International Standard 6805

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION

Rubber hoses and hose assemblies for underground mining — Wire reinforced hydraulic type for coal mining

Tuyaux et flexibles en caoutchouc pour l'exploitation minière — Type hydraulique avec armature de fils métalliques pour mines de charbon

First edition — 1984-12-15

UDC 621.643.33 : 622.2 **Ref. No. ISO 6805-1984 (E)**

Descriptors: mining equipment, rubber products, hoses, rubber hoses, classifications, specifications, dimensions.

Price based on 4 pages

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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 6805 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*.

Printed in Switzerland

Rubber hoses and hose assemblies for underground mining — Wire reinforced hydraulic type for coal mining

1 Scope and field of application

1.1 This International Standard specifies requirements for embedded wire hose of internal diameter from 5 to 51 mm for use with common hydraulic fluids such as mineral oils, soluble oils, oil and water emulsions, aqueous glycol solution, and water at temperatures ranging from −40 to +100 °C. Operation at the extremes of or outside this temperature range may materially reduce the life of the hose. The hose is not suitable for use with fluids having a castor oil or ester base. The hose shall be antistatic and fire resistant.[1)]

1.2 Three types of hose are specified:

Type 1 — This is a 2 steel wire braid hose dimensionally and constructionally in line with ISO 1436. For coal mining applications the performance requirements are in excess of those specified in ISO 1436.

Type 2 — This is a 2 steel wire braid hose which is typical of that at present in use in many very severe static or semi-static applications in coal mining installations. The dimensional parameters have been selected to provide increased reliability. The performance requirements reflect the higher design working pressure ratings of this hose.

Type 3 — This is a 4 steel wire spiral hose dimensionally and constructionally in line with ISO 3862. For coal mining applications the performance requirements are in excess of those specified in ISO 3862.

Types 1 and 2 represent two significantly different types of application of wire braided hose for hydraulic equipment used in the coal mining industry. Types 1 and 3 reflect normal hydraulic usage everywhere in conditions where the circuit experiences the full continuous dynamic impulses of the pump.

Hydraulic hoses for use with static or semi-static applications represent the major proportion of all hoses used in deep mines. The specific requirements of type 2 provide the most economic technical solution in such cases.

Where the values for type 2 in tables 1 to 6 differ from those of type 1, they have evolved in response to the needs of roof support equipment design as part of a programme of research and development.

1.3 This International Standard does not include requirements for end-fittings. It is limited to the performance of hoses and hose assemblies.

2 References

ISO 1307, *Rubber hose — Bore diameters and tolerances on length.*

ISO 1402, *Rubber hose — Hydrostatic testing.*

ISO 1436, *Rubber products — Hoses and hose assemblies — Wire reinforced hydraulic type.*

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

ISO 3862, *Rubber hoses and hose assemblies — Rubber-covered, spiral wire reinforced, hydraulic type.*

ISO 4672, *Rubber products — Hoses — Low temperature flexibility tests.*

ISO 6803, *Rubber and plastics hoses and hose assemblies — Wire reinforced — Hydraulic impulse test without flexing.*

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

ISO 7326, *Rubber and plastics hoses — Assessment of ozone under static conditions.*

ISO 8030, *Rubber and plastics hoses — Underground mining — Method of test for flammability.*[2)]

ISO 8031, *Rubber and plastics hoses — Determination of electrical properties.*[2)]

ISO 8033, *Rubber and plastics hoses — Determination of adhesion between components.*[2)]

1) Suitable tests will form the subjects of future International Standards.

2) At present at the stage of draft.

3 Materials and construction

3.1 The hose shall consist of an oil and water resistant synthetic rubber lining, steel wire reinforcement, of either type described in 1.2 and an oil, water, weather and abrasion resistant synthetic rubber cover. A ply or braid of suitable textile material may be used over the lining and/or the wire reinforcement to anchor the synthetic rubber to the wire. Each braid or spiral wire layer shall be separated by an insulating layer of rubber.

3.2 The hose shall be concentric in accordance with the requirements of table 1.

NOTE — ISO 1307 has not been followed for nominal bore or permitted range. The dimensions adopted in table 1 are in accordance with those specified by the Society of Automotive Engineers (USA), and are in wide use in numerous countries throughout the world.

Table 1 — Hose concentricity

Values in millimetres

Nominal bore	Maximum variation from concentricity			
	Internal diameter to overall diameter		Internal diameter to reinforcement diameter	
	Types 1 and 3	Type 2	Types 1 and 3	Type 2
Up to and including 6,3	0,8	0,5	0,5	0,5
Over 6,3 up to and including 19	1,0	0,7	0,7	0,7
Over 19	1,3	1,0	0,9	1,0

4 Dimensions

The bore diameter, diameter over reinforcement, and outside diameter of finished hose shall meet the requirements of tables 2 to 4.

