

4 June 2003

UPDATE ON IEC STANDARDS FROM TC 31 (Ex) AND TC 70 (INGRESS PROTECTION)

1. TC 31: Electrical apparatus for explosive atmospheres

1.1 Standards issued IEC 60079-0 Edition 3.1

IEC 60079-2 Edition 4.0
 IEC 60079-4 Edition 2.0
 IEC 60079-4A Edition 2.0
 IEC 60079-5 Edition 2.0
 IEC 60079-6 Edition 2.0
 IEC 60079-7 Edition 2.2
 IEC 60079-12 Edition 1.0
 IEC 60079-13 Edition 1.0
 IEC 60079-15 Edition 2.0
 IEC 60079-16 Edition 1.0
 IEC 60079-18 Edition 1.0
 IEC 60079-20 Edition 1.0
 IEC 62013-1 Edition 1.0
 IEC 62013-2 Edition 1.0
 IEC 62086-1 Edition 1.0
 IEC 62086-2 Edition 1.0

1.2 IEC 60079-0: General requirements Edition 4.0 has been approved for publication as a FDIS in March 2003. The changes are:

- ◆ Standard atmospheric conditions re-introduced.
- ◆ All requirements for third party certification removed from document.
- ◆ New type of protection n introduced.
- ◆ New apparatus standards for caplights, intrinsically safe systems, Zone 0 apparatus, and trace heating introduced.
- ◆ Clarification of the status of symbol “s”.
- ◆ Definitions for symbols “U” and “X” revised to align with current usage.
- ◆ Definition for Ex component transferred from IEC 60079-18.
- ◆ New definitions drafted for “energy limited” parameters to allow common usage by types of protection “i” and “n”.
- ◆ New definitions for batteries transferred from IEC 60079-7.
- ◆ Definition added for ambient temperature.
- ◆ Definition added for Continuous Operating Temperature (COT).
- ◆ Definition for Certificate transferred from IEC 60079-15 and revised based on ISO/IEC 17000.
- ◆ Definition added for cable gland.
- ◆ Clause 5 for temperature re-written to address the influences of ambient temperature, internal sources of heat, and external sources of heating or cooling.
- ◆ Transferred small component ignition test from IEC 60079-11 and IEC 60079-15.
- ◆ Requirements for bonding transferred from IEC 60079-7 and IEC 60079-15.
- ◆ Requirements for gasket retention transferred from IEC 60079-15 for wider applicability.
- ◆ Relative Thermal Index (RTI) added as an alternative to Thermal Index (TI).

- ◆ Transferred and rationalized electrostatic requirements from IEC 60079-15 and IEC 60079-26 to apply to all of Group I and Group II.
- ◆ Introduced two additional test methods to evaluate the use of non-metallic materials with respect to the storage of electrostatic charges.
- ◆ Transferred and rationalized the light metal requirements from IEC 60079-15 and IEC 60079-26 to apply to all of Group I and Group II.
- ◆ Introduced an existing test to evaluate the use of a non-metallic enclosure wall in an earth bonding connection.
- ◆ Clause 16 rewritten to align with industry usage of the terms cable gland and conduit entry.
- ◆ Equipotential bonding requirements for machines transferred from IEC 60079-7 and IEC 60079-15.
- ◆ Requirement for disconnectors in switchgear and luminaires revised to provide IP20 protection for live parts and include additional marking.
- ◆ Transferred general requirements for cells and batteries from IEC 60079-7 and IEC 60079-15.
- ◆ Impact test revised to specify drop height in lieu of energy.
- ◆ Clarified application of 5K and 10K temperature margins to type tested samples.
- ◆ Clarified order of tests for metallic materials.
- ◆ Clarified number of samples and order of tests for non-metallic materials.
- ◆ Clarified order of marking.
- ◆ Clarified marking details for associated apparatus.
- ◆ Clarified marking of specific gases.
- ◆ Clarified marking of temperature class.
- ◆ Clarified usage of compulsory certificate number.
- ◆ Clarified marking of small apparatus.
- ◆ Compiled all warning markings into a table.
- ◆ Clarified marking examples.
- ◆ Added clause on instructions.
- ◆ Deleted Annex A as information is available in more appropriate standards (IEC 60079-20).
- ◆ Revised and clarified Annex A (Previously B) to accommodate term cable gland.

