### (PREVIEW)

# Indian Standard EXPLOSIVE ATMOSPHERES

## PART 11 EQUIPMENT PROTECTION BY INTRINSIC SAFETY "7"

#### 1 Scope

This part of IEC 60079 specifies the construction and testing of intrinsically safe apparatus intended for use in an explosive gas atmosphere and for associated apparatus, which is intended for connection to intrinsically safe circuits which enter such atmospheres.

This type of protection is applicable to electrical apparatus in which the electrical circuits themselves are incapable *of* causing an explosion in the surrounding explosive atmospheres.

This standard is also applicable to electrical apparatus or parts of electrical apparatus located outside the explosive gas atmosphere or protected by another type of protection listed in IEC 60079-0, where the intrinsic safety of the electrical circuits in the explosive gas atmosphere may depend upon the design and construction of such electrical apparatus or parts of such electrical apparatus. The electrical circuits exposed to the explosive gas atmosphere are evaluated for use in such an atmosphere by applying this standard.

The requirements for intrinsically safe systems are provided in IEC 60079-25. The requirements for intrinsically safe concepts for fieldbus are provided in IEC 60079-27.

This standard supplements and modifies the general requirements of IEC 60079-0, except as indicated in Table 1. Where a requirement of this standard conflicts with a requirement of IEC 60079-0, the requirements of this standard shall take precedence.

If associated apparatus is placed in the explosive gas atmosphere, it must be protected by an appropriate type of protection listed in IEC 60079-0, and then the requirements of that method of protection together with the relevant parts of IEC 60079-0 also apply to the associated apparatus.

Table 1- Exclusion of specific clauses of IEC 60079-0

Clause or subclause of IEC 60079-0		Intrinsically safe apparatus	Associated apparatus
4.2.2	Group II - Surface temperature marking	Applies	Excluded
5.3	Maximum surface temperature	Applies	Excluded
5.4	Surface temperature and ignition temperature	Applies	Excluded
5.5	Small components	Applies	Excluded
6.3	Opening times	Excluded	Excluded
7.1.1	Applicability	Applies	Excluded
7.1.2	Specification of materials	Applies	Excluded

