Compound N8-90

Contoured Back-up Ring

Nitrile Rubber (NBR)

Material Description

Nitrile rubber, also known as NBR or Buna N, is one of the most commonly used sealing elastomers due to its resistance to petroleum-based fuels and lubricants and its relatively low price. Nitrile elastomers are copolymers of acrylonitrile and butadiene. There are a number of common variations of nitrile compounds.

GENERAL INFORMATION	
ASTM D1418 Designation	NBR
ISO/DIN 1629 Designation	NBR
ASTM D2000/ SAE J 200 Codes	BF, BG, BK, CH
Standard Color	Black
Hardness Range	40 to 90 Shore A
Relative Cost	Low

Acrylonitrile Content

The acrylonitrile (ACN) content of the polymer chains can be varied from 18% to 50%. Lower ACN content gives better low-temperature properties but poorer fuels and polar lubricants. Higher ACN content gives poorer low-temperature properties but improved fuels and polar lubricants resistance. Standard NBRs typically have 34% ACN content.

Cure system: Sulfur-cured

Standard Nitriles are usually sulfur-cured. Sulfur-cured compounds offer better low-temperature properties but are more prone to hardening with high temperatures. Peroxide-cured nitriles have better heat resistance and lower compression sets but are more expensive and more difficult to process.

SERVICE TEMPERATURES	
Standard Low Temperature	-40°C (-40°F)
Standard High Temperature	100°C (212°F)
Special Compound Low Temperature	-55°C (-67°F)
Special Compound High Temperature	135°C (275°F)

Other Common Variations

- Nitriles are often internally lubricated to improve ease of installation or reduce friction for dynamic applications.
- Nitriles can be formulated with only “white list” ingredients as specified in 21.CFR 177.2600 for use in applications where the elastomer will be in contact with food or beverages.
- Nitriles can be submitted for approval by the National Sanitation Foundation (NSF) for use in drinking water applications.
- Nitriles can also be submitted for approval to Underwriters Laboratories (UL) for use in applications as prescribed in UL 157.
- Nitrile rubber can be combined with polyvinyl chloride (PVC) to create fuel, ozone and weathering resistance NBR-PVC blends.

PERFORMS WELL IN:	DOESN’T PERFORM WELL IN:
• Petroleum based oils and fuels • Aliphatic hydrocarbons • Vegetable oils • Silicone oils and greases • Ethylene glycol • Dilute acids • Water to below 100°C (212°F)	• Aromatic hydrocarbons • Automotive brake fluid • Chlorinated hydrocarbons • Ketones • Ethers • Esters • Phosphate ester hydraulic fluids • Strong acids • Ozone/weathering/sunlight

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TEST REPORT FOR COMPOUND N8-90

MATERIAL: BUTADIENE ACRYLONITRILE COPOLYMER
DUROMETER: 90
COLOR: BLACK
ASTM* D2000 M7BG910 B14 EO14 EO34 EF11 EF21 EA14 Z1

N8-90

SECTION OF SPEC.	PROPERTIES	REQUIREMENTS	RESULTS	ASTM TEST METHOD
	ORIGINAL PHYSICAL PROPERTIES			
	Hardness, Shore A	90±5	87	D2240-05
	Tensile Strength, psi (MPa)	1450 (min.)	2499 (17.23)	D412-06a
	Elongation, percent	100 (min.)	133	D412-06a
	Modulus at 100%, psi (MPa)		1990 (13.72)	D412-06a
	Specific Gravity (g/cm³)		1.381	
B14	**COMPRESSION SET**			D395-04,
	22 hours at 100°C (212°F), percent	25 (button) (max.)	7.8	Method B
EA14	**WATER RESISTANCE**			D471-06
	70 hours at 100°C (212°F)			
	Hardness Change, points	±10	-2	
	Tensile Strength Change, percent		+5	
	Elongation Change, percent		-11	
	Volume Change, percent	±15	+3.3	
EF11	**FUEL A RESISTANCE**			D471-06
	70 hours at 23°C (73.4°F)			
	Hardness Change, points	±10	-3	
	Tensile Strength Change, percent	-25 (max.)	0	
	Elongation Change, percent	-25 (max.)	-5	
	Volume Change, percent	-5 to +10	+1.8	
EF21	**FUEL B RESISTANCE**			D471-06
	70 hours at 23°C (73.4°F)			
	Hardness Change, points	0 to -30	-14	
	Tensile Strength Change, percent	-60 (max.)	-28	
	Elongation Change, percent	-60 (max.)	-30	
	Volume Change, percent	0 to +40	+18.7	
EO14	**NO. 1 OIL**			D471-06
	70 hours at 100°C (212°F)			
	Hardness Change, points	-5 to +5	+3	
	Tensile Strength Change, percent	-25 (max.)	-2	
	Elongation Change, percent	-45 (max.)	-17	
	Volume Change, percent	-10 to +5	-2.8	
EO34	**NO. 3 OIL**			D471-06
	70 hours at 100°C (212°F)			
	Hardness Change, points	-10 to +5	-5	
	Tensile Strength Change, percent	-45 (max.)	-3	
	Elongation Change, percent	-45 (max.)	-16	
	Volume Change, percent	0 to +25	+6.0	

*American Society for Testing and Materials

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