INTERNATIONAL STANDARD

ISO 4899

Second edition
1993-12-01

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

iTeh STANDARD PREVIEW
(standards.iteh.ai)

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

ISO 4899:1993
https://standards.iteh.ai/catalog/standards/sist/5d1de9ed-0631-49c8-aa53-dc1fa584c390/iso-4899-1993

Reference number
ISO 4899:1993(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established 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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

International Standard ISO 4899 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 13, *Composites and reinforcement fibres*.

ISO 4899:1993
https://standards.iteh.ai/catalog/standards/sist/5d1de9ed-0631-49c8-aa53-dc11a584c590/iso-4899-1993

This second edition cancels and replaces the first edition (ISO 4899:1982), which has been technically revised.

Annex A of this International Standard is for information only.

© ISO 1993
All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Organization for Standardization
Case Postale 56 • CH-1211 Genève 20 • Switzerland
Printed in Switzerland

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

1 Scope

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

2 Normative references

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 4899:1993
https://standards.iteh.ai/catalog/standards/sist/dd...-4981-...
dc1fa584c390/iso-4899-1993

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 62:1980, *Plastics — Determination of water absorption.*

ISO 75-3:1993, *Plastics — Determination of temperature of deflection under load — Part 3: High-strength thermosetting laminates and long-fibre-reinforced plastics.*

ISO 175:1981, *Plastics — Determination of the effects of liquid chemicals, including water.*

ISO 178:1993, *Plastics — Determination of flexural properties.*

ISO 179:1993, *Plastics — Determination of Charpy impact strength.*

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

ISO 472:1988, *Plastics — Vocabulary.*

ISO 537:1989, *Plastics — Testing with the torsion pendulum.*

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

ISO 1210:1992, *Plastics — Determination of the burning behaviour of horizontal and vertical specimens in contact with a small-flame ignition source.*

ISO 2582:1978, *Cork and cork products — Determination of thermal conductivity — Hot plate method.*

ISO 2859-1:1989, *Sampling procedures for inspection by attributes — Part 1: Sampling plans indexed by acceptable quality level (AQL) for lot-by-lot inspection.*

ISO 3205:1976, *Preferred test temperatures.*

ISO 3268:1978, *Plastics — Glass reinforced materials — Determination of tensile properties.*

ISO 3951:1989, *Sampling procedures and charts for inspection by variables for percent nonconforming.*

ISO 4585:1989, *Textile glass reinforced plastics — Determination of apparent interlaminar shear properties by short-beam test.*

ISO 4589:1984, *Plastics — Determination of flammability by oxygen index.*

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

ISO 8515:1991, *Textile-glass-reinforced plastics — Determination of compressive properties in the direction parallel to the plane of lamination.*

ISO 8604:1988, *Plastics — Prepregs — Definitions of terms and symbols for designations.*

IEC 93:1980, *Methods of test for volume resistivity and surface resistivity of solid electrical insulating materials.*

IEC 112:1979, *Method for determining the comparative and the proof tracking indices of solid insulating materials under moist conditions.*

IEC 167:1964, *Methods of test for the determination of the insulation resistance of solid insulating materials.*

IEC 243-1:1988, *Methods of test for electric strength of solid insulating materials — Part 1: Tests at power frequencies.*

IEC 250:1969, *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 Definitions

For the purposes of this International Standard, the definitions given in ISO 472 and ISO 8604 and the following definition apply.

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

4 Properties and test methods

4.1 General

4.1.1 The characteristics considered in this International Standard concern only the basic properties of reinforced plastics. The list is not exhaustive. The choice of properties for specification and control purposes is a function of the ultimate application. The composition of the reinforced plastic and, if necessary, the test specimens may also need to be defined.

The characteristics chosen shall be as given in the relevant technical documents.

4.1.2 The procedures for obtaining a representative sample from a batch are given in ISO 2859-1 and ISO 3951.

4.2 Physical properties

4.2.1 Loss on ignition

Determine in accordance with ISO 1172. This method only determines the loss on ignition (combustible matter content). Extra tests may be required to determine the glass and inorganic filler separately.

4.2.2 Density

Determine in accordance with method A of ISO 7822.

4.2.3 Void content

Determine in accordance with ISO 7822.

4.3 Mechanical properties

4.3.1 Tensile

Determine in accordance with ISO 3268.

4.3.2 Flexural

Determine in accordance with ISO 178.

4.3.3 Shear

4.3.3.1 Shear modulus (torsion)

Determine in accordance with ISO 537.

4.3.3.2 Interlaminar shear (by delamination in flexure)

Determine in accordance with ISO 4585.

4.3.4 Compression

Determine in accordance with ISO 8515.

