



SURFACE VEHICLE STANDARD

J30™

MAY2022

Issued 1946-01
Revised 2022-05

Superseding J30 FEB2012

Fuel and Oil Hoses

RATIONALE

This document is being revised to add an impulse requirement to R2 formed hoses (Type 4).

TABLE OF CONTENTS

1.	SCOPE.....	4
2.	REFERENCES.....	4
2.1	Applicable Documents	4
2.1.1	SAE Publications.....	4
2.1.2	ASTM Publications.....	4
2.1.3	Military Specifications.....	4
2.1.4	Association for Rubber Products Manufacturers (ARPM) Publications.....	4
3.	APPLICATION SELECTION GUIDE	5
4.	HOSE CONSTRUCTION	7
4.1	Coupled and Uncoupled Synthetic Rubber Tube and Cover (SAE 30R2)	7
4.1.1	Type 1	7
4.1.2	Type 2	7
4.1.3	Type 3	7
4.1.4	Type 4	7
4.2	Lightweight Braided Reinforced Lacquer, Cement, or Rubber Covered Hose (SAE 30R3).....	8
4.3	Wire Inserted Synthetic Rubber Tube and Cover (SAE 30R5).....	8
4.4	Low-Pressure Coupled and Uncoupled Synthetic Rubber Tube and Cover (SAE 30R6, SAE 30R7, SAE 30R8)	8
4.5	Fuel Injection Hose Medium-Pressure Coupled and Uncoupled Synthetic Rubber Tube and Cover (SAE 30R9)	8
4.6	In-Tank, Low-Pressure, Uncoupled Fuel Hoses (SAE 30R10).....	8
4.7	Low Permeation Fuel Fill, Vent, and Vapor Hose (SAE 30R11)	9
4.8	Low Permeation Fuel Feed and Return Hose (SAE 30R12)	9
4.9	Diesel and Biodiesel Fuel Feed and Return Hose (SAE 30R13)	10
4.10	Low Permeation, Low Pressure Coupled and Uncoupled Synthetic Rubber Tube and Cover Hose for Small Engines (SAE 30R14).....	10

SAE Executive Standards Committee Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

SAE reviews each technical report at least every five years at which time it may be revised, reaffirmed, stabilized, or cancelled. SAE invites your written comments and suggestions.

Copyright © 2021 SAE International

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of SAE.

TO PLACE A DOCUMENT ORDER: Tel: 877-606-7323 (inside USA and Canada)
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
http://www.sae.org

SAE WEB ADDRESS:

Full document details: SAE J30_202205

For more information on this standard, visit
https://www.sae.org/standards/content/J30_202205/

Documents

Document Sharing Hub

5.	QUALIFICATION TESTS AND LOT ACCEPTANCE INSPECTION TESTS.....	11
5.1	Retests and Rejection	11
5.1.1	For SAE J30R2 and R3.....	11
5.1.2	For SAE J30R5	11
5.1.3	For SAE J30R6, 7, 8, 9, and 10	11
5.1.4	For SAE J30R11	12
5.1.5	For SAE J30R12	12
5.1.6	For SAE J30R13	13
5.1.7	For SAE J30R14	13
5.2	SAE 30R11, 12, and 13 Testing Requirements.....	14
5.3	Preformed Hose Dimensions and Tolerances	16
5.3.1	Squareness of Ends.....	16
5.3.2	Arm Lengths.....	16
5.3.3	General Layout.....	16
6.	TEST METHODS	34
6.1	Test Requirements.....	34
6.2	Change-in-Length Tests.....	34
6.3	Burst Test.....	34
6.4	Vacuum Collapse Test.....	34
6.5	Cold Flexibility	34
6.6	Tensile Strength and Elongation Original Properties.....	35
6.7	Dry Heat Resistance	35
6.8	Hose Flexibility After Heat Aging (Applies to Only R9, R10, R11, R12, and R13)	35
6.9	Fuel Resistance	36
6.10	Oil Resistance	36
6.11	Ozone Resistance.....	36
6.12	Adhesion Test	36
6.12.1	Original Adhesion.....	36
6.12.2	Aged Adhesion.....	36
6.13	Proof Test (if Required by Print or Table 3)	37
6.14	Tensile Test of Assembly	37
6.15	Leakage Test	37
6.16	Corrosion Test.....	37
6.17	Test for Extractable in Hose	37
6.17.1	Apparatus and Reagents	37
6.17.2	Specimens	38
6.17.3	Procedure.....	38
6.18	Oxidized Fuel Testing	39
6.18.1	Peroxide Number Analytical Method.....	39
6.18.2	Apparatus.....	39
6.18.3	Reagents	40
6.18.4	Procedure.....	40
6.18.5	Standard Sodium Thiosulfate Solution, 0.1 N (Reagent 4, See Above)	41
6.18.6	Reagents	41
6.19	Reservoir Method for Fuel Hose Permeation	42
6.19.1	Rate of Fuel Permeation	42
6.19.2	Reservoir Units.....	42
6.19.3	Screw Cap.....	42
6.19.4	Scale or Balance	42
6.19.5	Impermeable Plug.....	43
6.19.6	Hose Clamps.....	43
6.19.7	Procedure.....	43
6.20	Kink Resistance	44
6.21	Electrical Conductivity (Inspection Test on All Sizes)	45
6.22	Recirculation Test Procedure for R13 Hose	45

