SLOVENSKI STANDARD
SIST EN 13483:2005

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Gumene in polimerne cevi ter cevni priključki z notranjim sistemom za rekuperiranje hlapov za sisteme za merjeno točenje goriva na bencinskih črpalkah - Specifikacija

Rubber and plastic hoses and hose assemblies with internal vapour recovery for measured fuel dispensing systems - Specification

Gummi- und Kunststoffschläuche und -schlauchleitungen mit innenliegender Gasrückführung für Zapfsäulen an Tankstellen - Anforderungen

Tuyaux et flexibles en caoutchouc et en plastique a récupération interne de vapeur pour un systeme de distribution mesurée de carburants - Spécifications

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Rubber and plastic hoses and hose assemblies with internal vapour recovery for measured fuel dispensing systems - Specification

Tuyaux et flexibles à récupération interne de vapeur pour un système de livraison mesurée carburant - Spécification

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This European Standard was approved by CEN on 21 March 2005.

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Contents

Foreword

This document (EN 13483:2005) 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of an identical text or by endorsement, at the latest by November 2005, and conflicting national standards shall be withdrawn at the latest by November 2005.

WARNING — Persons using this document should be familiar with normal laboratory practice. This document does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and to ensure compliance with any national regulatory conditions.

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1 Scope

This document specifies the requirements for hose assemblies with vapour recovery for delivery systems on petrol filling stations.

The hose assemblies with vapour recovery for delivery systems on petrol filling stations shall be capable of withstanding anticipated mechanical, thermal and chemical stressing and shall be resistant to the combustible liquids used in these applications as well as their vapour and vapour air mixtures. The assemblies shall be constructed in such a way that actions during normal operation cannot give rise to dangerous electrostatic charges nor shall there be any reduction in the performance of the vapour recovery.

The assemblies are intended for use at ambient temperatures between –30 °C and +55 °C for normal temperature class and –40 °C and +55 °C for low temperature class at a working pressure ≤ 16 bar[1)].
Hoses may be constructed from rubber or thermoplastic elastomer (TPE) and this document specifies the requirements for three types of hoses in two categories and two classes of hose assemblies for measured fuel dispensing systems, including oxygenated fuels (≤ 15 % oxygenated compounds) with internal vapour recovery tubing or hose.

NOTE This document does not apply to multi chamber fuel dispensing hoses.

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 26801, *Rubber or plastics hoses — Determination of volumetric expansion (ISO 6801:1983).*

EN 27326, *Rubber and plastics hoses — Assessment of ozone resistance under static conditions (ISO 7326:1991).*

EN 28033, *Rubber and plastics hose — Determination of adhesion between components (ISO 8033:1991).*

EN ISO 1307, *Rubber and plastics hoses for general-purpose industrial applications — Bore diameters and tolerances, and tolerances on length (ISO 1307:1992).*

EN ISO 1402, *Rubber and plastics hoses and hose assemblies — Hydrostatic testing (ISO 1402:1994).*

EN ISO 4671, *Rubber and plastics hose and hose assemblies — Methods of measurements of dimensions (ISO 4671:1999).*

EN ISO 8031, *Rubber and plastics hoses and hose assemblies — Determination of electrical resistance (ISO 8031:1993).*

EN ISO 8330:2000, *Rubber and plastics hoses and hose assemblies — Vocabulary (ISO 8330:1998).*

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

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

ISO 554, *Standard atmospheres for conditioning and/or testing — Specifications.*

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1) 1 bar = 0,1 MPa

ISO 1746, *Rubber or plastics hoses and tubing — Bending tests.*

ISO 1817, *Rubber, vulcanised —Determination of the effect of liquids.*

ISO 4649, *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 8330:2000 and the following apply.

Hose assembly
fuel hose complete with an internal vapour tubing or vapour hose and fitted with couplings

4 Classification

Hoses for this application shall be divided into three types:

Type 1, textile reinforced;

Type 2, textile and helical wire reinforced; or

Type 3, fine wire reinforced.

Hoses for this application shall be divided into two categories:

Category M: electrically bonded

Category Ω: electrically conductive

Hoses for this application shall be divided into two temperature classes:

Normal temperature class with an ambient working temperature of –30 °C to +55 °C

Low temperature class (LT) with an ambient working temperature of –40 °C to +55 °C

5 Materials and construction

5.1 Fuel hose

The fuel hose shall consist of the following:

- a smooth, fuel resistant lining of rubber or thermoplastic elastomer (TPE);
- a suitable reinforcement, related to type;
- a non-corrugated fuel and weather resistant rubber or TPE cover.

