

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Mineral oil-filled electrical equipment in service – Guidance on the interpretation of dissolved and free gases analysis

Matériels électriques remplis d'huile minérale en service – Lignes directrices pour l'interprétation de l'analyse des gaz dissous et des gaz libres



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CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	8
2 Normative references	8
3 Terms, definitions and abbreviations	9
3.1 Terms and definitions.....	9
3.2 Abbreviations.....	11
3.2.1 Chemical names and formulae.....	11
3.2.2 General abbreviations.....	11
4 Mechanisms of gas formation	11
4.1 Decomposition of oil	11
4.2 Decomposition of cellulosic insulation	12
4.3 Stray gassing of oil.....	12
4.4 Other sources of gas.....	12
5 Identification of faults	13
5.1 General.....	13
5.2 Dissolved gas compositions.....	13
5.3 Types of faults	13
5.4 Basic gas ratios	14
5.5 CO ₂ /CO ratio	15
5.6 O ₂ /N ₂ ratio	16
5.7 C ₂ H ₂ /H ₂ ratio.....	16
5.8 C ₃ hydrocarbons.....	16
5.9 Evolution of faults	16
5.10 Graphical representations	17
6 Conditions for calculating ratios.....	17
6.1 Examination of DGA values	17
6.2 Uncertainty on gas ratios	17
7 Application to free gases in gas relays.....	18
8 Gas concentration levels in service.....	19
8.1 Probability of failure in service	19
8.1.1 General	19
8.1.2 Calculation methods	20
8.2 Typical concentration values.....	20
8.2.1 General	20
8.2.2 Calculation methods	20
8.2.3 Choice of normality percentages.....	20
8.2.4 Alarm concentration values.....	21
8.3 Rates of gas increase	21
9 Recommended method of DGA interpretation (see Figure 1)	21
10 Report of results	22
Annex A (informative) Equipment application notes.....	24
A.1 General warning	24
A.2 Power transformers.....	24
A.2.1 Specific sub-types	24

A.2.2	Typical faults	24
A.2.3	Identification of faults by DGA	25
A.2.4	Typical concentration values	25
A.2.5	Typical rates of gas increase	26
A.2.6	Specific information to be added to the DGA report (see Clause 10)	27
A.3	Industrial and special transformers	27
A.3.1	Specific sub-types	27
A.3.2	Typical faults	27
A.3.3	Identification of faults by DGA	27
A.3.4	Typical concentration values	27
A.4	Instrument transformers	28
A.4.1	Specific sub-types	28
A.4.2	Typical faults	28
A.4.3	Identification of faults by DGA	29
A.4.4	Typical concentration values	29
A.5	Bushings	30
A.5.1	Specific sub-types	30
A.5.2	Typical faults	30
A.5.3	Identification of faults by DGA	30
A.5.4	Typical concentration values	31
A.6	Oil-filled cables	31
A.6.1	Typical faults	31
A.6.2	Identification of faults by DGA	31
A.6.3	Typical concentration values	31
A.7	Switching equipment	32
A.7.1	Specific sub-types	32
A.7.2	Normal operation	32
A.7.3	Typical faults	32
A.7.4	Identification of faults by DGA	32
A.8	Equipment filled with non-mineral fluids	33
Annex B (informative)	Graphical representations of gas ratios (see 5.10)	34
Bibliography	38
Figure 1	– Flow chart	23
Figure B.1	– Graphical representation 1 of gas ratios (see [3])	34
Figure B.2	– Graphical representation 2 of gas ratios	35
Figure B.3	– Graphical representation 3 of gas ratios – Duval's triangle 1 for transformers, bushings and cables(see [4])	36
Figure B.4	– Graphical representation 4 of gas ratios – Duval's triangle 2 for OLTCs (see A.7.2)	37
Table 1	– DGA interpretation table	14
Table 2	– Simplified scheme of interpretation	15
Table 3	– Ostwald solubility coefficients for various gases in mineral insulating oils	19
Table A.1	– Typical faults in power transformers	25
Table A.2	– Ranges of 90 % typical gas concentration values observed in power transformers, in $\mu\text{l/l}$	26

