INTERNATIONAL STANDARD

ISO 8066-4

First edition
2023-07

Rubber and plastics hoses and hose assemblies for automotive air conditioning — Specification —

Part 4: Low vibration transmission type for Refrigerant 1234yf

Tuyaux et flexibles en caoutchouc et en plastique pour climatisation des automobiles — Spécifications —

Partie 4: Type de transmission à faible vibration pour le réfrigérant 1234yf

Reference number
ISO 8066-4:2023(E)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 1, *Rubber and plastics hoses and hose assemblies*.

A list of all parts in the ISO 8066 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Rubber and plastics hoses and hose assemblies for automotive air conditioning — Specification —

Part 4:
Low vibration transmission type for Refrigerant 1234yf

WARNING — Persons using this document should be familiar with normal laboratory practice. This document does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate health and safety practices and to ensure national regulatory conditions are taken into consideration.

1 Scope

This document specifies the requirements for rubber hoses and hose assemblies used for low-pressure application of circulating gaseous Refrigerant 1234yf (tetrafluoropropene) (hereinafter referred to as R1234yf) in the air-conditioning systems of automobiles. The hoses and hose assemblies are designed in such a way as to reduce vibration transmission between the engine room and the cabin. The operational temperature range is −40 °C to +80 °C.

Due to the critical relationship between the hose and coupling for this application, a requirement that the coupling to be used in service be used for testing is laid down.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 3448, *Industrial liquid lubricants — ISO viscosity classification*

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

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

ISO 8330, *Rubber and plastics hoses and hose assemblies — Vocabulary*

ISO/TR 11340, *Rubber and rubber products — Hydraulic hose assemblies — External leakage classification for hydraulic systems*

ISO 23529, *Rubber — General procedures for preparing and conditioning test pieces for physical test methods*

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

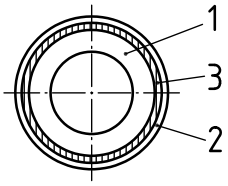
— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 Classification

4.1 Construction and material

The hose shall be built having a suitable seamless synthetic rubber tube. The reinforcement shall consist of textile yarn, cord or fabric adhered to the tube and cover. The outer cover shall be heat- and ozone-resistant synthetic rubber (see Figure 1).



Key

1 rubber tube

2 outer cover

3 textile reinforcement

Figure 1 — Hose construction and material

4.2 Pressure class

The pressure class of the hose shall be low pressure class intended for suction applications. The hose should not be used for high pressure class intended for discharge and liquid applications.

Working pressures are given in Table 1.

Table 1 — Working pressure

Pressure class	Working pressure MPa (bar)[a]
Low	1,06 (10,6)
[a] 1 bar = 0,1 MPa = 10^5 Pa; 1 MPa = 1 N/mm^2.	

4.3 Moisture-ingression grades

4.3.1 ML: low moisture ingression hose as defined in 6.14.

4.3.2 Mm: medium moisture ingression hose as defined in 6.14.

5 Dimensions

5.1 Hose inside diameters

Standard dimensions are given in Table 2. Other dimensions may be used as needed.

Table 2 — Typical inside diameters

Nominal size	Mean inside diameter mm
14	14
15	15
16 (5/8)	15,9
19 (3/4)	19
25 (1)	25,4
NOTE Nominal size with parenthesis is based on inch.	

5.2 Hose wall thickness variation

When the wall thickness is measured in accordance with ISO 4671, the variation in the wall thickness shall not exceed the values given in Table 3.

Table 3 — Wall thickness variation

Nominal size	Maximum departure from concentricity mm
Up to and including 19	1,0
Over 19	1,3

6 Testing and performance requirements

6.1 Test conditions

The testing room shall be kept at standard temperature in accordance with ISO 23529. The temperature of the hoses or hose assemblies shall be stabilized for 24 h before testing.

6.2 Gas leakage

6.2.1 Method A for type test and production test

When determined in accordance with the procedure given in 6.2.2, the loss in mass of refrigerant shall be no greater than 10 % of the initial mass of the refrigerant and there shall be no visible deterioration in the hoses or hose assemblies.

6.2.2 Procedure for method A

Test three test pieces. Fill each test piece with R1234yf. Maintain each test piece with the pressure listed in Table 1 for 24 h at a temperature of (80 ± 2) °C.

This test may be carried out separately or during the 24 h pre-conditioning period for the refrigerant loss test (see 6.3) at (80 ± 2) °C. When the test is carried out separately from 6.3, use the procedure described in Annex A.

6.2.3 Method B for routine test

When determined in accordance with the procedure given in 6.2.4, there shall be no leak and no visible deterioration in the hoses or hose assemblies. When the pricked hose is tested, gas bubbles which form on the surface of the hose and decrease gradually after pressurizing may be observed but are not considered to be leakage.

6.2.4 Procedure for method B

Immerse the test assembly in the water bath. Apply gas (air or inert gases) pressure and maintain the pressure listed in Table 1 for 5 min. A gas leak detector may also be applied to check leakage under the pressure listed in Table 1 for 5 min.

6.3 Refrigerant permeation

6.3.1 Requirement

When determined in accordance with the procedure described in 6.3.2, the loss of refrigerant from the hoses or hose assemblies shall be no greater than 5 kg/m^2/year.

6.3.2 Procedure

Test the hoses or hose assemblies in accordance with the procedure described in Annex A at (50 ± 2) °C.

