

**Rubber hoses and hose
assemblies —
Wire braid reinforced compact
type for hydraulic
applications —
Specification**

The European Standard EN 857 : 1996 has the status of a
British Standard

ICS 23.040.70

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee PRI/66, Rubber and plastics tubing, hoses and hose assemblies, upon which the following bodies were represented:

Association of Metropolitan Authorities
British Coal Corporation
British Compressed Gases Association
British Rubber Manufacturers' Association Ltd.
Chief and Assistant Chief Fire Officers' Association
Energy Industries Council
Fire Extinguishing Trades Association
Home Office
London Fire and Civil Defence Authority
Ministry of Defence
RAPRA Technology Ltd.
Society of Motor Manufacturers and Traders Limited

The following body was also represented in the drafting of the standard, through subcommittees and panels:

British Fluid Power Association

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National foreword

This British Standard has been prepared by Technical Committee PRI/66 and is the English language version of EN 857 : 1996 *Rubber hoses and hose assemblies — Wire braid reinforced compact type for hydraulic applications — Specification*, published by the European Committee for Standardization (CEN).

EN 857 : 1996 has been approved by CEN member bodies under the weighted voting procedures introduced in 1988 to coincide with the introduction of the 'New Approach' Directives from the Commission of the European Community.

Cross-references

Publication referred to	Corresponding British Standard
EN 24671 : 1993	BS EN 24671 : 1993 <i>Rubber and plastics hose and hose assemblies. Methods of measurement of dimensions</i>
EN 24672 : 1993	BS EN 24672 : 1993 <i>Rubber and plastics hoses. Sub-ambient temperature flexibility tests</i>
EN 27326 : 1993	BS EN 27326 : 1993 <i>Rubber and plastic hoses. Assessment of ozone resistance under static conditions</i>
EN 28033 : 1993	BS EN 28033 : 1993 <i>Rubber and plastics hose. Determination of adhesion between components</i>
EN ISO 1402 : 1996	BS EN ISO 1402 : 1997 <i>Rubber and plastics hoses and hose assemblies — Hydrostatic testing</i>
EN ISO 6945 : 1996	BS EN ISO 6945 : 1996 <i>Rubber hoses — Determination of abrasion resistance of the outer cover</i>
EN ISO 7233 : 1995	BS EN ISO 7233 : 1995 <i>Rubber and plastics hoses and hose assemblies. Determination of suction resistance</i>
ISO 1817 : 1985	BS 903 <i>Physical testing of rubber</i>
ISO 6743-4 : 1982	Part A16 : 1987 <i>Determination of the effect of liquids</i> BS 6413 <i>Lubricants, industrial oils and related products (class L)</i>
ISO 6803 : 1994	Part 4 : 1983 <i>Classification for family H (hydraulic systems)</i> BS ISO 6803 : 1996 <i>Rubber and plastics hoses and hose assemblies — Hydraulic-pressure impulse test without flexing</i>

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 6, an inside back cover and a back cover.

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Descriptors: Rubber hoses, hoses, armatures, wire, hydraulic systems, hydraulic fluids, specifications, dimensions, dimensional tolerances, tests, marking

English version

Rubber hoses and hose assemblies — Wire braid reinforced compact type for hydraulic applications — Specification

Tuyaux et flexibles en caoutchouc — Type hydraulique compact avec armature de fils métalliques — Spécification

Gummischläuche und -schlauchleitungen — Kompakthydraulikschläuche mit Drahtgeflechteinlage — Spezifikation

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Foreword

This European Standard was 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 1997, and conflicting national standards shall be withdrawn at the latest by April 1997.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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1 Scope

This European Standard specifies requirements for two types of wire braid reinforced compact hoses and hose assemblies of nominal bore from 6 to 25.

They are suitable for use with:

- hydraulic fluids in accordance with ISO 6743-4 with the exception of HFD R, HFD S and HFD T at temperatures ranging from -40 °C to +100 °C;
- water based fluids at temperatures ranging from -40 °C to +70 °C;
- water at temperatures ranging from 0 °C to +70 °C.

The standard does not include requirements for end fittings. It is limited to the performance of hoses and hose assemblies.

NOTE 1. The hoses are not suitable for use with castor oil based nor ester based fluids.

NOTE 2. Hoses and hose assemblies should not be operated outside the limits of this standard.