1.3 IEC 60079-2: Pressurized enclosures “p” Approved as standard during 2001. Some features are:

- ◆ Three protection types (px, py and pz) are defined to make provision for (a) the external potentially explosive atmosphere (Group I, Zone 1, Zone 2); (b) internal release of flammable substance; and (c) the presence of ignition-capable apparatus within the pressurized enclosure
 - ◆ The general constructional requirements are expanded and cover the enclosure and ducting mechanical strength, chemical resistance, fasteners, layout to ensure effective purging, sealing and spark/particle barriers.
- ◆ Specific safety devices (pressure sensors etc) are specified.
- ◆ The design and operation of the pressurization system is specified in detail.
- ◆ The concept of static pressurization (no leakage) is highlighted.
- ◆ The constructional requirements for pressurized apparatus with an internal source of release of flammable material are expanded.

- ◆ Several type tests and routine tests are added.

Local SABS IEC 60079-2:2001 has been approved as a national standard in September 2001.

- 1.4 IEC 60079-5: Sand-filled apparatus Ed 2.0 Amendment 1 has been circulated as a CDV with closing date for voting 9 May 2003. The amendment entails removal of the dates from the normative references and updating of the ones that require dating. It also removes 5.1.4 from the type tests, as this is a routine test only.
- 1.5 IEC 60079-6: Oil-immersed apparatus Ed 2.0 has been reconfirmed on 22 March 2002. The next review will take place in 2004.
- 1.6 IEC 60079-7: Increased safety apparatus Ed 2.2 Approved as standard. The main changes compared to the previous edition are
 - ◆ Examination of cage rotor machines for air gap sparking.
 - ◆ Requirements for converter-fed rotating machines are included.

- ◆ Requirements for rotating machine windings are included.
- ◆ Requirements for equipotential bonding conductors between separate enclosures of rotating machines are included.
- ◆ Shaft seals of rotating machines must be of material that does not spark when rubbing.
- ◆ Assessment and testing requirements for high voltage rotating machines are included.
- ◆ The requirements for lampholders and lampcaps are considerably expanded and include requirements for fluorescent bi-pin lamps.
 - ◆ Extensive requirements for primary and secondary batteries with capacity up to 25 Ah are included.

Note It is not clear from either IEC 60079-7 or -0 if these requirements have to apply to all such batteries or only to such batteries that have to comply with the Ex e technique. The implication of Clause 5.7.2.8 is that open-type, valve regulated and sealed gas-tight cells without safety devices should not be used with Ex d or Ex i apparatus. (The same uncertainty exists in the case of secondary batteries with capacity greater than 25 Ah.) This issue must be cleared up.
- ◆ For general purpose junction boxes, the method is detailed to determine the rated maximum dissipated power or the number and size of conductors and current for each terminal size
- ◆ An interturn over voltage test for current transformers is included as a routine test (ie to be conducted by the manufacturer).

Local **SABS IEC 60079-7:2001** has been accepted as a standard.

- 1.7 IEC 60079-15: Type of protection “n” (Edition 2) Approved as standard during 2001. Work on Edition 3.0 has commenced during 2002.

Some features are:

- ◆ Definitions brought in line with IEC 60079-0.
- ◆ “N-pressurization” concept has been removed.
Note – Covered by IEC 60079-2.
- ◆ Possible precautions included that can be taken to prevent circulating currents caused by stray magnetic fields.
- ◆ Thermal shock test for glass parts of enclosures included.
- ◆ Motors operated with frequency converters or a non-sinusoidal supply to be type tested as a system, to ensure meeting of temperature limits as well as functionality over operational speed range. For convertor-fed, form-wound motors rated 1 kV and above, the convertor shall be designed to limit the peak voltage-to-earth to two times the rated line-to-line voltage and the du/dt to $1\text{ kV}/\mu\text{s}$, or less.
- ◆ Electronic starters and ignitors which cause high-voltage stress the windings of ballasts of fluorescent luminaries shall be of the cut-out type. The cut-out device shall operate to limit the total period when the ballast is stressed to 15 minutes after any energization. Tests associated with high-voltage stress have been removed.
- ◆ Electrical apparatus having a maximum surface temperature greater than 450°C , shall bear only the inscription of the temperature (not a T-class).

