BS EN 16245-4:2013

BSI Standards Publication

Fibre-reinforced plastic composites — Declaration of raw material characteristics

Part 4: Specific requirements for fabrics

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National foreword

This British Standard is the UK implementation of EN 16245-4:2013.

The UK national committee is of the opinion that, in all parts of EN 16245, the use of the terms "guaranteed minimum value" and "guaranteed maximum value" is not appropriate within a voluntary-based standard. Furthermore, the absolute "minimum value" and "maximum value" cannot be determined practicably, so that "statistical minimum value" (defined in EN 16245-1) and "statistical maximum value" (calculated in a similar manner using maximal values) are preferred.

The UK participation in its preparation was entrusted to Technical Committee PRI/42, Fibre reinforced thermosetting plastics and prepregs.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Fibre-reinforced plastic composites - Declaration of raw material characteristics - Part 4: Specific requirements for fabrics

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Faserverstärkte Verbundwerkstoffe - Angabe von Werkstoffeigenschaften - Teil 4: Spezifische Anforderungen an Gewebe

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Foreword

This document (EN 16245-4:2013) has been prepared by Technical Committee CEN/TC 249 “Plastics”, the secretariat of which is held by NBN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2013, and conflicting national standards shall be withdrawn at the latest by October 2013.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

EN 16245 consists of the following parts, under the general title *Fibre-reinforced plastic composites — Declaration of raw material characteristics*:

— *Part 1: General requirements*

— *Part 2: Specific requirements for resin, curing systems, additives and modifiers*

— *Part 3: Specific requirements for fibre*

— *Part 4: Specific requirements for fabrics*

— *Part 5: Specific requirements for core materials*

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This part of this European Standard specifies the minimum information to be declared for fabrics to be used for the manufacturing of composites products, also impregnated products, but not to the composite products or impregnated products themselves.

These specific declaration requirements are in addition to the general requirements given in Part 1 of this standard (i.e. EN 16245-1).

This document includes requirements for the Certificate of Analysis (CoA). The purpose of the CoA is to verify that material properties and quality conform to the declared values.

This part of the standard is applicable to uni-axial and multi-axial fabric material.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 13473-1, *Reinforcement — Specifications for multi-axial multi-ply fabrics — Part 1: Designation*

EN 13473-2, *Reinforcement — Specifications for multi-axial multi-ply fabrics — Part 2: Methods of test and general requirements*

EN 16245-1:2013, *Fibre-reinforced plastic composites — Declaration of raw material characteristics — Part 1: General requirements*

EN 16245-3, *Fibre-reinforced plastic composites — Declaration of raw material characteristics — Part 3: Specific requirements for fibre*

EN ISO 291, *Plastics — Standard atmospheres for conditioning and testing (ISO 291)*

EN ISO 1889, *Reinforcement yarns — Determination of linear density (ISO 1889)*

EN ISO 3344, *Reinforcement products — Determination of moisture content (ISO 3344)*

EN ISO 4921, *Knitting — Basic concepts — Vocabulary (ISO 4921)*

ISO 1887, *Textile glass — Determination of combustible-matter content*

ISO 3374, *Reinforcement products — Mats and fabrics — Determination of mass per unit area*

ISO 5025, *Reinforcement products — Woven fabrics — Determination of width and length*

3 Terms and definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1.1
fabric
material constructed of interlaced yarns, fibres, or filaments, usually a planar structure

Note 1 to entry: Nonwovens can be included in this classification.

3.1.2
structural fibre
load carrying fibre in the fabric

3.2 Abbreviated terms

UD	uni-axial, fibres in one direction
BIAX	bi-axial, fibres in two directions
TRIAX	three-axial, fibres in three directions
QUADRIAX	four-axial, fibres in four directions

4 Content of a declaration

A declaration for the fabrics shall consist of information according to Clause 5 of EN 16245-1:2013 and Clause 5 of this standard.

5 Specific declaration requirements

5.1 General

The specific requirements for fabrics are given below.

All declaration requirements, i.e. the general information according to EN 16245-1 and the specific declaration requirements according to this part (i.e. EN 16245-4), and application dependant requirements as agreed between manufacturer/supplier and customer shall be declared by the supplier as information to the customer, and the following apply:

— if the property given has reference to a test method standard or test method, this test method standard or test method shall be used;

— the values given shall be in accordance with the test method standard given;

— if the test environment is not clearly stated in the specific test method standard, the standard atmosphere conditioning and testing shall be carried out in accordance with EN ISO 291;

— the manufacturer shall be responsible for the performance and results of all tests required for the declaration.

