

INTERNATIONAL
STANDARD

ISO
9291

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**Textile-glass-reinforced plastics —
Rovings — Preparation of unidirectional
plates by winding**

*Plastiques renforcés de verre textile — Stratifils — Préparation de plaques
unidirectionnelles par enroulement*



Reference number
ISO 9291:1996(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.

International Standard ISO 9291 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 13, *Composites and reinforcement fibres*.

Annex A of this International Standard is for information only.

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Introduction

Test specimens cut from unidirectional plates can be used to characterize the roving used; they can be used particularly for the determination of the properties listed in table 1.

Table 1 — Mechanical properties

Test	Property	Test method
3- and 4-point flexural tests	Longitudinal and transverse moduli of elasticity Longitudinal and transverse stresses	ISO 14125
Delamination	Breaking stress, by flexural rupture for example	ISO 4585
Impact (Charpy)	Impact strength	ISO 179
In tension	Longitudinal and transverse moduli of elasticity Longitudinal and transverse Poissons ratios Longitudinal and transverse stresses	ISO 527-4 ISO 527-5
In compression	Longitudinal and transverse moduli of elasticity Longitudinal and transverse stresses Longitudinal and transverse Poissons ratios	ISO 8515

When test specimens cut from such plates are not suitable for the test to be carried out, other ways of making test specimens may be used, such as that described in ISO 9163.

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Textile-glass-reinforced plastics — Rovings — Preparation of unidirectional plates by winding

1 Scope

This International Standard describes the preparation, under optimum industrial conditions, of unidirectional reinforced plates from which test specimens for various static mechanical tests can be cut.

The standard was developed for glass-reinforced plastics made of polyester or epoxy resin, but it can be extended to other types of resin and reinforcement (see annex A).

The maximum dimensions of the plates that are made are approximately length 350 mm and width 220 mm. If these dimensions are exceeded, warping or cracking may occur.

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

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

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*.

ISO 1144:1973, *Textiles — Universal system for designating linear density (Tex System)*.

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

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

ISO 9163:1996, *Textile glass — Rovings — Manufacture of test specimens and determination of tensile strength of impregnated rovings*.

ISO 14125:—¹⁾, *Fibre-reinforced plastic composites — Determination of flexural properties*.

3 Principle

A roving (or assembly of rovings) impregnated with resin is wound in several successive layers on to a former.

The final thickness of the winding is defined by placing flat lids over each face of the former. The winding is then cured either in a heated platen press or by heating in an oven with the lids clamped in place.

This method enables two similar plates to be prepared simultaneously.

1) To be published.