Local **SABS IEC 60079-15:2001** has been approved as a national standard in August 2001.

- 1.8 IEC 60079-18: Encapsulated apparatus Ed 2.0 has been circulated as a CDV, closing date for comments 6 December 2002. The comments have been discussed at the next meeting of the MT17 in April 2003 in Dubrovnic.

- 1.9 IEC 60079-26: Special requirements for construction, test and marking of electrical apparatus for use in zone 0 Has been circulated as a CDV, closing date for voting 7 February 2003. The comments will be discussed at the next meeting of the MT17 (to be arranged). The main protection methods proposed are

- ◆ Intrinsically safe category “ia” equipment
- ◆ Encapsulated “ma” equipment
- ◆ Two independent standardized types of protection suitable for Zone 1 (eg Ex d and Ex e) applied simultaneously in such a way that both give their full protection (eg measuring transducer with Ex ib circuit and Ex d enclosure)
- ◆ For apparatus installed across a boundary wall to Zone 0, one independent standardized types of protection suitable for Zone 1 (eg Ex d, Ex e) plus a separation element (eg measuring transducer with a 0,5 mm separation wall and Ex ib circuitry on the less hazardous side of the partition)

No ignition of the explosive atmosphere by means of other non-electrical potential sources of ignition (eg ultrasonic, optical or ionizing radiation) must be possible.

Electrical connections and permanently connected cables of the apparatus sited within zone 0 shall comply with the same level of protection required by this International Standard, e.g. an Ex “e” cable additionally protected by a flameproof conduit or an Ex “e” cable provided with an electronic leakage control.

Detailed cable and installation requirements for non-intrinsically safe circuits in zone 0 will be published in IEC 60079-14.

Because of ignition hazards that can arise from faults and/or transient circulating currents in the potential equalization system, galvanic isolation in the power and signal connections to the apparatus is preferred. Consideration should also be given to minimize the effect of transient fault currents in the potential equalization network by the use of electrical protection equipment such as sensitive earth leakage monitors.

- 1.10 IEC 62013-1: Caplights for use in mines susceptible to fire damp, Part 1: General requirements. Construction and testing in relation to the risk of explosion. Has been approved as standard.

IEC 62013-2: Caplights for use in mines susceptible to fire damp, Part 2: Performance and other related matters. Has been approved as standard.

Local SABS 1438 Parts 1 to 5 differ from the IEC standards; for example, the battery is not fully intrinsically safe. On the other hand, better mechanical protection is required. The relationship between the national and IEC standards has to be reconsidered in view of (a) the many intrinsically safe devices coming on the market that use the cap lamp battery as a power source, and (b) the need for certain caplights to remain energised in the presence of increased levels of flammable gas (≡ ATEX category M1).

This is currently an Emerging Need of TC 65.

- 1.11 IEC 62086-1: Electrical resistance heating in potentially explosive atmospheres, Part 1: General requirements Has been reaffirmed until 2004. The main features are:

- ◆ The trace heater must comply with one of the standardized Ex techniques
- ◆ Circuit protection, including an isolation device, earth fault protection, over-current protection

- ◆ Temperature limitation by means of a temperature control/protection device or a stabilised design

IEC 62086-2: Application guide for design, installation and maintenance Has been approved as a standard.

Local Both standards will be published as national standards.

- 1.12 IEC 60079-28, Ed.1: Electrical apparatus for explosive atmospheres Part 28: Risk of ignition by radiation of explosive atmospheres of gas, vapour or mist from optical radiation equipment and transmission systems has been accepted on 14 February 2003 as a NP.

This Standard explains the potential ignition hazard from equipment using optical radiation, intended for use in explosive gas atmospheres. It covers also equipment, which itself is located outside but its emitted optical radiation enters such atmospheres. It describes precautions and requirements that must be taken when using optical radiation transmitting equipment in explosive gas atmospheres. It also outlines a test method that can be used to determine ignition capability in special cases, if the optical limit values can not be guaranteed by assessment or measurement.

- 1.13 General An ad hoc Working Group is investigating the possibility of applying risk assessment to Ex apparatus.

A NP has been issued in October 2001 for a standard for automatic electrostatic equipment for flammable flock material.

