BS EN 13482:2013

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Rubber hoses and hose assemblies for asphalt and bitumen — Specification

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National foreword

This British Standard is the UK implementation of EN 13482:2013. It supersedes BS EN 13482:2001 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PRI/66, Rubber and plastics tubing, hoses and hose assemblies.

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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Rubber hoses and hose assemblies for asphalt and bitumen - Specification

Tuyaux et flexibles en caoutchouc pour asphalte et bitume - Spécification

Gummischläuche und -schlauchleitungen für Asphalt und Bitumen - Spezifikation

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Foreword

This document (EN 13482:2013) has been prepared by Technical Committee CEN/TC 218 “Rubber and plastics hoses and hose assemblies”, the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by April 2014, and conflicting national standards shall be withdrawn at the latest by April 2014.

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.

This document supersedes EN 13482:2001.

In comparison with EN 13482:2001 the following fundamental changes have been made:

a) Bitumen type PmB bitumen 25 (55-55A) added in Table 2;

b) Normative references updated;

c) Informative Annex E concerning environmental aspects added.

This European Standard is one in a series of specifications for hose and hose assemblies for conveying petroleum based and associated products. It covers types of hose and hose assemblies for conveying asphalt and bitumen, which are hazardous materials at temperatures where they can flow readily.

According to the CEN-CENELEC Internal Regulations, the national standards organizations 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 European Standard specifies requirements for two types of hose and hose assembly (Type 1 and Type 2) identified by their maximum working pressures (Type 1 7 bar and Type 2 15 bar) and main use, i.e. Type 1 is for road and rail tanker use and Type 2 is for dockside use. The types are further divided into two classes related to the maximum temperature of the product to be conveyed (Class A up to 175 °C and Class B up to 200 °C). The hose constructions may be smooth bore (SB) or rough bore (RB).

NOTE These types of hose or hose assemblies are not necessarily suitable for all types of petroleum based products or coal tar, or products containing coal tar.

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 14023, *Bitumen and bituminous binders - Specification framework for polymer modified bitumens*

EN ISO 4671, *Rubber and plastics hoses and hose assemblies — Methods of measurement of the dimensions of hoses and the lengths of hose assemblies (ISO 4671)*

EN ISO 7233:2008, *Rubber and plastics hoses and hose assemblies — Determination of resistance to vacuum (ISO 7233:2006)*

EN ISO 7326, *Rubber and plastics hoses — Assessment of ozone resistance under static conditions (ISO 7326)*

EN ISO 8031, *Rubber and plastics hoses and hose assemblies — Determination of electrical resistance and conductivity (ISO 8031)*

EN ISO 8330:2008, *Rubber and plastics hoses and hose assemblies – Vocabulary (ISO 8330:2007)*

EN ISO 10619-1, *Rubber and plastics hoses and tubing — Measurement of flexibility and stiffness — Part 1: Bending tests at ambient temperature (ISO 10619-1)*

ISO 37, *Rubber, vulcanized or thermoplastic — Determination of tensile stress-strain properties*

ISO 4649:2010, *Rubber, vulcanized or thermoplastic — Determination of abrasion resistance using a rotating cylindrical drum device*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 8330:2008 apply.

4 Classification

Hoses and hose assemblies shall be one of the following types:

Type 1 maximum working pressure 7 bar for road and rail tanker hose and hose assemblies;

Type 2 maximum working pressure 15 bar for dockside hose and hose assemblies.

Each type shall be available in SB or RB construction and these additional letters shall be part of the identification.

Each type shall be classed according to the following maximum temperature of operation:

Class A - Up to 175 °C,

Class B - Up to 200 °C.

NOTE These temperatures are the temperature of the product being conveyed inside the hose assembly.

5 Construction and materials

5.1 Type 1 and Type 2 hoses — rubber smooth bore (SB)

These hoses shall have the following construction:

— a synthetic rubber lining of minimum thickness 2,0 mm;

— reinforcing plies of textile or steel wire;

— a steel wire helix reinforcement; and

— an ozone resistant rubber cover of minimum thickness 2,0 mm.

