BRITISH STANDARD

BS EN
14889-1:2006

Fibres for concrete —

Part 1: Steel fibres — Definitions, specifications and conformity

The European Standard EN 14889-1:2006 has the status of a British Standard

ICS 91.100.30

BSI
British Standards

National foreword

This British Standard was published by BSI. It is the UK implementation of EN 14889-1:2006.

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A list of organizations represented on B/517/11 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.

Compliance with a British Standard cannot confer immunity from legal obligations.

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Fibres pour béton - Partie 1 : Fibres d'acier - Définitions, spécifications et conformité

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This European Standard was approved by CEN on 26 June 2006.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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Foreword

This document (EN 14889-1:2006) has been prepared by Technical Committee CEN/TC 104 “Concrete and related products”, the secretariat of which is held by DIN. It has been developed by working group 11, “Fibres for concrete”, the secretariat of which is held by BSI.

This standard comprises two parts:

Part 1 dealing with steel fibres for concrete;

Part 2 dealing with polymer fibres.

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of an identical text or by endorsement, at the latest by February 2007, and conflicting national standards shall be withdrawn at the latest by May 2008.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of the Construction Products Directive.

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

This European Standard should be given the status of a national standard.

No existing European Standard is superseded.

Not all fibre characteristics that may be relevant to the performance of a fibre concrete, structural or non-structural, such as early age effects, creep and chemical attack, have been addressed in this standard due to the difficulties of formulating meaningful and reproducible standardised test methods.

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

1 Scope

This Part 1 of EN 14889 specifies requirements for steel fibres for structural or non-structural use in concrete, mortar and grout.

NOTE Structural use of fibres is where the addition of fibres is designed to contribute to the load bearing capacity of a concrete element. This standard covers fibres intended for use in all types of concrete and mortar, including sprayed concrete, flooring, precast, in-situ and repair concretes.

2 Normative references

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

EN 10002-1, *Metallic materials – Tensile testing – Part 1: Method of test at ambient temperature*

EN 10218-1, *Steel wire and wire products - General – Part 1: Test methods*

EN 12350-3, *Testing fresh concrete - Part 3: Vebe test*

prEN 14845-1, *Test methods for fibres in concrete – Part 1: Reference concretes*

EN 14845-2, *Test methods for fibres in concrete - Part 2: Effect on concrete*

3 Terms and definitions

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

3.1
steel fibres
straight or deformed pieces of cold-drawn steel wire, straight or deformed cut sheet fibres, melt extracted fibres, shaved cold drawn wire fibres and fibres milled from steel blocks which are suitable to be homogeneously mixed into concrete or mortar

3.2
length
distance between the outer ends of the fibre

3.2.1

developed length (for deformed fibres with irregular cross section)
length of the deformed fibres after straightening the fibre without deforming the cross section

3.3
equivalent diameter
diameter of a circle with an area equal to the mean cross sectional area of the fibre. For circular fibres, the equivalent diameter is equal to the diameter of the fibres

3.4
aspect ratio
ratio of length (l) to equivalent diameter of the fibre

3.5
fibre shape
specific outer configuration of the fibres, both in the longitudinal direction and in the shape of the cross section and also the possible surface coatings and/or bundling of fibres

3.6
tensile strength of fibre
stress corresponding to the maximum force a fibre can resist. The tensile strength is calculated by dividing the maximum force a fibre can resist by the mean cross sectional area of the fibre

3.7
residual flexural strength
notional stress at the tip of the notch which is assumed to act in an uncracked mid-span section, with linear stress distribution, of a prism subjected to the centre-point load F_j corresponding to $CMOD_j$ where $CMOD_j > CMOD_{FL}$; or to δ_j where $\delta_j > \delta_{FL}$ (j = 1,2,3,4)

3.8
crack mouth opening displacement (CMOD)
linear displacement measured by a transducer installed on a prism subjected to a centre-point load F

