



TECHNICAL REPORT

J1402b

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AIR BRAKE HOSE—SAE J1402b

Report of Motorcoach and Motor Truck Division approved January 1942 and last revised by Nonmetallic Materials Committee January 1970. This material was formerly designated SAE 40R2.

[The specifications in this SAE Standard originated in the SAE-ASTM Technical Committee on Automotive Rubber (other than tires). They represent the correlation of the best information available from research investigation and production experience on the minimum constructional and performance characteristics essential for new brake-hose assemblies used as original or replacement equipment. They also represent the minimum quality recognized by car manufacturers and hose suppliers as essential for satisfactory and safe operation by the hose itself and other coating parts of the braking system.]

Scope—This specification covers seven types of air hose intended for use in automotive air brake systems. The system includes all air actuated equipment leading from the air brake line. These types of hose are not to be used from the air compressor to air reservoir if air temperature is in excess of 250 F. Type G hose is to be used in frame and cab piping only, and only where air temperature is not in excess of 200 F. The types of hose are as follows:

Type A—Hose shall be mandrel built having a tube and friction of oil resisting rubber, reinforced with cotton or synthetic cord or duck plies or a combination of both, and a cover of oil resisting compounds utilizing polymerized chloroprene as the basic material. Assemble with reusable or permanent type metal end fittings.

Type B—Hose shall be nonmandrel built having a tube and friction of oil resisting rubber, reinforced with cotton or synthetic cord or duck plies or a combination of both, and a cover of oil resisting compounds utilizing polymerized chloroprene as the basic material. Assemble with reusable or permanent type metal end fittings.

Type C—Hose shall be mandrel built having a tube of oil resisting rubber, reinforced with one braid of high tensile steel wire and a cover of oil resisting compounds utilizing polymerized chloroprene as the basic material. A cotton braid or other suitable material may be used to anchor the cover to the hose. Assemble with permanent type metal end fittings only.

Type D—Hose shall be mandrel built having a tube of oil resisting rubber, reinforced by two cotton or synthetic braids separated by a wire braid. All braids are to be impregnated with an oil and age resisting compound. The wire braid may be of high tensile carbon steel or of series 300 stainless steel. Hose may also have an optional thin cover of oil resisting compound utilizing polymerized chloroprene as the basic material. Assemble with reusable or permanent type metal end fittings.

Class I—The wire braid shall be of high tensile carbon steel.

Class II—The wire braid shall be of 300 series stainless steel.

Type E—Hose shall be mandrel built having a tube of oil resisting rubber, reinforced with two cotton or synthetic braids separated by a wire braid. All braids are to be impregnated with an oil and age resisting compound. This hose is not to be used on any line where abrasion

of the outer cover will be encountered in its service. Assemble with reusable type metal end fittings only.

Type F—Hose shall be mandrel built having a tube of oil resisting rubber, reinforced with one 300 Series stainless steel braid and one fabric braid separated by an insulation layer of oil resisting rubber. The fabric braid is to be impregnated with an oil and age resistant compound. Assemble with reusable or permanent type metal end fittings.

Type G—Hose shall be nonmandrel built having a tube of polyamide nylon reinforced with a braid of polyester or equivalent yarn, and an oil resistant cover of polyamide or polyurethane material containing self-extinguishing flame inhibitors. The polyamide shall have a maximum moisture absorption of 2% at 100% relative humidity and 75 F, and a minimum melting point of 350 F. This hose is intended for inframe and cab piping and for a temperature range of -40 F to 200 F. This hose is not to be used for frame to axle or cab to trailer connections. Assemble with either permanent or reusable type metal end fittings.

CAUTION: This hose is composed in part of thermoplastic materials and must not be used in applications where temperatures may exceed the range shown.

Manufacture—The construction of hose for this service embodies a smooth bore tube of oil resisting material reinforced as described for the types of hose and having a cover of abrasive oil and age resistant compound, except on Types D, E, and F where the cover will be an impregnated cotton cover. The hose shall be so manufactured as to comply with the test requirements set forth in this SAE Standard.

