

six times the nominal outside diameter of the tubing. (S12.8)

**S11.3.8 High temperature flexibility.** Plastic air brake tubing shall not rupture or burst when subjected to 80 percent of the burst strength pressure in Table VIII for the size of tubing being tested, after the tubing has been:

(a) conditioned in air at 230 °F for 72 hours while bent 180 degrees around a cylinder having a radius of two times the nominal outside diameter of the tubing; and

(b) cooled to room temperature while remaining on the cylinder, then straightened; and

(c) bent 180 degrees around the cylinder in the opposite direction of the first bending. (S12.9)

**S11.3.9 High temperature resistance.** Plastic air brake tubing shall not rupture or burst when subjected to 80 percent of the burst strength pressure in Table VIII for the size of tubing being tested, after the tubing has been conditioned in air at 230 °F for 72 hours. (S12.10)

**S11.3.10 High temperature conditioning, low temperature impact resistance.** Plastic air brake tubing shall not rupture or burst when subjected to 80 percent of the burst strength pressure in Table VIII for the size of tubing being tested, after the tubing has been conditioned in air at 230 °F for 24 hours, then conditioned in air at minus 40 °F for 4 hours and impacted with a one pound weight dropped from a height of 12 inches. (S12.11)

**S11.3.11 Boiling water conditioning, low temperature impact resistance.** Plastic air brake tubing shall not rupture or burst when subjected to 80 percent of the burst strength pressure in Table VIII for the size of tubing being tested, after the tubing has been conditioned in boiling water for two hours, then conditioned in air at minus 40 °F for 4 hours, and then impacted with a one pound weight dropped from a height of 12 inches. (S12.12)

**S11.3.12 Zinc chloride resistance.** The outer surface of plastic air brake tubing shall not show cracks visible under 7-power magnification after immersion in a 50 percent zinc chloride aqueous solution for 200 hours while bent around a cylinder having a radius of two times the nominal outside diameter of the tubing. (S12.13)

**S11.3.13 Methyl alcohol resistance.** The outer surface of plastic air brake tubing shall not show cracks visible under 7-power magnification after immersion in a 95 percent methyl alcohol aqueous solution for 200 hours while bent around a cylinder having a radius of two times the nominal outside diameter of the tubing (S12.14)

**S11.3.14 High temperature conditioning and stiffness.** Plastic air brake tubing shall require not more than the stiffness force specified in Table VIII to deflect 2 inches, when tested using the apparatus in Figure 9, after conditioning in air at 230 °F for 24 hours with the tubing supported in a straight position. (S12.15)

**S11.3.15 High temperature conditioning and adhesion.** Type B plastic air brake tubing shall have a tensile strength of 25 pounds per linear inch, measured at the interface of the inner and outer layers, after conditioning as specified in S11.3.8(a) through (c). (S12.16)

**S11.3.16 High temperature conditioning and collapse resistance.** The collapse of the outside diameter of plastic air brake tubing shall not exceed twenty percent of the original outside diameter when bent 180 degrees on a holding fixture to the bend radius specified in Table VIII and conditioned in air at 200 °F for 24 hours. (S12.17)

**S11.3.17 Ozone resistance.** The outer surface of plastic air brake tubing shall not show cracks visible under 7-power magnification after exposure to ozone for 70 hours at 104 °F. (S12.18)

**S11.3.18 Oil resistance.** Plastic air brake tubing shall not rupture or burst when subjected to 80 percent of the burst strength pressure in Table VIII for the size of tubing being tested, after the tubing has been conditioned in ASTM IRM 903 oil at 212 °F for 70 hours. (S12.19)

**S11.3.19 Tensile strength.** A plastic air brake tubing assembly designed for use between frame and axle or between a towed and a towing vehicle shall withstand, without separation of the tubing from its end fittings, a pull of 250 pounds if it is  $\frac{3}{8}$  inch or less or 10 mm or less in nominal outside diameter, or a pull of 325 pounds if it is larger than  $\frac{3}{8}$  inch or 10 mm in nominal outside diameter. A plastic air brake tubing assembly designed for use in any other application shall withstand, without separation of the hose from its end fittings, a pull of 35 pounds if it is  $\frac{1}{8}$  inch or 3 mm or less in nominal outside diameter, 40 pounds if it is  $\frac{5}{32}$  inch or 4 mm in nominal outside diameter, 50 pounds if it is  $\frac{3}{16}$  to  $\frac{3}{8}$  inch or 5 mm to 10 mm in nominal outside diameter, 150 pounds if it is  $\frac{1}{2}$  to  $\frac{5}{8}$  inch or 11 mm to 16 mm in nominal outside diameter, or 325 pounds if it is larger than  $\frac{5}{8}$  inch or 16 mm in nominal outside diameter. (S12.20)

**S11.3.20 Boiling water conditioning and tensile strength.** A plastic air brake tubing assembly when subjected to a tensile pull test shall either elongate 50 percent or withstand the tensile load in

Table VIII without separation from its end fittings, with one end of the assembly conditioned in boiling water for 5 minutes. (S12.21)

**S11.3.21 Thermal conditioning and tensile strength.** A plastic air brake tubing assembly when subjected to a tensile pull test shall either elongate 50 percent or withstand the tensile strength in Table VIII without separation from its end fittings after the assembly has been subjected to four cycles of conditioning in air at minus 40 °F for thirty minutes, normalizing at room temperature, conditioning in boiling water for 15 minutes, and normalizing at room temperature. (S12.22)

**S11.3.22 Vibration resistance.** A plastic air brake tubing assembly with an internal air pressure of 120 psi shall not leak more than 50 cm<sup>3</sup> per minute at a temperature of minus 40 °F and 25 cm<sup>3</sup> per minute at a temperature of 75 °F, after the assembly has been subjected to 1,000,000 cycles of vibration testing with one end of the assembly fixed and the other end stroked  $\frac{1}{2}$ -inch at 600 cycles per minute. In addition, end fittings that use a threaded retention nut shall retain at least 20 percent of the original retention nut tightening torque upon completion of the vibration testing. The vibration test shall be conducted in an environmental chamber and the air temperature shall be cycled between minus 40 °F and 220 °F during the test. (S12.23)

**S11.3.23 End fitting retention.** The end fittings of a plastic air brake tubing assembly shall not separate from the tubing or leak when the assembly is filled with hydraulic fluid and pressurized to the burst strength pressure in Table VIII. (S12.24)

**S11.3.24 Thermal conditioning and end fitting retention.** The end fittings of a plastic air brake tubing assembly shall not separate from the tubing or leak when filled with hydraulic fluid and:

(a) conditioned in air at 200 °F for 24 hours with atmospheric pressure inside the tubing assembly, and;

(b) maintaining an air temperature of 200 °F and increasing the pressure inside the tubing assembly to 450 psi, and holding this pressure for five minutes, and;

(c) reducing the internal tubing assembly pressure to atmospheric and permitting the tubing assembly to cool at 75 NF for 1 hour, and;

(d) conditioning the tubing assembly in air at minus 40 °F for 24 hours with atmospheric pressure inside the tubing assembly, and;

(e) maintaining an air temperature of minus 40 °F and increasing the pressure inside the tubing assembly to 450 psi,