Ensuring compliance and traceability of test equipment

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Scope of presentation

- Need for test equipment to be demonstrated for compliance with Standards
- Ensuring traceability
- Examples of standards where this is necessary

Test Equipment Compliance with Standards

- Various standards specify test equipment required for testing to those standards
- Often this equipment is unique to the standard
- ExTLs need to be able to demonstrate their test equipment complies with requirements in the standards

Ensuring traceability

- Where measurement is involved in demonstrating compliance, this measurement must be traceable to national standards and tolerances addressed
- There may be a need for periodic recheck for where parameters may change or damage occur

• 26.4.2 Resistance to impact

- Impact head mass, diameter of hemisphere
- Height of impact
- Steel base, material and mass
- 26.4.5 Degree of protection (IP) by enclosures, plus IEC 60529
 - IP tests for first numeral IP1X, 2X, 3X, 4X, 5X, 6X (see following slides)

Table 1 – Degrees of protection against access to hazardous parts indicated by the first characteristic numeral

First characteristic numeral	Degree of protection		Test
	Brief description	Definition	conditions, see
0	Non-protected	-	-
1	Protected against access to hazardous parts with the back of a hand	The access probe, sphere of 50 mm \emptyset , shall have adequate clearance from hazardous parts	12.2
2	Protected against access to hazardous parts with a finger	The jointed test finger of 12 mm \emptyset , 80 mm length, shall have adequate clearance form hazardous parts	12.2
3	Protected against access to hazardous parts with a tool	The access probe of 2,5 mm \varnothing shall not penetrate	12.2
4	Protected against access to hazardous parts with a wire	The access probe of 1,0 mm \varnothing shall not penetrate	12.2
5	Protected against access to hazardous parts with a wire	The access probe of 1,0 mm \varnothing shall not penetrate	12.2
6	Protected against access to hazardous parts with a wire	The access probe of 1,0 mm \varnothing shall not penetrate	12.2

NOTE In the case of the first characteristic numerals 3, 4, 5 and 6, protection against access to hazardous parts is satisfied if adequate clearance is kept. The adequate clearance should be specified by the relevant product committee in accordance with 12.3.

Due to the simultaneous requirement specified in table 2, the definition "shall not penetrate" is given in table 1.

Table 6 – Access probes for the tests for protection of persons against access to hazardous parts



- 26.4.5 Degree of protection (IP) by enclosures, plus IEC 60529
 - IP tests for second numeral IPX4, X5, X6 See following slides





IEC 283/01

Dimensions in millimetres

- 121 holes of Ø 0,5;
- 1 hole at the centre
- 42 inner circles of 12 holes at 30° pitch
- 4 outer circles of 24 holes at 15° pitch

Moving shield - Aluminium

Spray nozzle - Brass



Dimensions in millimetres

D' = 6,3 for the test of 14.2.5 (second characteristic numeral 5) D' = 12,5 for the test of 14.2.6 (second characteristic numeral 6)

- Annex B Spark test apparatus for intrinsically safe circuits
 - explosion chamber volume of at least 250 cm3.
 - 4 tungsten contact wires diameter 0,2 ±0,02 mm clamped on circle of 50 mm diameter
 - distance between electrode holder and cadmium disc 10 mm. Free length of contact wires 11 mm.
 - axes of the shafts driving cadmium disc and electrode holder 31 mm apart
 - contacts on shafts geared together by nonconductive gears with ratio of 50:12

- Annex B Spark test apparatus for intrinsically safe circuits - continued
 - electrode holder rotate at 80 r/min
 - either counting device to record the number of revolutions of motor-driven shaft of electrode holder or timing device to determine the test duration, from which number of revolutions of shaft of the electrode holder can be calculated
 - At terminals of the contact arrangement, selfcapacitance of test apparatus not exceed 30 pF with contacts open. Resistance not exceed 0,15 Ω at current of 1 A d.c. and self-inductance not exceed 3 µH with contacts closed

Examples - IEC 60079-30-1 **5.1.5 Impact test**



- 3 minor axis of non-circular heating cable
- 5 height of fall of hammer: 700 mm or 400 mm

5.1.6 Deformation test

• A sample is placed on a rigid flat steel plate. A crushing force of 1 500 N is then applied for 30 s, without shock, by means of a 6 mm diameter steel rod with hemispherical ends and a total length of 25 mm.

Examples - IEC 60079-30-1 5.1.7 Cold bend test



Key

1 sample trace heater

- 2 steel base
- 3 metal mandrel

d = trace heater diameter or primary bending plane unless specified otherwise by the manufacturer

5.1.13 Determination of maximum sheath temperature



Key

- 1 50 mm to 150 mm nominal pipe bore
- 2 fibre glass insulation, 25 mm minimum thickness and a density of approximately 3,25 kg per cubic metre

Summary

You need to ensure:

- Test equipment can be demonstrated to comply with the relevant standard
- Where measurements are involved, these are traceable and that measurements fall within tolerances if given
- Systems are in place to address needs for periodic recheck where parameters may change or damage occur