NOTE 3. Requirements for hydraulic hoses for underground mining are standardized in separate standards.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 24671	<i>Rubber and plastics hose and hose assemblies — Methods of measurement of dimensions</i> (ISO 4671 : 1984)
EN 24672	<i>Rubber and plastics hoses — Sub-ambient temperature flexibility tests</i> (ISO 4672 : 1988)
EN 27326	<i>Rubber and plastics hoses — Assessment of ozone resistance under static conditions</i> (ISO 7326 : 1991)
EN 28033 : 1993	<i>Rubber and plastics hoses — Determination of adhesion between components</i> (ISO 8033 : 1991)

EN ISO 1402	<i>Rubber and plastics hoses and hose assemblies — Hydrostatic testing</i> (ISO 1402 : 1994)
EN ISO 6945	<i>Rubber hoses — Determination of abrasion resistance of the outer cover</i> (ISO 6945 : 1991)
EN ISO 7233	<i>Rubber and plastics hoses and hose assemblies — Determination of suction resistance</i> (ISO 7233 : 1991)
ISO 1817	<i>Rubber, vulcanized — Determination of the effect of liquids</i>
ISO 6743-4	<i>Lubricants, industrial oils and related products (Class L) — Classification — Part 4: Family H (Hydraulic systems)</i>
ISO 6803	<i>Rubber and plastics hoses and hose assemblies — Hydraulic pressure impulse test without flexing</i>

3 Types of hoses

Two types of hoses are specified:

- type 1SC — hoses with a single braid of wire reinforcement;
- type 2SC — hoses with two braids of wire reinforcement.

4 Materials and construction

4.1 Hoses

Hoses shall consist of an oil and water resistant synthetic rubber lining, one or two layers of high tensile steel wire and an oil and weather resistant synthetic rubber cover.

4.2 Hose assemblies

Hose assemblies shall only be manufactured with those hose fittings whose functionality has been verified in all tests according to this standard.

5 Dimensions

5.1 Diameters and concentricity

When measured in accordance with EN 24671, the diameters of the hoses shall comply with the values given in table 1.

Table 1. Diameters of hoses								
Dimensions in millimetres								
Nominal bore	All types		Type 1SC			Type 2SC		
	Internal diameter		Diameter over reinforcement		Outside diameter of hose	Diameter over reinforcement		Outside diameter of hose
	min.	max.	min.	max.	max.	min.	max.	max.
6	6,1	6,9	9,6	10,8	13,5	10,6	11,7	14,2
8	7,7	8,5	10,9	12,1	14,5	12,1	13,3	16,0
10	9,3	10,1	12,7	14,5	16,9	14,4	15,6	18,3
12	12,3	13,5	15,9	18,1	20,4	17,5	19,1	21,5
16	15,5	16,7	19,8	21,0	23,0	20,5	22,3	24,7
19	18,6	19,8	23,2	24,4	26,7	24,6	26,4	28,6
25	25,0	26,4	30,7	31,9	34,9	32,5	34,3	36,6

When measured in accordance with EN 24671, the concentricity of the hoses shall comply with the values given in table 2.

Table 2. Concentricity of hoses		
Dimensions in millimetres		
Nominal bore	Maximum variation in wall thickness	
	Between internal diameter and outside diameter	Between internal diameter and reinforcement diameter
6	0,8	0,4
Over and including 19	1,0	0,6
Over 19	1,3	0,8

5.2 Length

5.2.1 Hoses

Hoses shall be supplied in lengths as specified by the purchaser, subject to a tolerance on the specified lengths of $\pm 2\%$.

When no specific hose lengths have been ordered, the percentages of different lengths in any given delivery shall be as follows:

- over 20 m: not less than 80 % of total length;
- over 10 m to 20 m: not more than 20 % of total length;
- 1 m to 10 m: not more than 3 % of total length.

No length of hose shall be less than 1 m.

5.2.2 Hose assemblies

The tolerances on the length of hose assemblies shall comply with the values given in table 3.

Table 3. Tolerances of length of hose assemblies	
Dimensions in millimetres	
Hose assembly length	Tolerances
Up to and including 630	+7 –3
Over 630 and including 1250	+12 –4
Over 1250 and including 2500	+20 –6
Over 2500 and including 8000	+1,5 % –0,5 %
Over 8000	+3 % –1 %

6 Requirements

6.1 Hydrostatic requirements

6.1.1 When tested in accordance with EN ISO 1402, the maximum working pressure, the proof pressure and burst pressure of the hoses and hose assemblies shall comply with the values given in table 4.

6.1.2 When tested in accordance with EN ISO 1402, the change in length of hose at the maximum working pressure shall not exceed +2 % to - 4 %.

Table 4. Maximum working pressure, proof pressure and burst pressure

Nominal bore	Maximum working pressure bar ¹⁾		Proof pressure bar		Burst pressure bar	
	Type		Type		Type	
	1SC	2SC	1SC	2SC	1SC	2SC
6	225	400	450	800	900	1600
8	215	350	430	700	860	1400
10	180	330	360	660	720	1320
12	160	275	320	550	640	1100
16	130	250	260	500	520	1000
19	105	215	210	430	420	860
25	88	165	176	330	352	660

¹⁾ 1 bar = 0,1 MPa

6.2 Minimum bend radius

When bent to the minimum bend radius given in table 5, measured on the inside of the bend, the flatness shall not exceed 10 % of the original outside diameter.