5.2 Declaration for fabrics with continuous fibre

5.2.1 Declaration for uni-axial and multi-axial fabrics

5.2.1.1 Properties of fabrics

The specific declaration requirements for fabrics are listed below. The declaration including tolerances shall be given in accordance with the test method standards stated in Table 1.

The following specific declaration requirements a) to k) apply for all fabrics independent of application:

a) identification (name/number/code used by the manufacturer for identification purposes);

   1) Products with equal identification shall have identical processing cards (i.e. fabrication specification, thread tension, knitting/stitching pattern, etc.).

b) fabric type (e.g. UD, BIAX, QUADRIAX);

c) fibre orientations (layer number one facing inwards against the centre of the roll) [°];

d) total nominal area weight [g/m^2];

e) dimensions (length and width) [mm];

f) defects;

g) moisture content [%];

h) loss of ignition;

i) core tube inner diameter [mm];

j) expiry date;

   1) The expiry date of the fabric is generally equal to the expiry date of the constituent sized fibre specified by the fibre manufacturer/supplier.

   2) If the fabric manufacturer/supplier applies size or other material affecting the expiry date of the fabric, this shall be taken into account.

k) marking.

The requested content of a Certificate of Analysis (CoA) verifies that the properties of the delivered fabric material comply with the declared properties based on Table 1. The CoA shall be given in accordance with Clause 6 in EN 16245-1:2013.

Table 1 — Material declaration of fabrics physical properties relevant for CoA

Ref. no 5.2.1.1	Property	Nominal value	Minimum and/or maximum value	Unit	Test method
c)	Fibre orientations	Mean value	Minimum and maximum value	°	EN 13473-1
d)	Total nominal area weight	Mean value	Minimum and maximum value	g/m^2	EN 3374
e)	Dimensions	Mean value	Minimum and maximum value	mm	ISO 5025
f)	Defects	Mean value	Minimum and maximum value		EN 13473-2
g)	Moisture content	Mean value	Minimum and maximum value	%	EN ISO 3344
h)	Loss of ignition	Mean value	Minimum and maximum value		ISO 1887

5.2.1.2 Properties of structural fibre

The structural fibres used in the fabric shall be declared according to EN 16245-3.

The fabric specific declaration requirements for structural fibres are listed below. The declaration including tolerances shall be given in accordance with the test method standards stated in Table 2.

The following specific declaration requirements a) to j) apply for all structural fibres independent of application:

a) identification (fibre name/number/code used by the fibre manufacturer for identification purposes);

b) layer number;

   1) The actual layer number where the fibre is used in the fabric.

   2) Layer number one is facing inwards on the roll.

c) fibre manufacturer;

d) fibre material type (e.g. glass, carbon, thermoplastics);

e) orientation, see 5.2.1.1 c);

f) linear density [g/km (=tex)];

g) area weight (the area weight of the structural fibres in respective orientation and layer) [g/m^2];

h) size type and identification;

   1) Reference to the size type and identification of the fibre manufacturer shall be given.

i) size content [wt%];

j) maximum gap between fibre bundles measured at stitch/knit point [mm].

The requested content of a Certificate of Analysis (CoA) verifies that the properties of the delivered structural fibre material comply with the declared properties based on Table 2. The CoA shall be given in accordance with Clause 6 in EN 16245-1:2013.

Table 2 — Material declaration of structural fibre physical properties relevant for CoA

Ref. no 5.2.1.2	Property	Nominal value	Minimum and/or maximum value	Unit	Test method
f)	Linear density	Mean value	Minimum and maximum value	g/km =tex	EN ISO 1889
g)	Area weight for each layer	Mean value	Minimum and maximum value	g/m^2	Process card
i)	Size content	Mean value	Minimum and maximum value	wt%	
j)	Max gap between fibre bundles	Mean value	Minimum and maximum value	mm	

5.2.1.3 Properties of stabilising/support material

The specific declaration requirements for stabilising/support material are listed below. The declaration including tolerances shall be given in accordance with the test method standards stated in Table 3.

The following specific declaration requirements a) to h) apply for all stabilising/support material independent of application:

a) material identification (name/number/code for identification purposes);

b) manufacturer of stabilising/support material;

c) material type and process if applicable (e.g. glass, carbon, thermoplastics, powder);

d) orientation (if applicable);

e) linear density [g/km (=tex)];

f) area weight [g/m^2];

g) size type and identification;

   1) Reference to the size type and identification of the fibre manufacturer shall be given.

h) size content [wt%].

