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Reinforced plastics composites — Specifications for pultruded profiles — Part 3: Specific requirements

Verstärkte Kunststoffverbundwerkstoffe — Spezifikationen für pultrudierte Profile — Teil 3: Besondere Anforderungen

Composites en plastiques renforcés — Spécifications pour les profilés pultrudés — Partie 3: Exigences spécifiques

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Foreword

This document has been prepared by CEN /TC 249, "Plastics".

This document is currently submitted to the Formal Vote.

EN 13706 consists of the following parts, under the general title *Reinforced plastics composites - Specifications for pultruded profiles*.

- *Part 1 : Designation*
- *Part 2 : Methods of tests and general requirements*
- *Part 3 : Specific requirements*

Annexes A to E of Part 2 are normative and Annexes F and G are informative.

1 Scope

1.1 This Part 3 of EN 13706 defines the specification of pultruded profiles. The specification defines those properties, which shall be specified and the level to be obtained for each grade of profile.

1.2 The specification defines grades where the short-form code, Exx, is related to the Effective Flexural Modulus of the profile measured by testing a length of the full section.

Two grades; E23 and E17 are defined.

NOTE Other grades may be introduced at future revisions of the standard.

1.3 The properties, that shall be achieved for each class of profile are given in Table 1. Other properties that may be reported are listed in Table 2.

1.4 Test methods to be used to show properties related to the suitability of the profile for specific applications are referenced in clause 4.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN ISO 527-4, *Plastics - Determination of tensile properties - Part 4: Test condition for isotropic and anisotropic fibre-reinforced plastics composites.*

EN ISO 2818, *Plastics – Preparation of test specimens by machining.*

EN ISO 14125, *Plastic - Fibre reinforced plastics composites - Determination of flexural properties.*

EN ISO 14126, *Plastic - Fibre reinforced plastics composites - Determination of compressive properties in the in-plane direction.*

EN ISO 14130, *Plastic - Fibre reinforced plastics composites - Determination of apparent inter-laminar shear by short beam method.*

ISO 472, *Plastics- Vocabulary.*

ISO 1172, *Textile glass reinforced plastics - Determination of loss on ignition.*

ISO 1183, *Plastics- Methods for determining the density and relative density of non-cellular plastics.*

ISO 1268-6, *Fibre reinforced plastics – Methods for producing test plates - Part 6: Pultrusion moulding.*

ISO 5893, *Rubber and plastics test equipment tensile flexural and compression types (constante note of traverse) – Description.*

ISO 11359-2, *Plastics - Thermomechanical analysis (TMA) - Part 2: Determination of coefficient of linear expansion and glass transition temperature.*

ISO 15310, *Plastic - Fibre reinforced plastics composites - Determination of in-plane shear modulus by plate-twist.*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given clause 3 of EN 13706-2 apply.

4 Specification

4.1 Obligatory specified properties

For each grade of pultrusion profile manufactured in accordance with this specification the manufacture shall meet the requirements for all the properties included in Table 1.

Measurement of the property requirement 1.1 in Table 1 is undertaken on a test length of the full section of the profile but is not applicable to solid, flat sections. Measurement of the property requirements in 1.2 to 1.10 in Table are undertaken using coupons cut from the profile or from a test plate prepared according to clause 6 of EN 13706-2.

4.2 Other properties which may be reported

Other properties of the profile, which may be reported but are not required to be specifically controlled are given in Table 2.

4.3 Specific performance properties

Pultruded profiles under this specification may be required to meet specific performance criteria. Unless otherwise specified, the test methods given in Table F.1 to F.4 in Annex F of EN 13706-2 are recommended. Annex G of EN 13706-2 allows flexural, shear and torsion data to be obtained for the full profile.

4.4 Other requirements

Profiles manufactured according to this specification shall comply fully with clause 4 of EN 13706-2.

Table 1 — Minimum properties that are required for each grade

	Property	Unit	Test method	Minimum Properties	
				E23 Grade	E17 Grade
1.1	Full section test	GPa	Annex D, EN 13706-2	23	17
1.2	Tension modulus-axial	GPa	EN ISO 527-4	23	17
1.3	Tension modulus-transverse	GPa	EN ISO 527-4	7	5
1.4	Tension strength-axial	MPa	EN ISO 527-4	240	170
1.5	Tension strength-transverse	MPa	EN ISO 527-4	50	30
1.6	Pin-bearing strength-axial	MPa	Annex E, EN 13706-2	150	90
1.7	Pin-bearing strength-transverse	MPa	Annex E, EN 13706-2	70	50
1.8	Flexural strength – axial	MPa	EN ISO 14125	240	170
1.9	Flexural strength – transverse	MPa	EN ISO 14125	100	70
1.10	Interlaminar shear strength-axial	MPa	EN ISO 14130	25	15

Table 2 — Material properties that may be reported

	Property	Unit	Test method
2.1	Compression strength-axial	MPa	EN ISO 14126
2.2	Compression strength-transverse	MPa	EN ISO 14126
2.3	Fibre content by weight	%	ISO 1172 (glass-fibre systems)
2.4	Density	kg/m ³	ISO 1183
2.5	Poisson's Ratio-axial		EN ISO 527-4
2.6	Poisson's Ratio-transverse		EN ISO 527-4
2.7	Thermal expansion-axial	10 ⁻⁶ /°C	ISO 11359-2
2.8	Thermal expansion-transverse	10 ⁻⁶ /°C	ISO 11359-2
2.9	In-plane shear modulus	GPa	ISO 15310