3.9
elastic modulus
initial slope of the tensile stress versus tensile strain curve

3.10
declared value
value for a product property, determined in accordance with this standard, that a manufacturer is confident of achieving within the given tolerances taking into account the variability of the manufacturing process

4 Symbols

Symbols used in this part of this standard are defined as follows:

A area of the cross section of the fibre, in mm^2;

d diameter or equivalent diameter of the fibre, in mm;

R_m tensile strength of the fibre, in MPa;

l length of the fibre, in mm;

l_d developed length of the fibre in mm;

m mass of the fibre in g;

λ = l / d and is the aspect ratio of the fibre;

ρ density of steel in kg/m³.

5 Requirements

5.1 General

The steel fibres shall conform to one of the groups or one of the shapes listed below:

a) group

Steel fibres shall be classified into one of the following groups, in accordance with the basic material used for the production of the fibres.

Group I : cold-drawn wire

Group II : cut sheet

Group III : melt extracted

Group IV : shaved cold drawn wire

Group V : milled from blocks

b) Shape

Fibres shall be either straight or deformed. The manufacturer shall declare the shape of the fibre. The control and tolerances on the shape shall be specified for each different shape separately, and may be performed using optical equipment.

When applicable, the type of bundling shall be declared.

When steel fibres are supplied with a coating (e.g. zinc coating), the type and characteristic quantity in g/m² shall be declared. The control of the quantity shall be a function of the type of coating and shall be declared by the manufacturer.

5.2 Dimensions and tolerances

5.2.1 General

For fibres of group I and II, the length, equivalent diameter and aspect ratio shall be declared. The tolerances shall be as given in Table 1. Specimens of fibres, when sampled in accordance with 6.2.2 and measured in accordance with 5.2.2 and 5.2.3 shall not deviate from the declared value by more than the tolerances given in Table 1. At least 95 % of the individual specimens shall meet the specified tolerances in both cases.

For fibres of group III, IV and V, the range of lengths, equivalent diameters and aspect ratio's shall be declared. Specimens of fibres, when sampled in accordance with 6.2.2 and measured in accordance with 5.2.2 and 5.2.3 shall be within the specified range. At least 90 % of the individual specimen fibres shall meet the specified tolerances in both cases.

Table 1 — Tolerances on fibre length and diameter

Property	Symbol	**Deviation of the individual value relative to the declared value**	**Deviation of the average value relative to the declared value**
Length and developed length >30 mm ≤ 30 mm	***l*** **,** ***l*****$_d$** **(if applicable)**	± 10 %	 ± 5 % ± 1,5 mm
(Equivalent) diameter >0,30 mm ≤ 0,30 mm	*d*	± 10 %	 ± 5 % ± 0,015 mm
Length/diameter ratio	λ	± 15 %	± 7,5 %

5.2.2 Determination of length

The length shall be measured with a marking gauge (callipers) with an accuracy of 0,1 mm.

In the case of an irregular cross section, the developed length of the fibre shall also be determined to calculate the equivalent diameter. If straightening of the fibre is necessary, it shall be done by hand or, if this is not possible, by hammering on a level of wood, plastic material or copper using a hammer of similar material. During the straightening the cross section should not be changed.

5.2.3 Determination of (equivalent) diameter

5.2.3.1 Round wire fibres

The diameter of the fibre shall be measured with a micrometer, in two directions, approximately at right angles, to an accuracy of 0,01 mm. The fibre diameter shall be the mean of the two diameters.

5.2.3.2 Rectangular fibres

The width (w) and thickness (t) of the fibres shall be measured with a micrometer with an accuracy of 0,01 mm.