4.3.5 Impact

Determine in accordance with ISO 179.

This standard includes a subclause covering reinforced plastics.

4.4 Chemical properties

The determination of the resistance of plastics to chemical attack is a complex subject. The following standards are general methods that may be used as a guide. Other test methods have been developed for specific applications as national and industry standards. No ISO standards exist for the resistance of reinforced plastics to chemical attack. Some ISO

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 4899:1993
https://standards.iteh.ai/catalog/standards/sist/3d1de9ed-0631-49c8-aa53-dc1fa584c390/iso-4899-1993

methods have been developed for plastics in general, but their applicability to reinforced plastics and composites should be confirmed in the light of the particular circumstances under consideration. Annex A includes three national standards that may be applicable.

4.4.1 Cold-water absorption

Determine in accordance with ISO 62.

4.4.2 Change in properties on exposure to chemicals

Determine in accordance with ISO 175.

4.5 Electrical properties

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

There are no ISO standards for the determination of the electrical properties of plastics; such standards are, however, published by the IEC. Clause 2 gives the IEC standards which shall be used for the determination of the characteristics which are generally required for glass-reinforced thermosetting plastics used as insulating materials, viz.:

Insulation resistance	IEC 167
Permissivity or loss factor	IEC 250
Dielectric strength	IEC 243-1
Surface resistivity	IEC 93
Volume resistivity	IEC 93
Tracking index	IEC 112

4.6 Thermal properties

4.6.1 Torsional rigidity as a function of temperature

Determine in accordance with ISO 537.

4.6.2 Thermal conductivity

Determine in accordance with ISO 2582.

4.6.3 Deformation due to temperature

Determine in accordance with ISO 75-3.

4.7 Fire behaviour

4.7.1 General

This is a complex subject with a considerable amount of national legislation to be observed. No comprehensive set of ISO standards has been developed for reinforced plastics. Some ISO standards exist for plastics in general, but their applicability to reinforced plastics and composites should be confirmed in the light of the particular circumstances under consideration.

4.7.2 Flammability

Determine in accordance with ISO 4589 or ISO 1210.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 4899:1993
https://standards.iteh.ai/catalog/standards/sist/5d1de9ed-0631-49c8-aa53-de1fa584c390/iso-4899-1993

5 Conditioning and test temperature

5.1 Conditioning

If not stated in the test method, use the conditions specified in ISO 291.

5.2 Test temperature

For testing at normal laboratory temperatures, use the conditions specified in ISO 291.

In all other cases, use as far as possible the temperature and duration of test recommended in ISO 3205.

Annex A
(informative)

Bibliography

A.1 Preferred test methods for industrial laminated sheets are given in:

ISO 1642:1987, *Plastics — Industrial laminated sheets based on thermosetting resins — Specification*

A.2 Test methods for determining the tensile properties of fibre-reinforced plastics are given in:

ISO 527-1:1993, *Plastics — Determination of tensile properties — Part 1: General principles*

ISO 527-4:—[1], *Plastics — Determination of tensile properties — Part 4: Test conditions for isotropic and orthotropic fibre-reinforced plastic composites.*

ISO 527-5:—[1], *Plastics — Determination of tensile properties — Part 5: Test conditions for unidirectional fibre-reinforced plastic composites.*

A.3 The following national standard methods may be suitable for the determination of resistance to chemical agents:

A.3.1 USA

ASTM C 581-87, *Standard practice for determining chemical resistance of thermosetting resins used in glass-fiber-reinforced structures intended for liquid service.*

ASTM D 3681-89, *Standard test method for chemical resistance of "fiberglass" (glass-fiber-reinforced thermosetting-resin) pipe in a deflected condition.*

A.3.2 Japan

Fibre reinforced thermoset resin chemical-resistant tanks — Standard 3 — Testing methods for chemical resistance of chemical resistant fibre reinforced plastics.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 4899:1993
https://standards.iteh.ai/catalog/standards/sist/5d1de9ed-0631-49c8-aa53-dc1fa584c390/iso-4899-1993

1) To be published.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
This page intentionally left blank
ISO 4899:1993
https://standards.iteh.ai/catalog/standards/sist/5d1de9ed-0631-49c8-aa53-dc1fa584c390/iso-4899-1993

© ISO

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 4899:1993
https://standards.iteh.ai/catalog/standards/sist/5d1de9ed-0631-49c8-aa53-dc1fa584c390/iso-4899-1993

UDC 678.067.5:678.072:620.1

Descriptors: plastics, glass reinforced plastics, thermosetting resins, properties, physical properties, chemical properties, electrical properties, thermodynamic properties, tests, layout.

Price based on 4 pages