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Plastics — Glass-reinforced materials — Determination of tensile properties

Plastiques — Matières renforcées au verre textile — Détermination des caractéristiques en traction

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FOREWORD

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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 3268 was developed by Technical Committee ISO/TC 61, *Plastics*, and was circulated to the member bodies in May 1974.

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

Austria	India	Sweden
Belgium	Iran	Thailand
Brazil	Ireland	Turkey
Canada	Israel	United Kingdom
Chile	Italy	U.S.A.
Egypt, Arab Rep. of	Netherlands	U.S.S.R.
France	Poland	Yugoslavia
Germany	Romania	
Hungary	Spain	

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

Czechoslovakia
Switzerland

Plastics — Glass-reinforced materials — Determination of tensile properties

1 SCOPE AND FIELD OF APPLICATION¹⁾

1.1 This International Standard specifies a method of determining certain tensile properties of textile-glass-reinforced plastics.

The method is applicable to both reinforced thermosetting resins and reinforced thermoplastics.

Injection-moulded test specimens made from reinforced thermoplastics are subject to fibre orientation, and may give values that are untypically high; however, they may be used if other methods of specimen preparation are impracticable.

1.2 The method specifies the determination of the following tensile properties :

- the initial tangent modulus of elasticity and the tensile secant modulus of elasticity;

NOTE — When it is not possible to determine the initial tangent modulus of elasticity, the tensile secant modulus of elasticity at 0,1 % strain is determined.

- the maximum tensile stress;

NOTE — If there is a clean break, the maximum tensile stress is the tensile stress at break; in other cases, it is the tensile stress corresponding to the maximum force.

- the percentage elongation at maximum force and the percentage elongation at break, as applicable.

NOTE — The force/elongation curves at different temperatures, degrees of humidity and rates of strain yield useful information concerning the behaviour of the materials.

1.3 It is only possible to obtain comparable values between different materials if identical test specimens are used. These should also be tested under well-defined conditions of pre-treatment, temperature, humidity and rate of strain.

1.4 Finally, it is the aim of this method to obtain tensile results that can be used for either

- routine quality control, or
- preparation of specifications for materials.

2 REFERENCES

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

ISO 1268, *Plastics — Preparation of glass fibre reinforced, resin bonded, low-pressure laminated plates or panels for test purposes.*

ISO 2602, *Statistical interpretation of test results — Estimation of the mean — Confidence interval.*

3 DEFINITIONS

3.1 tensile stress : The tensile force per unit area of original cross-section within the narrow parallel portion, carried by the test specimen at any moment.

3.2 percentage elongation : The increase in the distance between reference marks on the narrow parallel portion of the test specimen, due to a tensile force, and expressed as a percentage of the initial distance between the reference marks.

3.3 elastic modulus : The ratio of stress to corresponding strain within the range of the greatest stress that the material is capable of sustaining without any deviation of proportionality of stress to strain, i.e. the slope of the force/strain curve obtained in the tensile test. In the portion of the curve beyond the limit of proportionality, or if the limit does not exist, it is possible to determine the following moduli :

3.3.1 initial tangent modulus : The slope of the tangent of the force/strain curve at its origin.

NOTE — With some testing machines, the curves show local divergences at the origin, which make it impossible to draw the tangent. If this occurs, it is necessary to adjust the position of the origin on the elongation axis (see figure 1).

3.3.2 secant modulus at x % strain : The slope of the straight line passing through the origin (corrected, if necessary, as described in 3.3.1) of the force/strain curve and the point on the curve corresponding to an apparent strain of x %.

¹⁾ A new document for the testing of roving laminates (unidirectional) is under study and when completed will be integrated into this International Standard.