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**Code of practice for the safe use of fully enclosed oil-filled electrical equipment which may be contaminated with PCBs**

Code of practice for the safe use of fully enclosed oil-filled electrical equipment which may be contaminated with PCBs

Leitlinie für die Praxis zum sicheren Umgang mit vollständig gekapselten, möglicherweise mit PCB kontaminierten Öl befüllten elektrischen Betriebsmitteln

Code pour la sécurité d'emploi des matériels électriques remplis d'huile qui peuvent être contaminés par les PCB

[SIST EN 50225:1997](https://standards.iteh.ai/catalog/standards/sist/3b34b040-e29e-4a13-b92a-c21e4bd2da26/sist-en-50225-1997)

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**en**

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Descriptors: Electrical equipment, liquid electrical insulating materials, insulating oils, askarel, polychlorobiphenyl, contamination, environmental protection, warning notices, accident prevention, safety, safety measures, labelling, hazards, defects, accidents, fire, first aid, hygiene

English version

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This European Standard was approved by CENELEC on 1996-07-02. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

**CENELEC**

European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

**Central Secretariat: rue de Stassart 35, B - 1050 Brussels**

### Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 14, Power transformers, based on a contribution of the cooperating Partner UNIPEDE.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50225 on 1996-07-02.

The following dates were fixed:

- latest date by which the EN has to be implemented  
at national level by publication of an identical  
national standard or by endorsement (dop) 1997-06-01
- latest date by which the national standards conflicting  
with the EN have to be withdrawn (dow) 1997-06-01

For products which have complied with the relevant national standard before 1997-06-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 2002-06-01.

Annexes designated "normative" are part of the body of the standard.

Annexes designated "informative" are given for information only.

In this standard, annex A is informative and annex B is normative.

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## Introduction

Oils are used in electrical equipment as insulating and cooling liquids. They are produced by refining mineral oils and consist of a complex mixture of hydrocarbons.

When handling insulating liquids, precautions need to be taken regarding human health and protection of the environment.

It is recognised that oil-filled electrical equipment may have been contaminated by polychlorinated biphenyls (PCBs) either during manufacture or maintenance operations using oils which have been contaminated with PCBs.

Oil-filled electrical equipment is considered to be contaminated with PCBs if the level of PCBs is greater than 50 mg/kg.

Polychlorinated Biphenyls (PCBs) are synthetic liquids which have been used throughout the world since the 1930s. PCBs are chemically stable but possess a number of potential environmental disadvantages: being persistent in the environment and resistant to chemical and biological decomposition. They also "bio-accumulate": tending to accumulate up the food chain. Furthermore, potential environmental problems can arise should PCBs be involved in uncontrolled fire conditions. However, due to the small concentrations of PCBs in oil contaminated with PCBs, the consequences will be very much reduced compared with askarels.

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The generic term "askarels" is applied to such liquids and is used in this document for insulating liquids having PCBs as a major constituent.

## 1 Scope

This Code of Practice gives guidance to users of fully enclosed electrical equipment which is designed to be filled with oil but which may have become contaminated with PCBs.

National and Local Authority regulations (if any) take priority.

This Code of Practice is applicable to fully enclosed electrical equipment which is designed to be filled with oil but which may have become contaminated with PCBs.

This Code of Practice is applicable to electrical equipment which contains more than five litres of insulating and/or cooling liquid.

This Code of Practice gives guidance on the precautions to avoid pollution of the environment by the correct installation, maintenance, operation, storage and transportation of oil-filled electrical equipment which may be contaminated with PCBs.

This Code of Practice gives guidance on the safety precautions to be taken when handling oil which may be contaminated with PCBs, the refilling of transformers with an oil which does not contain PCBs, the disposal of waste contaminated with PCBs and on the decontamination of oil and electrical equipment.

NOTE: The principles contained within this Code of Practice may be applied or if necessary adapted to suit the appropriate circumstances where equipment is filled with insulating liquids other than oil.

## 2 Definitions

For the purposes of this Code of Practice, the following definitions apply:

### 2.1 askarels

Askarels is a generic term for low flammability insulating liquids having polychlorinated biphenyls (PCBs) as a major constituent, with or without the addition of polychlorinated benzenes.

### 2.2 askarel-filled equipment

Equipment containing askarels which is designed to be filled with askarels as the insulating and/or cooling liquid.

### 2.3 contaminated with PCBs

Having a PCB content greater than 50 mg/kg.

### 2.4 decontamination

All measures, including reclaiming or refilling, to reduce the PCB content in the oil or in equipment to a level of 50 mg/kg or lower.

### 2.5 equipment

Fully enclosed electrical equipment, except for small volume electrical equipment.

### 2.6 fully enclosed

Completely encapsulated, closed circuit equipment, not generally open to the atmosphere, but not excluding a breather or pressure relief device.

### 2.7 insulating liquid

A liquid with negligibly low electrical conductivity, used to separate conducting parts at different electrical potentials.

## 2.8 oil

Mineral insulating oil.

## 2.9 mineral insulating oil

An insulating liquid derived from petroleum crudes which are a complex mixture of hydrocarbons with small amounts of other natural chemical substances.

## 2.10 polychlorinated benzenes

An insulating and/or cooling liquid consisting of a mixture of several isomeric and homologous compounds, obtained by replacement of at least three or four atoms of hydrogen in the benzene molecule with chlorine atoms.