Table 2 — Hose dimensions — Type 1

Dimensions in millimetres

Nominal bore	Bore diameter		Diameter over outer wire braid		Outside diameter of finished hose	
	min.	max.	min.	max.	min.	max.
5	4,5	5,4	10,6	11,7	15,1	16,7
6,3	6,1	6,9	12,1	13,3	16,7	18,3
10	9,3	10,1	16,1	17,3	20,6	22,2
12,5	12,3	13,5	19,1	20,6	23,8	25,4
16	15,4	16,7	22,2	23,8	27,0	28,6
19	18,6	19,8	26,2	27,8	31,0	32,5
25	25,0	26,4	34,1	35,7	38,5	40,9
31,5	31,3	33,0	43,3	45,6	49,2	52,4
38	37,7	39,3	49,6	52,0	55,6	58,7
51	50,4	52,0	62,3	64,7	68,3	71,4

Table 3 — Hose dimensions — Type 2

Dimensions in millimetres

Nominal bore	Bore diameter		Diameter over outer wire braid		Outside diameter of finished hose	
	min.	max.	min.	max.	min.	max.
5	—	—	—	—	—	—
6,3	6,1	6,6	12,3	13,1	16,4	17,7
10	9,3	9,8	16,1	17,2	20,8	22,1
12,5	12,4	13,0	20,6	21,6	25,8	27,1
16	15,6	16,1	24,0	25,0	29,2	30,5
19	18,8	19,3	27,8	28,8	33,0	34,3
25	25,0	25,8	34,7	36,0	39,9	41,4
31,5	31,4	32,1	40,8	42,0	46,7	48,3
38	37,9	39,2	47,4	48,7	53,3	54,9
51	—	—	—	—	—	—

Table 4 — Hose dimensions — Type 3

Dimensions in millimetres

Nominal bore	Bore diameter		Diameter over outer wire braid		Outside diameter of finished hose	
	min.	max.	min.	max.	min.	max.
5	—	—	—	—	—	—
6,3	6,2	7,0	14,1	15,3	17,1	18,7
10	9,3	10,1	16,9	18,1	20,6	22,2
12,5	12,3	13,5	19,4	21,0	23,8	25,4
16	15,5	16,7	23,0	24,6	27,4	29,0
19	18,6	19,8	27,4	29,0	31,4	33,0
25	25,0	26,4	34,5	36,1	38,5	40,9
31,5	31,4	33,0	44,8	47,2	49,1	52,3
38	37,7	39,3	51,2	53,6	55,5	58,7
51	50,4	52,0	64,7	67,1	69,0	72,2

5 Pressure ratings

5.1 The design working and burst pressure of the hoses shall comply with the requirements of tables 5 and 6.

Table 5 — Design working pressure

Nominal bore	Type 1		Type 2		Type 3	
mm	MPa [1]	bar	MPa	bar	MPa	bar
5	41,5	415	—	—	—	—
6,3	40,0	400	45,0	450	45,0	450
10	33,0	330	38,0	380	44,5	445
12,5	27,5	275	31,0	310	41,5	415
16	25,0	250	28,0	280	35,0	350
19	21,5	215	24,0	240	35,0	350
25	16,5	165	21,0	210	28,0	280
31,5	12,5	125	17,0	170	21,0	210
38	9,0	90	14,0	140	18,5	185
51	8,0	80	—	—	16,5	165

1) 1 MPa = 1 N/mm^2 = 10 bar

Table 6 — Design burst pressure

Nominal bore	Type 1		Type 2		Type 3	
mm	MPa	bar	MPa	bar	MPa	bar
5	165,0	1650	—	—	—	—
6,3	160,0	1600	152,0	1520	180,0	1800
10	132,0	1320	131,0	1310	178,0	1780
12,5	110,0	1100	110,0	1100	166,0	1660
16	100,0	1000	85,0	850	140,0	1400
19	85,0	850	75,0	750	140,0	1440
25	65,0	650	67,0	670	112,0	1120
31,5	50,0	500	53,0	530	84,0	840
38	36,0	360	42,0	420	74,0	740
51	32,0	320	—	—	66,0	660

5.2 The hose shall withstand, without damage, a proof test pressure of twice the design working pressure maintained by the method described in ISO 1402.

NOTE — The design working pressures in table 5 are based on a bursting safety factor of 4 for types 1 and 3 hose. Working pressures based on a lower safety factor may be permissible for special conditions on some applications, provided these working pressures do not contravene the statutory requirements of the national authority of the particular country.

In the case of type 2, the factor between design working pressure and design burst pressure varies between 3,0 and 3,5. The design burst pressure for this hose as quoted is not a minimum requirement, but the hose must be capable of withstanding the hydrostatic stability test given in clause 13.

6 Minimum bend radius and change in length at design working pressure

6.1 The hose shall be capable of performing at design working pressure when curved to a radius not smaller than that given in table 7.