The equivalent diameter (d) is calculated as $\sqrt{\frac{4.w.t}{\pi}}$

5.2.3.3 Fibres with irregular cross section

The mass (m) and the developed length (l_d) of the fibre shall be determined. The mass shall be determined to an accuracy of 0,001 g. The equivalent diameter is computed from the mass and the developed length using the following formula:

$$d = \sqrt{\frac{4.m.10^6}{\pi.l_d.\rho}}$$

nominal density ρ of mild steel may be taken as 7850 kg/m³

nominal density ρ of stainless steel may be taken as 7950 kg/m³

5.3 Tensile strength of fibres

The tensile strength (R_m) shall be determined in accordance with EN 10002-1, except as indicated below, and shall be declared.

For Group I (cold drawn wire), the tensile strength shall be determined from the source wire before deformation. The acceptable tolerance on the declared value of R_m shall be 15 % for individual values and 7,5 % for the mean value. At least 95 % of the individual specimens shall meet the specified tolerance.

For Group II (cut sheet), the tensile strength shall be determined from the source plate before deformation. The acceptable tolerance on the declared value of R_m shall be 15 % for individual values and 7,5 % for the mean value. At least 95 % of the individual specimens shall meet the specified tolerance.

For Group III (melt extracted fibres), Group IV (shaved cold drawn wire) and Group V (milled from steel blocks) the tensile strength shall be determined from fibres with a minimum length of 20 mm clamped within the jaws of the testing machine. These fibre types have irregular cross-section and therefore the fibres will break at the minimum cross-section. The nominal tensile strength shall be determined by dividing the maximum load during the tensile test by the cross-section calculated from the equivalent diameter. The manufacturer may determine the cross-section at the break by an optical method, in which case the tensile strength obtained by dividing the maximum tensile load during the tensile test by the fracture cross-section, may also be declared, giving the precision of the area measurement.

For Groups III, IV and V the manufacturer may instead declare a minimum tensile strength and at least 90 % of the individual specimens of fibres shall then comply with this value.

5.4 Modulus of elasticity

The manufacturer shall declare the modulus of elasticity of the fibres.

The modulus of elasticity may be determined for Groups I and II fibres using the tensile test as described in EN 10002-1. The test shall be done on the basic material before deformation of the fibre and the modulus of elasticity shall be calculated using the stress and the deformation at 10 % and 30 % of R_m.

NOTE The typical modulus of elasticity for normal steel fibres is approximately 200.000 MPa. The typical modulus of elasticity for stainless steel fibres depends on the material composition and is approximately 170.000 MPa.

5.5 Ductility of fibres

If applicable, the manufacturer may declare a value for the ductility which shall be determined according to EN 10218-1 where the test is performed on the end diameter before deformation. The material shall be bent over a cylindrical support with a radius of maximum 2,5 mm. The average number of bends shall be declared.

5.6 Mixing

Mixing instructions shall be supplied by the manufacturer which recommend the mixing sequence to be adopted when introducing the fibre into both a centrally mixed concrete plant and for a dry batch truck mixed plant.

5.7 Effect on consistence of concrete

The effect of fibres on the consistence of a reference concrete conforming to prEN 14845-1 shall be determined.

The consistence according to EN 12350-3 shall be determined on the reference concrete without fibres and then on an identical mix with fibres. The effect on consistence shall be declared.

The amount of fibres added shall be declared by the manufacturer and shall be the minimum amount of fibres needed to obtain the required strength specified in 5.8. If a plasticiser or superplasticer is needed in order to meet the consistence requirements when determining the required addition level of fibres, the amount and type shall also be declared by the manufacturer.

The fibre manufacturer may additionally declare the consistence for the reference concrete with a range of dosages of fibres.

5.8 Effect on strength of concrete

The effect on strength shall be determined according to EN 14845-2 using a reference concrete conforming to prEN 14845-1. The unit volume of fibres in kg/m³ shall be declared by the manufacturer that achieves a residual flexural strength of 1,5 MPa at 0,5 mm CMOD (equivalent to 0,47 mm central deflection) and a residual flexural strength of 1MPa at 3,5 mm CMOD (equivalent to 3,02 mm central deflection).

