BRITISH STANDARD

BS EN 14188-3:2006

Joint fillers and sealants —

Part 3: Specifications for preformed joint seals

The European Standard EN 14188-3:2006 has the status of a British Standard

ICS 91.100.50

British Standards

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National foreword

This British Standard is the official English language version of EN 14188-3:2006.

The UK participation in its preparation was entrusted by Technical Committee B/510, Road materials, to Subcommittee B/510/3, Materials for concrete roads, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

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

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Catalogue under the section entitled “International Standards Correspondence Index”, or by using the “Search” facility of the BSI Electronic Catalogue or of British Standards Online.

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English Version

Joint fillers and sealants - Part 3: Specifications for preformed joint seals

Produits de scellement de joints - Partie 3 : Spécifications pour les joints d'étanchéité moulés

Fugeneinlagen und Fugenmassen - Teil 3: Anforderungen an elastomere Fugenprofile

This European Standard was approved by CEN on 12 October 2005.

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 European Standard (EN 14188-3:2006) has been prepared by Technical Committee CEN/TC 227 “Road materials”, the secretariat of which is held by DIN.

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 July 2006, and conflicting national standards shall be withdrawn at the latest by September 2007.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

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

This European Standard is one of a series of standards as listed below:

EN 14188-1, *Joint fillers and sealants — Part 1: Specifications for hot applied sealants.*

EN 14188-2, *Joint fillers and sealants — Part 2: Specifications for cold applied joint sealants.*

EN 14188-3, *Joint fillers and sealants — Part 3: Specifications for preformed joint seals.*

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.

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1 Scope

This European Standard specifies requirements for preformed joint seals made of vulcanised rubber for concrete pavements.

General requirements for finished joint seals are also given. This European Standard is applicable to joint seals for joints in new concrete pavements and maintenance work in concrete highways.

2 Normative references

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

EN 14840, *Joint fillers and sealants — Test methods for preformed joint seals*

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

ISO 48, *Rubber, vulcanised or thermoplastic — Determination of hardness (hardness between 10 IRHD and 100 IRHD)*

ISO 3302-1, *Rubber — Tolerances for products — Part 1: Dimensional tolerances*

3 Terms and definitions

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

3.1

joint

vertical discontinuity between the adjacent faces of slabs in the concrete layer of a pavement, formed for the purpose of providing some movement capability

3.2

joint chamber

cut into the upper part of the joint to offer a seating for the preformed joint seals. The width of the chamber depends on the movement capability of the preformed joint seals. The bottom of the chamber supports the preformed joint seals to withstand vertical forces by traffic

3.3

preformed joint seals

extruded (preformed) and vulcanised elastic rubber profile that, when inserted by special machines into the joint chamber, seals the joint by compression reaction to appropriate surfaces within the joint chamber to fill the joint and to prevent ingress of water

NOTE The behaviour of a preformed joint seals is mainly influenced by the elastomer. In this application mainly the following elastomers are used:

— EPDM rubber: Ethylen-Propylen-Dien-Monomer rubber,

— CR rubber: Chloroprene Rubber.

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3.4

rubber hardness degree

reaction forces of compressed preformed joint seals depend on geometry and rubber hardness of preformed joint seals. Hardness is measured in IRHD. IRHD is the international rubber hardness degree in accordance with ISO 48

NOTE The higher the hardness degree, the higher is the reaction force. The softer the hardness degree is, the better is the ability for the lips of the rubber profile to lean tight to surface roughness of the cut joint chamber.

3.5

manufacturer´s limiting value MLV

manufacturer's stated minimum or maximum value to be met during testing according to the requirements of this European Standard

3.6

manufacturer´s declared value MDV

value declared by the manufacturer accompanied by a declared tolerance

3.7

cold climate area

area in which the temperature can go below –25 °C and the opening of the joint can exceed 35 %

4 Classification

Table 1 specifies five hardness classes of materials for preformed joint seals.

Table 1 — Hardness classification

Hardness class	40	50	60	70	80
Range of hardness IRHD	36 to 45	46 to 55	56 to 65	66 to 75	76 to 85

5 Requirements

5.1 General

The materials shall not contain any ingredients that can have a detrimental effect on the concrete pavement.

NOTE An incorporated fibre reinforcement in the preformed joint seal as additional protection against over-extension is recommended.

5.2 Dimensional tolerances

The dimensions shall be determined in accordance with ISO 3302-1 and the result shall conform to classes E1 or E2 defined in ISO 3302-1.