A NP has been issued In October 2001 for a standard on special requirements for equipment intended to remain functional in atmospheres endangered by firedamp and/or coal dust (based on EN 50303 for Group I, Category M1 equipment).

2. SC 31A: Flameproof apparatus

- 2.1 Standards issued IEC 60079-1 Edition 4.0
IEC 60079-1A Edition 3.0

- 2.2 IEC 60079-1: Flameproof enclosures “d” Edition 4 of this document has been approved as a standard. It includes breathing and draining devices supplied as separate components.

A Maintenance Team is being composed to review IEC 60079-1 (for edition 5).

Local **SABS** IEC 60079-1 Ed 2 has been published as a national standard.

- 2.3 IEC 60079-1A: Construction and verification test of flameproof enclosures of electrical apparatus – First supplement: Appendix D: Method of test for ascertainment of maximum experimental safe gap (Edition 3) An amendment has been circulated as a CDV, next stage February 2002.

3. SC 31G: Intrinsically safe apparatus

- Standards issued IEC 60079-11 Edition 4.0
IEC 60079-27, TS: Electrical apparatus for explosive gas atmospheres-
Part 27 : FISCO

IEC 60079-25: Intrinsically safe systems Ed 1.0 has been registered as an FDIS on 26 July 2002.

WG2 is investigating ignition data.

Requirements for non-linear power supplies have been compiled and will be included in the next amendment of IEC 60079-11.

Comments have been requested on IEC 60079-11 Edition 4.0.

4. SC 31H: Apparatus for use in combustible dusts

Standards issued IEC 61241-1-1 Edition 2.0
 IEC 61241-1-2 Edition 2.0
 IEC 61241-2-1 Edition 1.0
 IEC 61241-2-2 Edition 1.0
 IEC 61241-2-3 Edition 1.0
 IEC 61241-3 Edition 1.0
 IEC 61241-4 Edition 1.0

The following renumbering of dust standards have been proposed by WG3 of SC31H:

Number of Current Standard	Proposed New Number	Subject	Anticipated Date of Change
IEC 61241-1-1	IEC 61241-0	General Requirements	2003
	IEC 61241-1	Protection by enclosure	2003
IEC 61241-1-2	IEC 61241-14	Selection & Installation	2003
IEC 61241-2-1	IEC 61241-20-1	Test Methods	2005
IEC 61241-2-2	IEC 61241-20-2	Test Methods	2005
IEC 61241-2-3	IEC 61241-20-3	Test Methods	2005
IEC 61241-3	IEC 61241-10	Classification	2003
IEC 61241-4	IEC 61241-2	Protection by pressurization	2005
	IEC 61241-11	Protection by intrinsic safety	2002
	IEC 61241-18	Protection by encapsulation	2004
	IEC 61241-17	Inspection & Maintenance	?
	IEC 61241-19	Repair & Overhaul	?

Note Standards numbered below with the Proposed New Number are marked with a *.

IEC 61241-0*: General requirements Ed 1.0 has been approved for circulation as a FDIS on 31 January 2003.

IEC 61241-1*: Electrical apparatus for use in the presence of combustible dust - Part 1: Protection by enclosures "tD" Ed 1.0 has been approved for circulation as a FDIS on 31 January 2003.

Note: Formerly DIP.

IEC 61241-10*: Electrical apparatus for use in the presence of combustible dust - Part 10:

Classification of areas where combustible dusts are or may be present Ed 1.0 has been approved for circulation as a FDIS on 4 March 2003.

IEC 61241-11*: Intrinsically safe apparatus "iD" Ed 1.0 has been circulated as a NP with closing date for voting 9 May 2003. The following principles are to be followed:

- ◆ The electronic circuits must fulfill Group IIB requirements according to 60079-11 to avoid spark ignition.
- ◆ IP 6x or encapsulation is normally required to ensure that creepage and clearance distances are not compromised by dusts. Therefore the importance and the durability of the integrity of the enclosure or encapsulation are much higher than required by IEC 60079-11.
- ◆ Power limitation for apparatus or parts of apparatus not protected by an enclosure or encapsulation (eg uninsulated sensor) to avoid ignition of a dust layer by power dissipation directly into the dust (power matching by conductive dusts) and to avoid thermal ignition at the surface of components.
- ◆ Limitation of the temperature of all exposed surfaces of all apparatus or parts of apparatus exceeding the power limitation limits in accordance to 61241-0. The surface can be the surface of the enclosure or of the encapsulation.

