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## **Isolervätskor – Bestämning av partiklars antal och storlek**

*Insulating liquids –  
Methods for counting and sizing particles*

Som svensk standard gäller europastandarden EN 60970:2007<sup>\*)</sup>. Den svenska standarden innehåller den officiella engelska språkversionen av EN 60970:2007.

### **Nationellt förord**

Europastandarden EN 60970:2007

består av:

- **europastandardens ikraftsättningsdokument**, utarbetat inom CENELEC
- **IEC 60970, Second edition, 2007 - Insulating liquids - Methods for counting and sizing particles**

utarbetad inom International Electrotechnical Commission, IEC.

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<sup>\*)</sup>Corrigendum January 2008 till EN 60970:2007, är inarbetat i texten.

## *Standarder underlättar utvecklingen och höjer elsäkerheten*

Det finns många fördelar med att ha gemensamma tekniska regler för bl a säkerhet, prestanda, dokumentation, utförande och skötsel av elprodukter, elanläggningar och metoder. Genom att utforma sådana standarder blir säkerhetskraven tydliga och utvecklingskostnaderna rimliga samtidigt som marknadens acceptans för produkten eller tjänsten ökar.

Många standarder inom elområdet beskriver tekniska lösningar och metoder som åstadkommer den elsäkerhet som föreskrivs av svenska myndigheter och av EU.

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 60970**

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English version

**Insulating liquids -  
Methods for counting and sizing particles  
(IEC 60970:2007)**

Isolants liquides -  
Méthodes de détermination du nombre  
et de la taille des particules  
(CEI 60970:2007)

Isolierflüssigkeiten -  
Verfahren zur Bestimmung der Anzahl  
und Größen von Teilchen  
(IEC 60970:2007)

This European Standard was approved by CENELEC on 2007-08-01. 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, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the 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

The text of document 10/695/FDIS, future edition 2 of IEC 60970, prepared by IEC TC 10, Fluids for electrotechnical applications, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60970 on 2007-08-01.

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) 2008-05-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2010-08-01

Annex ZA has been added by CENELEC.

The contents of the corrigendum of January 2008 have been included in this copy.

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## Endorsement notice

The text of the International Standard IEC 60970:2007 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60422      NOTE      Harmonized as EN 60422:2006 (not modified).

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**Annex ZA**  
(normative)

**Normative references to international publications  
with their corresponding European publications**

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

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
-	-	Insulating oil - Determination of fibre contamination by the counting method using a microscope	EN 50353	- <sup>1)</sup>
IEC 60475	- <sup>1)</sup>	Method of sampling liquid dielectrics	-	-
ISO 4406	- <sup>1)</sup>	Hydraulic fluid power - Fluids - Method for coding the level of contamination by solid particles	-	-
ISO 4407	- <sup>1)</sup>	Hydraulic fluid power - Fluid contamination - - Determination of particulate contamination by the counting method using an optical microscope	-	-
ISO 5884	- <sup>1)</sup>	Aerospace - Fluid systems and components - - Methods for system sampling and measuring the solid particle contamination of hydraulic fluids	-	-

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<sup>1)</sup> Undated reference.



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## INSULATING LIQUIDS – METHODS FOR COUNTING AND SIZING PARTICLES

### 1 Scope

This standard describes the sampling procedures and methods for the determination of particle concentration and size distribution.

Three methods are specified. One uses an automatic particle size analyser, working on the light interruption principle. The other two use an optical microscope, in either the transmitted light or incident light mode, to count particles collected on the surface of a membrane filter. The optical microscope methods are described in ISO 4407.

All three methods are applicable to both used and unused insulating liquids.

Annex A contains an alternative sampling procedure using a syringe and Annex B reports a reference for the calibration of automatic particle counters.

NOTE 1 The methods are not intended to measure particulate matter in liquids containing sludge. While analysing solid content on oils containing sludge refers to method for sediment and sludge determination in IEC 60422, Annex C.

NOTE 2 The methods specified are only applicable to measurements related to a limited range of size and number.

### 2 Normative references

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

IEC 60475: *Method of sampling liquid dielectrics*

ISO 4406: *Hydraulic fluid power – Fluids – Method for coding the level of contamination by solid particles*

ISO 4407: *Hydraulic fluid power – Fluid contamination – Determination of particulate contamination by the counting method using an optical microscope*

ISO 5884: *Aerospace – Fluid systems and components – Methods for sampling and measuring the solid particle contamination of hydraulic fluids*

EN 50353: *Insulating oil – Determination of fibre contamination by the counting method using a microscope*



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