



TUBING, POLYOLEFIN, HEAT SHRINKABLE, DUAL WALL, ADHESIVE LINED, SEMI-RIGID

ESA-M99D56-A3

1. SCOPE

The material defined by this specification is a selectively crosslinked dual wall polyolefin tubing whose diameter shall reduce to a predetermined size upon application of heat in excess of 75 °C. The tubing shall be fabricated from an irradiated, thermally stabilized, modified polyolefin composition, and shall be lined with a thermoplastic adhesive.

2. APPLICATION

This specification was released originally for material used as a barrier coating for protecting brake tubes from environmental and mechanical damage.

3. REQUIREMENTS

Material specification requirements are to be used for initial qualification of materials.

3.0 STANDARD REQUIREMENTS FOR PRODUCTION MATERIALS

Material suppliers and part producers must conform to the Company's Standard Requirements For Production Materials (WSS-M99P1111-A).

3.4 FORMED PARTS

The tubing shall be fabricated from thermally stabilized, modified polyolefin and shall be crosslinked by irradiation. It shall be homogeneous and essentially free from flaws, defects, pinholes, bubbles, seams, cracks, and inclusions.

3.4.1 Dimensions
(ASTM D 2671)

As specified on
engineering drawing.
(Shall be specified
before and after shrink).

3.4.2 Longitudinal Change, max
(100 mm sample as supplied, immerse in
125 +/- 2 °C glycol bath for 1 minute,
cool and measure length.)

+/- 5%

3.5 TENSILE STRENGTH AT MAXIMUM LOAD, min
(ASTM D 638, 20 mm benchmarks, 200 mm
specimen length, 200 +/- 20 mm/min test speed)

11 MPa

3.6 ELONGATION AT BREAK, min
(Test per paragraph 3.5)

300%

Date	Action	Revisions
2006 11 27	Revised	Inserted 3.0; Deleted 3.1, 3.2, 3.3, 3.14, 3.15 & 4
2001 07 02	Revised	Updated
1989 10 16	Released	NC00110011883042



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**3.7 HEAT AGED**

(ASTM D 3045, 24 h at 120 +/- 2 °C)

3.7.1 Tensile Strength at Maximum Load, min
(Test per paragraph 3.5)

11 MPa

3.7.2 Elongation at Break, min
(Test per paragraph 3.5)

270%

3.8 LOW TEMPERATURE FLEXIBILITY AT -30 °C(ASTM D 746, 32 +/- 6 mm, specimen
length, width 6.3 +/- 0.5 mm, wall thickness
1.9 +/- 0.25 mm)

No cracking

3.9 CONCENTRICITY

Six 150 mm specimens of tubing, as supplied, shall be measured for minimum and maximum wall thickness. Concentricity shall be calculated as follows:

$$C = W_{\min}/W_{\max} \times 100\%$$

Where:

Wmin = Minimum Wall Thickness

Wmax = Maximum Wall Thickness

3.9.1 Concentricity as Supplied, min

60%

3.10 COLORBlack or as specified
on engineering drawing**3.11 DEFORMATION RESISTANCE**

60%

Specimen after shrinkage shall be placed in an oven at 140 +/- 2 °C for 10 minutes. After heating, load at 2 kg/cm for 5 minutes. Allow to cool in loaded condition. Calculate ratio of final wall thickness to original wall thickness.

3.12 IMPACT RESISTANCE

(ASTM D 1709, 3 mm height, 250 g weight)

No cracks

3.13 ACID RESISTANCE

No cracks

Immerse six 100 mm samples in 35% by weight sulfuric acid at 50 +/- 1 °C for 20 days.