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**Rubber Hoses and Hose Assemblies – Wire-Braid-
Reinforced Hydraulic Types for Oil-Based or Water-Based
Fluids - Specification**

(ISO 1436:2020, IDT)

橡胶软管及软管组合件 油基或水基流体适用的钢丝编织增强液压型
规范

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Rubber Hoses and Hose Assemblies – Wire-Braid-Reinforced Hydraulic Types for Oil-Based or Water-Based Fluids – Specification

1 Scope

This Document specifies the requirements for 6 types of steel wire braided reinforced hoses and hose assemblies with nominal inner diameters of 5 ~ 51. This Document also specifies Type-2SN and Type-R2AT hoses with a nominal inside diameter of 63 and Type-2SN hose with a nominal inside diameter of 76.

This Document applies to hoses and hose assemblies used with the following media:

--- In the temperature range of $-40^{\circ}\text{C} \sim +100^{\circ}\text{C}$, HH, HL, HM, HR and HV oil-based hydraulic fluids defined by ISO 6743-4;

--- In the temperature range of $0^{\circ}\text{C} \sim +70^{\circ}\text{C}$, HFC, HFAE, HFAS and HFB water-based hydraulic fluids defined by ISO 6743-4;

--- Water in the temperature range of $0^{\circ}\text{C} \sim +70^{\circ}\text{C}$.

This Document excludes requirements for pipe joints, only include requirements for hoses and hose assemblies.

NOTE: It is the user's responsibility to consult the hose manufacturer to confirm the compatibility of the hose with the fluid being used.

2 Normative References

The provisions in following documents become the essential provisions of this Document through reference in this Document. For the dated documents, only the versions with the dates indicated are applicable to this Document; for the undated documents, only the latest version (including all the amendments) is applicable to this Document.

GB/T 14905-2020 Rubber and plastics hoses - Determination of adhesion between components (ISO 8033:2016, IDT)

ISO 1402 Rubber and plastics hoses and hose assemblies – Hydrostatic testing

ISO 8330 Rubber and plastics hoses and hose assemblies – Vocabulary

NOTE: GB/T 7528-2019 Rubber and plastics hoses and hose assemblies – Vocabulary (ISO 8330:2014, IDT)

ISO 10619-1:2017 Rubber and plastics hoses and tubing – Measurement of flexibility and stiffness – Part 1: Bending tests at ambient temperature

NOTE: GB/T 5565.1-2017 Rubber and plastics hoses and tubing – Measurement of flexibility and stiffness – Part 1: Bending tests at ambient temperature (ISO 10619-1:2011, IDT)

ISO 10619-2:2017 Rubber and plastics hoses and tubing – Measurement of flexibility and stiffness – Part 2: Bending Tests at sub-ambient temperatures

NOTE: GB/T 5565.2-2017 Rubber and plastics hoses and tubing – Measurement of flexibility and stiffness – Part 2: Bending Tests at sub-ambient temperatures (ISO 10619-2:2011, IDT)

3 Terms and Definitions

For the purposes of this Document, the terms and definitions given in ISO 8330 apply.

4 Classification

According to different structures, working pressure and oil resistance, hoses are divided into 6 types.

- Type-1ST: hose with a single layer of steel wire braided layer and a thick outer covering layer;
- Type-2ST: hose with double-layer of steel wire braided layer and thick outer covering layer;
- Type-1SN and Type-R1AT: hoses with a single layer of steel wire braided layer and a thin outer covering layer;
- Type-2SN and Type-R2AT: hoses with double-layer of steel wire braided layer and a thin outer covering layer.

Type-1ST and Type-2ST are not recommended for new product designs.

NOTE: In addition to having a thinner outer covering so that the outer covering or part of the outer covering does not need to be peeled off when assembling the hose joint, the reinforcement layer dimensions of Type-1SN and Type-R1AT, Type-2SN and Type-R2AT hose are respectively the same as those of Type-1ST and Type-2ST.

Table 1 -- Inner Diameter of hose and Outer Diameter of Reinforcement Layer

Nominal inner diameter a	All types		Type-R1AT, Type-1SN, Type-1ST		Type-R2AT, Type-2SN, Type-2ST	
	Inner diameter mm		Outer diameter of reinforcement layer mm			
	Min.	Max.	Min.	Max.	Min.	Max.
5	4,6	5,4	9,0	10,0	10,6	11,6
6,3	6,2	7,0	10,6	11,6	12,1	13,3
8	7,7	8,5	12,1	13,3	13,7	14,9
10	9,3	10,1	14,5	15,7	16,1	17,3
12,5	12,3	13,5	17,5	19,1	19,0	20,6
16	15,5	16,7	20,6	22,2	22,2	23,8
19	18,6	19,8	24,6	26,2	26,2	27,8
25	25,0	26,4	32,5	34,1	34,1	35,7
31,5	31,4	33,0	39,3	41,7	43,3	45,7
38	37,7	39,3	45,6	48,0	49,6	52,0
51	50,4	52,0	58,7	61,7	62,3	64,7
63 ^b	62,3	64,7	—	—	72,2	73,8
76 ^c	75,0	77,4	—	—	87,0	88,6

^a The nominal inner diameter corresponds to the inner diameter given by ISO 1307.

^b This hose with such dimension is only suitable for Type-R2AT and Type-2SN.

^c This hose with such dimension is only suitable for Type-2SN.

