MS 60296:2024

MALAYSIAN STANDARD

Fluids for electrotechnical applications - Mineral insulating oils for electrical equipment (IEC 60296:2020, MOD)

ICS: 29.040.10

Descriptors: fluids, electrotechnical applications, mineral insulating oils, electrical equipment

DEPARTMENT OF STANDARDS MALAYSIA

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For further information on Malaysian Standards, please contact:

Department of Standards Malaysia
Level 4 – 7, Tower 2, Menara Cyber Axis
Jalan Impact, Cyber 6
63000 Cyberjaya
Selangor Darul Ehsan
MALAYSIA

Tel: 60 3 8008 2900
Fax: 60 3 8008 2901
http://www.jsm.gov.my
E-mail: central@jsm.gov.my

Committee representation

The National Standards Committee on Generation, Transmission and Distribution of Energy (NSC 05) under whose authority this Malaysian Standard was adopted, comprises representatives from the following organizations:

Association of Consulting Engineers Malaysia
Department of Standards Malaysia (Secretariat)
Federation of Malaysian Consumers Association
Federation of Malaysian Manufacturers
Jabatan Kerja Raya
Malaysian Cable Manufacturers Association
Malaysian Communications and Multimedia Commission
Malaysian Electrical Appliances and Distributors Association
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The Electrical and Electronics Association of Malaysia
The Institution of Engineers, Malaysia
Universiti Malaya
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The Technical Committee on Renewable Energy (NSC 05/TC 7) which supervised the adoption of IEC Standard as Malaysian Standard consists of representatives from the following organizations:

Department of Standards Malaysia (Secretariat)
Federation of Malaysian Manufacturers
Malaysian National Committee of CIGRE
NineOne Resources Sdn. Bhd.
Sarawak Energy Berhad
Suruhanjaya Tenaga
Tenaga Nasional Berhad (Bahagian Grid)
Tenaga Nasional Berhad (Bahagian Pembahagian)
The Electrical and Electronics Association of Malaysia
The Institution of Engineers, Malaysia
Universiti Teknologi Malaysia

The Working Group on Insulation Oil for EE Equipment (NSC 05/TC 7/WG 3) which recommended the adoption of the IEC Standard as Malaysian Standard consists of representatives from the following organizations:

Department of Standards Malaysia (Secretariat)
Hyrax Oil Sdn Bhd
Jabatan Kerja Raya Malaysia
Pengurusan Air Selangor Sdn Bhd
Tenaga Nasional Berhad (Bahagian Grid)
Tenaga Nasional Berhad (Bahagian Pembahagian)
TJH2b Analytical Services Sdn Bhd
TNB LABS Sdn Bhd
Universiti Putra Malaysia
Universiti Teknikal Malaysia Melaka

National foreword

This Malaysian Standard was developed by the Working Group on Insulation Oil for EE Equipment (NSC 05/TC 7/WG 3) under the authority of The National Standards Committee on Generation, Transmission and Distribution of Energy (NSC 05).

This Malaysian Standard is identical with IEC 60296:2020, *Fluids for electrotechnical applications - Mineral insulating oils for electrical equipmen*t, published by the International Electrotechnical Commission (IEC). However, for the purposes of this Malaysian Standard, the following apply:

a) in the source text, "this International Standard" should read "this Malaysian Standard";

b) the comma which is used as a decimal sign (if any), to read as a point; and

c)

Clause/Subclause		Modification
3.3	Additive	Replace "Additive" with "Inhibitor and Additive"

Explanation: To provide clear specification subject of Inhibitor and Additive.

3.3.1	inhibitor	Add 'Chemical substance is added to mineral insulating oil in order to improve oxidation stability'
		Add 'EXAMPLES Antioxidants DBPC = 2,6-di-tert-butyl-para-cresol; DBP = 2,6-di-tert-butyl-phenol'

Explanation: To provide clear definition and examples of inhibitor.

3.3.2	additive	Add 'Chemical substance that is added to mineral insulating oil in order to improve certain characteristics'

Explanation: To provide the definition of additive.

3.4	Antioxidant	Replace "antioxidant" with "Antioxidant"

Explanation: To standardize the alphabet.

3.4	antioxidant	Replace "oxidation inhibitor" with "3.4.1 oxidation inhibitor"

Explanation: To standardize the numbering.

National foreword *(Continued)*

3.4.1	other antioxidant additive	Replace "other antioxidant additive " with "3.4.2 antioxidant additive"

Explanation: To standardize the numbering.

3.4.2	other antioxidant additive	Add ' [SOURCE: IEC 60050-212:2010, 212-17-13, modified – "specific" replaced with "chemical", "an insulating material or liquid in small proportion" replaced with "mineral insulating oil" and examples added.]

