

# Integration of Non-Electrical Standards (ISO 80079-36 & -37)

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# The TC 31/SC 31M non-electrical story

# Development of international Ex non-electrical standards

- In 2007 ISO (International Organization for Standardization) and IEC (International Electrotechnical Commission) jointly agreed to the establishment of IEC Subcommittee SC 31M within IEC TC 31 instead of establishing a separate committee in ISO.
- It was agreed that IEC SC 31M would produce IEC/ISO double logo standards as either double prefix ISO/IEC, or single prefix ISO and IEC standards.
- The first meeting of SC 31M took place on 7 November 2007.



# Development of international Ex non-electrical standards

- At a SC31M Plenary meeting in 2008 it was decided to create an Ad-Hoc Group to consider production of a standard covering Non-electrical equipment and components – Ignition hazard assessment, application of IEC 60079-0 for mechanical equipment using EN 13463-1 as a basis
- It was decided to draft the requirements for non-electrical equipment in two parts:
  - ISO 80079-36: Basic method and requirements
  - ISO 80079-37: Non electrical type of protection constructional safety 'c', control of ignition source 'b', liquid immersion 'k'
- This work was undertaken by two project teams
- The first drafts were published in 2010 and the first edition of the standards in February 2016
- ISO/IEC 80079-38 Equipment and components in explosive atmospheres in underground mines was published at the same time

# Scope of non-electrical equipment standards

ISO 80079-36 specifies:

- This part of ISO/IEC 80079 specifies the
  - the basic method and requirements for
  - design, construction, testing and marking of
  - non-electrical Ex equipment, Ex Components, protective systems, devices and assemblies of these products that have
  - their own potential ignition sources and are intended for use in explosive atmospheres.
- Hand tools and manually operated equipment without energy storage are excluded from the scope of the 80079-36 standard.

## Scope of non-electrical equipment standards

ISO 80079-36 supplements and modifies the general requirements of IEC 60079-0, as shown in Table 1 of the standard. Where a requirement of ISO 80079-36 conflicts with a requirement of IEC 60079-0, as far as applicable for non-electrical equipment, the requirement of ISO 80079-36 takes precedence.

# Scope of non-electrical equipment standards

ISO 80079-37 specifies:

- Requirements for the design and construction of non-electrical equipment, intended for use in explosive atmospheres, protected by the types of protection constructional safety “c”, control of ignition source “b” and liquid immersion “k”.
- Supplements and modifies the requirements in ISO 80079-36.
- Types of Protection “c”, “k” and “b” are not applicable for Group I, EPL Ma without additional protective precautions.
- The types of ignition protection described in the standard can be used either on their own or in combination with each other to meet the requirements for equipment of Group I, Group II, and Group III depending on the ignition hazard assessment in ISO 80079-36.



# Examples of Ex non-electrical equipment

Examples of non-electrical equipment are:

- couplings,
- pumps,
- gearboxes,
- brakes,
- hydraulic and pneumatic motors
- and any combination of devices to produce a machine, fan, engine, compressor, assemblies, etc.

# Assessment Procedure

Ignition hazard assessment procedure divided into the following steps:

1. Identification of ignition hazards (analysis of the ignition hazards and their causes),
2. Preliminary ignition hazard estimation and evaluation (estimation of the ignition hazards determined in step 1 regarding the frequency of their occurrence and comparison with the target EPL),
3. Determination of measures (determination of protective measures, if necessary, to reduce the likelihood of an ignition hazard according to step 2),
4. Finally ignition hazard estimation and categorisation (estimation of the ignition hazards regarding the frequency of occurrence after including protective measures determined in step 3),
5. Determination of the EPL, Temperature classification, Gas and Dust Group.