Internally, hoses shall have rubber linings that are smooth and free from delamination and blisters.

5.2 Type 1 and Type 2 hoses — rubber rough bore (RB)

These hoses shall have the following construction:

— an internal steel wire helix of flat or round cross-section;

— a synthetic rubber and/or textile lining matrix;

— reinforcing plies of textile or steel wire;

— additional helix reinforcement, if specified; and

— an ozone resistant rubber cover of minimum thickness 2,0 mm.

Overlapped joins in the lining matrix above the internal wire helix may be visible between the pitch of the helix.

5.3 End fittings

End fittings for all hose assemblies shall be of one of the following types.

a) ‘Built-in’ during manufacture of the hose.

b) ‘Swaged-on’, either internally or externally according to the manufacturer’s design, after manufacture of the hose.

c) ‘Clamped-on’ after manufacture of the hose.

‘Clamped-on’ fittings are NOT recommended for dockside hoses.

For each type of end connection to the hose, an assembly type test shall be carried out, in accordance with 8.2.

To obtain an electrical resistance of 10^2 OHMS/assembly (maximum) the steel helix shall be connected to the end fittings.

Materials for end fittings shall be steel or bronze (gunmetal/brass) and should be specified by the purchaser.

NOTE Design of nipples and ferrules is the responsibility of the manufacturer in as much that they will be suitable for the intended services and pass all tests required of the assembly.

6 Dimensions and minimum bend radius

6.1 Inside diameters, tolerances and minimum bend radii

When measured in accordance with EN ISO 4671 the inside diameters shall comply with the values given in Table 1.

When measured in accordance with EN ISO 10619-1 the minimum bend radius shall comply with the values given in Table 1.

Table 1 — Nominal bore, inside diameter, tolerances and bend radius

Nominal bore	Inside diameter mm	Tolerances mm	Minimum bend radius	
			Smooth bore hoses mm	Rough bore hoses mm
50	50	± 0,6	275	485
51	51	± 0,6	280	495
63	63	± 0,6	345	502
65	65	± 0,6	350	510
75	75	± 0,8	450	600
76	76	± 0,8	456	608
100	100	± 1,2	600	750
101	101	± 1,2	606	758
125	125	± 1,6	730	880
127	127	± 1,6	742	894
150	150	± 2,0	850	1 000
152	152	± 2,0	861	1 013
200	200	± 2,0	1 100	1 250
203	203	± 2,0	1 117	1 269

6.2 Lengths and tolerances

The finished length of a hose assembly shall have a tolerance of + 2 % to - 1 % of the ordered length, after conclusion of the pressure test.

Special short lengths, distance pieces etc., may not be able to be bent to the minimum radii as specified in Table 1. The purchaser should agree requirements of lengths less than 2 m with the manufacturer.

6.3 Concentricity

When measured in accordance with EN ISO 4671, the concentricity based on a total indicator reading shall be 1,0 mm for hoses of nominal bore 50 to 76 inclusive and 1,5 mm for hoses of nominal bore 100 to 203 inclusive.

7 Physical properties of rubber compounds

The physical properties of rubber used in lining and cover shall be determined on laboratory prepared test sheets, and vulcanized to the same cured state of production hoses. The results of the tests shall be as the values given in Table 2.

Table 2 — Physical properties of rubber compounds

Property	Unit	Requirement		Method of test
		Lining	Cover	
Tensile strength minimum	MPa	7	7	ISO 37 Dumbell test pieces
Elongation at break minimum	%	200	200	ISO 37 Dumbell test pieces
Ozone resistance	—	Not applicable	No cracking at 20 % extension	EN ISO 7326, 72 h at 40 °C in 50 pphm ozone, (55 ± 10) % relative humidity
Resistance to bitumen				
Volume swell max.	%	50	50	Test by 168 h immersion in PmB-bitumen 25(55-55A) according to EN 14023 at 175 °C for Class A and 200 °C for Class B
Retained tensile strength minimum	%	75	75	
Retained elongation at break minimum	%	30	30	
Hardness change	IRHD	± 20	± 20	
Abrasion resistance max.	mm^3	N/A	200	Method A of ISO 4649:2010

Additional tests may also be relevant to perform, see [1] to [3].