7.	MARKING	46
7.1	SAE J30 R2 through R10.....	46
7.2	SAE J30 R11 and R12.....	46
7.3	SAE J30 R13.....	47
7.4	SAE J30 R14.....	47
8.	SHELF LIFE ORDERING NUMBER SUFFIX.....	48
8.1	Ordering Number Designation SAE 30 RAAyTzL	48
8.1.1	Hose Storage Conditions	48
9.	NOTES	48
9.1	Revision Indicator.....	48
APPENDIX A	LISTING OF ASTM REFERENCE FUELS	49
Figure 1		7
Figure 2	Test sample on form for heat aging test (see Table 4).....	35
Figure 3	Test fixture for extractables.....	38
Figure 4	Fuel permeation test apparatus	42
Figure 5	Fuel permeation test - air bubble removal position.....	43
Figure 6	Fuel permeation reservoir test - assembly storage position	44
Table 1	Application selection guide	6
Table 1A	Dimensions and tolerances for SAE 30R2	14
Table 1B	Dimensions and tolerances for SAE 30R3	14
Table 1C	Dimensions and tolerances for SAE 30R5	15
Table 1D	Length tolerances for SAE 30R2, R3, and R5.....	15
Table 1E	Dimensions and tolerances for SAE 30R6, R7, R8, R9, R10, R11, R12, R13, and R14	15
Table 1F	Cut or long length tolerances for SAE 30R6, R7, R8, R9, R10, R11, R12, R13, and R14.....	15
Table 2	Elastomer specification requirements.....	17
Table 3	Dynamic hose properties - SAE J30 fuel and oil hose burst, working pressure, and change in length.....	32
Table 4	Dimensions for hose flexibility test.....	36
Table 5	Control rod dimensions	38
Table 6	Test piece size parameters.....	42
Table 7	Kink resistance.....	44
Table 8	R11 and R12 suffix definitions	46
Table 9	R13 suffix definitions.....	47
Table 10	R14 suffix definitions.....	48

1. SCOPE

This SAE Standard covers fuel, oil, or emission hose for use in coupled and uncoupled applications, for use with gasoline, oil, diesel fuel, lubrication oil, or the vapors present in either the fuel system or in the crankcase of internal combustion engines in mobile or stationary applications. This standard covers the hose portion only. If assembly/coupling is required, that is to be agreed to between the customer and assembler, along with the specific requirements.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

SAE J1681	Gasoline, Alcohol, and Diesel Fuel Surrogates for Materials Testing
SAE J1737	Test Procedure to Determine the Hydrocarbon Losses from Fuel Tubes, Hoses, Fittings, and Fuel Line Assemblies by Recirculation

2.1.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM B117	Method of Salt Spray (Fog) Testing
ASTM D380	Methods of Testing Rubber Hose
ASTM D413	Test Methods for Rubber Property - Adhesion to Flexible Substrate
ASTM D471	Test for Rubber Property - Effect of Liquids
ASTM D573	Test for Rubber - Deterioration in an Air Oven
ASTM D975	Specification for Diesel Fuel Oils
ASTM D1149	Test Method for Rubber Deterioration - Surface Ozone Cracking in a Chamber (Flat Specimens)

2.1.3 Military Specifications

Available from the Document Automation and Production Service (DAPS), Building 4/D, 700 Robbins Avenue, Philadelphia, PA 19111-5094, Tel: 215-697-6257, <http://assist.daps.dla.mil/quicksearch/>.

MIL-HDBK-695	Rubber Products: Recommended Shelf Life
--------------	---

2.1.4 Association for Rubber Products Manufacturers (ARPM) Publications

Available from ARPM, 7321 Shadeland Station Way, Suite 285, Indianapolis, IN 46256 Tel: (317) 863-4072, www.arpminc.com.

IP-2	Hose Handbook
------	---------------

3. APPLICATION SELECTION GUIDE

SAE J30R2 covers coupled and uncoupled synthetic rubber tube and cover hose.

SAE J30R3 covers lightweight braided reinforced lacquer, cement, or rubber covered hose.

SAE J30R5 covers wire inserted synthetic rubber tube and cover hose.

SAE J30R6, 7, and 8 covers low pressure coupled and uncoupled synthetic rubber tube and cover hose.

SAE J30R9 covers fuel injection, medium pressure coupled and uncoupled synthetic rubber tube and cover hose.

SAE J30R10 covers in-tank, low pressure, and uncoupled fuel hose.

SAE J30R11 covers low permeation fuel fill and vent hose.

SAE J30R12 covers low permeation fuel feed and return hose.

SAE J30R13 covers diesel or biodiesel fuel feed and return hose.

SAE J30R14 covers low permeation, low pressure coupled and uncoupled synthetic rubber tube and cover hose for small engines.

See Table 1 and Section 4.

SAE has included Table 1 to assist purchasers selecting fuel hose. We recommend any purchaser to discuss hose requirements with the manufacturer to confirm that the selected fuel hose is suitable for an intended application. The table is arranged by SAE specification, sizes by inside diameter of the hose, maximum external temperature the hose is exposed to, type of fuel testing, burst pressure, permeation in grams/square meter/day, and low temperature bend capability.