# Step 1: Identification of Ignition Hazards

Possible Ignition Sources	Equipment Related Yes/No	Reason
Hot surfaces	Yes	Inside and outside - Gas compression, vane friction, particle ingress
Mechanical sparks	Yes	Particles could produce hot-spots
Flames, hot gases	Outside No Inside Yes	Inside compression temperature to be measured - gas temperature directly at exhaust
Electrical sparks	No	Not present
Stray electric currents and cathodic corrosion protection	No	Not present
Static electricity	Yes	Vanes, lipseal, exhaust filter, float valve
Lightning	No	Not present
Electromagnetic waves	No	Not present
Ionising radiation	No	Not present
High frequency radiation	No	Not present
Ultrasonic	No	Not present
Adiabatic compression	Yes	Inside chamber
Chemical reaction	Yes	Possible with process fluid/gas

## Example with a non-metallic enclosure

In order to understand the process of the different steps about the assessment in accordance with ISO 80079-36 we are going to proceed with a very simple example:

- a non-metallic enclosure

# Step 1: Identification of Ignition Hazards

	1	
	Ignition hazard analysis	
	a	b
No.	Potential ignition source	Description of the basic cause (Which conditions originate the ignition hazard?)
1	electrostatic discharge	parts of non metallic material with a surface resistance exceeding 1 GΩ

# Step 2: First assessment

	1		2				
	Ignition hazard analysis		Assessment of the frequency of occurrence without application of an additional measure				
	a	b	a	b	c	d	e
No.	Potential ignition source	Description of the basic cause (Which conditions originate the ignition hazard?)	during normal operation	during expected malfunction	during rare malfunction	not relevant	Reasons for assessment
1	electrostatic discharge	parts of non metallic material with a surface resistance exceeding 1 GΩ		X			no charging during normal operation; material is an outer part of the casing; charging could be done by a person (operator)

# Step 3: Determination of protective measures

3		
Measures applied to prevent the ignition source becoming effective		
a	b	c
Description of the measure	References (standards, technical rules, experimental results known from literature)	Technical documentation (evidence including relevant features listed in column )
largest area less than 2500 mm <sup>2</sup>	ISO 80079-36, 5.7.5 c), 6.4.2 and 6.4.3	<ul style="list-style-type: none"> <li>- specifications of the material</li> <li>- (6.4.2);</li> <li>- parts list, pos. Z;</li> <li>- drawing No. Y</li> </ul>

# Step 4: Concluding estimation and categorisation (assigning EPL)

- After applying the protective measure, the categorisation (assigning EPL) has to be done as shown on the right
- If after applying the protective measures, the source of ignition remains during normal operation then the equipment can't be used in explosive atmospheres

4					
Frequency of occurrence incl. all measures					
a	b	c	d	e	f
during normal operation	during expected malfunction	during rare malfunction	No need for further consideration	resulting EPL in respect of this ignition hazard	necessary restrictions
			X	Ga Da	
		X		Gb Db	
	X			Gc Dc	
X				*	



# Marking of non-electrical Ex equipment

## Gas and dust examples from ISO 80079-36

- BEDELLE FR, = name
- AB 5 = type of equipment
- Ex h IIB T<sub>3</sub> Gb = marking according to Ex symbol, the letter “h”, equipment group II, (subgroup IIB) temperature class T<sub>3</sub>, EPL Gb
- Ex h IIIC T<sub>155</sub>°C Db = marking according to Ex symbol, the letter “h”, equipment group III, (subgroup IIIC) maximum surface temperature T<sub>155</sub>°C, EPL Db
- Ser. No. 32567 = serial number
- IECEx ABC 16.0012X = certificate number with special conditions

# Equipment assemblies

- TC 31 maintenance team PT 60079-46
- Producing Technical Specification IEC TS 60079-46  
Explosive atmospheres – Part 46: Equipment Assemblies
- Extracts from scope of early draft (CD):
  - This part of IEC 60079 specifies requirements for the design, construction, assembly, testing, initial inspection, marking, documenting and assessment of equipment assemblies for use in explosive atmospheres.
  - The requirements of this technical specification includes individual items of equipment according to the IEC 60079 series or ISO 80079 series that comprise the assembly and that have individual equipment certificates.



