Ford Motor Company

ENGINEERING MATERIAL SPECIFICATION

Material Name	Specification Number
TUBE, EPICHLOROHYDRIN (ECO) RUBBER, FUEL AND OIL RESISTANT	**WSD-M96D9-A**
TUBE, EPICHLOROHYDRIN (ECO) RUBBER, FUEL, OIL AND ACIDIC AQUEOUS CONDENSATE RESISTANT	**WSD-M96D9-A2**
TUBE, EPICHLOROHYDRIN (ECO) RUBBER, FUEL, OIL, ACIDIC AQUEOUS CONDENSATE, VACUUM/PRESSURE RESISTANT	**WSS-M96D9-A3**

1. SCOPE

The materials defined by these specifications are non-reinforced epichlorohydrin rubber molded or extruded tubes.

2. APPLICATION

The material was released originally for use as engine compartment tubing for emission control, vacuum and crankcase ventilation systems where good resistance to ozone, oil, vacuum collapse and tearing is required. It is capable of continuous operation at temperatures up to 130 °C and withstanding peak temperatures up to 150 °C. The material also has moderate resistance to oxygenated fuels and remains serviceable at - 40 °C. Tubes conforming to Suffix -A2 have good resistance to hot acidic aqueous engine condensates and should be used where prolonged exposure is anticipated. Tubes conforming to Suffix -A3 are additionally resistant to vacuum collapse and pressure dilation.

3. REQUIREMENTS

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).

3.2 DYNAMIC MECHANICAL ANALYSIS
(ASTM D 4065)

Ford Motor Company, at its option, may establish shear modulus/damping vs. temperature curves plotted for - 50 to + 170 °C temperature range for material/parts supplied to this specification. The shear modulus and damping curves established for initial approval shall constitute the reference standard and shall be kept on file at the designated material laboratory. All samples shall produce shear modulus and damping curves that correspond to the reference standard when tested under the same conditions.

Date	Action	Revisions	
2003 06 04	Revised	Suffix A3 added and completely revised	B Hennessey
2000 03 27	Revised	Aged Properties change to absolute	B Hennessey
1987 05 05	SM/ER 4802 TC	Final Release	B Hennessey

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3.3 FINISHED PART REQUIREMENTS

The finished part must conform with the requirements of any relevant performance specification and/or the relevant System Design Specifications (SDS).

3.4 TUBE CONSTRUCTION

The tube shall consist of an extrusion or molding of epichlorohydrin rubber without internal or external reinforcement.

3.5 MATERIAL TESTING

The following tests shall be performed on finished hoses and/or test specimens cut from them. The test specimens shall be die-cut from the finished parts and buffed or slit to the required thickness where necessary. When not feasible, specimens cut from molded test slabs manufactured from the same material with an equivalent state of cure shall be used. The test slabs shall have the following dimensions:

150 x 150 mm, min x 2.0 +/- 0.2 mm

3.6 ORIGINAL PROPERTIES

3.6.1	Hardness, International (ISO 48/ASTM D 1415)	65 - 75 IRHD
3.6.2	Hardness, Durometer A (ISO 868/ASTM D 2240, instantaneous, plied-up specimens. Hand held durometers shall not be used)	65 - 75
3.6.3	Tensile Strength, min (ISO 37/ASTM D 412, Die C)	10.0 MPa
3.6.4	Elongation at Break, min (Test method according to para 3.7.3)	200%
3.6.5	Modulus at 100% Elongation, min (Test method according to para 3.7.3)	3.0 to 6.0 MPa
3.6.6	Tear Strength, min (ISO 34, Method b, procedure (a)/ ASTM D 624, Die C)	25 kN/m

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