5.3 Imperfections and defects

The imperfections and defects shall be determined by visual inspection. The surface of preformed seals shall be free of surface defects or irregularities, which can affect their function.

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5.4 Hardness

5.4.1 Hardness

The hardness shall be determined in accordance with ISO 48 (method micro-test). The result shall conform to the relevant value given in Table 2, line 1.1.

5.4.2 Hardness tolerance

The hardness shall be determined in accordance with ISO 48 (method micro-test). Over a 5 m length of the preformed joint seal, 5 measurements randomly taken, the difference between the minimum and maximum hardness shall not be more than 5 IRHD. Each value shall be within the specified range for the relevant hardness class.

5.5 Tensile strength and elongation at break

The tensile strength and elongation at break shall be determined in accordance with EN 14840. The tensile strength and the elongation at break shall conform to the relevant values given in Table 2, line 2 and line 3.

5.6 Compression set in air

5.6.1 General

The test piece is taken from a preformed seal, then the measurement shall be carried out in the direction of compression of the seal in service.

5.6.2 Compression set at 70 °C

The compression set at 70 °C shall be determined in accordance with EN 14840. The compression set at 70 °C shall conform to the relevant values given in Table 2, line 4.

5.6.3 Compression set at low temperature (–25 °C)

The compression set at low temperature (–25 °C) shall be determined in accordance with EN 14840. The compression set at low temperature (–25 °C) shall conform to the relevant values given in Table 2, line 4.

5.7 Accelerated ageing in air

The accelerated ageing in air shall be determined in accordance with EN 14840. The changes in hardness, tensile strength and elongation at break shall conform to the relevant values given in Table 2, line 5.

5.8 Stress relaxation in compression

The stress relaxation in compression shall be determined in accordance with EN 14840. The stress relaxation after 100 days at 50 °C shall conform to the relevant values given in Table 2, line 6.

5.9 Recovery at low and high temperatures (–25 °C, +70 °C)

The recovery at low and high temperatures shall be determined in accordance with EN 14840. The recovery at low and high temperatures shall conform to the relevant values given in Table 2, line 7.

5.10 Ozone resistance

The ozone resistance shall be determined in accordance with EN 14840. The ozone resistance shall conform to the relevant values given in Table 2, line 8. This test is not required for EPDM-preformed joint seals.

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5.11 Protection against over-extension

The protection against over-extension shall be determined in accordance with EN 14840. The elongation at first effect of the fibre shall conform to the relevant values given in Table 2, line 9. The elongation at 300 N tensile force shall conform to the relevant values given in Table 2, line 9. The tensile force at first break of fibre shall conform to the relevant values given in Table 2, line 9.

5.12 Function testing for cold climate areas

When the seal is intended to be used in cold climate areas, the minimum compression force during function testing for cold climate area shall be determined in accordance with EN 14840. The compression force shall conform to the relevant values given in Table 2, line 10.

NOTE As the width of joints is changing with temperature, the profile should be flexible enough to compensate for dimensional changes within a broad temperature range, sometimes down to –30 °C. In this context, particular attention should be paid to the cyclic mechanical stresses and to the compression set of the material.

5.13 Dangerous substances

The manufacturer shall ensure that there are no emissions of any substances hazardous to health or the environment in excess of the legally permitted level in the member state of destination.

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Table 2 — Requirements for preformed joint seals (test methods are compiled in EN 14840)

No	Property	Unit	Clause	Requirements for hardness classes				
				40	50	60	70	80
1.1	Hardness	IRHD	5.4.1	36 to 45	46 to 55	56 to 65	66 to 75	76 to 85
1.2	Hardness tolerance	IRHD	5.4.2	≤ 5				
2	Tensile strength	MPa	5.5	≥ 9				
3	Elongation at break	%	5.5	≥ 400	≥ 375	≥ 300	≥ 200	≥ 125
4	Compression set		5.6					
	– at +70 °C	%	5.6.2	≤ 20				
	– at –25°		5.6.3	≤ 60				
5	Accelerated ageing in air		5.7					
	– Change in hardness	IRHD		–5 … +8				
	– Change in tensile strength	%		–20 … +40				
	– Change in elongation at break	%		–30 … +10				–40 … +10
6	Stress relaxation in compression	%	5.8	50			55	
7	Recovery at low and high temperatures		5.9					
	– at –25 °C	%		≥ 65				
	– at +70 °C			≥ 80				
8	Ozone resistance		5.10	no crack				
9	Protection against over-extension		5.11					
	– Elongation at first effect of fibre	%		≤ 2				
	– Elongation at 300 N tensile force	%		≤ 5				
	– Tensile force at first break of fibre	N		≥ 300				
10	Function testing for cold climate areas; minimum compression force	kN/m	5.12	≥ 0,03				

6 Evaluation of conformity

6.1 General

The compliance of the product with the requirements of this document shall be demonstrated by:

Initial Type Testing;

Factory Production Control by the manufacturer, including product assessment.