Explanation: To inform the international standard document used for the modification.

3.4.2	passivator	Replace "3.4.2 passivator" with "3.4.3 passivator"

Explanation: To standardize the numbering.

5.1.2	Antioxidant (oxidation inhibitor) content	Add 'Note T - Total inhibitor content minimum 0.01% and less than 0.08%, I - Total inhibitor content minimum 0.08% and maximum of 0.40%'

Explanation: To provide further explanation about inhibitor content.

6.1	Table 2 - Maximum viscosity and pour point of mineral insulating oil	Add 'b The oil viscosity at the Lowest Cold Start Energizing Temperature (LCSET) is not applicable to operations in Malaysian climatic condition'

Explanation: The requirement is not applicable to Malaysia climatic condition.

National foreword *(Continued)*

6.2	Pour point	Add 'NOTE The requirement for the pour point may not be applicable to Malaysia Climatic Condition'

Explanation: The requirement is not applicable to Malaysia climatic condition.

6.5	Density	Replace "Density shall be measured in accordance with ISO 12185 (reference method), ISO 3675 and ASTM D7042 are acceptable" with "Density shall be measured in accordance with ISO 12185 (reference method), ISO 3675, ASTM D7042 and ASTM D4052 are acceptable"

Explanation: To inform that there is another test method can be used.

6.19	Table 3	Replace "Viscosity at –30 °C [b]" with "Viscosity at –30 °C [b, k]" Replace "Viscosity at –30 °C [b]" with "Viscosity at –30 °C [b, k]" Replace "ISO 12185[a] or ISO 3675 or ASTM D7042" with "ISO 12185[a] or ISO 3675 or ASTM D4052 or ASTM D7042" Add '[k] The requirement is not applicable to Malaysia climatic condition'.

National foreword *(Continued)*

	Table 4	Replace "Viscosity at –30 °C b" with "Viscosity at –30 °C b, m"
		Replace "Viscosity at –40 °C c" with "Viscosity at –40 °C c, m"
		Replace "ISO 12185 [a] or ISO 3675 ASTM D7042" with "ISO 12185 [a] or ISO 3675 or ASTM D4052 or ASTM D7042"
		Add '[m] The requirement is not applicable to Malaysia climatic condition'

Explanation: The requirement is not applicable to Malaysia climatic condition.

Annex D	Table D.1	Replace "ISO 3675, ASTM D7042" with "ISO 3675, ASTM D4052, ASTM D7042"

Explanation: To inform that there is another test method can be used.

National foreword *(Continued)*

d) reference to International Standards should be replaced by corresponding Malaysian Standards as follows:

Referenced International Standards	Corresponding Malaysian Standards
IEC 60156, *Insulating liquids - Determination of the breakdown voltage at power frequency - Test method*	MS IEC 60156, *Insulating liquids - Determination of the breakdown voltage at power frequency - Test method*
IEC 60247, *Insulating liquids - Measurement of relative permittivity, dielectric dissipation factor (tan d) and d.c. resistivity*	MS IEC 60247, *Insulating liquids - Measurement of relative permittivity, dielectric dissipation factor (tan δ) and d.c. resistivity*
IEC 60422, *Mineral insulating oils in electrical equipment - Supervision and maintenance guidance*	MS 60422, *Mineral insulating oils in electrical equipment - Supervision and maintenance guidance*
IEC 60475, *Method of sampling insulating liquids*	MS 60475, *Method of sampling insulating liquids*
IEC 60567, *Oil-filled electrical equipment - Sampling of gases and analysis of free and dissolved gases - Guidance*	MS 60567, *Oil-filled electrical equipment - Sampling of gases and of oil for analysis of free and dissolved gases - Guidance*
IEC 60814, *Insulating liquids - Oil-impregnated paper and pressboard - Determination of water by automatic coulometric Karl Fischer titration*	MS IEC 60814, *Insulating liquids - Oil-impregnated paper and pressboard - Determination of water by automatic coulometric Karl Fischer titration*
IEC 62021-1, *Insulating liquids - Determination of acidity - Part 1: Automatic potentiometric titration*	MS IEC 62021-1, *Insulating liquids - Determination of acidity - Part 1: Automatic potentiometric titration*

Compliance with a Malaysian Standard does not of itself confer immunity from legal obligations.

NOTE. MOD on the front cover indicates a modified standard i.e. a standard adapted from an International Standard with permitted technical deviations, which are clearly identified and explained. The changes in structure are permitted provided that the altered structure permits easy comparison of the content of the two standards. Modified standards also include the changes permitted under identical correspondence.