Reusable End Fittings—Reusable end fittings shall consist of a nipple inserted into the bore of the hose and an outer sleeve (socket, body, or shell) engaging the nipple. The wall of the hose shall be compressed between the nipple and sleeve. Reusable end fittings on Types A and B shall be of such design and construction that they may be used on all constructions of both types of hose.

Dichromate Dip—All zinc plated end fittings are to be dichromate dipped.

Salt Spray Test—Hose assembly end connections shall withstand 24 hr exposure to salt spray when tested in accordance with ASTM B 117, Method of Salt Spray (Fog) Testing. Conformance to this requirement shall be determined by observation of the exterior of the fitting.

Hose Identification—The type of hose, the name or trademark of the hose manufacturer, and/or the hose assembler or coupling manufacturer shall appear on the outer cover of the hose at intervals not greater than 15 in. apart. The color of the branding shall be red for Types A, B, C, D, E, and F hose. Type G hose shall be marked with a color contrasting with the cover color. In addition, Type D, Class II hose shall have one plait in the cover braid colored white or yellow, the rest of the cover being black.

TABLE 1—AIR BRAKE HOSE DIAMETER

Size, in.	Inside Diameter Tolerance, in.					Types A and B OD, in.		Type C OD, in.		Type D OD, in.		Type E OD, in.		Type F OD, in.		Type G OD, in.	
	Type A	Type B	Type C	Types D, E and F	Type G	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
1/8	—	—	—	—	+0.020 -0.000	—	—	—	—	—	—	—	—	—	—	0.315	0.335
3/16 ^a	±0.016	±0.023	—	+0.026 -0.000	+0.020 -0.000	0.500	0.562	—	—	0.500	0.539	0.472	0.510	0.468	0.507	0.398	0.418
1/4	±0.016	±0.023	+0.023 -0.008	+0.031 -0.000	+0.020 -0.000	0.594	0.656	0.594	0.656	0.562	0.602	0.535	0.573	—	—	0.488	0.508
5/16	±0.016	±0.023	—	+0.031 -0.000	+0.020 -0.000	0.656	0.719	—	—	0.656	0.695	0.598	0.636	0.593	0.632	0.565	0.585
3/8	±0.016	±0.023	+0.023 -0.008	—	+0.020 -0.000	0.719	0.781	0.750	0.812	—	—	—	—	—	—	0.645	0.665
13/32	±0.016	—	—	+0.031 -0.000	—	—	—	—	—	0.742	0.789	0.714	0.760	0.742	0.788	—	—
7/16	±0.016	±0.031	—	—	—	0.781	0.844	—	—	—	—	—	—	—	—	—	—
1/2	±0.016	±0.031	+0.031 -0.015	+0.039 -0.000	+0.020 -0.000	0.844	0.906	0.875	0.937	0.898	0.945	0.808	0.854	0.837	0.883	0.805	0.825
5/8	±0.016	±0.031	—	+0.042 -0.000	+0.020 -0.000	1.031	1.094	—	—	1.054	1.101	0.933	0.979	0.953	1.015	0.960	0.980
5/8 Special	±0.016	±0.031	—	—	—	1.344	1.406	—	—	—	—	—	—	—	—	—	—
3/4	—	—	—	—	+0.020 -0.000	—	—	—	—	—	—	—	—	—	—	1.055	1.075

^a3/16 in. size Types A and B may be single-ply reinforcement.

Retests and Rejections—Any hose which fails in one or more tests may be resampled and retested for which purpose two additional samples shall be selected from the hose for the test that failed to meet the requirements. Failure of either of the retested samples shall be cause for final rejection.

Sizes—The hose shall conform to the dimensional requirements given in Table 1.