# The IECEx Ex non-electrical story

## Formation of IECEx ExMCWG15

- Working Group ExMC WG15 – Integration of non-electrical equipment
- Created at the Calgary, Canada, meeting in 2012.
- Terms of reference
  - The need for ExTRs
  - A proposed system /procedure for qualifying ExTLs and ExCBs, both new and existing Bodies
  - What additional expertise/tools would be necessary concerning assessment of ExTLs and ExCBs
  - Other issues as necessary

# Standards that can be used in IECEx

Now

- ISO 80079-36 Edition 1.0: Explosive atmospheres-Part 36:Non-electrical equipment for explosive Atmospheres — Basic method and requirements
- ISO 80079-37 Edition 1.0: Explosive atmospheres-Part 37:Non-electrical equipment for explosive atmospheres— Non electrical type of protection constructional safety 'c', control of ignition source 'b', liquid immersion 'k'
- ISO 16852 Edition 1: Flame arresters - Performance requirements, test methods and limits for use

In the future (once in a format suitable for certification):

- ISO/IEC 80079-38 Edition 1.0: Explosive Atmospheres - Part 38: Equipment and components in explosive atmospheres in underground mines (perhaps Edition 2)

## Documents produced for IECEx

- Revised Technical Capability Document (TCD) to include non-electrical equipment
- Draft ODxxx: Guide to certification of non-electrical equipment
- New ExTR blanks
- Interim OD005-3: IECEx Quality System Requirements for Manufacturers – Part 3: Supplementary requirements for non-electrical equipment to ISO/IEC 80079-34 Edition 1.
- Certificates of conformity – some changes mainly to remove general reference to ‘electrical’
- Training material

## Q & A

- Q: Will your non-electrical equipment have to be certified?
- A: Probably not. It depends on legislation/laws, your company policy, or tenders/contracts. For South Africa you need to consider ARP0108.
  
- Q: If you have electrical equipment certified, will IECEx require non-electrical components to be certified?
- A: No. That is optional. But the issues of 'assemblies' is being considered in TC 31 at present.
  
- Q: Is the certification of non-electrical equipment operational in IECEx?
- A: Yes. Some ExCBs already have the non-electrical standards in their scope –with more on the way. All are subjected to an on-site assessment before they are accepted. The scope of ExCBs can be checked at <http://www.iecex.com/directory/bodies/ExCB equip.asp?id=5>



## IECEX Certificate of Conformity

### INTERNATIONAL ELECTROTECHNICAL COMMISSION IEC Certification Scheme for Explosive Atmospheres

for rules and details of the IECEX Scheme visit [www.iecex.com](http://www.iecex.com)

Certificate No.: IECEX INE 16.0031X Issue No: 0 [Certificate history:](#)  
Issue No. 0 (2016-06-07)

Status: **Current** Page 1 of 3

Date of Issue: **2016-06-07**

Applicant: **DOSATRON INTERNATIONAL**  
Rue Pascal  
33370 TRESSES  
France

Equipment: **Dosing Pump type D3... and D8...**  
*Optional accessory:*

Type of Protection: **h**

Marking:  
Ex h I Ma  
Ex h IIA T6 Ga (for range D8...)  
Ex h IIB T6 Ga (for range D3...)  
Ex h IIIC T85°C Da

Approved for issue on behalf of the IECEX Certification Body: Thierry HOUEIX

Position: Ex Certification Officer

Signature:  
(for printed version)

Date:

1. This certificate and schedule may only be reproduced in full.
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France

Non-electrical Ex certificate



## Conclusion

- The IECEx Certified Equipment Scheme is a tool that can be used to demonstrate compliance with international Ex standards
- This now includes non-electrical standards
- The Scheme is not legislation/law
- So in general now you have the option of using it to demonstrate your equipment complies with the relevant non-electrical international standards