Table 7 — Minimum bend radius and change in length

Nominal bore	Bend radius [1]			Change in length	
	Type 1	Type 2	Type 3	Types 1 to 3	
mm	mm	mm	mm	%	
5	90	—	—	+2	−4
6,3	100	100	150	+2	−4
10	130	130	180	+2	−4
12,5	180	150	230	+2	−4
16	205	190	250	+2	−4
19	240	230	300	+2	−4
25	300	300	340	+2	−4
31,5	420	380	460	+2	−4
38	500	450	560	+2	−4
51	630	—	710	+2	−4

1) Bend radius is measured on the inside of the bend.

NOTE — Should any portion of the hose be curved to a radius smaller than the specified bend radius, the performance capability of the hose is reduced.

6.2 The change in length at the design working pressure shall not be greater than $^{+2}_{-4}$ % for all cases specified in table 7.

7 Tolerance on length

7.1 The hose shall be supplied in lengths as specified by the purchaser, subject to a tolerance on the specified lengths of ±1 % or ±3 mm, whichever is the greater.

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

a) over 13 m, not less than 65 %;

b) 7,5 to 13 m, not more than 35 %;

c) 1 to 7,5 m, not more than 10 %.

No length shall be less than 1 m.

8 Impulse test requirements

8.1 When tested in accordance with the requirements of ISO 6803 to a test pressure equal to 133 % of the design working pressures given in table 5, type 1 hose shall withstand a minimum of 200 000 impulse cycles, type 2 hose a minimum of 50 000 cycles and type 3 hose a minimum of 400 000 cycles.

8.2 The circulating oil in the hose assemblies under test shall be maintained at a temperature of 100 ± 5 °C for types 1 and 3 and 55 ± 5 °C for type 2.

8.3 There shall be no leakage or other malfunction at the specified number of cycles.

Leakage at the end-fitting, fitting blow-off or rupture of the hose adjacent to the fitting shall be considered as a failure in the performance of the assembly and not of the hose itself. Such failures do not necessarily demonstrate an inability of the hose to meet the specified requirements with an alternative fitting.

The mode and position of any failures shall be recorded.

9 Cold flexibility requirements

When tested in accordance with method B of ISO 4672 at a temperature of −40 ± 3 °C there shall be no cracking of the lining or cover. The test piece shall not leak or crack when subjected to a proof test after regaining ambient temperature.

10 Ozone resistance

When tested in accordance with ISO 7326, no cracking or deterioration of the cover shall be visible at a magnification of X 2 after exposure for 72 h at 40 ± 2 °C to an ozone concentration of 0,5 ± 0,05 ppm.

11 Oil resistance

The lining and the cover, when tested by the method described in ISO 1817, immersing in oil No. 3 for 72 h at a temperature of 100 °C, shall show no shrinkage and shall not show volume swelling greater than 100 % for the cover and 75 % for the lining.

12 Abrasion resistance

The cover of the hose, when tested by the method described in ISO 6945, shall have a maximum loss of 1,0 g after 2 000 test cycles.

13 Hydrostatic stability test — Type 2 hose only

A sample of hose not less than 300 mm long between fittings shall be tested in a straight condition with one free end as follows:

13.1 Pressure shall be raised to the design working pressure given in table 5, held for 1 min and then reduced to zero.

13.2 Suitable gauge marks shall be made and their distance apart measured; the distances of the marks from the fittings shall not be less than twice the nominal bore size.

13.3 Pressure shall then be raised to the design working pressure; the distance apart of the marks re-measured and the change of length recorded.

13.4 The internal pressure shall then be raised to a value of three times the design working pressure given in table 5. The rate of increase shall be such that this pressure is reached within 3 min. This pressure shall be held for 1 min during which time there shall be no sign of failure. The pressure shall then be increased until the hose or hose assembly fails.

The failure pressure shall be recorded.

14 Electrical resistance

When tested in accordance with ISO 8031, the electrical resistance, as measured between the electrodes in the manner described, shall not exceed $\frac{2 \times 10^6}{D}$ ohms, where D is the outside diameter of the hose, in millimetres.

Tests shall be made on 5 sample lengths of hose and all the test results shall be within the specified limit.

15 Flame resistance

When tested in accordance with ISO 8030, the average time of persistence of flame or glow, after withdrawal of the flame, shall not exceed 30 s. Six samples of hose shall be tested and the average value calculated from the individual results.

16 Adhesion between components

When tested in accordance with ISO 8033, adhesion between liner and reinforcement and between reinforcement layers shall not be less than 2,5 kN/m.

Adhesion between cover and reinforcement shall not be less than 4,0 kN/m.

17 Marking

Hoses and hose assemblies complying with this International Standard shall be marked with at least the following information:

a) the number of this International Standard;

b) the hose type;

c) the nominal bore size;

d) the manufacturer's name or mark;

e) the date of manufacture, quarter and last two digits of year of manufacture.

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