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

Part 2:

**Water-based fluid applications**

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

*Partie 2: Applications pour fluides à base d'eau*

[ISO 11237-2:2006](#)

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Published in Switzerland

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## 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 11237-2 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*

[ISO 11237-2:2006](#)

— *Part 2: Water-based fluid applications*

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

## Part 2: Water-based fluid applications

### 1 Scope

This part of ISO 11237 specifies requirements for four types of compact wire-braid-reinforced hoses and hose assemblies of nominal size from 5 to 31,5. They are suitable for use with hydraulic fluids HFC, HFAE, HFAS and HFB as defined in ISO 6743-4 at temperatures ranging from  $-40\text{ }^{\circ}\text{C}$  to  $+60\text{ }^{\circ}\text{C}$ .

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

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

### 2 Normative references

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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 6605, *Hydraulic fluid power — Hoses and hose assemblies — Test methods*

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*

ISO 11237-1, *Rubber hoses and hose assemblies — Wire-braid-reinforced compact types for hydraulic applications — Specification — Part 1: Oil-based fluid applications*

### 3 Classification

Four types of hose are specified, distinguished by their construction, working pressure and minimum bend radius. These hoses have thin covers designed for fitting assembly without the removal of the cover or a portion of the cover.

- 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 maximum working pressure hoses with one or two braids of wire reinforcement.

NOTE Types 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 rubber lining resistant to water-based hydraulic fluids, one or two layers of high-tensile steel wire, and an oil- and weather-resistant rubber cover.

#### 4.2 Hose assemblies

Hose assemblies shall be manufactured only with those hose fittings whose correct functioning has been verified in accordance with Subclauses 6.2, 6.4 and 6.5 of this part of ISO 11237. The manufacturer's instructions shall be followed for the preparation and fabrication of hose assemblies.

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### 5 Dimensions

#### 5.1 Hose diameters and cover thickness

When measured in accordance with ISO 4671, the hose diameters and the cover thickness shall conform to the values given in Table 1.

Table 1 — Hose dimensions

| Nominal size | All types       |      | Type 1SC           |      | Type 2SC                 |      | Type R16           |      | Type R17                 |      | All types       |      |
|--------------|-----------------|------|--------------------|------|--------------------------|------|--------------------|------|--------------------------|------|-----------------|------|
|              | Inside diameter |      | Diameter over wire |      | Outside diameter of hose |      | Diameter over wire |      | Outside diameter of hose |      | Cover thickness |      |
|              | min.            | max. | min.               | max. | min.                     | max. | min.               | max. | min.                     | max. | min.            | max. |
| 5            | 4,6             | 5,4  | N/A                | N/A  | N/A                      | N/A  | N/A                | N/A  | 10,1                     | 11,6 | 0,8             | 1,5  |
| 6,3          | 6,1             | 6,9  | 9,6                | 10,8 | 10,6                     | 11,7 | 14,2               | 12,3 | 11,0                     | 13,2 | 0,8             | 1,5  |
| 8            | 7,7             | 8,5  | 10,9               | 12,2 | 12,1                     | 13,3 | 16,0               | 13,3 | 13,0                     | 15,0 | 0,8             | 1,5  |
| 10           | 9,3             | 10,1 | 12,7               | 14,5 | 14,4                     | 15,6 | 18,3               | 15,9 | 15,0                     | 17,0 | 0,8             | 1,5  |
| 12,5         | 12,3            | 13,5 | 15,9               | 18,1 | 17,5                     | 19,1 | 21,5               | 19,1 | 18,8                     | 21,1 | 0,8             | 1,5  |
| 16           | 15,5            | 16,7 | 19,8               | 21,0 | 20,5                     | 22,3 | 24,7               | 22,5 | 23,6                     | 25,9 | 0,8             | 1,5  |
| 19           | 18,6            | 19,8 | 23,2               | 24,4 | 24,6                     | 26,4 | 28,6               | 26,3 | 27,7                     | 30,3 | 0,8             | 1,5  |
| 25           | 25,0            | 26,4 | 30,7               | 31,9 | 32,5                     | 34,3 | 36,6               | 34,0 | 35,6                     | 38,6 | 0,8             | 1,5  |
| 31,5         | 31,4            | 33,0 | 37,8               | 39,0 | 39,3                     | 41,7 | 44,3               | 41,9 | N/A                      | N/A  | 0,8             | 1,5  |

NOTE Nominal sizes correspond to the inside diameters in ISO 4397; N/A = Not available.