Hose assemblies shall be capable of conducting an electrical charge from coupling to coupling.

When this capability is provided by means of metallic bonding wires, not less than two (metallic) bonding wires shall be embedded in the hose and the metal used shall have a high resistance to fatigue and corrosion.

Hoses with metallic wires for electrical conductivity shall be designated ‘M‘ and those using conductive compounds shall be designated ‘Ω‘, the relevant mark being branded on the hose, (see Clause 12).

5.2 Vapour hose

The vapour hose shall consist of the following:

- a smooth fuel and vapour resistant lining of rubber or TPE;
- a textile and/or metallic reinforcement;
- a non-corrugated fuel and vapour resistant rubber or TPE.

5.3 Vapour tubing

The vapour tubing shall consist of the following:

- a smooth and vapour and fuel resistant thermoplastic

5.4 Vapour recovery fuel hose assembly

The vapour recovery fuel hose assembly shall consist of an outer fuel hose according to 5.1 and an inner vapour recovery hose according to 5.2 or vapour tubing according to 5.3 with the fuel hose and vapour hose or tubing attached to an electrically bonded coupling system.

6 Pressure requirements

The pressure ratings of the fuel hose and the vapour tubing/hose shall comply with values given in Table 1.

Table 1 — Pressure ratings

Property	Pressure ratings bar	
	Fuel hose	Vapour tubing/hose
Maximum working pressure	16	0,2 abs./8 [a)]
Proof test pressure	24	b)
Minimum burst pressure	48	18

a) The vapour tubing/hose shall be designed for an absolute pressure of 0,2 bar (vacuum) with an external pressurization of 8 bar.

b) See Annex B

7 Dimensions and tolerances

7.1 Diameters and bend radii

Diameters and bend radii shall comply with the values given in Table 2.

Table 2 — Dimensions requirements

Dimensions in millimetres

Tubing/hose/assembly	Internal diameter max.	Outside diameter max.	Bend radius min.
Vapour tubing/hose	8,4	—	75
Fuel hose	—	32,6	130
Assembly	—	—	130

7.2 Minimum thickness of lining and cover of the fuel hose

When measured in accordance with EN ISO 4671 the thickness of the lining shall be not less than 1,6 mm and the thickness of the cover shall be not less than 1,0 mm.

7.3 Concentricity

When determined in accordance with EN ISO 4671, the concentricity, based on a total indicator reading between the internal diameter and the outside diameter, shall not exceed 0,5 mm for the vapour tubing or hose, and shall not exceed 1,0 mm for the fuel hose.

7.4 Tolerance on cut lengths

For cut lengths, the tolerances on length shall be according to EN ISO 1307. The length of a hose assembly shall be measured from sealing face to sealing face of the end fittings with a tolerance from the nominal length of ± 1%.

8 Physical properties

8.1 Compounds

When tested in accordance with the methods in Table 3, the physical properties of the compounds used for the lining and cover shall comply with the values given in Table 3. Tests shall be carried out either on samples taken from the hose or from moulded vulcanised sheets at a thickness of 2 mm or moulded test pieces vulcanised to the same cured state as the production hoses.

Table 3 — Physical properties of compounds

Property	Unit	Requirement		Test piece[a]	Test method
		Rubber	TPE		
Tensile strength, min. Lining and cover of fuel hose and vapour tubing and hose	MPa	9	12	Test piece cut from hose or from test sheet	ISO 37
Elongation at break, min. Lining and cover of fuel hose and vapour tubing and hose	%	250	350		
Accelerated ageing Tensile strength change, Lining and cover fuel hose and vapour tubing and hose, max.		20	10		ISO 188 (air oven method) 14 days at (70 ± 1) °C
Elongation at break change, Lining and cover of fuel hose and vapour tubing and hose, max.		–35	–20		
Resistance to liquids Swell of lining of fuel hose; tubing and cover of vapour hose max.		+70			ISO 1817 70 h at 40 °C in oxygenated fuel Type 3
		+25			ISO 1817 70 h at 100 °C in oil N° 3
Extracted matter Lining of fuel hose; tubing and cover of vapour hose max. Normal Temperature Class–30 °C Low Temperature Class–40 °C		+10 +15			ISO 1817 70 h at 40 °C in oxygenated fuel Type 3 then dry 24 h at 100 °C
Swell of cover of fuel hose		+100			ISO 1817 70 h at 23 °C in liquid B
Low temperature class resistance, -lining and cover of fuel hose and vapour tubing and hose, at –30 °C (or –40 °C if required)	—	No cracks under x 10 magnification			Annex A
Abrasion, max. -cover of fuel hose	mm^3	500		Test piece from moulded test sheet of cover compound	ISO 4649 Method A

[a] It is necessary that the test report indicates the source of the test piece.

