

Mineral insulating oils — Characterization of paraffinic/naphthenic nature — Low temperature differential scanning calorimetry (DSC) test method

ICS 29.040.10

National foreword

This Published Document was published by BSI. It is the UK implementation of IEC/TR 61946:2007.

The UK participation in its preparation was entrusted to Technical Committee GEL/10, Fluids for electrotechnical applications.

A list of organizations represented on GEL/10 can be obtained on request to its secretary.

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

This Published Document was published under the authority of the Standards Policy and Strategy Committee on 30 April 2007

© BSI 2007

ISBN 978 0 580 50526 3

Amendments issued since publication

Amd. No.	Date	Comments

TECHNICAL REPORT

IEC TR 61946

First edition
2007-02

**Mineral insulating oils –
Characterization of paraffinic/naphthenic nature –
Low temperature differential scanning calorimetry
(DSC) test method**



Reference number
CEI/IEC/TR 61946:2007

CONTENTS

INTRODUCTION.....	3
1 Scope.....	4
2 Normative references	4
3 Terms and definitions	4
4 Test method	5
5 Interference.....	5
6 Apparatus.....	5
7 Sampling	6
8 Calibration.....	6
9 Procedure	7
10 Calculations – Classification of oils.....	8
11 Report	8
 Annex A (informative) Calculation of transition temperatures	9
 Bibliography.....	12
 Figure 1 – Low temperature DSC of two different naphthenic oils	10
Figure 2 – Low temperature DSC (heating mode) of a paraffinic oil.....	10
Figure 3 – Low temperature DSC (cooling mode) of a paraffinic oil	11
 Table 1 – Reference materials for high temperature calibration.....	6
Table 2 – Reference materials for low temperature calibration	7

INTRODUCTION

Mineral insulating oils are naturally occurring products obtained by distillation and refining of petroleum crudes. Depending upon the petroleum source, they can be classified as paraffinics or naphthenics.

Paraffinic oils contain crystallizable paraffins which may form crystals when the oil is cooled. Naphthenic oils do not contain such crystallisable compounds.

The presence of these compounds not only affects the low temperature behaviour of the oil, but also may influence other physical properties such as the viscosity index and the solubility properties of the oil.

Differential scanning calorimetry (DSC) has been proven to be an easy and reliable method to distinguish between these two classes of oils.

NOTE DSC alone cannot be used to reliably predict the behaviour (crystallization) of insulating oils at very low temperatures, since this behaviour depends not only on the amount of linear paraffins, but also on the duration of cooling at these low temperatures, the amount of pour point depressant and the type of the linear paraffins.

General caution

This technical report does not purport to address all the safety problems associated with its use. It is the responsibility of the user of this report to establish appropriate health and safety practices and determine the applicability of regulatory limitations prior to use.

The mineral oils which are the subject of this technical report should be handled with due regard to personal hygiene. Direct contact with the eyes may cause slight irritation. In the case of eye contact irrigation with copious quantities of clean running water should be carried out and medical advice sought.

Some of the procedures referenced in this report involve the use of processes that could lead to a hazardous situation. Attention is drawn to the relevant standard for guidance.

Attention should be drawn to the presence of equipment or equipment components at very low temperatures.

Environment

This technical report deals with mineral insulating oils, chemicals, used sample containers and oil contaminated solids. The disposal of these items should be carried out according to local regulations with regard to their impact on the environment. Every precaution should be taken to prevent their release into the environment.