SLOVENSKI STANDARD
SIST EN 60079-6:2016/oprA1:2018

01-oktober-2018

Eksplozivne atmosfere - 6. del: Zaščita opreme s potopitvijo v olje "o"

Explosive atmospheres - Part 6: Equipment protection by liquid immersion "o"

Explosionsgefährdete Bereiche - Teil 6: Geräteschutz durch Flüssigkeitskapselung "o"

Atmosphères explosives - Partie 6: Protection du matériel par immersion dans le liquide "o"

Ta slovenski standard je istoveten z: **EN 60079-6:2015/prA1:2018**

ICS:

29.260.20	Električni aparati za eksplozivna ozračja	Electrical apparatus for explosive atmospheres

SIST EN 60079-6:2016/oprA1:2018 **en,fr,de**

31/1389/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER: **IEC 60079-6/AMD1 ED4**	
DATE OF CIRCULATION: **2018-07-20**	CLOSING DATE FOR VOTING: **2018-10-12**
SUPERSEDES DOCUMENTS: **31/1352/CD,31/1367A/CC**	

IEC TC 31 : EQUIPMENT FOR EXPLOSIVE ATMOSPHERES

SECRETARIAT: United Kingdom	SECRETARY: Mr Mick Maghar
OF INTEREST TO THE FOLLOWING COMMITTEES:	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.

FUNCTIONS CONCERNED:

☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☐ SAFETY

☒ SUBMITTED FOR CENELEC PARALLEL VOTING ☐ NOT SUBMITTED FOR CENELEC PARALLEL VOTING

Attention IEC-CENELEC parallel voting

The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting.

The CENELEC members are invited to vote through the CENELEC online voting system.

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

TITLE:

Explosive atmospheres - Part 6: Equipment protection by liquid immersion "o"

PROPOSED STABILITY DATE: 2025

NOTE FROM TC/SC OFFICERS:

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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EXPLOSIVE ATMOPHERES –

Part 6: Equipment protection liquid immersion “o”
Annex D

FOREWORD

This amendment has been prepared by IEC technical committee 31 Equipment for explosive atmospheres.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
XX/XX/FDIS	XX/XX/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

The National Committees are requested to note that for this document the stability date is 20xx..

THIS TEXT IS INCLUDED FOR THE INFORMATION OF THE NATIONAL COMMITTEES AND WILL BE DELETED AT THE PUBLICATION STAGE.

Clause 1

Insert additional text after Para 4

Additionally, for the Level of Protection “oc” (EPL “Gc”) the requirements of Annex D applies where the rated voltage exceeds 15 kV AC_{RMS} or DC and up to 245 kV AC_{RMS} or DC

The Annex D applies specifically to liquid immersed transformers and reactors, and other liquid immersed equipment such as swivels for off-shore platforms, power regulators, tap changers and earthing/switching resistors.

Delete the Note
“Requirements for higher voltages are under consideration”

Insert new Annex D after Annex C

Annex D
(normative)

Supplementary requirements for Electrical Equipment with Level of Protection “oc” for voltages greater than 15 kV and up to including 245 kV

D.1 General

The Annex D supplements and modifies the requirements of this standard. Clause 4.3, 4.4 and 4.6 do not apply to equipment covered by this Annex D.

The voltage of explosion protected electrical equipment is limited for the type of protection “oc” up to 15 kV rms. A.C. or D.C. Application of higher voltages exists to supply offshore plants that are a long distance from the coast. Voltage levels up to 245 kV AC_{RMS} or DC are needed to allow power transmission up to some hundred kilometres from shore to offshore or between locations on shore/offshore. This Annex can be applied to liquid immersed transformers, reactors, power regulators, tap changers and other liquid immersed HV Electrical Equipment without dedicated IEC standards such as Oil-immersed Swivel for HV Connections, Oil-immersed Earthing Resistors and Oil-immersed Switching Resistors.

D.2 Additional Normative References

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60076 (all parts), *Power Transformers including Reactors*

IEC 60079-1, Explosive Atmospheres, Part 1: Equipment protection by flameproof enclosure “d”

IEC 60079-2, Explosive Atmospheres, Part 2: Equipment protection by pressurized enclosure “p”

IEC 60214 all parts), *Tap-Changers*

IEC 62770, *Fluids for electrotechnical applications - Unused natural esters for transformers and similar electrical equipment*

IEC 60137, *Insulated bushings for alternating voltages above 1,000 V*

IEC 60071 (all parts), *Insulation co-ordination*

D.3 Added terms and definitions

For the purposes of this Annex, the following terms and definitions apply.

NOTE Additional definitions applicable to explosive atmospheres can be found in IEC 60050-426.