Type C Wire, Outside Diameter—The outside diameter over the wire reinforcement of Type C shall conform to the following:

TYPE C, OD OVER WIRE

ID, in.	Wire OD, in.
1/4	7/16 ± 3/128
3/8	19/32 ± 3/128
1/2	23/32 ± 1/32

Samples for Tests—A representative sample of hose approximately 6 ft in length shall be selected from each lot to be tested. If a single length of 6 ft is not available, several sections, each of sufficient length to provide the required test specimens, may be taken.

Test Requirements—All measurements and tests necessary for determining the conformity of the hose with these specifications shall be made in accordance with ASTM D 622, Methods of Testing Automotive Air Brake and Vacuum Brake Hose.

To qualify hose under this specification, all of the requirements shown under Qualification Tests and Inspection Tests must be met. Production shipments or lots of the qualified hose shall meet the requirements shown under Inspection Tests, but the user may in addition, if he so desires, test hose from any or all such production shipments or lots to the requirements under the Qualification Tests.

Qualification Tests

Aging Test—The hose shall show no cracks, charring, or disintegration externally or internally when straightened after being bent over a form having the radius given in Table 2 after a period of 70 hr in an oven at 100 ± 1 C (212 ± 1.7 F).

Cold Test—After being subjected to this test, the hose shall show no signs of cracking or breaking.

Length Change—Types A, C, D and E hose shall not contract in length more than 3% nor elongate more than 5% when tested under a pressure of 200 psi.

Types B and F hose shall not contract in length more than 7% when tested under a pressure of 200 psi. Under the same test the hose shall not elongate.

Type G hose shall not contract in length more than 1.5% nor elongate more than 1.5% when tested to a pressure to 200 psig.

Ozone Test—The outer cover of the hose shall show no cracking when examined under 7 power magnification after a period of 70 hr in

TABLE 2—AIR BRAKE HOSE AGING TEST

	Hose Size, Inside Diameters, in.									
	1/8	3/16	1/4	5/16	3/8	4/16	1/2	5/8	5/8 Special	3/4
Types A-E and G: Length of Specimen, in.	3	6	9	10	10	11	11	12	14	16
Radius of Form	1/2	1	1-1/2	1-3/4	1-3/4	2	2	2-1/4	2-1/2	2-3/4
Type F: Length of Specimen, in.	3/16		5/16		13/32		1/2		5/8	
Radius of Form	9		11		12		15		19	
	1-1/2		2		2-5/16		2-3/4		3-1/4	

the ozone cabinet at 50 parts of ozone per 100 million of air by volume at 104 F.

Flammability—Type G hose shall be self-extinguishing when tested as follows: A 12 in. length of hose held horizontally shall be placed in a 1 in. high Bunsen burner flame near the center of the length until the hose is ignited, but not longer than 15 sec. Remove the hose from the flame and note the time for flame to extinguish. Maximum time permissible will be 5 sec. Tests must be performed in a draft free area.

NOTE: This requirement is included for Type G hose only due to the fact that the materials involved are particularly vulnerable to fire if not properly protected.

Ultraviolet Light Test—After being subjected to ultraviolet light for 30 days as described in ASTM D 795, the hose shall be bent around a form as specified in Table 2, Air Brake Aging Test, and shall show no cracking of the cover.

Fungus Test—When subjected to Fungus Test, MIL-F-13927, the hose shall show no visible evidence of fungus attack.

NOTE: Due to the very lengthy time required to perform this test, it is not required as a part of certification tests. The hose manufacturer may, however, be required to certify that the material has not been changed subsequent to original qualification testing.

Temperature Cycling—The hose shall be aged 70 hr at 200 F, 26 hr at -40 F, 70 hr at 200 F, and 24 hr at -40 F. After being aged, the hose shall meet the requirements of the Air Pressure Test, Burst Test, and Tensile Test.

Inspection Tests—The hose shall conform to the following test requirements:

Adhesion—The minimum load required by the machine method to separate the tube from the plies, the plies, and the cover from the plies shall be 8 lb. No adhesion test shall be required on Type G hose. This test is to be made only on the original unaged specimens.