5.9 Release of dangerous substances

Materials used in products shall not release any dangerous substances in excess of the maximum permitted levels specified in a relevant European Standard for the material or permitted in the national regulations of the member state of destination.

6 Evaluation of conformity

6.1 General

The conformity of a fibre to the requirements of this standard and with the declared values shall be demonstrated by the manufacturer by carrying out both:

- initial type testing of the product (see 6.2.)
- factory production control (see 6.3.)

Alternative methods of test to the methods specified in this standard may be adopted except for the initial type tests and in case of dispute, provided that these alternative methods satisfy the following :

a) a correlation can be shown to exist between the results from the specified test and those from the alternative test and,

b) the information on which the relationship is based is available.

6.2 Initial type testing

6.2.1 General

Initial type testing shall be performed to show conformity with this standard. Tests previously performed in accordance with the provisions of this standard (same product, same characteristic(s), test method, sampling procedure, system of attestation of conformity, etc.) may be taken into account.

The appropriate initial tests shall be repeated whenever a change in the basic materials or manufacturing procedures occurs, or a new product type is being produced.

The tests to be conducted shall be the tests and/or calculations as described in this standard for the following properties:

shape (see 5.1.b)

dimensions and tolerances (see 5.2)

tensile strength (see 5.3)

ductility (see 5.5.)

Table 1 — consistence (see 5.7)

effect on strength of concrete (see 5.8)

The results of initial type tests shall be recorded and be available for inspection. Sampling for initial type testing shall be in accordance with 6.2.2.

6.2.2 Sampling

The minimum sample size shall be as given in Table 2 and shall be drawn at random to be representative of the batch or consignment. Pre-production samples may be used for initial type tests where it is possible to demonstrate that the characteristics of performance are representative of products from the full production process.

Table 2 - Sampling - number of specimens

Type test			Minimum number per test
Clause	**Normative (N), or Optional (O)**	**Characteristic**	
5.1.b	N	Shape; tolerances	30 fibres
5.2	N	Dimensions; tolerances	30 fibres
5.3	N	Tensile strength; tolerances	30 fibres
5.5	O	Ductility	30 fibres
5.7	N	Consistence	mean value of 3 tests
5.8	N	Effect on strength of concrete	12 beams

NOTE For the performance characteristics to be determined in order to address the provisions of Annex ZA, see Table ZA.1.

6.3 Factory production control (FPC)

6.3.1 General

The manufacturer shall establish, document and maintain a FPC system to ensure that the products placed on the market conform to the requirements of this standard and the declared performance characteristics. The FPC system shall consist of procedures, regular inspections,tests and/or assessments and the use of the results to control raw and other incoming materials or components, equipment, the production process and the product.

Subsequently, any fundamental changes in basic materials, manufacturing procedures or the control scheme that affects the properties or use of a product shall be recorded in the manual or relevant document, together with the test data that identifies the new characteristics of the fibre.

The results of inspections, tests or assessments requiring action shall be documented, as shall any action taken. The action to be taken when control values or criteria are not met shall be recorded.

NOTE An FPC system conforming with the requirements of the relevant part(s) of EN ISO 9001, and made specific to the requirements of this standard, is considered to satisfy the above requirements.

6.3.2 Equipment

All weighing, measuring and testing equipment shall be calibrated and regularly inspected according to documented procedures, frequencies and criteria.

6.3.3 Raw materials

The specifications of all incoming raw materials shall be documented, as shall the inspection scheme for ensuring their conformity.

6.3.4 Design process

The factory production control system shall document the various stages in the design of products, identify the checking procedure and those individuals responsible for all stages of design.

During the design process itself, a record shall be kept of all checks, their results, and any corrective actions taken. This record shall be sufficiently detailed and accurate to demonstrate that all stages of the design phase, and all checks, have been carried out satisfactorily.

6.3.5 Product testing and evaluation

The manufacturer shall establish procedures to ensure that the declared values of the characteristics are maintained, as confirmed by the initial type tests.