D.3.1

Oil-immersed Swivel for HV Connections
equipment for the transfer of power from a fixed to a rotational motion

D.3.2

Oil-immersed Earthing Resistors
equipment intended for system neutral earthing

D.3.3

Oil-immersed Switching Resistors
equipment intended for inrush current limitation

D.4 Added requirements

D.4.1 Safety devices

Requirements in 4.7.3 for Level of Protection “ob” apply for equipment or components Level of Protection “oc” according to this Annex D.

Each individual compartment shall have their own safety devices.

For equipment, according to this Annex D, a pressure relief device shall be provided that automatically disconnects the power when the pressure relief device activates. The electrical equipment or system associated to the pressure relief device to activate the automatic disconnection shall be suitable for EPL Gc. If the pressure relief device itself is not directed downward a guide system e.g. a pipe shall be provided. The dimensioning of this guide system shall not compromise the functionality of the pressure relief.

D.4.2 Protective liquid specification

In addition to clause 5.1 natural ester insulating liquids in accordance with IEC 62770 can be used in higher voltage equipment along with the insulating liquids already identified in the 60079-6 standard.

NOTE Natural ester liquids per IEC 62770 are proven up 245 kV considering the ambient temperature limitation

D.4.3 Liquid immersion depth

Instead of Table 2 the required minimum liquid immersion depths are defined by high voltage test as specified in D.4.7. The tests shall be done with the minimum liquid level.

D.4.4 Connections

Cables for field wiring connections greater than 15 kV shall be shielded to prevent external arcs and sparks caused by an external dielectric field. The termination of the HV cable shall be within enclosures in accordance with IEC 60079-1 and IEC 60079-2. All HV cables above 15 kV shall be armoured and shielded. Considerations shall be made to prevent against circulating currents and external arcs and sparks during energizing operation (see IEC 60079-0 “Circulating currents in enclosures”).

When bushings are used the requirements of IEC 60137 apply.

In the case of an enclosure in accordance with IEC 60079-1 the interface to the liquid immersion shall withstand the overpressure caused by an explosion within the enclosure.

D.4.5 On-Load Tap-Changer (OLTC)

The On-Load Tap-Changer shall be of type which does not produce arcs and sparks during switching.

DC switching is not permitted.

NOTE OLTC according IEC 60214 can make switching operations up to several MVA/phase without sparking in liquid when vacuum tap changers are applied. In a vacuum tap changer current switching takes place inside a closed vacuum bottle and the current is limited by transition resistor or reactor during the switching.

D.4.6 Containment solutions

The liquid containment enclosure shall be sealed from the ambient environment in accordance with 4.5.2.

Unsealed enclosures of 4.5.3 are not permitted.

NOTE 1 Sealing can be achieved by diaphragm/bladder/bag in conservator tank between the liquid and air or by closed gas cushion (usually nitrogen) or by flexible fully filled tank (flexible corrugations or radiators)..

NOTE 2 Because mineral oil, esters and silicone oil are hygroscopic, a sealed design in HV liquid insulated equipment is considered as the only practical choice to increase maintenance intervals and reduce failure risks. Expansion vessels with membrane shall be considered sealed.

D.4.7 Routine Tests

D.4.7.1 Routine dielectric tests

Transformers and reactors test methods and voltages are defined in IEC 60076-3. Test voltages for transformers may be applied to other oil-immersed HV equipment or IEC 60071 may be applied where there is no industrial standard for the type of equipment.

The following routine dielectric tests apply:

a) The test for phase to earth shall be conducted in accordance with the requirements of IEC 60076-3 or IEC 60071.

b) The test for phase to phase shall be conducted in accordance with the requirements of IEC 60076-3.

c) The test of partial discharge measurement for long duration with pre-stress voltage and measurement level shall be conducted in accordance with IEC 60076-3. The acceptance criteria shall be applied.

d) The test for lightning impulse given in IEC 60076-3 is applicable for transformers and reactor, and for other equipment according to IEC 60071.

Tests a) and b) shall be a routine test for all equipment. Test c) and Test d) shall be an additional routine test for all equipment above 72,5 kV.

The Tests of c) and d) may apply with a voltage level less than 72,5 kV as agreed between the manufacturer and the purchaser.

There shall be no breakdown during the tests of a), b) and d).

D.4.7.2 Routine tests

For Level of Protection "oc" according to this annex D, a pressure equal to 1.5 times the pressure relief device setting shall be applied internally to the sealed enclosure. If necessary the expansion tank and other optional attached equipment can be tested separately. The period of application of the pressure shall be at least 60^{+10}_{-0} s.

The pressure relief device entry shall be sealed for the duration of the test.

D.4.8 Selection and erection requirements

Annex A applies

D.4.9 Maintenance

Annex B applies

D.4.10 Repair & Overhaul

Annex C applies