Nederlandse voornorm

NVN-ENV 1007-6 (en)

Technische keramiek - Keramische composieten - Beproevingsmethoden voor versterkingen - Deel 6: Bepaling van trekeigenschappen van filament bij hoge temperatuur

Advanced technical ceramics - Ceramic composites - Methods of test for reinforcements - Part 6: Determination of tensile properties of filament at high temperature

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Als Nederlandse voornorm is aanvaard:
- ENV 1007-6:2002,IDT

Normcommissie 310 032 "Technische keramiek"

NEN

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Nederlands voorwoord

Voor de in deze voornorm vermelde normatieve verwijzingen bestaan in Nederland de volgende equivalenten:

vermelde norm	Nederlandse norm	titel
ENV 843-5	NVN-ENV 843-5	Technische keramiek - Keramische monolieten - Mechanische eigenschappen bij kamertemperatuur - Deel 5: Statistische analyse (en)
ENV 1007-3	NVN-ENV 1007-3	Technische keramiek - Keramische composieten - Beproevingsmethoden voor versterkingen - Deel 3: Bepaling van de middellijn van de vezels (en)
ENV 1007-4	NVN-ENV 1007-4	Technische keramiek - Keramische composieten - Beproevingsmethoden voor versterkingen - Deel 4: Bepaling van de trekeigenschappen van vezels bij omgevingstemperatuur (en)
EN 10002-2	-	-
EN 60584-1	NEN 10584-1	Thermokoppels - Deel 1: Referentietabellen (en,fr)
EN 60584-2	NEN 10584-2	Thermokoppels - Deel 2: Toleranties in meetwaarden (en,fr)

EUROPEAN PRESTANDARD

PRÉNORME EUROPÉENNE

EUROPÄISCHE VORNORM

ENV 1007-6

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English version

Advanced technical ceramics - Ceramic composites - Methods of test for reinforcements - Part 6: Determination of tensile properties of filament at high temperature

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Ref. No. ENV 1007-6:2002 E

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Foreword

This European Prestandard (ENV 1007-6:2002) has been prepared by Technical Committee CEN/TC 184 "Advanced technical ceramics", the secretariat of which is held by BSI.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this European Prestandard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Prestandard specifies the conditions for measurement of tensile properties of single filament of ceramic fibres at high temperature in air or inert atmosphere (vacuum or controlled atmosphere). The method applies to continuous ceramic filaments taken from tows, yarns, staple fibre, braids and knitting, which have strain to fracture less or equal to 5 % and show linear elastic behaviour to fracture.

The method does not apply to testing for homogeneity of strength properties of fibres, nor to assess the effects of volume under stress. Statistical aspects of fibre failure are not included.

Two methods are proposed depending on the temperature of the filament end :

— Hot end method.

NOTE Current experience with this technique is limited to 1300 °C, because of the application temperature of ceramic glue.

This method allows determination of tensile strength, of Young's modulus and of the stress strain curve.

— Cold end method.

NOTE This method is limited to 1700 °C in air and 2000 °C in inert atmosphere because of the limits of furnaces.

2 Normative references

This European Prestandard 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 Prestandard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

ENV 843-5, *Advanced technical ceramics – Monolithic ceramics – Mechanical tests at room temperature – Part 5 : Statistical analysis.*

ENV 1007-3, *Advanced technical ceramics - Ceramic composites - Methods of test for reinforcements Part 3 : Determination of filament diameter.*

EN 1007-4, *Advanced technical ceramics - Ceramic composites - Methods of test for reinforcements Part 4 : Determination of tensile properties of filament at ambient temperature.*

EN 10002-2, *Metallic materials – Tensile testing – Part 2 : Verification of the force measuring system of the tensile testing machine.*

EN 60584-1, *Thermocouples – Part 1 : Reference tables.*

EN 60584-2, *Thermocouples - Part 2 : Tolerances.*

3 Principle

A ceramic filament is heated to the test temperature and loaded in tension. The test is performed at constant force/displacement rate up to failure. Force and cross-head displacement are measured and recorded simultaneously. When required, the elongation is derived from the cross-head displacement using a compliance correction. The test duration is limited to reduce time dependent effects.

Subjecting the whole length of a fibre to temperatures well above 1000 °C makes it difficult to fix the ends of the specimen into appropriate temperature proof extensions. In high temperature cold-end tests this problem is avoided by keeping the junction at the ends of the test specimen at room temperature, allowing organic resins to be used like in the room temperature tests (EN 1007-4).

Two methods can thus be used :

— one consists of heating the filament over its total length (hot end method) ;

— the other one consists of heating only the central part of the filament (cold end method).

4 Definitions and symbols

For the purposes of this European Prestandard, the following definitions and symbols apply.

4.1
test temperature, T
temperature of the filament at the centre of the gauge length

4.2
Lengths

4.2.1
lauge length, L_o
initial distance between two reference points on the filament. The temperature variation in the gauge length shall be within 20 °C at test temperature

4.2.2
test specimen length, L_f
initial distance between the gripped ends of the filament

4.2.3
uniformly heated length, L_h
length of the heated zone at the test temperature, where the temperature variation is within 20 °C (see Figure 2 Appendix A)

4.2.4
gradient zone length, L_d
length of each part of the test specimen where the temperature decreases from the temperature at the end of the uniformly heated length to room temperature (see Figure 2 Appendix A)

4.2.5
room temperature zone length, Lc
length of each part of the test specimen where the temperature is equal to room temperature

4.3
initial cross section area A_o
initial cross section area of the filament within the gauge length determined at room temperature

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