The characteristics that shall be controlled are:

shape (see 5.1.b)

fibre coating, if applicable (see 5.1b)

dimensions and tolerances (see 5.2)

tensile strength (see 5.3)

ductility (see 5.5)

The frequency and volume of testing shall be at least that given in Table 3.

Table 3 – Minimum number of units for production control

Characteristic	Clause	Assessment method	Minimum number of units		
			Tightened control (T)	Normal control (N)	Reduced control (R)
Shape/ coating					
Shape	5.1b	See 5.1b	12 fibres/ 10 t/ machine	12 fibres/ 50 t/ machine	3 fibres/week/machine
Coating	5.1b	Depending on type of coating	at least 3 measurements for deliveries < 15 t. 1additionional per 5 t	1 measurement per 5 t	1 measurement per 10 t
Dimensions and tolerances	5.2	See 5.2	12 fibres/ 10t/ machine	12 fibres/ 50 t/ machine	3 fibres/week/machine
Tensile strength Group I,II and IV Group III and V	5.3	 EN 10002-1 See 5.3	 1 measurement per 1 t	 1 measurement per 5 t	 1 measurement per 10 t
ductility	5.5	EN 10218-1	1 measurement per 1 t	1 measurement per 5 t	1 measurement per 10 t

NOTE By machine is meant the final machine in the production process prior to packaging.

The data, together with details and results of inspection, checks and tests shall be recorded. The conditions for switching between the types of control are given in Annex A.

Where possible and applicable, the results of inspections, checks and tests shall be interpreted statistically by attributes or by variables to determine whether the corresponding production conforms to the requirements in this standard and the declared values for the products.

6.3.6 Traceability

Systems of traceability and control of designs, incoming materials, and the use of materials shall be given in the manual or relevant document.

The stock control system of manufactured products shall be given in the manual or relevant document.

6.3.7 Corrective actions for non conforming products

The immediate actions to be taken when incoming materials or finished products do not conform to the specified requirements shall be described and recorded. These actions shall include the steps necessary to rectify the deficiency, modify the manual or relevant document if required, identify and isolate the deficient raw or incoming materials and finished products and determine whether they shall be discarded or re-specified under a concessionary system.

Annex A
(normative)

Conditions for switching between the control regimes T-N-R

The T-regime shall be applied when starting up a new plant and for at least 6 months.

The manufacturer may switch from the T to the N-regime when all of the following conditions apply:

- Testing has been undertaken for at least 6 months under the T-regime;
- The fibres produced during the last 3 months of production conform to specification.

The manufacturer may switch from the N to the R-regime when all of the following conditions apply:

- the fibres fall within Groups I or II;
- testing has been undertaken for at least 12 months under the N-regime;
- the fibres produced during the last 12 months of production conform to specification;
- the Cpk's of tensile strength and dimensions, calculated from the 3-monthly period of production, are greater than 1 for the last two successive quarters.

The manufacturer shall switch back from R to the N regime if the Cpk on tensile strength or geometry for one quarter becomes smaller or equal to 0,67. Switching back to R is permitted if the Cpk for the next quarter is again higher than 0,67, and if results are according to specification.

NOTE The Cpk is the capability index which accounts for process centering and is defined as the minimum of

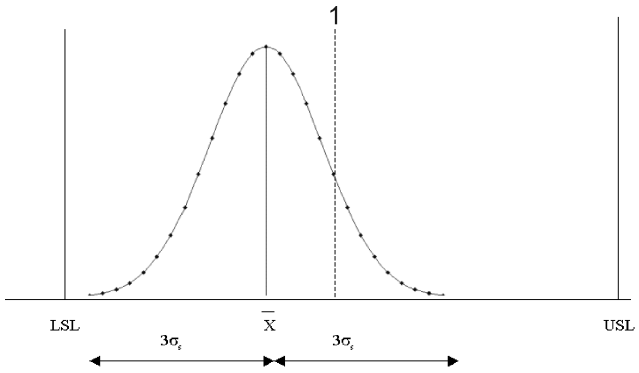
$$\frac{USL - \overline{X}}{3\sigma_s} \text{ or } \frac{\overline{X} - LSL}{3\sigma_s}$$

