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

Part 1: Oil-based fluid applications

ICS 23.100.40; 83.140.40

BSi
British Standards

National foreword

This British Standard reproduces verbatim ISO 11237-1:2004 and implements it as the UK national standard.

The UK participation in its preparation was entrusted to Technical Committee PRI/66, Rubber and plastics tubing, hoses and hose assemblies, 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 committee can be obtained on request to its secretary.

Cross-references

The British Standards which implement international 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.

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 does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, the ISO title page, pages ii to iv, pages 1 to 8, an inside back cover and a back cover.

The BSI copyright notice displayed in this document indicates when the document was last issued.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 7 November 2005

Amendments issued since publication

Amd. No.	Date	Comments

ISBN 0 580 46701 5

BS ISO 11237-1:2004

INTERNATIONAL STANDARD

ISO 11237-1

First edition
2004-01-15

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

Part 1:

Oil-based fluid applications

Tuyaux et flexibles en caoutchouc — Types hydrauliques compacts avec armature de fils métalliques — Spécifications —

Partie 1: Applications pour fluides à base d'huile

Reference number
ISO 11237-1:2004(E)

Contents

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 11237-1 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 1, *Hoses (rubber and plastics)*.

ISO 11237 consists of the following parts, under the general title *Rubber hoses and hose assemblies — Wire-braid-reinforced compact types for hydraulic applications — Specification*:

Part 1: Oil-based fluid applications

Part 2 : Water-based fluid applications

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

Part 1:

Oil-based fluid applications

1 Scope

This part of ISO 11237 specifies requirements for three types of wire-braid-reinforced compact hose and hose assembly of nominal bore from 6,3 to 31,5. They are suitable for use with hydraulic fluids HH, HL, HM, HR and HV in accordance with ISO 6743-4 at temperatures ranging from −40 °C to +100 °C.

This part of ISO 11237 does not include requirements for end fittings. It is limited to the performance of hoses and hose assemblies.

NOTE It is the responsibility of the user, in consultation with the hose manufacturer, to establish compatibility of the hose with the fluid to be used.

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.

ISO 1402, *Rubber and plastics hoses and hose assemblies — Hydrostatic testing*

ISO 1817, *Rubber, vulcanized — Determination of the effect of liquids*

ISO 4671, *Rubber and plastics hoses and hose assemblies — Methods of measurement of dimensions*

ISO 4672:1997, *Rubber and plastics hoses — Sub-ambient temperature flexibility tests*

ISO 6803, *Rubber or plastics hoses and hose assemblies — Hydraulic pressure impulse test without flexing*

ISO 6945, *Rubber hoses — Determination of abrasion resistance of the outer cover*

ISO 7233, *Rubber and plastics hoses and hose assemblies — Determination of suction resistance*

ISO 7326:1991, *Rubber and plastics hoses — Assessment of ozone resistance under static conditions*

ISO 8033:1991, *Rubber and plastics hose — Determination of adhesion between components*

3 Classification

Three types of hose are specified, distinguished by their construction, working pressure, minimum bend radius and oil resistance:

a) Type 1SC, hoses with a single braid of wire reinforcement;

b) Type 2SC, hoses with two braids of wire reinforcement;

c) Type R16, hoses with one or two braids of wire reinforcement;

d) Type R17, 210 bar constant-pressure hoses with one or two braids of wire reinforcement.

NOTE Type R16 and R17 are not subjected to the vacuum resistance or abrasion resistance tests.

4 Materials and construction

4.1 Hoses

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

4.2 Hose assemblies

Hose assemblies shall only be manufactured with those hose fittings whose functionality conforms to the requirements of 6.1, 6.3 and 6.4 of this part of ISO 11237.

The manufacturer's instructions for proper preparation and fabrication of hose assemblies shall be followed.

5 Dimensions

When measured in accordance with ISO 4671, the dimensions of the hoses shall conform to the values given in Table 1.