Table 1 - Application selection guide

SAE Spec	ID Sizes (mm)	Rated External Temperature	ASTM Reference Test Fuel	Burst Pressure		Permeation g/m ² /day	Low Temp
				ID (mm)	(MPa)		
30R2	3 to >30	100 °C	48 hours @ RT Fuel B	Type 1: 3.5 to 4.8 MPa Type 2: 1.7 to 4.8 MPa Type 3: 8.3 to 13.8 MPa Type 4: 0.55 to 1.72 MPa		None	5 hours @ -40 °C Fuel B aged
30R3	4 to 11	100 °C	48 hours @ RT Fuel B	6.2 to 13.8 MPa as size increases		None	5 hours @ -40 °C Fuel B aged
30R5 (Filler with wire)	19 to 65	100 °C	48 hours @ RT Fuel B		0.6	None	5 hours @ -40 °C Fuel B aged
30R6	3 to >64	100 °C	48 hours @ RT Fuel C 70 hours @ RT Fuel G	≤9.53 >9.53 to 25.4 >25.4	1.72 1.20 0.5	600 Fuel C 8 days @ RT	5 hours @ -40 °C Fuel C aged
30R7	3 to >64	125 °C	48 hours @ RT Fuel C 70 hours @ RT Fuel G 14 day @ 40 °C Sour Gas #1	≤9.53 >9.53 to 25.4	1.72 1.20	550 Fuel C 8 days @ RT	5 hours @ -40 °C Fuel C aged
30R8	3 to >64	135 °C intermittent to 150 °C	48 hours @ RT Fuel C 70 hours @ RT Fuel G	≤9.53 >9.53 to 25.4	1.72 1.20	200 Fuel C 8 days @ RT	5 hours @ -40 °C Fuel C aged
30R9 (Fuel injected)	6 to 13	135 °C intermittent to 150 °C	48 hours @ RT Fuel C 70 hours @ RT Fuel G 14 day @ 40 °C Sour Gas #1	≤9.53 >9.53	6.2 3.4	15 Fuel C 8 days @ RT	24 hours @ -40 °C Fuel C aged
30R10 (In tank, uncoupled)	6 to 13	100 °C intermittent to 125 °C	48 hours @ RT Fuel C 70 hours @ RT Fuel I	3.4 to 2.8 MPa as size increases		Not Required	24 hours @ -40 °C Fuel C aged
30R11	3 to >64	100 °C T1 125 °C T2 (can be selected)	48 hours @ RT Fuel C Fuel I Extended Test		1.2	100 to 25 max Fuel I @ 40 °C	24 hours @ -40 °C Fuel C aged
30R12	6 to 13	100 °C T1 125 °C T2 135 °C T3 150 °C T4 (can be selected)	48 hours @ RT Fuel C 168 hours @ RT Fuel I 168 hours @ RT Fuel K Fuel I Extended Test		8	100 to 25 max Fuel I @ 60 °C	24 hours @ -40 °C Fuel C aged
30R13	6 to 16	100 °C T1 125 °C T2 135 °C T3 150 °C T4 (can be selected)	168 hours @ "T" Temperature and Fuel per Table 2 Recirculation for 20 weeks @ 80 °C with Fuel B-20		1.72	None	24 hours @ -40 °C after conditioning with 100% SME (SAE J1681 Appendix C)
30R14	3 to >64	T1 = 100 °C T2 = 125 °C	48 hours @ RT Fuel C 70 hours @ RT Fuel G 14 day @ 40 °C Sour Gas #1 (T2 only)	≤ 9.53 >9.53 to 25.4	1.72 1.20	15 max Fuel CE10 21 days @ RT after 28 days presoak	5 hours @ -40 °C Fuel C aged

NOTE: This guide is intended to be a quick reference guide to assist the user in selection of the proper type of hose for the application. There are more requirements than are shown on this page. Please see the appropriate sections of this specification for the detailed complete requirements for that type of hose.

4. HOSE CONSTRUCTION

4.1 Coupled and Uncoupled Synthetic Rubber Tube and Cover (SAE 30R2)

4.1.1 Type 1

The construction of this hose embodies a smooth bore tube of suitable synthetic rubber material, reinforced with one ply of braided, knit, spiral, or multiples of woven fabric, and finished with a suitable oil- and ozone-resisting synthetic rubber cover.

4.1.2 Type 2

The construction of this hose embodies a smooth bore tube of suitable synthetic rubber material, reinforced with two braided plies or multiples of woven fabric, and finished with a suitable oil- and ozone-resisting synthetic rubber cover.

4.1.3 Type 3

The construction of this hose embodies a smooth bore tube of suitable synthetic rubber material, a single braided ply of textile reinforcement, and finished with a suitable oil- and ozone-resisting synthetic rubber cover.

4.1.4 Type 4

The construction of this hose embodies a smooth bore tube of suitable synthetic rubber material, reinforced with one ply of braided, knit, spiral, or multiples of woven fabric, and finished with a suitable oil- and ozone-resisting synthetic rubber cover. This type is for formed hoses with impulse requirements as defined in this document.

4.1.4.1 Impulse Test for Type 4

Hose assemblies shall be tested at 133% of working pressure for all hose sizes.

Hoses to be tested to a minimum of 100000 cycles per SAE J343 low impulse wave (0.2 to 1.0 Hz), without leakage or other malfunction.