NOTE The test temperature is specified at 50 °C in consideration of the actual working temperature and the total operational temperature range.

6.4 Ageing

6.4.1 Requirement

When tested in accordance with 6.4.2, there shall be no leak and no cracks in a test hose or hose assembly.

6.4.2 Procedure

Wind a hose or hose assembly, of length between 300 mm and 1 000 mm, on to a mandrel having a diameter eight times the outside diameter of the hose. Place the mandrel and hose or hose assembly in a circulating-air oven for 168 h at (125 ± 2) °C.

Take the mandrel and hose or hose assembly out of the oven, allow to cool to ambient temperature, unwind the hose or hose assembly and examine it externally for any cracks, disintegration or other defects. Then test the hose or hose assembly in accordance with the procedure given in 6.2.3 and 6.2.4.

6.5 Low-temperature test

When tested in accordance with the method described in Annex B, there shall be no leak or loss due to cracks or splits.

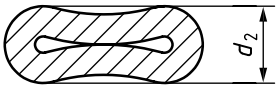
6.6 Vacuum resistance

6.6.1 General

A hose or hose assembly shall be subjected, consecutively, to the vacuum test, then the length variation test (6.7), followed by the burst test (6.8).

6.6.2 Requirement

The outer diameter d_2 (see Figure 2) shall be more than twice the wall thickness and there shall be no obstruction of flow caused by the hose collapse when the hose or hose assembly is subjected to a reduced internal pressure (vacuum) of (1,33 ± 0,66) kPa (absolute) for 2 min in accordance with 6.6.3.



Key

d_2 collapsed hose outside diameter

Figure 2 — Definition of the outer diameter d_2 of the collapsed hose

6.6.3 Procedure

The test hose or hose assembly shall have a free length of between 610 mm and 1 000 mm. Bend the hose into a U shape, whereby the internal radius of the base of the U shall be five times the mean outside diameter of the hose. Apply a vacuum of (1,33 ± 0,66) kPa (absolute) to the bent hose for 2 min. At the end of this period and while the vacuum is still being applied, measure the minor axis, d_2, at the base of the U. Check whether d_2 is more than twice the wall thickness and confirm the flow by vacuum application.

6.7 Length change under pressure

6.7.1 Requirement

When subjected to a pressure listed in Table 1, a hose or hose assembly shall not contract by more than 4 % or extend by more than 2 %.

6.7.2 Procedure

Subject the hose or hose assembly, in a horizontal position, to an internal hydrostatic pressure of 7 kPa (0,07 bar[1)]) and measure the length. Increase the pressure to the prescribed value and measure the length once again within the following minute. Express the length as a percentage of the length at 7 kPa (0,07 bar).

Refer to ISO 1402 for additional information.

6.8 Minimum bursting pressure

When determined in accordance with the method described in ISO 1402, using test pieces that have been subjected to the test for refrigerant loss described in 6.3, the minimum bursting pressure shall be the value listed in Table 4.

Table 4 — Minimum burst pressure

Pressure class	Minimum burst pressure MPa (bar)
Low	4,24 (42,4)

6.9 Proof pressure

When tested in accordance with the procedure described in ISO 1402 at the pressure listed in Table 5 and holding the pressure for 2 min ± 30 s, a hose or hose assembly shall exhibit no leakage, cracking, abrupt distortion (indicating irregularity in materials or manufacture) or other signs of failure.

1) 1 bar = 0,1 MPa = 10^5 Pa; 1 MPa = 1 N/mm^2.

Table 5 — Proof pressure

Pressure class	Proof pressure MPa (bar)
Low	2,12 (21,2)

6.10 Extraction by R1234yf

When determined in accordance with Annex C, the quantity of matter extracted from the lining of the hose by the R1234yf shall not exceed 118 g/m^2.

NOTE The substances extracted will be of an oily or greasy nature.

6.11 Ozone resistance

The test shall be carried out on the hose itself in accordance with ISO 7326. Bend the hose with a bend radius equal to four times the mean outside diameter and mount on a test piece holder or wind the hose around a cylinder with a diameter equal to eight times the mean outside diameter specified by the manufacturer and the test shall be carried out using an ozone concentration of (50 ± 5) mPa.

The hose cover shall exhibit no visible cracks when viewed under ×7 magnification.

6.12 Hose cleanliness

6.12.1 Requirement

The tube of the hose shall be dry and clean. When determined in accordance with 6.12.2, the mass of insoluble matter shall be a maximum of 270 mg/m^2 based on the internal surface area of the hose.

6.12.2 Procedure

Take a hose test piece having a minimum length of 300 mm. Bend the hose into a U shape, with the legs of the U of equal length. Place the hose in a vertical position and fill the hose with a suitable solvent.

Immediately empty the hose, filtering the solvent through a prepared Gooch crucible, a sintered-glass crucible or a 0,4 mm filter of known mass.

After drying the filter and residue at approximately 70 °C for 20 min, determine the mass of insoluble matter by difference.

6.13 Impulse test

6.13.1 Requirement

When tested in accordance with 6.13.2, hoses or hose assemblies shall not leak or fail prior to 150 000 cycles.

6.13.2 Procedure

Carry out the test in accordance with Annex D.

Install a minimum of two hose assemblies on the test apparatus and subject them to a pulsating pressure listed in Table 6 at 30 cycles per minute to 40 cycles per minute.