The characteristics indicated in Clause 5 shall be determined within 3 months of the date of delivery from the manufacturer.

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For the purposes of testing, the product may be grouped into families, where it is considered that the selected property is common to all products within that family.

6.2 Type testing

6.2.1 Initial Type Testing

Initial Type Testing shall be performed to show conformity with this European Standard. Tests previously performed in accordance with the provisions of this European Standard (same product, same characteristic(s), test method, sampling procedure, system of attestation of conformity etc.) may be taken into account. In addition, Initial Type Testing shall be performed at the beginning of the production of a new product type (unless a member of the same family) or at the beginning of a new method of production (where this may affect the stated properties).

All characteristics in Clause 5 shall be subject to Initial Type Testing with the exception of dangerous substances which may be assessed indirectly by controlling the presence of the substance concerned.

6.2.2 Further type testing

Whenever a change occurs in the product design, the raw material or supplier of the components, or the production process (subject to the definition of a family), which would change significantly one or more of the characteristics, the type tests shall be repeated for the appropriate characteristic(s).

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 stated performance characteristics. The FPC system shall consist of procedures, regular inspections and 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.

A FPC system conforming to the requirements of EN ISO 9001, and made specific to the requirements of this European Standard, shall be considered to satisfy the above requirements.

The results of inspections, tests or assessments requiring action shall be recorded, as shall any action taken. The action to be taken when control values or criteria are not met shall be recorded and retained for the period specified in the manufacturer’s FPC procedures.

6.3.2 Frequency of testing

Minimum frequencies of testing for factory production quality control shall be as shown in Table A.1.

6.3.3 Equipment

6.3.3.1 Testing

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

6.3.3.2 Manufacturing

All equipment used in the manufacturing process shall be regularly inspected and maintained to ensure use, wear or failure does not cause inconsistency in the manufacturing process. Inspections and maintenance shall be carried out and recorded in accordance with the manufacturer’s written procedures and the records retained for the period defined in the manufacturer's FPC procedures.

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6.3.4 Raw materials and components

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

6.3.5 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.

6.3.6 Non-conforming products

The manufacturer shall have written procedures which specify how non-conforming products shall be dealt with. Any such events shall be recorded as they occur and these records shall be kept for the period defined in the manufacturer's written procedures.

7 Marking, labelling and packaging

Each container of preformed joint seals shall be clearly and indelibly marked, giving as a minimum requirement the following information:

manufacturer's name and address;

nominal joint width;

profile identification number;

type identification number of the rubber compound;

date of manufacture;

number and date of this European Standard;

guidelines for storage and disposal.

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Annex A

(normative)

Initial Type Testing and frequencies of testing for Factory Production Control

The minimum frequencies of testing for Factory Production Control are given in Table A.1.

Table A.1 — Initial Type Testing and frequencies of Factory Production Control

Column	1		2	3	4	5	6	7
Line	Product characteristic		Clause	Initial Type Testing	Factory Production Control Minimum frequencies of testing per			
					batch	week	month	year
1	Dimensional tolerances		5.2	X	1	–	–	–
2	Hardness		5.4	X	1	–	–	–
3	Tensile strength and elongation at break		5.5	X	1	–	–	–
4	Compression set in air		5.6	X	1	–	–	–
5	Accelerated ageing in air		5.7	X	–	1	–	–
6	Stress relaxation in compression		5.8	X	–	–	–	–
7	Recovery at low and high temperatures	+70 °C	5.9	X	–	1	–	–
		–5 °C		X	–	1	–	–
8	Ozone resistance		5.10	X	–	–	–	–
9	Protection against over-extension		5.11	X	–	1	–	–
10	Function testing for cold climate areas		5.12	X	–	–	–	–

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Annex B

(informative)

Example of a product data sheet

B.1 General information

Date and reference of this technical data sheet

Product trade name

Manufacturer / supplier

Origin / source of manufacturing

Description of the product

Intended use and method of application

Product performance[1)] (see Table B.1)