Stems (based on SAE J1231 bead) and clamps per design intent—TBD by customer.

Hose shape per design shown below (in millimeters).

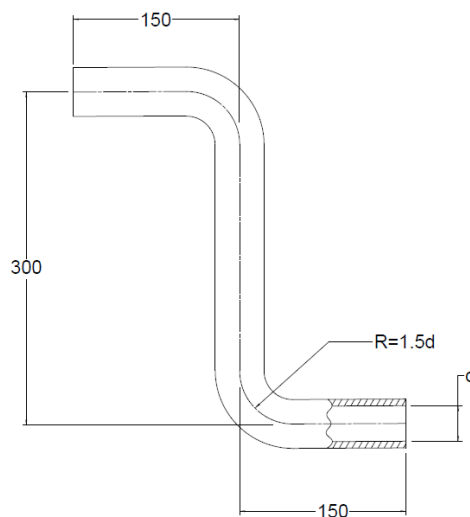


Figure 1

4.2 Lightweight Braided Reinforced Lacquer, Cement, or Rubber Covered Hose (SAE 30R3)

The construction of this hose embodies a smooth bore tube of suitable synthetic rubber material, reinforced with one braided ply of cotton or other suitable material and finished with a gasoline-, oil-, and water-resistant flexible coating of lacquer, cement, or synthetic rubber.

4.3 Wire Inserted Synthetic Rubber Tube and Cover (SAE 30R5)

A wire inserted hose for fuel and oil filler and vent use in mobile, stationary, or marine applications. The hose is furnished uncoupled in specific lengths and is secured in application by the use of suitable clamps. The hose is particularly useful in applications where it must be installed in a curved configuration and where resistance to collapse is desirable.

The construction of this hose embodies a fuel- and oil-resistant tube, a helical high-carbon steel wire embedded in the convoluted section of this hose and running out into the plain one ends and an ozone- and oil-resistant cover. A ply of fabric or cord may be applied between the tube or cover and the helical wire. A ply of fabric must be used to reinforce the ends.

4.4 Low-Pressure Coupled and Uncoupled Synthetic Rubber Tube and Cover (SAE 30R6, SAE 30R7, SAE 30R8)

Hose which may be supplied either coupled or uncoupled for use with gasoline, diesel fuel, lubrication oil, or the vapor present in either the fuel system or in the crankcase of internal combustion engines in mobile, stationary, and marine applications. Exposure of these hoses to gasoline or diesel fuel which contain high levels, greater than 5% by volume, of oxygenates, i.e., ethanol, methanol, or MTBE (methyl tertiary butyl ether), may result in significantly higher permeation rates than those listed for 30R6, R7, or R8. This hose is for maximum working pressures of 0.34 MPa (50 psi) up to and including 9.53 mm (3/8 inch) ID and 0.24 MPa (35 psi) for over 9.53 mm (3/8 inch). For 30R6 hose in excess of 25.40 mm (1 inch), the working pressure is 0.11 MPa (16 psi). The hose may be furnished in long lengths, specific cut lengths, or as a part preformed to a specific configuration. This hose is suitable for use in temperatures up to 100 °C (212 °F) for 30R6, 125 °C (257 °F) for 30R7, and 150 °C (302 °F) intermittently and 135 °C (275 °F) continuously for 30R8.

The construction of this hose embodies a smooth bore tube of fuel- and oil-resistant synthetic rubber compound, suitably reinforced with textile fiber yarn, cord, or fabric, and a cover of suitable oil-, ozone-, and heat-resistant synthetic rubber compound.

4.5 Fuel Injection Hose Medium-Pressure Coupled and Uncoupled Synthetic Rubber Tube and Cover (SAE 30R9)

Hose primarily intended to meet the demands of fuel injection systems. These would include, for example, electronic fuel metering (EFM), electronic fuel injection (EFI), throttle body injection (TBI), and the like. Other areas of utility are those applications requiring fuel permeation resistance exceeding 30R8 and ones which require fuel resistance greater than that obtainable with 30R6, R7, and R8. Exposure of this hose to gasoline or diesel fuel that contains high levels, greater than 5% by volume, of oxygenates, i.e., ethanol, methanol, or MTBE may result in significantly higher permeation rates than realized with ASTM Fuel C. This hose may be supplied in either a coupled or uncoupled form, and is useful in the transportation of gasoline, ethanol extended gasoline, diesel fuel, lubrication oil, or the vapor present in either the fuel system or the crankcase of internal combustion engines in mobile, stationary, and marine applications. This hose has a maximum working pressure of 0.69 MPa (100 psi) up to and including 12.70 mm (1/2 inch) ID. This hose may be furnished in long lengths, specific cut lengths, or as a part preformed to a specific configuration. This hose is suitable for use in normal operating temperatures of -34 to +135 °C (-29 to +275 °F) and intermittent use at +150 °C (+302 °F).

The construction of this hose typically consists of a smooth bore tube or laminated tube(s) of a synthetic rubber compound(s) resistant to chemical attack, swelling, and permeation by gasoline, oxidized ("sour") gasoline, ethanol extended gasoline, diesel fuel, and oil or lubricants. It shall be suitably reinforced with a textile fiber, yarn, cord, or fabric, and a cover of a suitable oil-, ozone-, and heat-resistant elastomer.

