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INTERNATIONAL
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SURFACE VEHICLE STANDARD

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Submitted for recognition as an American National Standard

TRANSMISSION OIL COOLER HOSE

1. Scope—This SAE Standard covers four types of hose for use with automatic transmission fluid: A, B, AT, and BT. Type A and Type B are for use within a temperature range of –40 °C to 125 °C (–40 °F to 257 °F) while types AT and BT are for use within a temperature range of –40 °C to 150 °C (–40 °F to 302 °F). Recommended maximum operating pressure for Type A and Type AT hose is 1.7 MPa (250 psi) while recommended maximum operating pressure for Type B and Type BT hose is 1.0 MPa (150 psi). The lower pressure (Types B and BT) hose is for auxiliary cooler applications only. The reference fluid for tests requiring the use of automatic transmission fluid shall be Dexron-II E/Mercon or equivalent.

2. References

2.1 Applicable Publications—The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply.

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J343—Tests and Procedures for SAE 100R Series Hydraulic Hose and Hose Assemblies

2.1.2 ASTM PUBLICATIONS—Available from ASTM,100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM D 380—Test Methods for Testing Rubber Hose
ASTM D 413—Test Methods for Rubber Property—Adhesion to Flexible Substrate
ASTM D 1149—Test Method for Rubber Deterioration—Surface Ozone Cracking in a Chamber (Flat Specimens)

3. Dimensions—The dimensions of this hose are listed in Table 1. Previous designations for metric nominal hose size are listed as alternative designations in parentheses. Concentricity based on total indicator reading between the bore and outer surface cannot exceed 0.8 mm (0.03 in).

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TABLE 1—DIMENSIONS

Nominal Hose Size mm (alt)	Nominal Hose Size in	Inside Diameter mm	Inside Diameter in	Outside Diameter mm	Outside Diameter in
8 (7.9)	5/16	7.62/8.64	0.300/0.340	13.5/15.1	0.531/0.594
9 (8.7)	11/32	8.43/9.45	0.332/0.372	14.3/15.9	0.563/0.625
10 (9.5)	3/8	9.22/10.24	0.363/0.403	15.1/16.7	0.594/0.657
13 (12.7)	1/2	12.12/13.28	0.476/0.523	19.0/20.6	0.748/0.811

4. Qualification Tests

4.1 Original Burst Test—When hydrostatically tested in accordance with ASTM D 380, two hose samples with a minimum of 460 mm (18.1 in) in length, shall not burst or leak below the burst pressure defined in Table 2.

TABLE 2—BURST PRESSURE

Nominal Hose Size mm	Nominal Hose Size in	Type A and Type AT MPa	Type A and Type AT psi	Type B and Type BT MPa	Type B and Type BT psi
8	5/16	6.9	1000	4.1	600
9	11/32	6.9	1000	4.1	600
10	3/8	6.2	900	4.1	600
13	1/2	6.9	1000	4.1	600

4.2 Ozone Test—Test procedure and apparatus shall be in accordance with ASTM D 1149. A hose specimen of sufficient length shall be bent around a mandrel of non-ozone absorbing material with diameter as specified in Table 3. Both ends shall be tied at their crossing with enameled copper or aluminum wire. After mounting, the specimen shall be allowed to rest in an ozone-free atmosphere for 24 h at room temperature of 23 °C ± 2 °C (73.4 °F ± 3.6 °F). The mounted specimen shall be placed in a test chamber with an ozone partial pressure of 100 mPa ± 5 mPa at a temperature of 40 °C ± 2 °C (104 °F ± 3.6 °F). After 70 to 72 h of exposure, the specimen shall be removed, allowed to cool to a temperature of 23 °C ± 2 °C (73.4 °F ± 3.6 °F) and then visually inspected under 7X magnification. There shall be no evidence of surface cracking except for the area immediately adjacent to the wire, which shall be ignored.