7.1.3         Plastic materials         Excluded           7.2         Thermal endurance         Excluded           7.3         Electrostatic charges on external nonmetallic materials of enclosures           7.3.2         Avoidance of a build-up electrostatic charge           7.4         Threaded holes         Excluded           8.1         Material composition         Excluded           8.2         Threaded holes         Excluded           9         Fasteners         Excluded           10         Interlocking devices         Excluded           11         Bushings         Excluded           12         Materials used far cementing         Excluded           14         Connection facilities and terminal compartments         Excluded           15         Connection facilities for earthing or Excluded compartments         Excluded           16.5         Conductor temperature         Excluded           17         Supplementary requirements for rotating electrical machines         Excluded           18         Supplementary requirements for fuses         Excluded           20         Supplementary requirements for Excluded plugs and sockets         Excluded           21         Supplementary requirements for Excluded caplights and handlights         Excluded <th>Excluded</th>	Excluded
7.3. Electrostatic charges on external nonmetallic materials of enclosures 7.3.2 Avoidance of a build-up electrostatic charge 7.4 Threaded holes Excluded 8.1 Material composition Excluded 8.2 Threaded holes Excluded 9 Fasteners Excluded 10 Interlocking devices Excluded 11 Bushings Excluded 12 Materials used far cementing Excluded 13 Connection facilities and terminal compartments 14 Connection facilities for earthing or bonding conductors 15 Conductor temperature Excluded 16.5 Conductor temperature Excluded 17 Supplementary requirements for switchgear 18 Supplementary requirements for Excluded switchgear 19 Supplementary requirements for Excluded fuses 20 Supplementary requirements for Excluded luminaires 21 Supplementary requirements for Excluded caplights and handlights 23.1 Batteries Applies 26.4 Tests of enclosures Applies 26.5.2 Thermal shock test Applies 26.5.3 Small component ignition test Applies 26.6 Torque test for bushings Excluded 26.7* Non-metallic parts of enclosures 26.8 Thermal endurance to cold Excluded 26.9* Thermal endurance to cold Excluded 26.11* Resistance to chemical agents for Excluded	Excluded
metallic materials of enclosures  Avoidance of a build-up electrostatic charge  7.4 Threaded holes  8.1 Material composition  8.2 Threaded holes  8.2 Excluded  8.2 Threaded holes  9 Fasteners  10 Interlocking devices  11 Bushings  12 Materials used far cementing  14 Connection facilities and terminal compartments  15 Connection facilities for earthing or bonding conductors  16.5 Conductor temperature  17 Supplementary requirements for requirements for switchgear  18 Supplementary requirements for switchgear  19 Supplementary requirements for Excluded fuses  20 Supplementary requirements for Excluded plugs and sockets  21 Supplementary requirements for Excluded luminaires  22 Supplementary requirements for Excluded caplights and handlights  23.1 Batteries  24.4 Tests of enclosures  26.5.2 Thermal shock test  26.5.3 Small component ignition test  26.6.6 Torque test for bushings  26.6.7 Non-metallic parts of enclosures  26.8 Thermal endurance to cold  26.9* Thermal endurance to cold  Resistance to chemical agents for Excluded  26.11* Resistance to chemical agents for Excluded  Resistance to chemical agents for Excluded	Excluded
charge 7.4 Threaded holes 8.1 Material composition 8.2 Threaded holes 9 Fasteners 10 Interlocking devices 11 Bushings 12 Materials used far cementing 13 Excluded 14 Connection facilities and terminal compartments 15 Connection facilities for earthing or bonding conductors 16.5 Conductor temperature 17 Supplementary requirements for fuses 18 Supplementary requirements for switchgear 19 Supplementary requirements for fuses 20 Supplementary requirements for fuses 21 Supplementary requirements for Excluded luminaires 22 Supplementary requirements for Excluded caplights and handlights 23.1 Batteries 26.4 Tests of enclosures 26.5.2 Thermal shock test 26.5.3 Small component ignition test 26.6.7 Torque test for bushings 26.8 Thermal endurance to cold 26.9* Thermal endurance to cold 26.11* Resistance to light 28. Resistance to chemical agents for Excluded 28. Excluded 28. Excluded 28. Excluded 28. Excluded 28. Excluded 29. Excluded 20. Excluded	Excluded
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Interlocking devices	Excluded
11   Bushings   Excluded     12   Materials used far cementing   Excluded     14   Connection facilities and terminal compartments     15   Connection facilities for earthing or bonding conductors     16.5   Conductor temperature   Excluded     17   Supplementary requirements for rotating electrical machines     18   Supplementary requirements for switchgear     19   Supplementary requirements for fuses     20   Supplementary requirements for plugs and sockets     21   Supplementary requirements for luminaires     22   Supplementary requirements for caplights and handlights     23.1   Batteries   Applies     26.4   Tests of enclosures   Applies     26.5.1   Temperature measurement   Applies     26.5.2   Thermal shock test   Applies     26.5.3   Small component ignition test   Applies     26.6   Torque test for bushings   Excluded     26.7*   Non-metallic enclosures   Caplies     26.8*   Thermal endurance to cold   Excluded     26.10*   Resistance to light   Excluded     26.11*   Resistance to chemical agents for Group I electrical apparatus	Excluded
Materials used far cementing	Excluded
Connection facilities and terminal compartments	Excluded
Connection facilities for earthing or bonding conductors   Excluded	Excluded
bonding conductors  16.5 Conductor temperature Excluded  17 Supplementary requirements for cotating electrical machines  18 Supplementary requirements for switchgear  19 Supplementary requirements for fuses  20 Supplementary requirements for plugs and sockets  21 Supplementary requirements for luminaires  22 Supplementary requirements for excluded luminaires  23.1 Batteries Applies  26.4 Tests of enclosures Applies  26.5.1 Temperature measurement Applies  26.5.2 Thermal shock test Applies  26.6 Torque test for bushings Excluded  26.7* Non-metallic enclosures or non-metallic parts of enclosures  26.8* Thermal endurance to heat Excluded  26.10* Resistance to chemical agents for Group I electrical apparatus	Excluded