Table A.3 – Ranges of 90 % typical rates of gas increase observed in power transformers (all types), in $\mu\text{l/l/year}$	26
Table A.4 – Examples of 90 % typical concentration values observed on individual networks.....	28
Table A.5 – Typical faults in instrument transformers.....	29
Table A.6 – Ranges of 90 % typical concentration values observed in instrument transformers.....	29
Table A.7 – Maximum admissible values for sealed instrument transformers.....	30
Table A.8 – Typical faults in bushings.....	30
Table A.9 – Simplified interpretation scheme for bushings.....	31
Table A.10 – 95 % typical concentration values in bushings.....	31
Table A.11 – Ranges of 95 % typical concentration values observed on cables.....	32
Table A.12 – Typical faults in switching equipment.....	32

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**MINERAL OIL-FILLED ELECTRICAL EQUIPMENT
IN SERVICE – GUIDANCE ON THE INTERPRETATION
OF DISSOLVED AND FREE GASES ANALYSIS**

FOREWORD

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International Standard IEC 60599 has been prepared by IEC technical committee 10: Fluids for electrotechnical applications.

This third edition cancels and replaces the second edition published in 1999 and Amendment 1:2007. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) revision of 5.5, 6.1, 7, 8, 9, 10, A.2.6, A.3, A.7;
- b) addition of new sub-clause 4.3;
- c) expansion of the Bibliography;
- d) revision of Figure 1;
- e) addition of Figure B.4.

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

FDIS	Report on voting
10/967/FDIS	10/973/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

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

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

INTRODUCTION

Dissolved and free gas analysis (DGA) is one of the most widely used diagnostic tools for detecting and evaluating faults in electrical equipment filled with insulating liquid. However, interpretation of DGA results is often complex and should always be done with care, involving experienced insulation maintenance personnel.

This International Standard gives information for facilitating this interpretation. The first edition, published in 1978, has served the industry well, but had its limitations, such as the absence of a diagnosis in some cases, the absence of concentration levels and the fact that it was based mainly on experience gained from power transformers. The second edition attempted to address some of these shortcomings. Interpretation schemes were based on observations made after inspection of a large number of faulty oil-filled equipment in service and concentrations levels deduced from analyses collected worldwide.

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MINERAL OIL-FILLED ELECTRICAL EQUIPMENT IN SERVICE – GUIDANCE ON THE INTERPRETATION OF DISSOLVED AND FREE GASES ANALYSIS

1 Scope

This International Standard describes how the concentrations of dissolved gases or free gases may be interpreted to diagnose the condition of oil-filled electrical equipment in service and suggest future action.

This standard is applicable to electrical equipment filled with mineral insulating oil and insulated with cellulosic paper or pressboard-based solid insulation. Information about specific types of equipment such as transformers (power, instrument, industrial, railways, distribution), reactors, bushings, switchgear and oil-filled cables is given only as an indication in the application notes (see Annex A).

This standard may be applied, but only with caution, to other liquid-solid insulating systems.

In any case, the indications obtained should be viewed only as guidance and any resulting action should be undertaken only with proper engineering judgment.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050-191:1990, *International Electrotechnical Vocabulary – Chapter 191: Dependability and quality of service* (available at <http://www.electropedia.org>)

IEC 60050-192:2015, *International Electrotechnical Vocabulary – Part 192: Dependability* (available at <http://www.electropedia.org>)

IEC 60050-212:2010, *International Electrotechnical Vocabulary – Part 212: Electrical insulating solids, liquids and gases* (available at <http://www.electropedia.org>)

IEC 60050-604:1987, *International Electrotechnical Vocabulary – Chapter 604: Generation, transmission and distribution of electricity – Operation* (available at <http://www.electropedia.org>)

IEC 60475, *Method of sampling insulating liquids*

IEC 60567:2011, *Oil-filled electrical equipment – Sampling of gases and analysis of free and dissolved gases – Guidance*

IEC 61198, *Mineral insulating oils – Methods for the determination of 2-furfural and related compounds*