4.6 In-Tank, Low-Pressure, Uncoupled Fuel Hoses (SAE 30R10)

Hose intended primarily for use in fuel injection systems where the hose may be submerged in the fuel tank. The hose is capable of handling gasoline, alcohol-extended gasoline or diesel fuel used in mobile, stationary, and marine applications.

This hose has a maximum working pressure of 0.69 MPa (100 psi) up to and including 12.7 mm ID. This hose may be furnished in long lengths, specific cut lengths, or as a part preformed to a specific configuration. This hose is suitable for use in normal operating temperatures of -34 to +100 °C (-29 to +212 °F) and intermittent use at +125 °C (+257 °F).

The construction of this hose consists of a smooth bore tube and cover based on synthetic rubber compound(s) which are resistant to chemical attack or swelling by gasoline, oxidized ("sour") gasoline, alcohol extended gasoline, and diesel fuel. The hose shall be suitably reinforced with a textile fiber, yarn, cord, or fabric which is resistant to the same fuels as the tube and cover.

4.7 Low Permeation Fuel Fill, Vent, and Vapor Hose (SAE 30R11)

Low permeation hose (100 g/m²/day or less) for use as a low pressure (<14.5 kPa) liquid or vapor carrying component for use in gasoline or diesel fuel filler, vent, and vapor systems. The construction shall be designed to be functional over the following temperature ranges:

- T1 designation: -40 to +100 °C (-40 to +212 °F).
- T2 designation: -40 to +125 °C (-40 to +257 °F).

The construction typically consists of a smooth bore or laminated tube of one or more synthetic rubber compound(s) and/or thermoplastic material(s) resistant to chemical attack, swelling, and permeation by gasoline, alcohol extended gasoline, or diesel fuel. It will be suitably reinforced with a textile fiber, yarn, cord, or fabric. It will also be covered with a suitable oil-, ozone-, and heat-resistant synthetic rubber compound and/or thermoplastic. The specific construction details are to be agreed between the supplier and the original purchaser.

4.8 Low Permeation Fuel Feed and Return Hose (SAE 30R12)

Low permeation reinforced hose suitable for use in fuel supply systems including fuel injection systems. Applies to hose with an elastomeric inner layer. Hose with a thermoplastic inner layer is specifically excluded.

Low permeation hose, for the purpose of SAE 30R12, is defined as hose having a permeation rate less than 100 g/m²/day by method SAE J1737 when tested with CM15 fuel at 60 °C (140 °F).

This hose is intended for use as fuel feed and return hose in applications where low levels of evaporative emissions are required. This hose is useful in this and other applications for the transportation of gasoline, ethanol or methanol extended gasoline, reformulated gasoline (RFG), alcohol fuel, diesel fuel, lubrication oil, or the vapor present in either the fuel system or the crankcase of internal combustion engines in mobile, stationary, and marine applications. This hose has a maximum working pressure of 1.0 MPa (145 psi). Hose is suitable for use in four categories of normal operating temperature ranges:

- T1 designation: -40 to +100 °C (-40 to +212 °F).
- T2 designation: -40 to +125 °C (-40 to +257 °F).
- T3 designation: -40 to +135 °C (-40 to +275 °F).
- T4 designation: -40 to +150 °C (-40 to +302 °F).

This hose may be furnished in long lengths, specific cut lengths, or as a part preformed to a specific configuration.

The construction of this hose typically consists of a smooth bore tube with an internal diameter below 13 mm, which is resistant to chemical attack, swelling, and permeation by gasoline, oxidized ("sour") gasoline, alcohol extended gasoline, reformulated gasoline (RFG), alcohol fuels, diesel fuel, and oil or lubricants. The tube may be composed of a single elastomeric material or be a laminated construction of two or more synthetic rubber compounds and/or thermoplastic materials provided the innermost layer is an elastomeric layer. The tube shall be suitably reinforced with a textile fiber, yarn, cord or fabric and covered with an oil, ozone, and heat-resistant elastomer.

4.9 Diesel and Biodiesel Fuel Feed and Return Hose (SAE 30R13)

Hose suitable for use in diesel or biodiesel fuel supply systems. This hose may be constructed from elastomeric materials or a combination of elastomeric and thermoplastic materials and is designed to perform in both diesel and bio-diesel fuel mixtures at long term operating temperatures up to 80 °C.

This hose is intended for use as fuel feed and return hose in applications where high temperature diesel or bio-diesel fuel is being circulated through the diesel fuel delivery system of on demand and recirculating type found in mobile, stationary, and marine applications. This hose has a maximum working pressure of 0.34 MPa (50 psi). Hose is suitable for use in four categories of external operating temperature ranges.

- Category T1 hose is suitable for use in a normal external operating temperature range from -40 to 100 °C.
- Category T2 hose is suitable for use in a normal external operating temperature range from -40 to 125 °C.
- Category T3 hose is suitable for use in a normal external operating temperature range from -40 to 135 °C.
- Category T4 hose is suitable for use in a normal external operating temperature range from -40 to 150 °C.

All external operating temperature “T” ratings have a maximum fuel temperature of 80 °C.

This hose may be furnished in long lengths, specific cut lengths, or as a part preformed to a specific configuration.