8 Hose and hose assemblies

8.1 General

When tested by the methods listed in Table 3, the physical properties of the finished hose and hose assemblies shall comply with the values given in Table 3.

Table 3 — Physical properties of finished hoses and hose assemblies

Property	Unit	Requirements	Method of test
Proof pressure	bar	Type 1 = 10,5 Type 2 = 22,5	Annex A
Change in length at proof pressure Temporary max. Permanent max.	 % %	 7,5 1,5	Annex A
Resistance to vacuum	bar	0,85 bar absolute for 10 min	EN ISO 7233:2008 Method B
Electrical resistance max.	Ω	10^2 OHMS/Assembly	EN ISO 8031
Bend test at proof pressure		No leakage	Annex B
Burst pressure min.	bar	Fittings to retain intact upped minimum burst requirement of 40 bar for type 1 90 bar for type 2	Annex B

8.2 Type tests

Type tests shall be carried out by the manufacturer to confirm that all of the material, construction and test requirements of this standard have been met by the method of manufacture and hose and hose assembly design.

The type tests shall be carried out a minimum of every five years or whenever a change of manufacture or materials occur.

Hoses or hose assemblies of a smaller inside diameter of a tested type do not require a separate type test.

9 Frequency of testing

Type and routine tests are specified in Table C.1.

Type tests are those tests required to confirm that all the material, construction and test requirements of this European Standard have been met by the method of manufacture and hose or hose assembly design.

Routine tests are those tests that shall be carried out on all hose assemblies prior to dispatch.

Production acceptance tests are specified in Table D.1 and are the recommended frequency of routine tests that should be carried out by the manufacturer to control the quality of his manufacture. This frequency specified in Annex D is a guide being an informative annex only.

10 Marking

10.1 Hoses

At least the following information shall be permanently and legibly marked on the hose cover either in one position at one end of the hose and at 180° opposed to that position at the opposite end of the hose, or alternatively continuously along the length.

a) manufacturer’s name or trademark, e.g. xxx;

b) the number and year of this European Standard;

c) type and class of hose, e.g. Type 1 SB/A;

d) inside diameter;

e) maximum working pressure, in bar;

f) maximum working temperature, e.g. 175 °C;

g) quarter and year of manufacture, e.g. 3Q12;

h) asphalt and bitumen.

EXAMPLE xxx – EN 13482:2013 – type 1 SB/A – 150 – 7 bar – 175 °C – 3Q12 – ASPHALT AND BITUMEN.

10.2 Hose assemblies

Fittings should be marked with the manufacturer's trademark. Hose assemblies should be marked with the hose assembler's mark and the date of assembly.

Annex A
(normative)

Test method for change in length at proof pressure

A.1 Test medium and temperature

The test medium shall be water, and the temperature at which the test is conducted shall be between 10 °C and 30 °C.

A.2 Procedure

The hose assembly shall be laid out as straight as possible, filled with water and vented to remove all trapped air. The hose assembly shall be free to expand and contract without restraint.

Carry out the following sequence:

a) raise pressure to 0,7 bar and measure the overall length of the assembly;

b) raise to half the proof pressure (see Table 3 depending on type) over 5 min and hold for 10 min;

c) reduce pressure to zero over 5 min;

d) raise to full proof pressure (see b) above) over 5 min and hold for 10 min;

e) measure the overall length at proof pressure to ascertain the temporary elongation. Record as a percentage of the original length measured at 0,7 bar;

f) reduce pressure to zero over 5 min;

g) after an interval of at least 15 min and not more than 30 min, raise the pressure to 0,7 bar;

h) measure overall length at 0,7 bar to ascertain permanent elongation. Record as percentage of original length measured at 0,7 bar.

