

Model formula for farm tire innerliner Exxon™ bromobutyl 2222, natural rubber, SBR blend

Energy lives here™



Exxon™ bromobutyl is readily blended with other materials to improve processibility or take advantage of material properties from other types of rubber.

Material	Units	Amount
Exxon bromobutyl 2222	PHR ⁽¹⁾	60.00
Natural rubber SMR 20	PHR	20.00
Styrene butadiene rubber (IISRP 1712)	PHR	27.50
Carbon black grade N660	PHR	35.00
Waterwashed clay	PHR	35.00
Naphthenic oil	PHR	8.00
Aromatic and aliphatic hydrocarbon resin blend	PHR	7.00
Phenolic tackifying resin	PHR	4.00
Magnesium oxide	PHR	0.15
Stearic acid	PHR	2.00
Zinc oxide	PHR	3.00
Sulfur	PHR	0.50
N-t-butyl-2-benzothiazole sulfenamide (TBBS)	PHR	1.50
Zinc isopropyl xanthate (ZIX)	PHR	0.25
Total (PHR)		203.90

Properties	Test method based on	Units and conditions ⁽²⁾	Typical values ⁽³⁾
Mooney viscosity ML (1+4) at 100°C	ASTM D1646	MU, 100°C	31.2
Mooney scorch	ASTM D1646	at 125°C	
Minimum viscosity		MU	12.5
Time to 5pt rise		minutes	22.8
Time to 10pt rise		minutes	29.5
MDR rheometer	ASTM D5289	160°C; 30 minutes; 0.5 deg. arc	
Minimum torque ML		dNm	0.7
Maximum torque MH		dNm	4.1
MH - ML		dNm	3.4
Ts2		minutes	3.4
Tc'50		minutes	8.0
Tc'90		minutes	15.7
Peak rate		dNm/min	0.5

Model formula for farm tire innerliner
Exxon™ bromobutyl 2222, natural rubber, SBR blend

Properties	Test method based on	Units and conditions ⁽²⁾	Typical values ⁽³⁾
MDR rheometer	ASTM D5289	180°C; 30 minutes; 0.5 deg. arc	
MI (minimum torque)		dNm	0.6
Mh (maximum torque)		dNm	3.8
Mh -MI (delta torque)		dNm	3.2
Tc ₁₀ (time to 10% torque increase)		minutes	1.3
Tc ₅₀ (time to 50% torque increase)		minutes	2.4
Tc ₉₀ (time to 90% torque increase)		minutes	4.2
Cure rate (rate at tc50)		dNm/min	1.9
Cure time		25 minutes at 160°C	
Tensile strength	ASTM D412	MPa	9.8
Elongation at break	%	%	812
Modulus 100%	MPa	MPa	1.2
Modulus 200%	MPa	MPa	2.0
Modulus 300%	MPa	MPa	2.9
Energy to break		joules	9.6
Tear strength (die B) peak load	ASTM D624	KN/m	75.9
Tear Strength (die B) mean			44.4
Hardness	ASTM D2240	shore A	43.7
Rebound	DIN53512	%, 23°C	15.9
Fatigue to failure (cycles)	ExxonMobil method	cycles at 134% strain	173389
Mocon oxygen permeability coefficient		cc*mm (m ² -day-mmHg) at 60°C	1.36
ARES dynamic properties at 0°C	ExxonMobil method	1% strain, 1.0 Hz.	
G'		MPa	6.16
G''	MPa	MPa	1.80
Tan_delta			0.29
ARES dynamic properties at 60°C		1% strain, 1.0 Hz.	
G'		MPa	1.88
G''		MPa	0.43
Tan_delta			0.23
ARES dynamic properties at 0°C	ExxonMobil method	1% strain, 10.0 Hz.	
G'		MPa	8.22
G''		MPa	3.80
Tan_delta			0.46
ARES dynamic properties at 60°C	1% strain, 10.0 Hz.		
G'		MPa	2.28
G''		MPa	0.57
Tan_delta			0.25

1. Parts per hundred rubber.

2. Samples cured 14 minutes at 160°C.

3. Values given are typical and should not be interpreted as a specification.

©2018 ExxonMobil. ExxonMobil, the ExxonMobil logo, the interlocking "X" device and other product or service names used herein are trademarks of ExxonMobil, unless indicated otherwise. This document may not be distributed, displayed, copied or altered without ExxonMobil's prior written authorization. To the extent ExxonMobil authorizes distributing, displaying and/or copying of this document, the user may do so only if the document is unaltered and complete, including all of its headers, footers, disclaimers and other information. You may not copy this document to or reproduce it in whole or in part on a website. ExxonMobil does not guarantee the typical (or other) values. Any data included herein is based upon analysis of representative samples and not the actual product shipped. The information in this document relates only to the named product or materials when not in combination with any other product or materials. We based the information on data believed to be reliable on the date compiled, but we do not represent, warrant, or otherwise guarantee, expressly or impliedly, the merchantability, fitness for a particular purpose, freedom from patent infringement, suitability, accuracy, reliability, or completeness of this information or the products, materials or processes described. The user is solely responsible for all determinations regarding any use of material or product and any process in its territories of interest. We expressly disclaim liability for any loss, damage or injury directly or indirectly suffered or incurred as a result of or related to anyone using or relying on any of the information in this document. This document is not an endorsement of any non-ExxonMobil product or process, and we expressly disclaim any contrary implication. The terms "we," "our," "ExxonMobil Chemical" and "ExxonMobil" are each used for convenience, and may include any one or more of ExxonMobil Chemical Company, Exxon Mobil Corporation, or any affiliate either directly or indirectly stewarded.

Contact your ExxonMobil Chemical representative for more information:
butylrubber.com

T09 - B0218-021E49

ExxonMobil
 Energy lives here™