The construction of this hose typically consists of a smooth bore tube with an internal diameter below 16 mm, which is resistant to chemical attack and swelling by diesel or bio-diesel fuels. The tube may be composed of a single elastomeric material or be a laminated construction of two or more synthetic rubber compounds and/or thermoplastic materials, provided the innermost layer is an elastomeric material. The tube may be suitably reinforced with a textile fiber, yarn, cord, or fabric, and covered with an oil, ozone, and heat-resistant elastomer.

NOTE: Fuel fill, vent, and emission hoses may not need the temperature range or pressure of this specification. Hoses for these applications may be covered and specified as a different class in SAE J30, or may use R13 class with an exception to temperature (either inner fuel or external or both) and pressure and the exception parameters would need to be agreed to between the manufacturer and user and specified on the blue print with the appropriate exceptions.

4.10 Low Permeation, Low Pressure Coupled and Uncoupled Synthetic Rubber Tube and Cover Hose for Small Engines (SAE 30R14)

Hose which may be supplied either coupled or uncoupled for use with gasoline, diesel fuel, lubrication oil, or the vapor present in either the fuel system or in the crankcase of internal combustion engines in small engine applications. Exposure of these hoses to gasoline or diesel fuel which contain high levels, greater than 5% by volume, of oxygenates, i.e., ethanol, methanol, or MTBE (methyl tertiary butyl ether), may result in significantly higher permeation rates than those listed for 30R14. This hose is for maximum working pressures of 0.34 MPa (50 psi) up to and including 9.53 mm (3/8 inch) ID and 0.24 MPa (35 psi) for over 9.53 mm (3/8 inch) to 25.40 mm (1 inch). For hose in excess of 25.40 mm (1 inch), the working pressure is 0.11 MPa (16 psi). The hose may be furnished in long lengths, specific cut lengths, or as a part preformed to a specific configuration. This hose is suitable for use in temperatures up to 100 °C (212 °F) for 30R14 T1, 125 °C (257 °F) for 30R14 T2. The construction of this hose embodies a smooth bore tube of fuel- and oil-resistant synthetic rubber compound, suitably reinforced with textile fiber yarn, cord, or fabric, and a cover of suitable oil-, ozone-, and heat-resistant synthetic rubber compound. A permeation resistant elastomeric or thermoplastic layer may be used if needed to reduce the permeation through the hose wall, provided the innermost layer is an elastomeric layer. The specific construction details are to be agreed between the supplier and the original purchaser.

5. QUALIFICATION TESTS AND LOT ACCEPTANCE INSPECTION TESTS

5.1 Retests and Rejection

Any hose or assembly that fails in one or more tests shall be resampled and retested. Twice the number of specimens shall be selected from the lot in question for any retests, and failure of any of the retested samples shall be cause for rejection.

5.1.1 For SAE J30R2 and R3

5.1.1.1 Qualification Tests

For qualification tests, one 7.6 m length of bulk hose or ten assemblies of each size to be qualified shall be furnished. In order to qualify under this standard, hose and hose assemblies must meet the requirements of the following tests: (a) change-in-length followed by (b) burst, (c) vacuum collapse, (d) cold flexibility, (e) tensile strength and elongation, tube and cover (if present), (f) dry heat resistance, (g) fuel resistance, (h) oil resistance, (i) ozone resistance, and (j) adhesion (if cover present).

In addition to the above, hose assemblies shall be subjected to qualification tests as follows: (k) proof, (l) tensile test of assembly, (m) leakage, (n) corrosion, and (o) visual inspection.

5.1.1.2 Frequency of Testing for Inspection

On uncoupled hose, tests shall be conducted on samples representing each lot of 152 to 3048 m. Where a lot is 152 m or less, no tests shall be conducted, but materials and workmanship shall be the same on such lots as on hose previously qualified under this specification.

On coupled hose lots from 100 to 10000 pieces, not less than two assemblies shall be subjected to all inspection tests except the visual test, which shall apply to 100% of the assemblies.

5.1.1.3 Inspection Tests

On uncoupled hose, these inspection tests shall apply: (a) change-in-length, (b) burst, (c) vacuum collapse, (d) cold flexibility, and (e) adhesion (if cover present).

On coupled hose assemblies, these tests shall apply: (f) burst, (g) proof, (h) tension test of assembly (unaged), and (i) visual inspection (100%).

5.1.1.4 Visual Inspection

All assemblies shall be inspected to see that the correct fittings are properly applied.

5.1.2 For SAE J30R5

5.1.2.1 Qualification and Inspection Testing

For qualifications, ten lengths of each size to be qualified shall be furnished and shall be subjected to burst, cold flexibility, vacuum collapse, ozone, and property testing as shown in Table 2.

For inspection testing, not less than two samples shall be selected from each lot which shall not exceed 10000 pieces and shall be subjected to the burst, vacuum collapse, and low-temperature flexibility tests described above.

5.1.3 For SAE J30R6, 7, 8, 9, and 10

5.1.3.1 Qualification Tests

For the qualification tests, one 7.5 m length of bulk hose, ten preformed parts, or ten assemblies of each size to be qualified shall be furnished. In order to qualify under this specification, hose and hose assemblies must meet all the test requirements of Sections 1, 2, and 3.

5.1.3.2 Frequency of Testing for Inspection

As agreed upon between supplier and user.

