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# International Standard



# 4899

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INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

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## Textile glass reinforced thermosetting plastics — Properties and test methods

*Plastiques thermodurcissables renforcés au verre textile — Caractéristiques et méthodes d'essai*

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been authorized has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 4899 was developed by Technical Committee ISO/TC 61, *Plastics*, and was circulated to the member bodies in March 1980.

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It has been approved by the member bodies of the following countries :

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Belgium	India	Romania
Brazil	Ireland	South Africa, Rep. of
China	Israel	Spain
Czechoslovakia	Italy	Sweden
Egypt, Arab Rep. of	Japan	Switzerland
Finland	Korea, Rep. of	United Kingdom
France	Netherlands	USA
Hungary	Poland	USSR

The member bodies of the following countries expressed disapproval of the document on technical grounds :

Canada  
Germany, F. R.

# Textile glass reinforced thermosetting plastics — Properties and test methods

## 1 Scope and field of application

This International Standard establishes a list of properties, and the corresponding test methods, that permit inspection control of thermosetting plastics reinforced with textile glass.

Preferred test methods for industrial laminated sheets are given in ISO 1642, *Plastics — Industrial laminated sheets based on thermosetting resins — Specification*.

## 2 Definition

**thermosetting plastic reinforced with textile glass:** A composite material that has two essential constituents, namely a thermosetting resin (matrix) and a textile glass product (reinforcement).

## 3 Properties and test methods

### 3.1 General

**3.1.1** The characteristics considered in this International Standard concern only the basic properties of reinforced plastics. The list is not exhaustive. The choice of properties to control is a function of the ultimate application of the textile glass reinforced plastic.

**3.1.2** The choice of properties to be tested, and if necessary test specimens to be used, depends on the composition of the reinforced thermosetting plastic. This choice shall be given in the corresponding technical documents.

### 3.2 Physical properties

#### 3.2.1 Loss on ignition

To be determined in accordance with ISO 1172, *Textile glass reinforced plastics — Determination of loss on ignition*.<sup>1)</sup>

#### 3.2.2 Density

To be determined in accordance with ISO 1183, *Plastics — Methods for determining the density and relative density (specific gravity) of plastics excluding cellular plastics*.<sup>2) 3)</sup>

#### 3.2.3 Void content

(Method under study.)

## 3.3 Mechanical properties

#### 3.3.1 Tensile

To be determined in accordance with ISO 3268, *Plastics — Glass reinforced materials — Determination of tensile properties*.

#### 3.3.2 Flexure

To be determined in accordance with ISO 178, *Plastics — Determination of flexural properties of rigid plastics*.<sup>4)</sup>

#### 3.3.3 Shear

- a) Shear modulus (torsion)

To be determined in accordance with ISO 537, *Plastics — Testing with the torsion pendulum*.<sup>2)</sup>

- b) Interlaminar shear (by delamination in flexure)

(Method under study.)

- c) Plane shear

(Method under study.)

1) At present at the stage of draft. (Revision of ISO 1172-1975.)

2) This method is intended for plastics generally. Check its application to textile glass reinforced plastics; make any necessary modifications to it or reject it in favour of another method in case of incompatibility with textile glass reinforced plastics.

3) At present at the stage of draft. (Revision of ISO/R 1183-1970.)

4) At present at the stage of draft. (Revision of ISO 178-1975.)

### 3.3.4 Compression

(Method under study.)

### 3.3.5 Impact

To be determined in accordance with

ISO 179, *Plastics — Determination of Charpy impact strength of rigid materials*,<sup>1)</sup> or

ISO 180, *Plastics — Determination of Izod impact strength of rigid materials*.<sup>1)</sup>

## 3.4 Chemical properties

### 3.4.1 Cold water absorption

To be determined in accordance with ISO 62, *Plastics — Determination of water absorption*.<sup>1)</sup>

### 3.4.2 Resistance to chemical substances

To be determined in accordance with ISO 175, *Plastics — Determination of the effects of liquid chemicals, including water*.<sup>1)</sup>

### 3.4.3 Residual styrene monomer

(Method under study.)

### 3.4.4 Degree of cure by differential microcalorimetry

(Method to be studied.)

## 3.5 Electrical properties

Determination of these properties is exclusively reserved for products intended for electrical applications.

### 3.5.1 Insulation resistance

To be determined in accordance with IEC Publication 167, *Methods of test for the determination of the insulation resistance of solid insulating materials*.

### 3.5.2 Permittivity or loss factor

To be determined in accordance with IEC Publication 250, *Recommended methods for the determination of the permittivity and dielectric dissipation factor of electrical insulating*

*materials at power, audio and radio frequencies including metre wavelengths*.

### 3.5.3 Dielectric strength

To be determined in accordance with IEC Publication 243, *Recommended methods of test for electric strength of solid insulating materials at power frequencies*.

### 3.5.4 Surface resistivity

To be determined in accordance with IEC Publication 93, *Methods of test for volume resistivity and surface resistivity of solid electrical insulating materials*.

### 3.5.5 Volume resistivity

To be determined in accordance with IEC Publication 93, *Methods of test for volume resistivity and surface resistivity of solid electrical insulating materials*.

### 3.5.6 Tracking index

To be determined in accordance with IEC Publication 112, *Method for determining the comparative and the proof tracking indices of solid insulating materials under moist conditions*.

## 3.6 Thermal properties

### 3.6.1 Coefficient of linear thermal expansion

(Method to be studied.)

### 3.6.2 Torsional rigidity as a function of temperature

To be determined in accordance with ISO 458/1, *Plastics — Determination of stiffness in torsion of flexible materials — Part 1 : General method*.<sup>1) 2)</sup>

### 3.6.3 Thermal conductivity

To be determined in accordance with ISO 2582, *Cork and cork products — Determination of thermal conductivity — Hot plate method*.

### 3.6.4 Deformation due to temperature

(Method to be studied.)

1) This method is intended for plastics generally. Check its application to textile glass reinforced plastics; make any necessary modifications to it or reject it in favour of another method in case of incompatibility with textile glass reinforced plastics.

2) At present at the stage of draft. (Partial revision of ISO/R 458-1965.)

### 3.7 Behaviour with regard to fire

To be determined in accordance with ISO 1210, *Plastics — Determination of flammability characteristics of plastics in the form of small specimens in contact with a small flame.*<sup>1)</sup>

(Other methods to be studied.)

## 4 Conditioning and test temperatures

### 4.1 Conditioning

If not stated in the test method, use the conditions specified in ISO 291, *Plastics — Standard atmospheres for conditioning and testing.*

### 4.2 Test temperatures

For testing at normal laboratory temperature, use the conditions specified in ISO 291, *Plastics — Standard atmospheres for conditioning and testing.*

In all other cases, if possible choose the temperature and duration of test from those recommended in ISO 3205, *Preferred test temperatures.*

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