

**Textile glass reinforced plastics -
Determination of void content - Loss on
ignition, mechanical disintegration and
statistical counting methods**

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void content - Loss on ignition, mechanical
disintegration and statistical counting methods

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN ISO 7822:2000 sisaldab Euroopa standardi EN ISO 7822:1999 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 11.01.2000 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN ISO 7822:2000 consists of the English text of the European standard EN ISO 7822:1999.</p> <p>This document is endorsed on 11.01.2000 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
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<p>Käsitlusala: This standard specifies three methods for the determination of the void content of textile glass reinforced plastics or composites, of which the constituents are of a solid nature</p>	<p>Scope: This standard specifies three methods for the determination of the void content of textile glass reinforced plastics or composites, of which the constituents are of a solid nature</p>
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ICS 13.220.01, 83.120

Võtmesõnad: density (mass/volume), determination, glass reinforced plastics, plastics, tests, void fractions

ICS 13.220.00; 83.120

English version

Textile glass reinforced plastics – Determination of
void content

Loss on ignition, mechanical disintegration and statistical
counting methods
(ISO 7822 : 1990)

Plastiques renforcés de verre textile –
Détermination de la teneur en vide –
Méthodes par perte au feu, par
désintégration mécanique et par
comptage statistique
(ISO 7822 : 1990)

Textilglasverstärkte Kunststoffe –
Bestimmung der Menge vorhandener
Lunker – Glühverlust, mechanische
Zersetzung und statistische Aus-
wertungsverfahren (ISO 7822 : 1990)

This European Standard was approved by CEN on 1999-05-06.

CEN 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 CEN member.

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

CEN members are the national standards bodies of Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

CEN

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

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Foreword

International Standard

ISO 7822 : 1990 Textile glass reinforced plastics – Determination of void content – Loss on ignition, mechanical disintegration and statistical counting methods,

which was prepared by ISO/TC 61 'Plastics' of the International Organization for Standardization, has been adopted by Technical Committee CEN/TC 249 'Plastics', the Secretariat of which is held by IBN, as a European Standard.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, and conflicting national standards withdrawn, by December 1999 at the latest.

In accordance with the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard:

Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

Endorsement notice

The text of the International Standard ISO 7822 : 1990 was approved by CEN as a European Standard without any modification.

NOTE: Normative references to international publications are listed in Annex ZA (normative.)

1 Scope

This International Standard specifies three methods for the determination of the void content of textile glass reinforced plastics or composites, of which the constituents are of a solid nature.

1.1 Method A — Loss on ignition

This method is applicable to composites for which the effects of the loss on ignition test on the materials are known. Most matrix resins and textile glass fibre reinforcements fall into this class.

The method is not applicable to composites for which the effects of the loss on ignition test on the resin, the reinforcement, and any fillers are unknown. This may include silicone resins, which do not burn off completely, and fillers consisting of oxides, carbonates, etc., which may gain or lose weight. Note that separate weight loss tests on individual materials will usually, but not necessarily, give the same result as when all the materials are combined.

The accuracy of the method is $\pm 2,5$ % by volume.

1.2 Method B — Mechanical disintegration

This method is applicable if the composite can be disintegrated in such a way, for example by crushing in a press, that all the enclosed voids are connected with the outside of the composite material. The method is destructive and has limited application if the matrix material shows ductile behaviour under compression, unless it can be made more brittle in an artificial way (for example by cooling).

The method is especially suitable when the densities of the constituent materials are not known or not determinable.

The method neglects the influence of any volatile constituents that could evaporate during and after disintegration. In this connection, the conditioning shall be chosen with care. The method also does not take into account any cut or exposed voids at the surface of the sample.

The accuracy of the method is ± 1 % by volume.

1.3 Method C — Statistical counting

This method is applicable to composites having a void content less than or equal to 1 % by volume.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 291:1977, *Plastics — Standard atmospheres for conditioning and testing*.

ISO 1172:1975, *Textile glass reinforced plastics — Determination of loss on ignition*.

3 Principle

3.1 Method A — Loss on ignition

Determination of the densities of the resin, the reinforcement, filler(s) (if present) and the composite. Determination of the resin content and calculation of a theoretical composite density. Comparison with the measured composite density. The difference in densities indicates the void content.

NOTE — The density of the resin, in this method, is assumed to be the same in the composite as it is in a moulded mass. Although there is no realistic way of avoiding having to make this assumption, it is nevertheless not strictly correct. Differences in curing, heating, pressure and molecular forces arising from the reinforcement surface all make the density of the resin in the composite different from the bulk resin density.

Composites containing inorganic fillers require special care. An accurate determination of the filler content and density is required if the accuracy of this method is to be maintained.

3.2 Method B — Mechanical disintegration

Determination of the mass and volume, before and after disintegration, of a fibre reinforced plastic sample to obtain the void content by density difference.

3.3 Method C — Statistical counting

Superimposition of a square grid of 20 to 200 points on a micrographic section of the material to be tested. Statistically, the proportion of points of the grid which are superimposed on voids corresponds to the void content of the material. The counting method may be manual, or semi-automatic or automatic using suitable apparatus.