

and holding this pressure for five minutes. (S12.25)

S11.3.24 *End fitting corrosion resistance.* After 24 hours of exposure to salt spray, air brake hose end fittings shall show no base metal corrosion on the end fitting surface except where crimping or the application of labeling information causes a displacement of the protective coating. (S12.26)

S12. *Test procedures—Plastic air brake tubing, plastic air brake tubing assemblies, plastic air brake tubing end fittings.*

S12.1 *Air brake tubing dimensions.* Measure the tubing dimensions including wall thickness, inside diameter, and outside diameter, using appropriate metrology apparatus such as micrometers, dial indicators and gauge blocks, or optical comparators. To account for slight out-of-round conditions, diameter measurements may be calculated using the average of the major and minor diameters.

S12.2 *Constriction test.*

(a) Utilize a plug gauge as shown in Figure 4. Diameter "A" shall be equal to 66 percent of the nominal inside diameter of the plastic air brake tubing being tested.

(b) Tubing assemblies that are to be used for additional testing shall have constriction testing only at each end fitting. Other tubing assemblies may be cut into three inch lengths to permit constriction testing of the entire assembly.

(c) Hold the tubing in a straight position and vertical orientation.

(d) Place the spherical end of the plug gauge just inside the tubing. If the spherical end will not enter the tubing or end fitting using no more force than gravity acting on the plug gauge, this constitutes failure of the constriction test.

(e) Release the plug gauge. Within three seconds, the plug gauge shall fall under the force of gravity alone up to the handle of the gauge. If the plug gauge does not fully enter the tubing up to the handle of the gauge within three seconds, this constitutes failure of the constriction test.

S12.3 *High temperature conditioning and dimensional stability test.*

(a) Condition the tubing at 230 °F for 4 hours in an air oven.

(b) Remove the tubing from the oven and allow to cool at room temperature for 30 minutes.

(c) Measure the dimensions of the tubing using the procedure in S12.1.

S12.4 *Boiling water conditioning and dimensional stability test.*

(a) Utilize a pot constructed of a non-reactive material and fill with distilled water.

(b) Cut the tubing to a length that will fit into the pot without touching any surface of the pot. Slip the tubing over a stainless steel wire for positioning it in the pot.

(c) Bring the water to a boil. Place the tubing in the water and position it so that it does not touch the pot. Boil the tubing for two hours. Replenish the water as necessary, adding it slowly so that the water in the pot boils continuously.

(d) Remove the tubing from the water and allow to cool at room temperature for 30 minutes. Wipe off any water that remains on the tubing.

(e) Measure the dimensions of the tubing using the procedure in S12.1.

S12.5 *Moisture absorption test.*

(a) Prepare a sample of tubing twelve inches in length.

(b) Condition the tubing at 230 °F for 24 hours in an air oven. Remove the tubing from the oven and within 30 seconds, weigh it to establish the initial weight. The weight shall be measured with a resolution of 0.01g; if the scale has a higher resolution, then values of 0.005g and above shall be rounded to the nearest 0.01g and values below 0.005g shall be truncated.

(c) Place the tubing in an environmental chamber and condition it for 100 hours at 100 percent relative humidity and a temperature of 75 °F.

(d) Remove the tubing from the chamber within a period of 5 minutes, remove all surface moisture from the tubing using cloth and weigh the tubing to establish the conditioned weight. Weight shall be measured to the nearest 0.01g as in (b) above.

(e) Calculate percentage of moisture absorption as follows:

$$\frac{[\text{Conditioned Weight} - \text{Initial Weight}] + [\text{Initial Weight}] \times 100}{[\text{Initial Weight}]}$$

S12.6 *Burst strength test.*

(a) Utilize an air brake tubing assembly or prepare a 12 inch length of tubing and install end fittings according to the end fitting manufacturer's instructions.

(b) Connect one end of the tubing assembly to a source of air pressure and plug the other end.

(c) Increase the pressure inside the tubing assembly at a constant rate to the burst strength pressure for the size of tubing being tested as specified in Table VIII within a period of 5 seconds.

S12.7 *Ultraviolet light resistance test.*

(a) *Apparatus.* An accelerated weathering test machine for ultraviolet

light conditioning of plastic air brake tubing. The machine shall be equipped with fluorescent UVA-340 light bulbs and automatic irradiance control. Also utilize an impact test apparatus as shown in Figure 8.

(b) *Test Standards.* The testing is in accordance with American Society for Testing and Materials (ASTM) G154-00 Standard Practice for Operating Light Apparatus for UV Exposure of Nonmetallic Materials; ASTM G151-97 Standard Practice for Exposing Nonmetallic Materials in Accelerated Test Devices that Use Laboratory Light Sources, and; ASTM D4329-99 Standard Practice for Fluorescent UV Exposure of Plastics.

(c) *Preparation.*

(i) Utilize a 12 inch length of plastic air brake tubing. Mask 1 inch of each end of the tubing where end fittings will be attached using opaque tape.

(ii) Attach the tubing to the test rack of the machine, securing it at the ends along the masked sections. Wipe the outside surface of the tubing with acetone to remove any surface contaminants. Place the tubing and rack in the accelerated weathering test machine so that the center of the tubing assembly is approximately in the center of the UV light exposure area of the test machine and the longitudinal axis of the tubing is parallel to the fluorescent bulb. (If multiple plastic brake tubing assemblies are tested, then their position in the machine should be rotated according to ASTM D4329-99 S7.4.1, except the rotation is each 96 hours instead of weekly.) The distance from the light bulb to the tubing is approximately 2 inches. Set the UV irradiance to 0.85 W/m² @ 340 nm and maintain this level during the testing. Maintain a temperature inside the test chamber of 113 °F, and use only atmospheric humidity. Expose the tubing at this UV irradiance level for 300 hours continuously. Remove the tubing from the test chamber.

(iii) Place the tubing inside the impact test apparatus, and drop the impactor onto the tubing from a height of 12 inches.

(iv) Remove the masking material from the ends of the tubing. Install end fittings according to the end fitting manufacturer's instructions. Conduct the burst strength test in S12.6 using 80 percent of the burst strength pressure for the size of tubing being tested as specified in Table VIII.

Figure 8. Impact Test Apparatus