Supplementary requirements for rotating electrical machines  Supplementary requirements for switchgear  Supplementary requirements for fuses  Supplementary requirements for fuses  Supplementary requirements for plugs and sockets  Supplementary requirements for luminaires  Supplementary requirements for excluded exaplights and handlights  Applies  Ap	Excluded
rotating electrical machines  Supplementary requirements for switchgear  19 Supplementary requirements for fuses  20 Supplementary requirements for plugs and sockets  21 Supplementary requirements for luminaires  22 Supplementary requirements for caplights and handlights  23.1 Batteries  26.4 Tests of enclosures  26.5.1 Temperature measurement  26.5.2 Thermal shock test  26.5.3 Small component ignition test  26.6 Torque test for bushings  26.7* Non-metallic enclosures  26.8* Thermal endurance to cold  26.9* Thermal endurance to cold  26.11* Resistance to chemical agents for Group I electrical apparatus	Excluded
Switchgear  Supplementary requirements for fuses  Supplementary requirements for plugs and sockets  Supplementary requirements for luminaires  Supplementary requirements for Excluded luminaires  Supplementary requirements for Excluded caplights and handlights  Applies  App	Excluded
fuses  Supplementary requirements for plugs and sockets  Supplementary requirements for luminaires  Supplementary requirements for caplights and handlights  Supplementary requirements for caplights and handlights  Applies  23.1 Batteries Applies  26.4 Tests of enclosures Applies  26.5.1 Temperature measurement Applies  26.5.2 Thermal shock test Applies  26.5.3 Small component ignition test Applies  26.6 Torque test for bushings Excluded  26.7* Non-metallic enclosures or non-metallic parts of enclosures  26.8 Thermal endurance to heat Excluded  26.9* Thermal endurance to cold Excluded  26.10* Resistance to chemical agents for Group I electrical apparatus	Excluded
plugs and sockets  21 Supplementary requirements for luminaires  22 Supplementary requirements for caplights and handlights  23.1 Batteries Applies  26.4 Tests of enclosures Applies  26.5.1 Temperature measurement Applies  26.5.2 Thermal shock test Applies  26.5.3 Small component ignition test Applies  26.6 Torque test for bushings Excluded  26.7* Non-metallic enclosures or nonmetallic parts of enclosures  26.8 * Thermal endurance to heat Excluded  26.9* Thermal endurance to cold Excluded  26.10* Resistance to light Excluded  26.11* Resistance to chemical agents for Group I electrical apparatus	Excluded
Luminaires   Luminaires	Excluded
caplights and handlights  23.1 Batteries Applies  26.4 Tests of enclosures Applies  26.5.1 Temperature measurement Applies  26.5.2 Thermal shock test Applies  26.5.3 Small component ignition test Applies  26.6 Torque test for bushings Excluded  26.7* Non-metallic enclosures or nonmetallic parts of enclosures  26.8* Thermal endurance to heat Excluded  26.9* Thermal endurance to cold Excluded  26.10* Resistance to light Excluded  26.11* Resistance to chemical agents for Group I electrical apparatus	Excluded
23.1 Batteries Applies 26.4 Tests of enclosures Applies 26.5.1 Temperature measurement Applies 26.5.2 Thermal shock test Applies 26.5.3 Small component ignition test Applies 26.6 Torque test for bushings Excluded 26.7* Non-metallic enclosures or nonmetallic parts of enclosures 26.8 * Thermal endurance to heat Excluded 26.9* Thermal endurance to cold Excluded 26.10* Resistance to light Excluded 26.11* Resistance to chemical agents for Group I electrical apparatus	Excluded
26.5.1 Temperature measurement Applies 26.5.2 Thermal shock test Applies 26.5.3 Small component ignition test Applies 26.6 Torque test for bushings Excluded 26.7* Non-metallic enclosures or nonmetallic parts of enclosures 26.8 * Thermal endurance to heat Excluded 26.9* Thermal endurance to cold Excluded 26.10* Resistance to light Excluded 26.11* Resistance to chemical agents for Group I electrical apparatus	Excluded
26.5.2 Thermal shock test Applies 26.5.3 Small component ignition test Applies 26.6 Torque test for bushings Excluded 26.7* Non-metallic enclosures or non-metallic parts of enclosures 26.8 * Thermal endurance to heat Excluded 26.9* Thermal endurance to cold Excluded 26.10* Resistance to light Excluded 26.11* Resistance to chemical agents for Group I electrical apparatus	Excluded
26.5.3 Small component ignition test Applies 26.6 Torque test for bushings Excluded 26.7* Non-metallic enclosures or non-metallic parts of enclosures 26.8* Thermal endurance to heat Excluded 26.9* Thermal endurance to cold Excluded 26.10* Resistance to light Excluded 26.11* Resistance to chemical agents for Group I electrical apparatus	Excluded
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26.7* Non-metallic enclosures or non-metallic parts of enclosures  26.8* Thermal endurance to heat Excluded  26.9* Thermal endurance to cold Excluded  26.10* Resistance to light Excluded  26.11* Resistance to chemical agents for Group I electrical apparatus	Excluded
metallic parts of enclosures  26.8 * Thermal endurance to heat Excluded  26.9 * Thermal endurance to cold Excluded  26.10 * Resistance to light Excluded  26.11 * Resistance to chemical agents for Group I electrical apparatus	Excluded
26.9* Thermal endurance to cold Excluded 26.10* Resistance to light Excluded 26.11* Resistance to chemical agents for Group I electrical apparatus	Excluded
26.10* Resistance to light Excluded 26.11* Resistance to chemical agents for Group I electrical apparatus	Excluded
26.11* Resistance to chemical agents for Excluded Group I electrical apparatus	Excluded
Group I electrical apparatus	Excluded
	Excluded
26.12 Earth continuity Excluded	Excluded
26.13 Surface resistance test of parts of Applies	Excluded
enclosures or non-metallic materials	
26.14 Charging tests Applies	Excluded
26.15 Measurement of capacitance Applies	Excluded
Annex A Ex cable glands Excluded	Excluded