The requested content of a Certificate of Analysis (CoA) verifies that the properties of the delivered stabilising/support material comply with the declared properties based on Table 3. The CoA shall be given in accordance with Clause 6 in EN 16245-1:2013.

Table 3 — Material declaration of stabilising/support material physical properties relevant for CoA

Ref. no 5.2.1.3	Property	Nominal value	Minimum and/or maximum value	Unit	Test method
e)	Linear density	Mean value	Minimum and maximum value	g/km =tex	EN ISO 1889
f)	Area weight	Mean value	Minimum and maximum value	g/m^2	Process card
h)	Size content	Mean value	Minimum and maximum value	wt%	If sized by fabric manufacturer

5.2.1.4 Properties of assembly material/method

The specific declaration requirements for assembly material/method are listed below. The requirements shall be given in accordance with the test method standards stated in Table 4 and including the tolerances.

The following specific declaration requirements a) to j) apply for all assembly material/method independent of application:

a) material identification;

   1) If the setup or production machine have any influence on the product it shall be identified by the identification.

b) manufacturer of assembly material;

c) fabric assembly method (e.g. adhesive, knitting, stitching);

d) assembly material type (e.g. polyester yarn, thermoplastic adhesive);

e) orientation (if applicable);

f) linear density [g/km (=tex)];

g) area weight (weight of the assembly material only) [g/m^2];

h) assembly stitching or knitting pattern;

i) stitch or knit length [mm];

NOTE 1 Defined as the distance between individual needle travel from stitch point to stitch point along the length of the reinforcement.

j) space between stitches/needles (gauge) [mm].

NOTE 2 Defined as the distance between the individual needles along the width of the reinforcement.

The requested content of a Certificate of Analysis (CoA) verifies that the properties of the delivered assembly material/method comply with the declared properties based on Table 4. The CoA shall be given in accordance with Clause 6 in EN 16245-1:2013.

Table 4 — Material declaration of assembly material physical properties relevant for CoA

Ref. no 5.2.1.4	Property	Nominal value	Minimum and/or maximum value	Unit	Test method
f)	Linear density	Mean value	Minimum and maximum value	g/km =tex	EN ISO 1889
g)	Area weight	Mean value	Minimum and maximum value	g/m^2	Process card
h)	Assembly stitching/knitting pattern	Mean value	Minimum and maximum value		EN ISO 4921
i)	Stitch/knit length	Mean value	Minimum and maximum value	mm	Process card
j)	Space between stitches/needles	Mean value	Minimum and maximum value	mm	Process card

5.2.2 Declaration for woven roving fabric

To be specified in later revision of this standard.

5.3 Declaration for fabrics with discontinuous fibre

To be specified in later revision of this standard.

5.4 Declaration for additional process/material

The specific declaration requirements for additional process/material are listed below. The requirements shall be given in accordance with the test method standards stated in Table 5 and including the tolerances.

The following specific declaration requirements a) to d) apply for all additional process/material independent of application:

a) additional material identification (name/number/code for material identification purposes);

b) additional material type;

NOTE 1 Defines the type of the additional material (e.g. urethane, polyester, glass). Information about orientation will be given if applicable.

c) additional process;

NOTE 2 This is a process affecting the fabric, such as toughting, Z-pinning, sizing, etc.

If size is applied to the fabric by the fabric manufacturer or supplier, the fabric manufacturer/supplier will declare this size type and content according to the requirements given in EN 16245-3.

d) additional area weight [g/m^2].

NOTE 3 The area weight of additional material applied to the fabric only (individual materials). In the case of multiple additional materials, all will be defined separately.

The requested content of a Certificate of Analysis (CoA) verifies that the properties of the delivered additional material comply with the declared properties based on Table 5. The CoA shall be given in accordance with Clause 6 in EN 16245-1:2013.

Table 5 — Material declaration of additional material physical properties relevant for CoA

Ref. no 5.4	Property	Nominal value	Minimum and/or maximum value	Unit	Test method
c)	Size content	Mean value	Minimum and maximum value	wt%	
d)	Area weight	Mean value	Minimum and maximum value	g/m^2	Process card

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[1] EN ISO 10548, *Carbon fibre — Determination of size content (ISO 10548)*

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