IEC 61241-14*: Electrical apparatus for use in the presence of combustible dust - Part 14: Selection and installation Ed 1.0 has been approved for circulation as a FDIS on 31 January 2003.

IEC 61241-17*: Electrical apparatus for use in the presence of combustible dust atmospheres- Part 17: Inspection and maintenance Ed 1.0 has been approved for circulation as a CDV on 31 January 2003.

Some features are:

- ◆ checklists for pD, iD and mD apparatus
- ◆ comprehensive description of inspector competence
- ◆ inclusion of earthing resistance requirements.

IEC 61241-18*: Electrical apparatus for use in the presence of combustible dust atmospheres- Part 18: Protection by encapsulation "mD" Ed 1.0 will be registered as an FDIS by June 2003.

IEC 61241-19*, Ed.1: Electrical apparatus for use in the presence of combustible dust - Part 19: Repair and Overhaul of electrical apparatus for combustible dust areas has been circulated as a NP with closing date for voting 13 June 2003.

Some features are:

- ◆ Covers tD, pD, iD and mD.
- ◆ Repair workshops: All explosion-protected (Ex) apparatus for use in an explosive atmosphere shall only be repaired or overhauled by a workshop that is verified for the particular explosion-protection technique applicable to that piece of Ex apparatus.
- ◆ Prior to any repairs, modifications or overhauls, the original certificate and/or approval documentation should be obtained to identify the type of protection used, e.g. 'Ex tD', 'Ex pD' etc., and the appropriate installation and maintenance requirements to ensure that following repair, overhaul or modification, such apparatus is safe and fit for the purpose. In all cases reference shall be made to the original certificate and approval documentation.

Where the certificate documentation is not available from the original apparatus manufacturer, supplier, end user or relevant regulatory authority, Ex pD and Ex tD can be repaired if a competent person is employed, using the current standard as guideline.

◆ “Competent person” clearly defined.

◆ Tests: Ex pD pressure test. Ex tD IP test (if certification documentation not available).

◆ Examples of typical Overhaul and Examination Reports.

5. SC 31J: Area classification and installation of electrical apparatus

<u>Standards issued</u>	IEC 60079-10 Edition 4.0
	IEC 60079-14 Edition 3.0
	IEC 60079-17 Edition 3.0
	IEC 60079-19 Edition 1.0

IEC 60079-10: Classification of hazardous locations Edition 4 has been circulated as a CDV, as well as the comments received. It expands the concepts further that were given in Edition 3. The amended standard has been approved as a standard on 3 May 2002.

IEC 60079-14: Electrical installations in hazardous areas (other than mines) Ed 3.0 has been approved as a standard. The main changes are:

- ◆ Conduit connected to flameproof enclosures must have a stopper box right at the enclosure.
- ◆ The presence of personal electric apparatus (excluding wristwatches) in a hazardous location is prohibited.
- ◆ Provision is made for circuits involving energy-limited non-sparking apparatus.

Local SANS 60079-14 Ed 3.0 is being adopted as a standard.

IEC 60079-17: Inspection and maintenance of electrical installations in hazardous areas (other than mines) has been amended to include the concept of “continuous supervision”. Continuous supervision will give the same safety as Periodical Inspections (visual or close) and can be conducted by skilled production personnel. The amended standard has been approved on 14 June 2002.

Local SANS 60079-17 Ed 3.0 is being adopted as a standard.

6. SC 31L: Gas detectors

<u>Standards issued</u>	IEC 61779-1 to -6 Edition 1.0
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IEC 61779-1 to 6 to be reviewed by Maintenance Team starting 2001.

Local SABS IEC 61779-6: Electrical apparatus for the detection and measurement of flammable gas, Part 6 – Guide for the selection, installation, use and maintenance of apparatus for the detection and measurement of flammable gases, was adopted by SC 65A.

SABS 1515-1: Flammable-gas measuring instruments and warning devices primarily for use in mines, Part 1: Battery operated portable instruments and devices, covers Parts 1 to 5 of the IEC 61779 series for Group I gas detectors. This document, which deviates from the IEC 61779 series in

