Engineering Material Specification

Material Name	Specification Number
ETHYLENE PROPYLENE RUBBER, HYDRAULIC BRAKE SYSTEM - SEALS	ESA-M2D257-A

1. SCOPE

The material defined by this specification is an ethylene propylene rubber having excellent non-mineral hydraulic fluid aging characteristics for use at high and low temperatures.

2. APPLICATION

This specification was released originally for material used in seals and o-rings in the brake master cylinder.

3. REQUIREMENTS

3.1 CHEMICAL COMPOSITION

The chemical composition of the rubber material must be 100% copolymer and/or terpolymer of ethylene propylene. Slab stock must accompany parts for analysis. The slab stock must be of the same compound batch and cured at equivalent cure cycles of the parts supplied.

3.2 COLOR — Black

3.3 SLAB STOCK AND BUTTON SPECIMENS

3.3.1 Original Properties

Hardness - Durometer "A" (ASTM D 2240)	65 - 75
Tensile Strength, min (ASTM D 412)	1500 psi (10.3 MPa)
Elongation, Ultimate, min	200%

3.3.2 Heat Aged (22 h at 175 ± 2°C)

Hardness - Durometer "A" Change, max	0 to +12
Tensile Strength Change, max	-15%
Elongation Change, max	-30%

3.3.3 Immersion in Brake Fluid (▽ ESA-M6C25-A) (22 h at 149 ± 2°C)

Hardness - Durometer "A" Change, max	-8

Date	Para. No.	Revisions	Approval
1979 01 10		Metricated and Retyped CMH2 82338S	
1974 10 15		Released COE2-CBE2-CDE2-CEE2-760020	

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	Tensile Strength Change, max	-20%
	Elongation Change, max	-20%
	Volume Change	0 to +10%
3.3.4	Immersion in Brake Fluid (∇ ESA-M6C25-A) (7 days at 21 - 27°C)	
	Volume Change	No shrinkage
3.3.5	Compression Set (ASTM D 395, Method "B", 22 h at 175 ± 2°C, 25% deflection)	
	Recovery, min	95%
	Set of Deflection, max	20%
3.3.6	Low Temperature Test at -54°C (5 h conditioning)	
	Bend Test (90° angle bend over square edge mandrel)	Must be flexible with no cracks

3.4 RUBBER PARTS

3.4.1	Hardness (ASTM D 1415)	IRHD, see engineering drawing
3.4.2	Immersion in Brake Fluid (∇ ESA-M6C25-A) (SAE J 1601, 22 h at 149 ± 2°C)	
	Hardness Change, max	-8 IRHD
	Volume Change	0 to +10%
	Base Diameter Change	0 to +3.3%
3.4.3	Low Temperature Test at -54°C (SAE J 1601, except conditioning shall be for 5 h)	
	Bend Test	No cracks and shall return to its approx. original shape within 1 min.
3.4.4	Heat Aged (SAE J 1601, except aged for 22 h at 175 ± 2°C)	
	Hardness Change, max	0 to +10 IRHD

3.4.5 Infrared Spectrophotometry

Ford Motor Company, at its option, may conduct infrared analysis of material/parts supplied to this specification. The curves established for initial approval shall constitute the reference standard and shall be kept on file at Central Laboratory. All samples shall produce curves that correspond to the reference standard when tested under the same conditions as those specified on the master curve.

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