Certification mark where relevant

Consumer information[2)]

Table B.1 — Information from testing

Column	1	2	3	4	5
Line	**Characteristic**	**Test method**	**Unit**	**Expression of result** [a]	**Value or statement** [b]
1	Dimensional tolerances	ISO 3302-1	[–]	MDV	value
2	Hardness	ISO 48	IRHD	MDV	value
3	Tensile strength and elongation at break	EN 14840	MPa, %	MLV	value
4	Compression set in air	EN 14840	%	MLV	value
5	Accelerated ageing in air	EN 14840	IRHD, %, %	MLV	value
6	Stress relaxation in compression	EN 14840	%	MLV	value
7	Recovery at low and high temperatures – +70 °C – –25 °C	EN 14840	%	MLV	value
8	Ozone resistance	EN 14840	–	pass	value
9	Protection against over-extension	EN 14840	%, %, N	MLV	value
10	Function testing for cold climate areas	EN 14840	kN/m	MLV	value

a MLV: manufacturer's limiting value according to 3.5;
MDV: manufacturer's declared value according to 3.6.

b To be completed by the manufacturer.

1) See ZA.3 which limits the information to be given in association with CE marking.

2) E.g. restrictions concerning use and storage and safety precaution during installation and disposal.

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Annex C
(informative)

Installation

C.1 The preformed joint seals section should be always in compression.

C.2 The cutting depth for the profile chamber normally is 30 mm. Greater depths can be necessary according to the dimensions of profile.

C.3 The cutting width for the preformed joint seal chamber is the nominal width ± 1 mm.

The standard transverse joint chamber has a width of 8 mm. Transverse expansion joints have a width of 20 mm. Longitudinal joints have a chamber width of 6 mm and longitudinal construction joints have a chamber width of 10 mm.

C.4 A bevel cut of 45° is necessary to avoid spalling and to ease the installation. The width of the bevel cut should be between 1 mm and 3 mm.

C.5 Prior to rubber profile installation the joint chambers should be cleaned, e.g. by blowing out. They do not need to be dry. Snow or ice should be removed.

C.6 Mechanical insertion of the rubber profile has to be carried out so that longitudinal elongation doesn't exceed 5 %. The top of the section should not be higher than the lower corner of the bevel and should not be lower than 15 mm under concrete surface.

Rubber profiles should be installed into the joint without twisting.

C.7 The intersection (crossing) points should be produced preferably following the guidelines of the rubber profile manufacturer. Two methods are available:

Mechanical locking is obtained by partial insertion of the upper section in the already laid lower section (cut a U-shaped groove down to max 1/2 of the profile height, fill it up with Polyurethane-glue).

Mechanical locking is obtained by using an elastic metal clamp which is anchored into the ends of the cut through rubber joint leaving open a deep U-shaped groove for the upper section which is filled up with Polyurethane-glue.

C.8 Splicing should be done only on longitudinal joints and in a distance of minimum 1 m to a crossing point.

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Annex ZA

(informative)

Clauses of this European Standard addressing essential requirements or other provisions of EU Directives

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under mandate M/124 Road construction products (as amended) 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 preformed joint seals 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 uses, can be applicable to the preformed joint seals 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 has the same scope as Clause 1 of this European Standard with regard to the product covered. It establishes the conditions for the CE marking of preformed joint seals intended for the use indicated below and shows the relevant clauses applicable (see Table ZA.1).

Construction Product: preformed joint seals.

Intended uses: roads, airfields and other concrete pavements.

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Table ZA.1 — Characteristics meeting Mandate M 124 given under CPD

Essential characteristics	Requirement clauses in this (or another) EN	Levels and/or classes [b]	NOTES
Cohesion	5.5	–	threshold value
Watertightness [a]	5.6	–	threshold value
	5.8	–	threshold value
	5.9	–	threshold value
	5.12	–	threshold value
Resistance to deformation	5.6	–	threshold value
	5.8	–	threshold value
	5.9	–	threshold value
	5.12	–	threshold value

a Watertightness is given if the requirements on resistance to deformation are fulfilled.

b – means that no classes or levels are given by the mandate.

The requirement on a certain characteristic is not applicable in those Member States (MSs) where there are no regulatory requirements on that characteristic for the intended use of the product. In this case, manufacturers placing their products on the market of these Member States are not obliged either to determine nor to 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 ZA.3) may be used.