## 2.11 polychlorinated biphenyls (PCBs)

An insulating and/or cooling liquid consisting of a mixture of several isomeric and homologous compounds, obtained by replacement of at least two atoms of hydrogen in the biphenyl molecule with chlorine atoms.

## 2.12 reclaiming

The elimination of soluble and insoluble contaminants including PCBs from an insulating liquid by chemical absorption means, or by chemical reaction, in addition to mechanical means, in order to restore properties as close as possible to the original specification values.

NOTE: The process may include the use of antioxidants.

## 2.13 refilled equipment

Equipment which contained oil contaminated with PCBs and has been subject to refilling.

## 2.14 refilling

All operations designed to replace an insulating liquid contaminated with PCBs by a liquid not containing PCBs.

## 2.15 screening test

A field-useable test to detect the presence of PCBs in oils.

## 2.16 small volume

Not greater than five litres.



## 2.17 water systems

Systems which include:

- a) effluent systems, e.g. drains, sewers, etc.;
- b) water courses, e.g. ditches, streams, canals, rivers, lakes, etc.;
- c) water storage systems, e.g. reservoirs, etc.

## 3 Identification of insulating liquids

The normal point of identification of insulating liquids is the manufacturers rating-plate. In case of doubt, the original manufacturer may be consulted. Cases of doubt may arise if there is no rating-plate or if the contents are unknown.

There is no need for measurement of the PCB content where there is a known history, for example a known source without contamination or a record of previous analysis.

Insulating liquid may be suspected to be contaminated with PCBs from such evidence as is available, including:

- the name of the manufacturer;
- the year of manufacture;
- the type of equipment;

or such other information indicating that contamination may have occurred either during manufacturing, or operation and maintenance of the equipment.

If the insulating liquid is suspected to be contaminated with PCBs, then the PCB content *should* be measured:

- at the end of the useful life;
- before disposal;
- after an internal failure;
- in case of leakage;
- before planned replacement of insulating liquid, including repair or maintenance involving contact with the insulating liquid;
- after refilling;
- before transfer of ownership.

There is no known risk to human health or to the environment, so long as the equipment remains fully enclosed, even if the insulating liquid is contaminated with PCBs.

Screening tests are useful for the quick identification of possible contamination within certain specified levels.

More accurate standardised measurement methods may be necessary after a positive screening test. There are a number of laboratories that may be used to analyze insulating liquids which may be suspected to be contaminated with PCBs.

Where the PCB content in oil is measured to be not greater than 50 mg/kg the equipment is considered to be not contaminated with PCBs.

Where the PCB content in oil is measured to be greater than 50 mg/kg the equipment is considered to be contaminated with PCBs and the equipment *should* be labelled accordingly (see clause 5, Labelling).

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### 4 Site design and construction (standards.iteh.ai)

#### 4.1 General

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<https://standards.iteh.ai/catalog/standards/sist/3b34b040-e29e-4a13-b92a-2014-2-environment-should>

Precautions to prevent pollution of the environment *should* be taken into account at the design and construction stage (see clause 6, Pollution of the environment). For existing sites, these precautions *should* be implemented where reasonably practicable.

When the amount of oil contained in a transformer is 1000 litres or greater, adequate arrangements *should* be constructed to contain all spillage and prevent any waste products from reaching water systems.

Bunded areas *should* not be rendered ineffective by ingress of rain water.

#### 4.2 Mechanical protection

All oil-filled equipment and areas where spares are stored *should* be adequately protected against mechanical damage, e.g., by fork lift trucks, etc., if such damage is possible.

#### 4.3 Storage

Storage areas containing oil *should* not have drains which could cause pollution of the environment.

Spare oil containers and equipment containing oil in storage *should* be controlled to prevent accidental spillage.

## 5 Labelling

The following *should* be labelled:

- a) Oil-filled equipment contaminated with PCBs.
- b) Compounds containing oil-filled equipment contaminated with PCBs.
- c) Temporary storage areas containing oil-filled equipment, or oil, contaminated with PCBs.
- d) Containers containing oil contaminated with PCBs.
- e) Containers containing waste materials contaminated with PCBs.

The label *should* be indelible, durable and *should* give adequate warning and suitable emergency instructions.

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## 6 Pollution of the environment

### 6.1 General

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Liquid wastes containing oil *should* not be disposed of into any water systems. Precautions *should* be taken to avoid any spillage or leakage from gaining access to such systems. Adequate bunding of all areas containing contaminated oils is of prime importance.

There is no known risk to the environment so long as the equipment remains fully enclosed, even if the insulating liquid is contaminated with PCBs.

### 6.2 Precautions to be taken to avoid pollution of the environment when working on or handling equipment or containers of insulating liquids

In case of leakage or spillage, the insulating liquid *should* be analyzed if it is suspected to be contaminated with PCBs.

Alternatively, the insulating liquid may be considered to be contaminated with PCBs without the need for an analysis.

If the insulating liquid is either proven or suspected to be contaminated with PCBs, then the following precautions *should* be taken:

- a) Spilled oil *should* not be hosed away into water systems or normal waste channels. If spillage or leakage is found to have occurred, it *should* be absorbed using vermiculite, sand, ash, or other inert absorbent material which *should* be collected and later disposed of in an appropriate manner.