USL: upper spread limit, is the declared value plus the deviation of the individual value from Table 1 (or 5.3) times the declared value

LSL: lower spread limit, is the declared value minus the deviation of the individual value from Table 1 (or 5.3) times the declared value

$\overline{X}$: average value of the characteristic (dimension, tensile strength) of the group of individual results (the number of group given in Table 3), taken over one quarter.

σ_s : standard deviation of the same group of results as the average value, taken over one quarter.



Key

1 Declared value

Figure A.1 — Calculation of the Cpk -value

Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive for Construction Products (89/106/EEC)

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under Mandate M/128, as amended, 'Products related to concrete mortar or grout' given to CEN by the European Commission and the European Free Trade Association.

The clauses of this European Standard, shown in this annex, meet the requirements of the mandate given under the EU Construction Products Directive (89/106/EEC).

Compliance with these clauses confers a presumption of fitness of the steel fibres covered by this annex for the intended uses indicated herein ; reference shall be made to the information accompanying the CE marking.

WARNING : Other requirements and other EU Directives, not affecting the fitness for intended use(s), may be applicable to the steel fibres falling within the scope of this European Standard.

NOTE 1 In addition to any specific clauses relating to dangerous substances contained in this standard, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the EU Construction Products Directive, these requirements need also to be complied with, when and where they apply.

NOTE 2: An informative database of European and national provisions on dangerous substances is available at the Construction Web Site on EUROPA (accessed through http://europa.eu.int/comm/enterprise/construction/internal/dangsub/dangmain.htm).

This annex establishes the conditions for the CE marking of steel fibres intended for the uses indicated in Table ZA.1 and shows the relevant clauses applicable.

This annex has the same scope as Clause 1 of this standard and is defined by Table ZA.1.

Table ZA.1 - Scope and relevant clauses

Product	**Steel fibres in concrete mortar or grout**		
Intended use			
Essential Characteristics	**Requirement clauses in this or other European Standard. (This standard unless otherwise stated)**	**Mandated level(s) and/or class (es)**	**Notes**
Tensile strength/ modulus of elasticity	5.3 and 5.4	none	declared values
Effect on consistence (workability) of concrete	5.7	none	declared value
Effect on strength of concrete	5.1, 5.2 and 5.8	none	declared values
Release of dangerous substances	5.9 and ZA.1	none	requirements are dependent on regulations in the place of use
Durability	–	–	durability relates to the concrete incorporating fibres

The requirement on a certain characteristic is not applicable in those Member States where there are no regulatory requirements on that characteristic for the intended end use of the product. In this case, manufacturers placing their products on the market of these Member States are not obliged to determine nor declare the performance of their products with regard to this characteristic and the option “No performance determined” (NPD) in the information accompanying the CE marking (see Clause ZA.3) may be used. The NPD option may not be used, however, where the characteristic is subject to a threshold level.

ZA.2.Procedure(s) for the attestation of conformity of products

ZA.2.1 Systems of attestation of conformity

The system(s) of attestation of conformity of the steel fibres indicated in Table ZA.1, in accordance with the decision of the Commission 99/469/EC of 1999-07-17 amended by 01/596/EC of 2001-08-02, as given in Annex III of the mandate is shown in Table ZA.2 for the indicated intended use(s) and relevant level(s) and class(es) :

Table ZA.2 - Systems of attestation of conformity

Product(s)	**Intended use(s)**	**Level(s) or class(es)**	**Attestation of conformity system(s)**
Steel fibres	for structural uses in concrete mortar or grout	See Table ZA.1	**1**
Steel fibres	for other uses in concrete mortar or grout	See Table ZA.1	**3**
System 1: See Directive 89/106/EEC (CPD) Annex III.2.(i), without audit testing of samples. System 3: See Directive 89/106/EEC (CPD) Annex III.2.(ii), Second possibility.			