ZA.2 Procedure(s) for attestation of conformity

ZA.2.1 Systems of attestation of conformity

The systems of attestation of conformity of preformed joint seals indicated in Table ZA.1, in accordance with the Decision of the Commission 98/601/EC as given in annex III of the mandate M/124 and shown in Table ZA.2 for the indicated intended use and relevant classes.

Table ZA.2 — Systems of attestation of conformity

Product	Intended use	Level(s) or class(es)	Attestation of conformity systems
Preformed joint seals	on roads, airfields, bridge decks, parking decks etc.	None	4
System 4: See Directive 89/106/EEC (CPD) annex III.2.(ii), Third possibility.			

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Table ZA.3 — Assignment of evaluation of conformity tasks for preformed joint seals under system 4

Tasks		Content of the task	Evaluation of conformity clauses to apply
Tasks for the manufacturer	Factory production control (F.P.C)		
		Parameters related to all relevant characteristics of Table ZA.1	6.3
	Initial type testing	All relevant characteristics of Table ZA.1	6.2

ZA.2.2 EC Certificate and declaration of conformity

When compliance with the conditions of this annex is achieved, the manufacturer or his agent established in the EEA shall prepare and retain a 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 the place of production;
- description of the product (type, identification, use), and a copy of the information accompanying the CE marking;
- provisions to which the product conforms (e.g. Annex ZA of this European Standard);
- particular conditions applicable to the use of the product (e.g. provisions for use under certain conditions, etc);
- name of, and position held by, the person empowered to sign the declaration on behalf of the manufacturer or his authorised representative.

The above mentioned declaration and certificate shall be presented in the official language or languages of the Member State in which the product is to be used.

ZA.3 CE marking and labelling

The manufacturer or his authorized 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. The CE marking symbol, the number of the EC certificate of factory production control and the information required by Qlause 7 shall be shown on a label attached to the product.

The CE marking symbol shall also appear on the accompanying technical documentation, together with the following:

- name or identifying mark and registered address of the producer;
- last two digits of the year in which the marking is affixed;
- reference to this European Standard, i.e. EN 14188-3;
- description of the product: preformed joint seal;
- information on the relevant characteristic values in Table ZA.1.

Figure ZA.1 gives an example of the information to be given on the commercial documents.

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CE	CE conformity marking, consisting of the "CE"-symbol given in directive 93/68/EEC.
AnyCo Ltd, PO Box 21, B-1050	Name or identifying mark and registered address of the producer
06	Last two digits of the year in which the marking was affixed
EN 14188-3	No. of European Standard
EPDM-preformed joint seal Type F 8	Description of product
hardness class: 70 IRHD	and
Tensile strength 10 MPa Elongation at break 210 % Compression set at + 70 °C 10 % Compression set at –25 °C 30 % Stress relaxation 40 % Recovery at –25 °C 80 % Recovery at +70 °C 90 %	information on regulated characteristics

Figure ZA.1 — Example CE marking information to be given on the accompanying commercial (technical) documentation for a product

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 European legislation without national derogations need not be mentioned.

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Bibliography

[1] ISO 37, *Rubber, vulcanised or thermoplastic — Determination of tensile stress-strain properties*

[2] ISO 188, *Rubber, vulcanised or thermoplastic — Accelerated ageing and heat-resistance tests*

[3] ISO 815, *Rubber, vulcanised or thermoplastic — Determination of compression set at ambient, elevated or low temperatures*

[4] ISO 1431-1, *Rubber, vulcanised or thermoplastic — Resistance to ozone cracking — Part 1: Static and dynamic strain testing*

[5] ISO 2285, *Rubber, vulcanised or thermoplastic — Determination of tension set under constant elongation, and of tension set, elongation and creep under constant tensile load*

[6] ISO 3384, *Rubber, vulcanised of thermoplastic — Determination of stress relaxation in compression at ambient and at elevated temperatures*

[7] ISO 5893, *Rubber and plastics test equipment — Tensile, flexural and compression types (constant rate of traverse) — Specification*

[8] Guidance paper F "Durability and the Construction Products Directive"

[9] Guidance paper D "CE marking under the Construction Products Directive"

[10] Guidance paper H "A harmonized approach to dangerous substances under the Construction products directive"

[11] Essential Requirements (ER) n° 3 "Hygiene, health and environmental protection" of the Council Directive of 21 December 1988 on the approximation of laws, regulations and administrative provisions of the Member States relating to constructions products (89/106/EEC)

[12] web site EUROPA (accessed through http://europa.eu.int/comm/enterprise/construction/internal/dangsub/dangmain.htm)

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