Table 1 — Dimensions of hoses

Nominal bore	All types		Type 1SC			Type 2SC			Type R16		Type R17	
	Inside diameter		Diameter over reinforcement		Outside diameter of hose	Diameter over reinforcement		Outside diameter of hose	Diameter over reinforcement	Outside diameter of hose	Diameter over reinforcement	Outside diameter of hose
	mm		mm		mm	mm		mm	mm	mm	mm	mm
	min.	max.	min.	max.	max.	min.	max.	max.	max.	max.	max.	max.
6,3	6,1	6,9	9,6	10,8	13,5	10,6	11,7	14,2	12,3	14,5	11,0	13,2
8	7,7	8,5	10,9	12,1	14,5	12,1	13,3	16,0	13,3	15,8	13,0	15,0
10	9,3	10,1	12,7	14,5	16,9	14,4	15,6	18,3	15,9	18,8	15,0	17,0
12,5	12,3	13,5	15,9	18,1	20,4	17,5	19,1	21,5	19,1	22,0	18,8	21,1
16	15,5	16,7	19,8	21,0	23,0	20,5	22,3	24,7	22,5	25,4	23,6	25,9
19	18,6	19,8	23,2	24,4	26,7	24,6	26,4	28,6	26,3	29,0	27,7	30,3
25	25,0	26,4	30,7	31,9	34,9	32,5	34,3	36,6	34,0	36,6	35,6	38,6
31,5	31,4	33,0	37,8	39,0	42,2	39,3	41,7	44,3	41,9	44,3	—	—

NOTE Inside diameters are in accordance with ISO 4397.

When measured in accordance with ISO 4671, the concentricity of the hoses shall conform to the values given in Table 2.

Table 2 — Concentricity of hoses

Nominal bore	Maximum variation in wall thickness	
	Between internal diameter and outside diameter mm	Between internal diameter and reinforcement diameter mm
6,3	0,8	0,5
over 6,3 and including 19	1,0	0,6
over 19	1,3	0,8

6 Hose requirements

6.1 Hydrostatic requirements

6.1.1 When determined in accordance with ISO 1402, the maximum working pressure, the proof pressure and minimum burst pressure of the hoses and hose assemblies shall conform to the values given in Table 3.

Table 3 — Maximum working pressure, proof pressure and minimum burst pressure

Nominal bore	Maximum working pressure bar [a]				Proof pressure bar				Minimum burst pressure bar			
	Type				Type				Type			
	1SC	2SC	R16	R17	1SC	2SC	R16	R17	1SC	2SC	R16	R17
6,3	225	400	350	210	450	800	700	420	900	1 600	1 400	840
8	215	350	298	210	430	700	595	420	860	1 400	1 190	840
10	180	330	280	210	360	660	560	420	720	1 320	1 120	840
12,5	160	275	245	210	320	550	490	420	640	1 100	980	840
16	130	250	192	210	260	500	385	420	520	1 000	770	840
19	105	215	158	210	210	430	315	420	420	860	630	840
25	88	165	140	210	176	330	280	420	352	660	560	840
31,5	63	125	110	—	125	250	228	—	250	500	455	—

a 1 bar = 0,1 MPa

6.1.2 When determined in accordance with ISO 1402, the change in length of hoses at their maximum working pressure shall not exceed +2 % or –4 %.

6.2 Minimum bend radius

Use test pieces having a length at least four times the minimum bend radius. Measure the hose outside diameter with callipers in the straight lay position before bending the hose. Bend the hose through 180° to the minimum bend radius and measure the flatness with the callipers.

When bent to the minimum bend radius given in Table 4, measured on the inside of the bend, the flatness shall not exceed 10 % of the original outside diameter.

Table 4 — Minimum bend radius

Nominal bore	Minimum bend radius mm mm			
	Type 1SC	Type 2SC	Type R16	Type R17
6,3	75	75	50	50
8	85	85	55	55
10	90	90	65	65
12,5	130	130	90	90
16	150	170	100	100
19	180	200	120	120
25	230	250	150	150
31,5	250	280	210	—

6.3 Resistance to impulse

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

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

For type 2SC, R16 and R17 hoses, when tested at an 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 destroyed after the test.

6.4 Leakage of hose assemblies

When tested in accordance with 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 destroyed after the test.

6.5 Cold flexibility

When tested in accordance with method B of ISO 4672:1997 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 in accordance with ISO 1402 after regaining ambient temperature.

6.6 Adhesion between components

When determined in accordance with ISO 8033, the adhesion between lining and reinforcement, and between cover and reinforcement, shall not be less than 2,5 kN/m for type 1SC and 2SC hoses, and not less than 1,8 kN/m for type R16 and R17 hoses.

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 ISO 8033:1991.

6.7 Vacuum resistance

When tested in accordance with ISO 7233, hoses and hose assemblies shall conform to the values given in Table 5.

