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

**Part 3:
Refrigerant 1234yf**

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

Partie 3: Réfrigérant 1234yf

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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.

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 documents 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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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 3: 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 compliance with any national regulatory conditions.

1 Scope

This document specifies the requirements for rubber or thermoplastic hoses and hose assemblies used for circulating liquid and gaseous R1234yf (tetrafluoropropene) in the air-conditioning systems of automobiles. The hoses and hose assemblies are designed in such a way as to restrict losses of refrigerant and contamination of the system. The operational temperature range is -40 °C to $+125\text{ °C}$.

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 has been 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.

<https://standards.iteh.ai/>
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ISO 1402, *Rubber and plastics hoses and hose assemblies — Hydrostatic testing*

ISO 4671:2007, *Rubber and plastics hoses and hose assemblies — Methods of measurement of the dimensions of hoses and the lengths of hose assemblies*

ISO 7326:2016, *Rubber and plastics hoses — Assessment of ozone resistance under static conditions*

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

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

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

3 Terms and definitions

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

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

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

4 Classification

4.1 Types

4.1.1 General

Including, but not limited to the following.

4.1.2 Type A — Rubber, textile-reinforced, rubber-covered

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.

4.1.3 Type B — Rubber, wire-reinforced, rubber-covered

The hose shall be built having a suitable seamless synthetic rubber tube. The reinforcement shall consist of steel wire adhered to the rubber tube. The cover shall consist of a heat-resistant textile yarn impregnated with a synthetic rubber cement.

4.1.4 Type C — Barrier, textile-reinforced, rubber-covered

The hose shall have a suitable thermoplastic barrier between rubber layers. The reinforcement shall consist of suitable textile yarn, cord, or fabric adhered to the tube and cover. The outer cover shall be heat- and ozone-resistant synthetic rubber.

4.1.5 Type D — Thermoplastic, textile-reinforced, thermoplastic-covered

The hose shall have a suitable thermoplastic tube. The reinforcement shall consist of a suitable textile yarn, cord, or fabric adhered to the tube and cover. The outer cover shall be heat- and ozone-resistant synthetic elastomer.

4.1.6 Type E — Veneer, textile-reinforced, rubber-covered

The hose shall have a suitable thermoplastic veneer lining with a rubber tube outer layer. The reinforcement shall consist of a textile yarn, cord, or fabric adhered to the tube and cover. The cover shall be heat- and ozone-resistant synthetic rubber.

4.1.7 Type F — Veneer, barrier, thermoplastic liner

The hose shall have a suitable thermoplastic veneer liner with a thermoplastic barrier between elastomeric layers. The reinforcement shall consist of a suitable textile yarn, cord, or fabric adhered to the tube and cover. The cover shall be heat- and ozone-resistant elastomer.

[Table 1](#) gives the figure and applicable pressure class for each type.

Table 2 — Working pressure

Pressure class	Working pressure
	MPa (bar)
High	3,28 (32,8)
Low	1,06 (10,6)

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](#).

4.4 Refrigerant-permeation grades

4.4.1 RU — Ultra low refrigerant permeation hose as defined in [6.3.2](#).

4.4.2 RL — Low refrigerant permeation hose as defined in [6.3.2](#).

4.4.3 Rm — Medium refrigerant permeation hose as defined in [6.3.2](#).

5 Dimensions

5.1 Hose inside diameters

Standard dimensions are given in [Table 3](#), but not limited to the following.

Table 3 — Typical inside diameters

Nominal size	Mean inside diameter mm
8 (5/16)	8
10 (13/32)	10,3
11	11
13 (1/2)	12,7
14	14
15	15
16 (5/8)	15,9
19 (3/4)	19
25 (1)	25,4

NOTE Nominal size in parenthesis is in inches.

5.2 Hose wall thickness variation

When the wall thickness is measured in accordance with method 2 of ISO 4671:2007, the variation in the wall thickness shall not exceed the values given in [Table 4](#).

Table 4 — Wall thickness variation

Type A, B, C and E		Type D and F	
Nominal size	Maximum departure from concentricity mm	Nominal size	Maximum departure from concentricity mm
Up to and including 19	1,0	Up to and including 13	0,6
		Over 13 and including 19	0,8
Over 19	1,3	Over 19	1,0

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 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 containing (10 ± 1) % refrigerant compatible lubrication oil. Maintain each test piece with the pressure listed in Table 2 for 24 h at a temperature of $80 \text{ }^\circ\text{C} \pm 2 \text{ }^\circ\text{C}$.

This test can be carried out separately or during the 24 h pre-conditioning period for the refrigerant loss test (see 6.3) at $80 \text{ }^\circ\text{C} \pm 2 \text{ }^\circ\text{C}$. 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 pricked hose is tested, gas bubbles which form on the surface of the hose and decrease gradually after pressurizing may be observed but not be considered as a leak.

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 2 for 5 min. Also, a gas leak detector, snoop liquid leak detector may be applied to check leakage under the pressure listed in Table 2 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 the values given in Table 5.