Measure the hose outside diameter with a caliper before bending the hose. Bend the hose to the minimum bend radius and measure the flatness with the caliper.

Table 5. Minimum bend radius

Dimensions in millimetres		
Nominal bore	Minimum bend radius	
	Type 1SC	Type 2SC
6	75	75
8	85	85
10	90	90
12	130	130
16	150	170
19	180	200
25	230	250

6.3 Impulse test requirements

6.3.1 The impulse test shall be in accordance with ISO 6803. The test temperature shall be 100 °C.

6.3.2 For type 1SC hose, when tested at impulse pressure equal to 125 % of the maximum working pressure, the hose shall withstand a minimum of 150 000 impulse cycles.

For type 2SC, when tested at impulse pressure equal to 133 % of the maximum working pressure, the hose shall withstand a minimum of 200 000 impulse cycles.

6.3.3 There shall be no leakage or other malfunction before reaching the specified number of cycles.

6.3.4 This test shall be considered a destructive test and the test piece shall be thrown away.

6.4 Leakage of hose assemblies

When tested in accordance with EN ISO 1402 there shall be no leakage or evidence of failure. This test shall be considered a destructive test and the test piece shall be thrown away.

6.5 Cold flexibility

When tested in accordance with method B of EN 24672 at a temperature of -40 °C there shall be no cracking of the lining or cover. The test piece shall not leak or crack when subjected to a proof pressure test after regaining ambient temperature.

6.6 Adhesion between components

When tested in accordance with EN 28033, the adhesion between lining and reinforcement, and between cover and reinforcement shall not be less than 2,5 kN/m.

Test pieces shall be type 5 for lining and reinforcement and type 2 or type 6 for cover and reinforcement as described in table 1 of EN 28033 : 1993.

6.7 Vacuum resistance

When tested in accordance with EN ISO 7233 the hose and hose assemblies shall comply with the values given in table 6.

Table 6. Degree of vacuum

Nominal bore	Negative gauge pressure max. bar ¹⁾	
	Type 1SC	Type 2SC
6	-0,8	-0,95
8		
10		
12		
16		
19	—	
25		

¹⁾ 1 bar = 0,1 MPa

6.8 Abrasion resistance

When tested in accordance with EN ISO 6945, with a vertical force of $(25 \pm 0,5)$ N, the loss of mass after 2000 cycles shall not be greater than 0,5 g.

6.9 Fluid resistance

6.9.1 Test pieces

The fluid resistance tests shall be carried out on moulded sheets of lining and cover compound, 2 mm minimum thickness, of equivalent cure state to that of the hose.

6.9.2 Oil resistance

When tested in accordance with ISO 1817, the lining immersed in Oil No.3 for 168 h at a temperature of 100 °C shall show no shrinkage nor volume swelling greater than 25 %.

When tested in accordance with ISO 1817, the cover immersed in Oil No.3 for 168 h at a temperature of 70 °C shall show no shrinkage nor volume swelling greater than 100 %.

6.9.3 Water based fluid resistance

When tested in accordance with ISO 1817, the lining and cover immersed in a test liquid made up of equal volumes of 1,2-ethanediol and distilled water for 168 h at a temperature of 70 °C shall show no shrinkage. The volume swelling shall be not greater than 25 % for lining nor 100 % for cover.

6.9.4 Water resistance

When tested in accordance with ISO 1817, the lining and cover immersed in a water for 168 h at a temperature of 70 °C shall show no shrinkage. The volume swelling shall be not greater than 25 % for lining nor 100 % for cover.

6.10 Ozone resistance

When tested in accordance with method 1 of EN 27326, no cracking or deterioration of the cover shall be visible under $\times 2$ magnification.

7 Designation

Hoses shall be designated as the following example.

Designation of a type 1SC hydraulic hose with wire braid reinforcement and a nominal bore of 10:

Hose EN 857 - 1SC 10

8 Marking

8.1 Hoses

Hoses shall be marked at a maximum spacing of 500 mm with at least the following information:

- a) manufacturer's name or identification, e.g. XXX;
- b) the sign 'EN 857';
- c) type, e.g. 1SC;
- d) nominal bore, e.g. 16;
- e) quarter and last two digits of year of manufacture, e.g. 4Q96.

Example: XXX/EN 857/1SC/16/4Q96.

NOTE. Other information, as agreed between the purchaser and the manufacturer, can be included, if requested.

8.2 Hose assemblies

Hose assemblies shall be marked with at least the following information:

- a) the manufacturer's name or identification, e.g. XXX;
- b) maximum working pressure of the assemblies, in bar, e.g. 160;
- c) the last two digits of year and month of assembly, e.g. 9610

Example: XXX/160/9610.

NOTE. Other information, as agreed between the purchaser and the manufacturer, can be included, if requested.

List of references

See national foreword.

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