Annex B
(normative)

Test method for bend and burst pressure

Following the non-destructive testing of Table 3, points 1 to 4, carry out the following test:

a) bend the hose assemblies to their minimum bend radius (see Table 1) and while in the bent position carry out the hydrostatic pressure procedure as described in Annex A, omitting the measurement of elongation;

b) release the hose assemblies from the bent position and increase the pressure over a period of 15 min to the minimum burst pressure as specified in Table 3;

c) maintain this pressure for 15 min and then further increase the pressure until the hose assemblies burst;

d) record the pressure at which the hose assemblies burst and the mode of failure.

The fittings shall not leak up to and at the proof pressure and shall remain in place up to and at the minimum burst pressure.

Annex C
(normative)

Type and routine tests

Table C.1 — Type and routine tests

Property	Type	Routine
Lining and cover material tests		
Tensile strength	X	N/A
Elongation at break	X	N/A
Ozone resistance (cover only)	X	N/A
Resistance to bitumen	X	N/A
Abrasion resistance (cover only)	X	N/A
Hose and hose assembly tests		
Proof pressure	X	X
Temporary elongation	X	X
Permanent elongation	X	X
Resistance to vacuum	X	X
Electrical resistance	X	X
Bend	X	N/A
Burst	X	N/A
X = Test to be carried out, N/A = Not applicable		

Annex D
(informative)

Recommended test frequency for production acceptance tests

Table D.1 — Recommended test frequency for production acceptance tests

Property	Frequency per batch
Lining and cover material tests	
Tensile strength	X
Elongation at break	X
Ozone resistance (cover only)	X
Resistance to bitumen	N/A
Abrasion resistance (cover only)	N/A
Hose and hose assembly tests	
Proof pressure	N/A
Temporary elongation	N/A
Permanent elongation	N/A
Resistance to vacuum	N/A
Electrical resistance	N/A
Bend	N/A
Burst	N/A
X = Test to be carried out, N/A = Not applicable	

NOTE A batch of compound is defined as 2 000 kg of lining or cover compound.

Annex E
(informative)

Environmental checklist

E.1 Materials should be selected to optimize product durability and lifetime and consideration should be made to avoiding the selection of rare or hazardous materials.

E.2 Packaging design should consider using recycled materials, and materials that need little energy for their manufacture, and should minimize waste.

E.3 The size and weight of packaging should be minimized whilst protecting the products to minimize waste through damage. Packaging should be designed to optimize capacity of transportation vehicles whilst facilitating safe loading and unloading.

E.4 Using hoses covered by this European Standard, the end users handle bitumen up to 200 °C. There is a risk to the environment from accidents if the materials are not handled in the recommended way.

Table E.1 — Environmental Checklist

Environmental Issue	Stages of the life cycle										All stages
	Acquisition		Production		Use			End-of-Life			
	Raw materials and energy	Pre-manu-factured materials & components	Production	Packaging	Use	Maintenance and repair	Use of additional products	Reuse/ Material and Energy Recovery	Incineration without energy recovery	Final disposal	Transportation
Inputs											
Materials	E.1	E.1									
Water											
Energy				E.2							E.3
Land											
Outputs											
Emissions to air											
Discharges to water											
Discharges to soil											
Waste				E.2							E.3
Noise, vibration, radiation, heat											
Other relevant aspects											
Risk to the environment from accidents or unintended use					E.4	E.4					
Customer information											
Comments:											

NOTE 1 The stage of packaging refers to the primary packaging of the manufactured product. Secondary or tertiary packaging for transportation, occurring at some or all stages of the life cycle, is included in the stage of transportation.

NOTE 2 Transportation can be dealt with as being a part of all stages (see checklist) or as separate sub-stage. To accommodate specific issues relating to product transportation and packaging, new columns can be included and/or comments can be added.

Bibliography

[1] EN ISO 8033, *Rubber and plastic hose — Determination of adhesion between components (ISO 8033)*

[2] EN ISO 10619-2, *Rubber and plastics hoses and tubing — Measurement of flexibility and stiffness — Part 2: Bending tests at sub-ambient temperatures (ISO 10619-2)*

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

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