8.2 Finished hoses/tubing

When tested in accordance with the methods in Table 4, the physical properties of the finished hoses or tubing shall comply with the values given in Table 4.

Table 4 — Physical properties of tubing and hoses

Property	Unit	Requirement	Test piece	Test method
Vapour tubing/hoses				
Pressure test	–	Free ball passage, no leakage	Short length cut from hose/tubing	Annex B
Change in length due to swelling max.	%	4	Annex C	Annex C
Pressure loss max.	bar	0,030	4 m of hose/tubing	Annex D, D.1
Burst pressure min.		18	Short length cut from hose/tubing	EN ISO 1402
Adhesion (hose only) Un-aged Aged	N/mm	 2,4 1,8	Short length cut from hose	Annex E
Low temperature class flexibility max.	–	No cracks or breaks Maximum bending force 170 N	Annex F	Annex F
Ozone resistance, Tubing and lining of hose		No cracks under × 2 magnification	Short length cut from hose/tubing	EN 27326 72 h at 23 °C, 50 pphm, relative humidity (55 ± 10) % and elongation 20 %
Fuel Hoses				
Proof pressure at 24 bar	–	No leakage or other signs of weakness nor abrupt twisting	Full length of hose	EN ISO 1402 Proof test pressure
Burst pressure, min.	bar	48	Short length cut from hose	EN ISO 1402 Burst pressure
Volumetric expansion, max. Type 1 and Type 2 Type 3	%	 2 1	At least 1 m cut from hose	EN 26801 Test pressure 3 bar
Adhesion between components on Un-aged hose, min. Aged hose, min.	kN/m	 2,4 1,8	Short length cut from hose	Annex E
Ambient temperature bending	–	$\frac{T}{D} \geq 0{,}8$		ISO 1746 Nominal diameter C = 10 × nominal bore
Low temperature class flexibility		No cracks or breaks Maximum bending force 180 N	Annex F	Annex F
Change in length at proof pressure	%	0 to +5	Full length of hose	EN ISO 1402
Change in length due to swelling max.		4	Short length cut from hose	Annex C
Ozone resistance of cover	–	No cracks under × 2 magnification		EN 27326 168 h at 40 °C, 50 pphm, relative humidity (55 ± 10) %, and elongation 20 %
Fuel permeation of hose max. Normal temperature class Low temperature class	ml/(m·day)	 12 18	2 m test piece cut from hose	Annex G

Table 4 (continued)

Property	Unit	Requirement	Test piece	Test method
Electrical resistance max. Category Ω	Ω	1×10^{6}	Equivalent to the length of hose assembly	EN ISO 8031 Method 3.4, 3.5 or 3.6
Category M		1×10^{2}		EN ISO 8031 Method 4
Flammability	–	a) Burning with a naked flame to cease within 20 s of removal of the burner; b) no further glowing visible 2 min after removal of the burner; c) hose shall show no sign of leakage	Length of assembly to suit test rig	Annex H

8.3 Hose assembly

When tested in accordance with the methods in Table 5, the physical properties of the hose assembly shall comply with the values given in Table 5.

Table 5 — Physical properties of hose assembly

Property	Unit	Requirement	Test piece	Test method
Electrical resistance max. Category M	Ω/ assembly	1×10^{2}	Full length of hose assembly	EN ISO 8031 Method 4
Category Ω		1×10^{6}		EN ISO 8031 Method 3.4, 3.5 or 3.6
Leak test	–	No leakage		Annex I
Flex test		No defects after 18000 cycles No leakage after 50000 cycles max. electrical resistance		Annex J
Pull-off test		No movement of end fitting after removal of force.	Short length of hose assembly	Annex K
Difference between the change in length due to swelling of the fuel hose and the vapour tubing/hose, max.	%	1,5	Full length of hose assembly	Annex C
Pressure loss max.	bar	0,75		Annex D, D.2

9 End fittings

The end fittings used for this application for both fuel and vapour hoses shall be compatible with the specification shown in Figure 1.