5.1.3.3 Inspection Test

On hose and/or hose assemblies the following inspection tests shall apply: burst, vacuum collapse, cold flexibility, adhesion, kink resistance (if specified). The kink resistance test shall not normally be required on preformed hose, but may be specified for straight sections of at least 300 mm length.

NOTE: No vacuum testing is required for SAE J30R10.

5.1.4 For SAE J30R11

5.1.4.1 Qualification Testing

In order to qualify under this specification, hose or the assembly must meet all the applicable test requirements of Sections 1, 2, and 3. Hose for testing will be 12.7 mm ID or as agreed upon between supplier and user. The construction must be representative of construction of all other sizes. The impermeable layer thickness cannot be reduced with other data.

5.1.4.2 Frequency of Testing for Qualification

Qualification testing to be performed once annually except for permeation testing which only needs to be tested initially.

5.1.4.3 Inspection Testing

On hose or the assembly, the following inspection shall apply: burst, vacuum collapse, original adhesion, kink resistance, and electrical conductivity (if required).

5.1.4.4 Frequency of Testing for Inspection and Quality Acceptance Standards

Quality acceptance standards to be agreed upon between supplier and the original purchaser.

5.1.5 For SAE J30R12

5.1.5.1 Tests

ASTM test slabs are permissible for testing tube or cover when thickness does not meet ASTM D412 minimum 1.5 mm.

5.1.5.2 Qualification Tests

In order to qualify under this specification, hose and/or hose assemblies must meet all the applicable test requirements. Qualification testing is to be performed on samples of the largest ID size to be supplied, or on 13 mm ID hose, whichever is smaller. The hose used for qualification tests must be representative of the construction of all other sizes. The impermeable layer thickness of the qualification sample cannot be greater than that of the other sizes.

5.1.5.3 Frequency of Testing for Qualification

Qualification testing is to be performed once per year, with the exception of permeation testing which is to be performed on original qualification only.

5.1.5.4 Inspection Testing

On hose and/or hose assemblies, the following inspection tests, shall apply: burst, vacuum collapse, original adhesion, kink resistance, and electrical conductivity (if specified). The kink resistance test shall not normally be required on preformed hose, but may be specified for straight sections of at least 300 mm length.

5.1.5.5 Frequency of Testing for Inspection and Quality Acceptance Standards

As agreed upon between supplier and user.

5.1.6 For SAE J30R13

5.1.6.1 Tests

ASTM test slabs are permissible for testing tube or cover when thickness does not meet ASTM D412 minimum 1.5 mm.

5.1.6.2 Qualification Tests

In order to qualify under this specification, hose and/or hose assemblies must meet all the applicable test requirements. Qualification testing is to be performed on samples of the largest ID size to be supplied, or on 16 mm ID hose, whichever is smaller. The hose used for qualification tests must be representative of the construction of production hose. The impermeable layer thickness of the qualification sample cannot be greater than that of the other sizes.

5.1.6.3 Frequency of Testing for Qualification

Qualification testing is to be performed once per year except recirculation fuel test is repeated every 5 years or when there are rubber formulation changes in the liner rubber or fuel barrier.

5.1.6.4 Inspection Testing

On hose and/or hose assemblies, the following inspection tests shall apply: burst, vacuum collapse, original adhesion, kink resistance, and electrical conductivity (if specified). The kink resistance test shall not normally be required on preformed hose, but may be specified for straight sections of at least 300 mm length.

5.1.6.5 Frequency of Testing for Inspection and Quality Acceptance Standards

As agreed upon between supplier and user.

5.1.7 For SAE J30R14

5.1.7.1 Qualification Tests

For the qualification tests, one 7.5 m length of bulk hose, ten preformed parts, or ten assemblies of each size to be qualified shall be furnished. In order to qualify under this specification, hose and hose assemblies must meet all the test requirements of Tables 1, 2, and 3.

5.1.7.2 Frequency of Testing for Inspection

As agreed upon between supplier and user.

5.1.7.3 Inspection Test

On hose and/or hose assemblies the following inspection tests shall apply: burst, vacuum collapse, cold flexibility, adhesion, kink resistance (if specified). The kink resistance test shall not normally be required on preformed hose, but may be specified for straight sections of at least 300 mm length.

NOTE: No vacuum testing is required for SAE J30R10.

5.2 SAE 30R11, 12, and 13 Testing Requirements

Test	R11	R12	R13
Burst	Inspection test - all sizes	Inspection test - all sizes	Inspection test - all sizes
Vacuum Collapse	Inspection test - all sizes	Inspection test - all sizes	Inspection test - all sizes
Electrical Conductivity	Inspection test - all sizes	Inspection test - all sizes	Inspection test - all sizes
Original Adhesion	Inspection test - all sizes	Inspection test - all sizes	Inspection test - all sizes
Kink	Inspection test - all sizes	Inspection test - all sizes	Inspection test - all sizes
Permeation	Initial qualification only	Initial qualification only	Not required
ID for Permeation Test	12.7 mm, 13 mm nominal		
Low Temperature Flexibility	Initial qualification	Annual qualification*	Annual qualification*
Original Material Properties	Initial qualification	Annual qualification**	Annual qualification**
Heat Resistance	Initial qualification	Annual qualification*	Annual qualification*
Oil Resistance	Initial qualification	Annual qualification*	Annual qualification**
Fuel Resistance	Initial qualification	Annual qualification**	Annual qualification**
Oxidized Fuel Resistance	Not required	Annual qualification**	Not required
Extractables	Initial qualification	Annual qualification*	Not required
Aged Adhesion	Initial qualification	Annual qualification*	Annual qualification*
Recirculation	Not required	Not required	Initial qualification and repeat every 5 years*

* To be tested on nominal 13 mm ID hose.