NOTE For a definition of structural use see Clause 1 of this standard.

The attestation of conformity of the steel fibres in Table ZA.1 shall be based on the evaluation of conformity procedures indicated in Tables ZA.3.1 and ZA.3.2 resulting from application of the clauses of this or other European Standard indicated therein.

Table ZA.3.1 — Assignment of evaluation of conformity tasks for steel fibres under system 1

Tasks		**Content of the task**	**Evaluation of conformity clauses to apply**
Tasks under the responsibility of the manufacturer	Factory production control (FPC)	Parameters related to all characteristics of Table ZA.1 relevant for the intended use	6.3
	Further testing of samples taken at factory	All characteristics of Table ZA.1 relevant for the intended use	6.2
	Initial type testing by the manufacturer	Those characteristics of Table ZA.1 relevant for the intended use not tested by the notified body	6.2
Tasks under the responsibility of the product certification body	Initial type testing	Those characteristics of Table ZA.1 relevant for the intended use : Tensile strength/modulus of elasticity, Effect on strength of concrete, Effect on consistence of concrete.	6.2
	Initial inspection of factory and of FPC	Parameters related to all characteristics of Table ZA.1, relevant for the intended use, in particular: Tensile strength/modulus of elasticity, Effect on strength of concrete, Effect on consistence of concrete, Release of dangerous substances	6.3
	Continuous surveillance, assessment and approval of FPC	Parameters related to all characteristics of Table ZA.1, relevant for the intended use, in particular: Tensile strength/modulus of elasticity, Effect on strength of concrete, Effect on consistence of concrete, Release of dangerous substances	6.3

Table ZA.3.2 — Assignment of evaluation of conformity tasks for steel fibres under system 3

Tasks		Content of the task	Evaluation of conformity clauses to apply
Tasks under the responsibility of the manufacturer	Factory production control (FPC)	Parameters related to all characteristics of Table ZA.1 relevant for the intended use	6.3
	Initial type testing by a notified test laboratory	Tensile strength/modulus of elasticity, Effect on strength of concrete, Effect on consistency of concrete.	6.2
	Initial type testing by the manufacturer	Those characteristics of Table ZA.1 relevant for the intended use not tested by the notified test lab	6.2

ZA.2.2 EC Certificate and Declaration of conformity

(In case of products with system 1+ or 1): When compliance with the conditions of this annex is achieved, the certification body shall draw up a certificate of conformity (EC Certificate of conformity), which entitles the manufacturer to affix the CE marking. The certificate shall include:

— name, address and identification number of the certification body;

— name and address of the manufacturer, or his authorised representative established in the EEA, and place of production;

NOTE 1 The manufacturer may also be the person responsible for placing the product onto the EEA market, if he takes responsibility for CE marking.

— description of the product (type, identification, use, ...);

— provisions to which the product conforms (i.e. Annex ZA of this EN);

— particular conditions applicable to the use of the product (e.g. provisions for use under certain conditions);

— the number of the certificate;

— conditions of validity of the certificate, where applicable;

— name of, and position held by, the person empowered to sign the certificate.

In addition, the manufacturer shall draw up and retain a declaration of conformity (EC Declaration of conformity) including the following:

— name and address of the manufacturer, or his authorised representative established in the EEA;

— name and address of the certification body;

— description of the product (type, identification, use, ...), and a copy of the information accompanying the CE marking;

NOTE 2 Where some of the information required for the Declaration is already given in the CE marking information, it does not need to be repeated.

— provisions to which the product conforms (i.e. Annex ZA of this EN), and a reference to the ITT report(s) and factory production control records (if appropriate);

— particular conditions applicable to the use of the product (e.g. provisions for use under certain conditions);

— number of the accompanying EC Certificate of conformity;

— name of, and position held by, the person empowered to sign the declaration on behalf of the manufacturer or of his authorised representative.

