

BS 148:2020



BSI Standards Publication

# **Recycled mineral insulating oil for transformers and switchgear — Specification**

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## Summary of pages

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# Foreword

## Publishing information

This British Standard is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 31 March 2020. It was prepared by Technical Committee GEL/10, *Fluids for electrotechnical applications*. A list of organizations represented on this committee can be obtained on request to its secretary.

## Supersession

This British Standard supersedes BS 148:2009, which is withdrawn.

## Information about this document

The limits given in this British Standard are based on BS EN 60296. For ease of cross-reference, the clause numbering of this standard follows that of BS EN 60296 as far as possible. This standard differs from BS EN 60296 in specifying limits for total furans. The increasing use of total furfural/furans measurements as an in-service diagnostic tool has brought about the necessity to impose limits on reclaimed oil, which is continued in this edition. This British Standard acknowledges UK practice whereby the limiting values for reclaimed mineral insulating oils are based on those for unused mineral insulating oils for transformers and switchgear while having due regard for the variability of used oil feedstock from which reclaimed oil is produced.

## Use of this document

It has been assumed in the preparation of this British Standard that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

## Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is “shall”.

*Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.*

Requirements in this standard are drafted in accordance with *Rules for the structure and drafting of UK standards*, subclause **G.1.1**, which states, “Requirements should be expressed using wording such as: ‘When tested as described in [Annex A](#), the product shall ...’”. This means that only those products that are capable of passing the specified test will be deemed to conform to this standard.

## Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

**Compliance with a British Standard cannot confer immunity from legal obligations.**

## 1 Scope

This British Standard specifies requirements for recycled oxidation inhibited and uninhibited mineral insulating oils, as delivered, for use in transformers, switchgear and similar electrical equipment in which oil is required as an insulant and/or for heat transfer.

Oils with and without additives are within the scope of this standard.

This standard does not differentiate between methods used to recycle used mineral insulating oil, thus reclaimed or regenerated oil, re-refined oil, dechlorinated oil and reconditioned oil are all considered recycled oil for the purposes of this standard.

This standard does not apply to mineral insulating oils used as impregnates in cables or capacitors, or to hydrocarbon insulating liquids obtained by synthesis.

*NOTE* Oils conforming to the requirements of this standard, and containing no additives, are considered to be compatible with one another and can be mixed in any proportion. This does not necessarily apply to oils containing additives, and where the user wishes to mix such oils a check should be made to ensure that the mixture conforms to the requirements of this standard.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes provisions of this document.<sup>1)</sup> For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ASTM E1687-10, *Standard test method for determining carcinogenic potential of virgin base oils in metalworking fluids*

BS EN 60156, *Insulating liquids – Determination of the breakdown voltage at power frequency. Test method*

BS EN 60247, *Insulating liquids – Measurement of relative permittivity, dielectric dissipation factor ( $\tan \delta$ ) and d.c. resistivity*

BS EN 60475, *Method for sampling liquid dielectrics*

BS EN 60666, *Detection and determination of specified additives in mineral insulating oils*

BS EN 60814, *Insulating liquids – Oil-impregnated paper and pressboard. Determination of water by automatic coulometric Karl Fischer titration*

BS EN IEC 61125:2018, *Insulating liquids – Test methods for oxidation stability – Test method for evaluating the oxidation stability of insulating liquids in the delivered state*

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

BS EN 61619, *Insulating liquids – Contamination by polychlorinated biphenyls (PCBs) – Method of determination by capillary column gas chromatography*

BS EN 62021-1, *Insulating liquids – Determination of acidity – Part 1: Automatic potentiometric titration*

BS EN 62021-2, *Insulating liquids – Determination of acidity – Part 2: Colourimetric titration*

BS EN 62535, *Method for detection of potentially corrosive sulfur in used and unused mineral insulating oils*

<sup>1)</sup> Documents that are referred to solely in an informative manner are listed in the Bibliography.