** To be tested on nominal 13 mm ID hose or on ASTM test slabs.

NOTE: Annually is defined as 12 months $\pm$ 1 month.

For dimensions and tolerances for all hose types, see Tables 1A through 1F.

Table 1A - Dimensions and tolerances for SAE 30R2

Nominal Size, mm	Inside Diameter Tolerance, mm	Nominal Wall Thickness, mm Type 1 and 3	Outside Diameter ⁽¹⁾ Tolerance, mm Type 1 and 3	Nominal Wall Thickness, mm Type 2	Outside Diameter ⁽¹⁾ Tolerance, mm Type 2
3.0 to 4.0	± 0.25	2.88	± 0.60	4.36	± 0.79
>4.0 to 10.0	± 0.40	2.88	± 0.60	4.36	± 0.79
>10.0 to 16.0	± 0.58	3.17	± 0.79	4.36	± 0.79
>16.0 to 25.0	± 0.58	4.35	± 0.79	4.36	± 0.79
>25.0 to 26.0	± 0.79	4.17	± 1.20	4.16	± 1.20
>26.0 to 30.0	± 0.79		---	5.56	± 1.59
>30.0	± 0.99		---	5.56	± 1.59

- (1) Concentricity based on total indicator reading between the inside bore of the hose and the outer surface of the hose shall not exceed the values given below:
 Sizes 7 mm and under: 0.76 mm.
 Sizes over 7 mm up to 23 mm: 1.02 mm.
 Sizes over 23 mm: 1.27 mm.

Table 1B - Dimensions and tolerances for SAE 30R3

Nominal Size, mm	Inside Diameter Tolerance, mm	Outside Diameter ⁽¹⁾ Tolerance, mm	Nominal Wall Thickness, mm
4.0 to 7.0	± 0.40	± 0.40	2.18
>7.0 to 9.0	± 0.40	± 0.40	2.58
>9.0 to 11.0	± 0.40	± 0.60	2.88

- (1) Concentricity based on total indicator reading between the inside bore of the hose and the outer surface of the hose shall not exceed the following values:
 Size 7 mm and under: 0.762 mm.
 Size over 7 mm: 1.016 mm.

Table 1C - Dimensions and tolerances for SAE 30R5

ID, mm	ID Tolerance, mm	Wall Thickness, mm
19.0 to 26.0	+0.76 -1.52	3.05/5.89
>26.0 to 65.0	+0.76 -2.28	3.05/5.89

NOTE: The minimum tube gage for all sizes shall be 1.57 mm.

Table 1D - Length tolerances for SAE 30R2, R3, and R5

Length, mm	Tolerance, mm
0 to 305	±6.35
305 to 610	±12.70
610 to 915	±19.05
>915	±2%

Table 1E - Dimensions and tolerances for SAE 30R6, R7, R8, R9, R10, R11, R12, R13, and R14

Nominal Size, mm	Inside Diameter Tolerance, mm	Outside Diameter ⁽¹⁾ Tolerance, mm	Nominal Wall Thickness, mm
3.0 to 4.0	±0.40	±0.58	2.58
>4.0 to 6.0	±0.40	±0.58	2.78
>6.0 to 10.0	±0.40	±0.58	3.17
>10.0 to 13.0	±0.58	±0.79	3.57
>13.0 to 16.0	±0.79	±0.79	3.97
>16.0 to 26.0	±0.79	±1.59	4.77
>26.0 to 56.0	±0.99	----	4.32 to 5.89
>56.0 to 64.0	±0.99	----	4.32 to 6.35
>64.0	±0.99	----	----

⁽¹⁾ Concentricity based on total indicator reading between the inside bore of the hose and the outer surface of the hose shall not exceed the values given below:

Sizes 7 mm and under: 0.762 mm.

Sizes over 7 mm up to 13 mm: 1.016 mm.

Sizes over 13 mm: 1.270 mm.

Table 1F - Cut or long length tolerances for SAE 30R6, R7, R8, R9, R10, R11, R12, R13, and R14

Length, m	Precision, mm	Commercial, mm	Maximum End Out-of-Squareness Angle, Degrees ⁽¹⁾
0 to 0.3	±3.0	+9.5 - 3.0	
>0.31 to 0.6	±4.8	+9.5 - 4.8	
>0.61 to 0.9	±6.3	+12.7 - 6.3	
>0.91 to 1.2	±9.5	+12.7 - 9.5	Use equation below
>1.21 to 1.8	±12.7	+19.0 - 12.7	
>1.81	1%	2%	

⁽¹⁾ These values were determined by the equation:

$$A = 15 \text{ degrees} - (K \times D)$$

where:

A = maximum out-of-squareness angle

K = 0.12 degree per mm of diameter (a slope factor derived from linear best-fit previous squareness requirement)

D = nominal inside diameter in millimeters

NOTE: Other dimensions and sizes are acceptable if agreed upon between buyer and seller.