For Type-1ST, Type-1SN and Type-R1AT hoses, during the test, if the nominal inner diameter of the hose is 25 and below, the pulse pressure is 125% of the maximum working pressure of the hose. If the nominal inner diameter of the hose is 31.5 and above, the pulse pressure is the maximum working pressure, the hose shall withstand at least 150,000 pulses.

For Type-2ST, Type-2SN and Type-R2AT hoses, during the test, if the pulse pressure is 133% of the maximum working pressure of the hose, and the hose shall withstand at least 200,000 pulses.

The hose shall not leak or otherwise malfunction before reaching the specified number of pulses.

This test shall be regarded as a destructive test, and the specimen shall be discarded after the test.

The following tests can be used to maximize test efficiency.

- a) Aging the assembly filled with a water-based fluid specified in 7.4.2 in an oven at 70°C for 120h.
- b) Conduct a pulse test on the aged assembly with oil-based hydraulic fluid at 100°C.

For Type-1ST, Type-1SN and Type-R1AT hoses, during the test, if the nominal inner diameter of the hose is 25 and below, the pulse pressure is 125% of the maximum working pressure of the hose. If the nominal inner diameter of the hose is 31.5 and above, the pulse pressure is the maximum working pressure, the hose should withstand at least 150,000 pulses.

For Type-2ST, Type-2SN and Type-R2AT hoses, during the test, if the pulse pressure is 133% of the maximum working pressure of the hose, and the hose shall withstand at least 200,000 pulses.

The hose shall not leak or otherwise malfunction before reaching the specified number of pulses.

This test shall be regarded as a destructive test, and the specimen shall be discarded after the test.

7.5 Leakage from hose assemblies

When tested according to ISO 1402 or ISO 6605, there shall be no leakage or failure. This test shall be considered a destructive test and the specimen shall be discarded after the test.

7.6 Low temperature flexural properties

When tested in accordance with Method-B in Clause 5 of ISO 10619-2:2017 at -40°C, there shall be no cracks in the inner lining or outer covering layers. After returning to room temperature, when performing a verification pressure test according to ISO 1402 or ISO 6605, the specimen shall have no leakage or cracks.

7.10.2 Oil resistance

When tested according to ISO 1817, the volume change rate of the lining layer of Type-1SN, Type-1ST, Type-2SN and Type-2ST hoses shall be between 0% ~ +25% when immersed in IRM903 oil at 100°C for 168h. For Type-R1AT and Type-R2AT hoses, it shall be between 0% ~ +100% (that is, no shrinkage is allowed).

When tested according to ISO 1817 and immersed in IRM903 oil for 168 hours at 70°C, the volume change rate of the outer covering layer shall be between 0% ~ +100% (that is, no shrinkage is allowed).

7.10.3 Water resistance

When tested according to ISO 1817 and immersed in distilled water for 168 hours at 70°C, the volume change rate of the inner lining of all types of hoses shall be between 0% ~ +25%; and the volume change rate of the outer covering layer shall be between 0% ~ +100% (that is, no shrinkage is allowed).

7.11 Ozone resistance

When selecting Method-1 or Method-2 according to ISO 7326:2016 based on the nominal inner diameter of the hose, observe at 2 times magnification and the outer covering shall have no cracks or other aging phenomena.

7.12 Visual inspection

The outer layer of the hose shall be inspected for visible defects and the hose shall be properly labeled and marked. Additionally, the hose assemblies shall be inspected to confirm that the correct assemblies are installed.

8 Inspection Frequency

Type inspection and routine inspection shall comply with the provisions in Appendix A.

Type inspection is used to verify that hoses manufactured using a specific design method and specific production process meet all the requirements of this Document. These inspections shall be repeated at intervals of up to 5 years or when there are changes in the used manufacturing methods or materials. All sizes, categories and types of hoses shall be subject to type inspection except hoses of the same size and structure.

Routine inspection refers to the test performed on each finished hose before leaving the factory.

See Appendix B for production acceptance inspections. These inspections are to better control production quality. The frequencies specified in Appendix B are for reference only.

9 Marking

9.1 Hoses

Hoses that comply with the requirements of this Document shall be marked with at least the following information at least every 760 mm:

- a) Name or logo of the manufacturer, such as: ×××;
- b) This Document number, such as: GB/T 3683-2023;
- c) Type, such as: 2SN;
- d) Nominal size; such as 16;
- e) Maximum working pressure, in MPa, such as 25MPa;
- f) The last two digits of the quarter and year of manufacturing, such as: 4Q18 (year, month, day and other date encoding methods can also be used).

Example: ×××/GB/T 3683-2023/2SN/16/25 MPa/4Q18

For item b), the hose manufacturer shall use the latest version of this document, otherwise the standard year number shall be indicated in the mark.

9.2 Hose assemblies

Hose assemblies that comply with the requirements of this Document shall be permanently marked with at least the following information.

- a) Manufacturer's name or logo, such as: ×××.
- b) The maximum working pressure of the assembly, in MPa, such as: 25MPa.

NOTE 1: The maximum working pressure of a hose assembly is equal to the minimum value of the maximum working pressure of each of its assemblies.

- c) Two digits representing the assembly month, a slash, and the last two digits of the assembly year, such as: 18/11 (year, month, day and other date encoding methods can also be used).

Example: ×××/25 MPa/18/11

NOTE 2: Standard marks include but are not limited to stamping on pipe joints, embossing on metal or plastic rings, etc. The order of identifying elements is optional and need not be on the same line.

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