				General requirements			
60079-1		Ex da Ex db Ex dc		Flameproof (prevention of propagation)	0 1 2		
60079-2		Ex pxb Ex pyb Ex pzc	Ex pxb Ex pyb Ex pzc	Pressurized (gas/dust exclusion)	1 1 2	21 21 22	
60079-5		Ex q		Powder filled (prevention of propagation)	1		
60079-6		Ex ob Ex oc		Oil filled (gas exclusion)	1 2		
60079-7		Ex eb Ex ec		Increased safety (by design)	1 2		
60079-11		Ex ia Ex ib Ex ic	Ex ia Ex ib Ex ic	Intrinsic safety (energy limitation)	0 1 2	20 21 22	
60079-13		pb pc	pb pc	Equipment protection by pressurized room "p" and artificially ventilated room "v" (dust and/or gas exclusion)	1 2	21 22	
		v vc			(see standard)		
60079-15		Ex nA Ex nR Ex nC		Non-sparking restricted breathing enclosed break	2		
60079-18		Ex ma Ex mb Ex mc	Ex ma Ex mb Ex mc	Encapsulation (gas and dust exclusion)	0 1 2	20 21 22	
60079-28		Ex op is Ex op pr Ex op sh	Ex op is Ex op pr Ex op sh	Protection of equipment and transmission systems using optical radiation (is: inherently safe) (pr: mechanically protected) (sh: interlock/shutdown)	0 1 1 or 2 (see standard)	20 21 21 or 22 (see standard	
	60079-31		Ex ta Ex tb Ex tc	Enclosure (dust exclusion)		20 21 22	
60079-33		Ex sa Ex sb Ex sc	Ex sa Ex sb Ex sc	Equipment protection by special protection "s"	0 1 2	20 21 22	

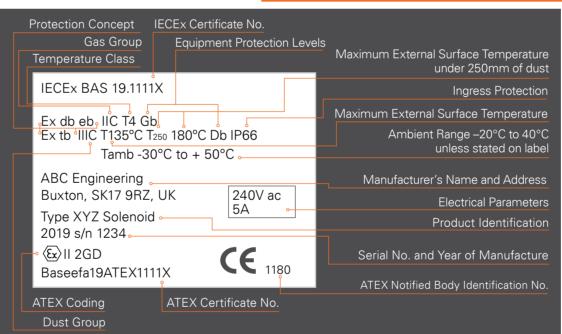
TY	PE OF PROTECTION	IP RATING	
minimur	ous area equipment typically m IP rating of IP54 but may led to the higher ratings belo	be assessed	
Dust	Dust protected	IP5x	
	Dust tight	IP6x	
Water	Protection against – splashing water	IPx4	
	Protection against – water jets	IPx5	
	Protection against – powered water jets	IPx6	
	Protection against – temporary immersion	IPx7	
	Protection against – continuous immersion	IPx8	
See IEC/E	EN 60529 for full definitions of IF	ratings.	

NON-ELECTRICAL (MECHANICAL) PROTECTION

Non-electrical products have been required to comply with the ATEX Directive since July 2003. The original (European only) standards EN 13463 series supported compliance and were published from 2001 onwards. Harmonization status (confirming that meeting the standard gives presumption of conformity with the Directive) ceases in October 2019. The current (international) standards should now be used both for the international certification to the IECEx Scheme and (in their EN version) for ATEX.

Further details of EN ISO 80079-36, EN ISO 80079-37 and ISO/IEC 80079-38 are provided on wallchart 2, along with details of:

- Design compliance and production responsibility
- Protection concepts (new and old)
- Marking requirements (new and old)
- Potential ignition sources
- Ignition hazard assessment process



ATEX CODING

⟨Ex⟩ II 2GD

I – mining II – non-mining

(*) = in presence of explosive atmosphere

EQUIPMENT CATEGORY

1 – very high protection 0

3 – normal protection 2

M1 – energized (*)

2 – high protection

EQUIPMENT GROUP

IEC 61508 – SAFETY SYSTEMS

IEC/EN 61508 is the international standard for electrical, electronic and programmable electronic safety related systems. It sets out the requirements for ensuring that systems are designed, implemented, operated and maintained to provide the required safety integrity level (SIL). Four SILs are defined according to the risks involved in the system application, with SIL4 being used to protect against the highest risks.

IEC 61508 is the base standard for EN 50495 Safety Devices for ATEX.

The standard is in seven parts:

- IEC 61508-1 General requirements
- IEC 61508-2 Requirements for E/E/PE safety-related systems
- IEC 61508-3 Software requirements
- IEC 61508-4 Definitions and abbreviations
- IEC 61508-5 Examples and methods for the determination of safety integrity levels
- IEC 61508-6 Guidelines on the application of IEC 61508-2 and IEC 61508-3
- IEC 61508-7 Overview of techniques and measures

SGS BASEEFA SERVICES

- ATEX and IECEx equipment/component
- IECEx certificate of personnel competence
- IEC 61508 certification

GAS GROUPS

GAS GROUP REPRESENTATIVE TEST GAS

Propane

Ethylene

Hydrogen

Gases are classified according to the ignitability of gas-

Refer to EN 60079-20-1 for classification of common

IIB

IIC

gases and vapours.

Methane (mining only)

- Quality system approval
- Assistance with DSEAR (ATEX user directive) implementation
- IECEx certification Technical file storage

SGS BASEEFA LIMITED

M2 – de-energized (*) 1/21 2/22

EU Explosive

atmosphere symbol

GAS DUST

20

20

21

22

0

Rockhead Business Park, Staden Lane, Buxton, SK17 9RZ tel. +44 (0)1298 766600 fax. +44 (0)1298 766601 e-mail: baseefa@sgs.com www.sgs.co.uk/sgsbaseefa

DUST GROUPS

TEMPERATURE CLASS

Combustible flyings

Non-conductive dust

Conductive dust

MAXIMUM SURFACE

TEMPERATURE

450°C

300°C

200°C

135°C

100°C

85°C

DUST GROUP

IIIB

IIIC

T CLASS

T1

T2

Т3

T4

T5

T6

- certification
- - - Testing

G=gas, D=dust, M=mining *in presence of explosive atmosphere

EQUIPMENT PROTECTION

LEVEL

ZONE

0

1

2

20

21

22

Energized*

De-energized*

Training and technical advice

EQUIPMENT

PROTECTION LEVEL

Gb

Gc

Da

Db

Dc

Ma

Mb

SGS

February 2020

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