Table 5 — Degree of vacuum

Nominal bore	Negative gauge pressure kPa [a] max.	
	Type 1SC	**Type 2SC**
6,3 8 10 12,5 16	−80,0	−95,0
19 25 31,5		—
a 1 kPa = 0,01 bar		

NOTE Type R16 and R17 are not subjected to this test.

6.8 Abrasion resistance

When determined in accordance with ISO 6945, with a vertical force of (25 ± 0,5) N, the loss in mass after 2 000 cycles shall not be greater than 0,5 g.

NOTE Type R16 and R17 are not subjected to this test.

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 of cure state equivalent to that of the hose and having a minimum thickness of 2 mm.

6.9.2 Oil resistance

For type 1SC and 2SC, when determined in accordance with ISO 1817, by immersion in IRM 903 oil for 168 h at a temperature of 100 °C, the percentage change in volume of the lining ΔV_{100} shall be between 0 and +25 %.

For type R16 and R17, when determined in accordance with ISO 1817, by immersion in IRM 903 oil for 72 h at a temperature of 100 °C, the percentage change in volume of the lining ΔV_{100} shall be between 0 and +100 %.

For types 1SC and 2SC, when determined in accordance with ISO 1817, by immersion in IRM 903 oil for 168 h at a temperature of 70 °C, the percentage change in volume of the cover ΔV_{100} shall be between 0 and +100 %.

For type R16 and R17, when determined in accordance with ISO 1817, by immersion in IRM 903 oil for 72 h at a temperature of 100 °C, the percentage change in volume of the cover ΔV_{100} shall be between 0 and +100 %.

6.10 Ozone resistance

When tested in accordance with method 1 or 2 of ISO 7326:1991, no cracking or deterioration of the cover shall be visible under ×2 magnification.

7 Designation

Hoses shall be designated in accordance with the following example for a type 1SC hydraulic hose with wire braid reinforcement and a nominal bore of 10.

EXAMPLE ISO 11237-1/1SC/10

8 Marking

8.1 Hoses

Hoses shall be marked with at least the following information, and the marking shall be repeated at least once every 760 mm:

a) the manufacturer's name or identification, e.g. Man;

b) the number of this part of ISO 11237, i.e. ISO 11237-1;

c) the type, e.g. 1SC;

d) the nominal bore, e.g. 16;

e) the quarter and last two digits of the year of manufacture, e.g. 4Q04.

EXAMPLE Man/ISO 11237-1/1SC/16/4Q04

8.2 Hose assemblies

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

a) the manufacturer's name or identification, e.g. Man;

b) the maximum working pressure of the assembly, in bars [this shall be taken as the lower of a) the working pressure of the hose and b) the working pressure of the assembly], e.g. 16;

c) the last two digits of month and year of assembly, e.g. 04/04.

EXAMPLE Man/16/04/04

Annex A

(informative)

Recommendations for lengths of supplied hoses and hose assemblies

A.1 Hoses

Hoses should be supplied in lengths as specified by the purchaser, subject to a tolerance of ±2 %.

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

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

No length of hose should be less than 1 m.

A.2 Hose assemblies

The tolerances on the lengths of hose assemblies should conform to the values given in Table A.1.

Table A.1 — Tolerances on lengths of hose assemblies

Hose assembly length mm	Tolerances
Up to and including 630	±3 mm
Over 630 up to and including 1 250	±12 mm
Over 1 250 up to and including 2 500	±20 mm
Over 2 500 up to and including 8 000	±5 %
Over 8 000	±3 %

Bibliography

[1] ISO 4397, *Fluid power systems and components — Connectors and associated components — Nominal outside diameters of tubes and nominal inside diameters of hoses*

[2] ISO 6743-4, *Lubricants, industrial oils and related products (class L) — Classification — Part 4: Family H (Hydraulic systems)*

blank

BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover. Tel: +44 (0)20 8996 9000. Fax: +44 (0)20 8996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: +44 (0)20 8996 9001. Fax: +44 (0)20 8996 7001. Email: orders@bsi-global.com. Standards are also available from the BSI website at http://www.bsi-global.com.

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre. Tel: +44 (0)20 8996 7111. Fax: +44 (0)20 8996 7048. Email: info@bsi-global.com.

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration. Tel: +44 (0)20 8996 7002. Fax: +44 (0)20 8996 7001. Email: membership@bsi-global.com.

Information regarding online access to British Standards via British Standards Online can be found at http://www.bsi-global.com/bsonline.

Further information about BSI is available on the BSI website at http://www.bsi-global.com.

BSI

389 Chiswick High Road

London

W4 4AL