(In case of products under system 3): When compliance with the conditions of this annex is achieved, the manufacturer or his agent established in the EEA shall draw up and retain a declaration of conformity (EC Declaration of conformity), which entitles the manufacturer to affix the CE marking. This declaration shall include:

— name and address of the manufacturer, or his authorised representative established in the EEA, and place of production;

NOTE 1 The manufacturer may also be the person responsible for placing the product onto the EEA market, if he takes responsibility for CE marking.

— description of the product (type, identification, use,...), and a copy of the information accompanying the CE marking;

NOTE 2 Where some of the information required for the Declaration is already given in the CE marking information, it does not need to be repeated.

— provisions to which the product conforms (i.e. Annex ZA of this EN), and a reference to the ITT report(s) and factory production control records (if appropriate);

— particular conditions applicable to the use of the product, (e.g. provisions for use under certain conditions);

— name and address of the notified laboratory(ies);

— name of, and position held by, the person empowered to sign the declaration on behalf of the manufacturer or his authorised representative.

ZA.3 CE Marking and labelling

The manufacturer or his authorised representative established within the EEA is responsible for the affixing of the CE marking. The CE marking symbol to affix shall be in accordance with Directive 93/68/EC and shall be shown on the accompanying label, the packaging or on the accompanying commercial documents, e.g. a delivery note. The following information shall accompany the CE marking symbol :

— identification number of the certification body (only for system 1);

— name or identifying mark and registered address of the producer;

— the last two digits of the year in which the marking is affixed;

— number of the EC Certificate of conformity or factory production control certificate (if relevant);

— reference to this European Standard;

— description of the product: generic name, material, group, dimensions, shape … and intended use;

— information on those relevant essential characteristics listed in Table ZA.1 which are to be declared;

— declared values and, where relevant, level or class to declare for each essential characteristic as indicated in "Notes" in Table ZA.1;

— “No performance determined” for characteristics where this is relevant;

— as an alternative, a standard designation which shows some or all of the relevant characteristics (where the designation covers only some characteristics, it will need to be supplemented with declared values for other characteristics as above).

The “No performance determined” (NPD) option may not be used where the characteristic is subject to a threshold level. Otherwise, the NPD option may be used when and where the characteristic, for a given intended use, is not subject to regulatory requirements in the Member State of destination.

Figure ZA.1 gives an example of the information to be given on the label, packaging and/or commercial documents of fibres in structural use.

CE 01234	*CE conformity marking, consisting of the "CE"-symbol given in Directive 93/68/EEC.* *Identification number of the certification body (where relevant)*
AnyCo Ltd, PO Box 21, B-1050 **06** 01234-CPD-00234	*Name or identifying mark and registered address of the producer* *Last two digits of the year in which the marking was affixed* *Certificate number (where relevant)*
EN 14889-1 Steel fibres for structural use in concrete mortar and grout Group I Length: 50 mm Diameter: 1.00 mm Shape: deformed Tensile strength: 1200 N/mm² Consistence with 30 kg/m³ fibres: Vebe time: 25 s Effect on strength of concrete: 30kg/m³ to obtain 1,5 N/mm² at CMOD=0,5 mm and 1N/mm² at CMOD=3,5 mm.	*No. of European Standard* *Description of product* *Information on regulated characteristics*

Figure ZA.1 — Example CE marking information

In addition to any specific information relating to dangerous substances shown above, the product should also be accompanied, when and where required and in the appropriate form, by documentation listing any other legislation on dangerous substances for which compliance is claimed, together with any information required by that legislation.

NOTE 1 European legislation without national derogations need not be mentioned.

NOTE 2 Affixing the CE marking symbol means, if a product is subject to more than one directive, that it complies with all applicable directives.

Bibliography

EN ISO 9001, *Quality management systems – Requirements (ISO 9001:2000)*

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