<sup>\*</sup> indicates that these requirements apply for 6.1 2a) only.

#### 2 Normative references

The following normative documents constitute provisions of this part of contain provisions which, through reference in this text, constitute provisions of this part of contain provisions which, through reference in this text, IEC 60079. For dated references, only the edition cited applies, For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60079-0:2004, Electrical apparatus for explosive gas atmospheres - Part 0: General requirements

IEC 60079-7, Explosive atmospheres – Part 7: Equipment protection by increased safety "e"

IEC 60079-25, Electrical apparatus for explosive gas atmospheres – Part 25: Intrinsically safe systems

IEC 60079-27, Electrical apparatus for explosive gas atmospheres – Part 27: Fieldbus intrinsically safe concept (FISCO) and Fieldbus non-incendive concept (FNICO)

IEC 60085, Electrical insulation – Thermal classification

IEC 60112, Method for the determination of the proof and the comparative tracking indices of solid insulating materials

IEC 60127 (all parts), Miniature fuses

IEC 60317-3, Specifications for particular types of winding wires – Part 3: Polyester enameled round copper wire, class 155

IEC 60317-7, Specifications for particular types of winding wires - Part 7: polyimide enameled round copper wire, class 220

IEC 60317-8, Specifications for particular types of winding wires – Part 8: Polyesterimide enamelled round copper winding wire, class 180

IEC 60317-13, Specifications for particular types of winding wires - Part 13 Polyester or polyesterimide overcoated with polyamide-imide enamelled round copper wire, class 200

IEC 60529, Degrees of protection provided by enclosures (IP Code)

IEC 60664-1:2002, Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests <sup>1)</sup>

Amendment 1 (2000)

Amendment 2 (2002)

IEC 60664-3:2003, Insulation coordination for equipment within low-voltage systems - Part 3: Use of coating, potting or moulding for protection against pollution

ANSUUL 248-1, low-Voltage Fuses – Part 1: General Requirements