**5.2 Hose concentricity**

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

**Table 2 — Concentricity of hoses**

| Nominal size                        | Maximum variation in wall thickness            |  |
|-------------------------------------|--|--|
|                                     | mm   |  |
|                                     | Between internal diameter and outside diameter | Between internal diameter and reinforcement diameter |
| Up to and including 6,3             | 0,8  | 0,5  |
| Over 6,3 and up to and including 19 | 1,0  | 0,6  |
| Over 19                             | 1,3  | 0,8  |

**6 Performance requirements**

**6.1 General**

The requirements for type and routine testing are given in Annex A and recommendations for production acceptance testing in Annex B.

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**6.2 Hydrostatic requirements**

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When determined in accordance with ISO 1402 or ISO 6605, the maximum working pressure, the proof pressure and the minimum burst pressure of 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 size | Maximum working pressure |         |     | Proof pressure |         |     | Minimum burst pressure |         |     |
|--------------|--------------------------|---------|-----|----------------|---------|-----|------------------------|---------|-----|
|              | bar                      |         |     | bar            |         |     | bar                    |         |     |
|              | Type                     |         |     | Type           |         |     | Type                   |         |     |
|              | 1SC                      | 2SC/R16 | R17 | 1SC            | 2SC/R16 | R17 | 1SC                    | 2SC/R16 | R17 |
| 5            | N/A                      | N/A     | 210 | N/A            | N/A     | 420 | N/A                    | N/A     | 840 |
| 6,3          | 225                      | 400     | 210 | 450            | 800     | 420 | 900                    | 1 600   | 840 |
| 8            | 215                      | 350     | 210 | 430            | 700     | 420 | 860                    | 1 400   | 840 |
| 10           | 180                      | 330     | 210 | 360            | 660     | 420 | 720                    | 1 320   | 840 |
| 12,5         | 160                      | 275     | 210 | 320            | 550     | 420 | 640                    | 1 100   | 840 |
| 16           | 130                      | 250     | 210 | 260            | 500     | 420 | 520                    | 1 000   | 840 |
| 19           | 105                      | 215     | 210 | 210            | 430     | 420 | 420                    | 860     | 840 |
| 25           | 88                       | 165     | 210 | 176            | 330     | 420 | 352                    | 660     | 840 |
| 31,5         | 63                       | 125     | N/A | 125            | 250     | N/A | 250                    | 500     | N/A |

NOTE 1 bar = 0,1 MPa; N/A = Not available.



### 6.3 Length change requirements

When determined in accordance with ISO 1402 or ISO 6605, the change in length of hoses at the maximum working pressure shall not exceed +2 % to –4 %.

### 6.4 Minimum bend radius

Use a test piece having a length at least four times the minimum bend radius. Measure the hose outside diameter with a calliper in the straight lay position before bending the hose. Bend the hose through 180° to the minimum bend radius (see Table 4) and measure the flatness with the calliper.

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 size | Minimum bend radius<br>mm |          |          |          |
|--------------|---------------------------|----------|----------|----------|
|              | Type 1SC                  | Type 2SC | Type R16 | Type R17 |
| 5            | N/A                       | N/A      | N/A      | 45       |
| 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      | N/A      |

NOTE N/A = Not available.

### 6.5 Resistance to impulse

#### 6.5.1 Standard impulse test

The impulse test shall be in accordance with ISO 6803 or ISO 6605. The test fluid used shall be HFC, HFAE, HAFS or HFB as defined in ISO 6743-4. The test fluid temperature shall be 60 °C.

#### 6.5.2 Optional impulse test

The following test may be used to maximize efficiency:

- oven-age assemblies filled with one of the above water-based fluids for 120 h at 60 °C;
- impulse-test the aged assemblies using an oil-based hydraulic fluid as required in ISO 11237-1.

For type 1SC hoses, when tested at an impulse pressure equal to 125 % of the maximum working pressure, the assemblies 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 assemblies shall withstand a minimum of 200 000 impulse cycles.