TABLE 3—TEST FIXTURE DIMENSIONS

Nominal Hose Size mm	Nominal Hose Size in	Mandrel Diameter, Ozone Test (mm)	Mandrel Diameter, Cold Flex (mm)	Bend Radius, Impulse (mm)
8	5/16	108–121	135–151	31.8 minimum
9	11/32	114–127	143–159	36.0 minimum
10	3/8	121–134	151–167	40.2 minimum
13	1/2	152–165	190–206	50.8 minimum

4.3 Automatic Transmission Fluid Resistance Test—Type A and Type B hose shall be filled with reference fluid and aged for 168 h at 125 °C ± 2 °C (257 °F ± 3.6 °F). Type AT and Type BT hose shall be filled with reference fluid and aged for 70 h at 150 °C ± 2 °C (302 °F ± 3.6 °F), six specimens of aged hose shall then be subjected to the tests described as follows so that each specimen is subjected to one and only one of the tests.

a. Vacuum Collapse Test—Measure the O.D. of the hose along its narrowest dimension with calipers. Seal one end air tight and connect the other to a vacuum source. Then expose to a vacuum of 508 mm (20 in) of Hg for 30 s and measure the O.D. of the hose along its narrowest dimension under vacuum. The O.D. of the hose must not collapse more than 25% when compared to the O.D. of the hose before exposure of vacuum.

b. Kink Resistance—Hose shall not kink when tested as follows: Use a board approximately 20 mm thick with hole diameter, center distance and sample length as shown in Table 4. Insert one end of the hose into the board with the end flush on the opposite side of the board. Carefully bend the hose along its natural curvature and insert the other end carefully into the second hole until it projects 65 mm out the other side. After the hose has been in this position for 5 min, a steel ball having the diameter specified in Table 4 must be able to roll from one end of the hose to the other.

TABLE 4—KINK RESISTANCE DIMENSIONS

Nominal Hose Size mm	Nominal Hose Size in	Hose Sample Length (mm)	Hole Center Distance (mm)	Diameter of Hole (mm)	Diameter of Ball (mm)
8	5/16	275	45	15.5-16.0	3.9-4.0
9	11/32	275	50	16.0-16.5	4.3-4.4
10	3/8	300	75	17.0-17.5	4.7-4.8
13	1/2	300	100	21.0-21.5	6.2-6.3

c. Burst Test—When hydrostatically tested in accordance with ASTM D 380, two hose samples, a minimum of 460 mm (18.1 in) in length, shall not burst or leak below the burst pressure defined in Table 2.

d. Cold Flexibility—The hose shall be placed in a cold box in a straight position for 70 h at –40 °C ± 2 °C (–40 °F ± 3.6 °F). While still in the cold box, the hose shall be bent 180 degrees around a mandrel having the diameter specified in Table 3 and stabilized at –40 °C ± 2 °C (–40 °F ± 3.6 °F) within 4 to 8 s. The hose shall not fracture and shall not show any cracks, checks, or breaks in the tube or cover.

e. Adhesion—The minimum force required to separate the reinforcement from cover and tube shall be 1.4 N/mm of width (8.0 lb/in) as tested against the machine method in ASTM D 413.

4.4 Hot Oil Circulation Test—Reference fluid shall be circulated through Type A and Type B hose at 125 °C ± 3 °C (257 °F ± 5.4 °F) for 1008 h (42 days) at a pressure of 0.34 MPa ± 0.02 MPa (50 psi ± 3 psi). Reference fluid shall be circulated through Type AT and Type BT hose at 150 °C ± 3 °C (302 °F ± 5.4 °F) for 1008 h (42 days) at a pressure of 0.34 MPa ± 0.02 MPa (50 psi ± 3 psi). The hose shall not leak or burst.

4.5 Accelerated Impulse Test—Impulse testing shall be conducted in accordance with the procedure outlined in SAE J343. The test fluid shall be reference fluid, the test pressure shall be 1.03 MPa ± 0.10 MPa (150 psi ± 15 psi), the low pressure shall not exceed 0.14 MPa (20 psi), the impulse rate shall be 30 to 40 cpm, and the minimum bend radius shall be as specified in Table 3. Type A and Type B hose shall be tested at 125 °C ± 3 °C (257 °F ± 5.4 °F). Type AT and Type BT hose shall be tested at 150 °C ± 3 °C (257 °F ± 5.4 °F). The hose must not burst or leak before a minimum of 150 000 cycles for Type A and Type AT hose or a minimum of 50 000 cycles for Type B and Type BT hose.

4.6 Identification Marking—The hose shall be identified with the SAE number, type, nominal size, date code, and manufacturer's code marking. This marking shall appear at least once per length of hose repeating at intervals of no greater than 300 mm (12 in). Additional identification may be added as agreed upon by user and supplier.

5. Notes

5.1 Marginal Indicia—The change bar (l) located in the left margin is for the convenience of the user in locating areas where technical revisions have been made to the previous issue of the report. An (R) symbol to the left of the document title indicates a complete revision of the report.

PREPARED BY THE SAE FUEL, OIL, AND EMISSION HOSE COMMITTEE