SLOVENSKI STANDARD
SIST HD 488 S1:1999

01-januar-1999

Gassing of insulating liquids under electrical stress and ionization (IEC 60628:1985)

Gassing of insulating liquids under electrical stress and ionization

Das Gasen von Isolierflüssigkeiten unter elektrischer Beanspruchung und Ionisation

Gassing des isolants liquides sous contrainte électrique et ionisation

Ta slovenski standard je istoveten z: **HD 488 S1:1987**

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GASSING OF INSULATING LIQUIDS UNDER ELECTRICAL STRESS AND IONIZATION

Gassing des isolants liquides sous contrainte électrique et ionisation	**Das Gasverhalten von Isolierflüssigkeiten unter elektrischer Beanspruchung und Ionisation**

BODY OF THE HD

The Harmonization Document consists of:

- **IEC 628 (1985) ed 2; IEC/SC 10A, not appended**

This Harmonization Document was approved by CENELEC on 1987-03-05.

The English and French versions of this Harmonization Document are provided by the text of the IEC publication and the German version is the official translation of the IEC text.

According to the CENELEC Internal Regulations the CENELEC member National Committees are bound:

to announce the existence of this Harmonization Document at national level **by or before 1987-09-15**

to publish their new harmonized national standard **by or before 1988-03-15**

to withdraw all conflicting national standards **by or before 1988-03-15.**

Harmonized national standards are listed on the HD information sheet, which is available from the CENELEC National Committees or from the CENELEC Central Secretariat.

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Gassing des isolants liquides sous contrainte électrique et ionisation

Gassing of insulating liquids under electrical stress and ionization

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Gassing des isolants liquides sous contrainte électrique et ionisation

IEC Publication 628
(Second edition - 1985)

Gassing of insulating liquids under electrical stress and ionization

C O R R I G E N D U M 1

Correction du texte anglais seulement.

Correction of the English text only.

Page 17

au lieu de:

Page 17

instead of:

13.1.1 Glass cell precision bore (see Figure 4) made of borosilicate glass tubing with permittivity of 5 ± 0.2 (at 50 Hz and 80 °C) and dimensions as follows:

lire:

read:

13.1.1 Glass cell precision bore (see Figure 4) made of borosilicate glass tubing with a relative permittivity of 5 ± 0.2 (at 50 Hz and 80 °C) and dimensions as follows:

Octobre 1986

October 1986

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

GASSING OF INSULATING LIQUIDS UNDER ELECTRICAL STRESS AND IONIZATION

FOREWORD

1) The formal decisions or agreements of the IEC on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.

2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.

3) In order to promote international unification, the IEC expresses the wish that all National Committees should adopt the text of the IEC recommendation for their national rules in so far as national conditions will permit. Any divergence between the IEC recommendation and the corresponding national rules should, as far as possible, be clearly indicated in the latter.

PREFACE

This standard has been prepared by Sub-Committee 10A: Hydrocarbon Insulating Oils, of IEC Technical Committee No. 10: Fluids for Electrotechnical Applications.

This publication is the second edition of IEC Publication 628.

The text of this standard is based on the following documents:

Six Months' Rule	Report on Voting
10A(CO)53	10A(CO)60

Further information can be found in the Report on Voting indicated in the table above.

Other publications quoted:

ISO Standard 653 (1980): Long Solid-stem Thermometers for Precision Use.
ISO Standard 683/13 (1974): Heat-treated Steels, Alloy Steels and Free-cutting Steels — Part XIII: Wrought Stainless Steels.
ISO Standard 4803 (1978): Laboratory Glassware — Borosilicate Glass Tubing.

GASSING OF INSULATING LIQUIDS UNDER ELECTRICAL STRESS AND IONIZATION

SECTION ONE — GENERAL

1. Scope

This standard describes two procedures each using different apparatus to measure the tendency of insulating liquids to evolve or absorb gas when subjected, in cells having specific geometries, to electrical stress of sufficient intensity to cause an electric discharge through a gas phase in which a gas-oil interface is located.

The methods described in this standard are suitable for purchase specifications, general selection of insulating liquids, product development and quality assurance.

WARNING! Attention is called to national regulations associated with the use of high voltage, hydrogen and solvents.

2. General notes on the methods

2.1 These methods indicate whether insulating liquids are gas absorbing or gas evolving under the test conditions. The gassing behaviour of any one insulating liquid is primarily a function of its chemistry but changes in certain test parameters can modify the results significantly.

2.2 These methods can operate under a variety of gas phase, temperature and voltage stress conditions. In order to establish uniform criteria of measurement, specific test conditions are specified which experience has shown to be most informative of the general performance expected from the liquid dielectric in electrical equipment should ionization occur.

At present, however, though it is generally agreed that gas absorbency of the impregnant has a positive effect in minimizing ionization problems in impregnated insulation systems used at high electrical stress, correlation of gassing-cell test results with equipment performance is limited. Engineering judgement is necessary in interpreting the test results in relation to any intended application.

2.3 Both methods, have been originally designed for the range of gassing rates characteristic of mineral insulating liquids. The use of these methods with other liquids may require some adaptations in the dimensions of the test cell.

SECTION TWO — METHOD A

3. Outline of method

This method determines the gassing tendency of an insulating liquid under a hydrogen atmosphere and expresses the results in terms of gassing rate over a relatively short test period.

After being dried and saturated with hydrogen gas, the insulating liquid and the hydrogen pocket above the liquid are subjected in the specified cell to a radial electrical stress under the following experimental conditions:

— voltage: 10 kV;
— frequency: 50 Hz or 60 Hz;
— temperature: 80 °C;
— test duration: 120 min at 50 Hz or 100 min at 60 Hz.

The rate of evolution or absorption of gas resulting from reactions at the gas-oil interface, is calculated as volume per unit of time from changes in pressure with time.

4. Apparatus

4.1 *Gassing-cell and gas-burette assembly*

The gassing-cell illustrated in Figure 1, page 28, with dimensions given in Figure 2, page 29, consists of the following components:

— Cell made of borosilicate glass with a relative permittivity of 5 ± 0.2 at 80 °C measured at a stated frequency (50 Hz or 60 Hz). The part under stress is constructed of 16 ± 0.2 mm inside diameter and 18 ± 0.2 mm outside diameter precision selected lightwall tubing according to ISO Standard 4803. This cell has an outer electrode (earth) 60 mm high made of solvent-resistant silver paint with a vertical slit for observing the oil level and a copper band for earth connection.

— Hollow high-voltage electrode made of 10 ± 0.1 mm outside diameter centreless-ground and polished stainless steel seamless tubing No. 11 according to ISO Standard 683/XIII and containing a 1.0 mm stainless steel capillary tubing as a gas passage.

The electrode shall be supported and centred by a precision machined 24/29 recessed polytetrafluoroethylene plug.

A 3.0 mm needle valve (E) with gas inlet is on top of the electrode.

Note. — After repeated tests at 80 °C, the shape of the polytetrafluoroethylene plug should be checked because it may deform and no longer be leak-tight.

— Gas burette (Figure 1) made of 7 mm outside diameter borosilicate glass tubing with an etched scale (mm), tapered glass joint 10/19 (G) for connecting to the gassing-cell, a by-pass stopcock (D) and three glass bulbs (A, B and C). The correlation between the reading (mm) and the volume (mm^3) must be known.

Note. — Increased capacity of gas-burette is required for highly gas absorbing liquids.