

Model formula for Exxon™ chlorobutyl 1066 based tire innertube: low permeability

Energy lives here™



Innertubes formulated with 100 PHR Exxon™ chlorobutyl maximize the air barrier properties of the innertube ensuring the best performance and reducing time and energy of tire maintenance.

| Material | Units | Amount |
|--------------------------------------|--------------------|---------------|
| Exxon chlorobutyl 1066 | PHR ⁽¹⁾ | 100.0 |
| Carbon black grade N660 | PHR | 60.0 |
| High viscosity paraffinic oil | PHR | 15.0 |
| Magnesium oxide | PHR | 0.15 |
| Stearic acid | PHR | 1.0 |
| Zinc oxide | PHR | 5.0 |
| Zinc dibenzyl dithiocarbamate (ZBEC) | PHR | 2.0 |
| Sulfur | PHR | 0.5 |
| Total (PHR) | | 183.65 |

| Properties | Test method based on | Units and conditions | Typical values ⁽²⁾ |
|--|----------------------|---------------------------------|-------------------------------|
| Mooney viscosity ML (1+4) at 100°C | ASTM D1646 | MU, 100°C | 50 |
| Mooney scorch (tested at 125°C) | ASTM D1646 | | |
| Minimum viscosity | ASTM D1646 | MU | 49 |
| Time to 5pt rise | ASTM D1646 | minutes | 18.2 |
| Time to 10pt rise | ASTM D1646 | minutes | 20.6 |
| MDR rheometer | ASTM D5289 | 160°C; 30 minutes; 0.5 deg. arc | |
| M _i (minimum torque) | ASTM D5289 | dNm | 1.5 |
| M _h (maximum torque) | ASTM D5289 | dNm | 6.8 |
| M _h - M _i (delta torque) | ASTM D5289 | dNm | 5.3 |
| Tc ₁₀ (time to 10% torque increase) | ASTM D5289 | minutes | 1.0 |
| Tc ₅₀ (time to 50% torque increase) | ASTM D5289 | minutes | 2.3 |
| Tc ₉₀ (time to 90% torque increase) | ASTM D5289 | minutes | 10.0 |
| Cure rate (peak rate) | ASTM D5289 | dNm/min | 1.8 |

**Model formula for Exxon™ chlorobutyl 1066 based tire innertube:
low permeability**

| Properties | Test method based on | Units and conditions ⁽²⁾ | Typical values ⁽³⁾ |
|--|----------------------|--|-------------------------------|
| MDR rheometer | ASTM D5289 | 180°C; 30 minutes; 0.5 deg. arc | |
| M _l (minimum torque) | ASTM D5289 | dNm | 1.2 |
| M _h (maximum torque) | ASTM D5289 | dNm | 9.6 |
| M _h - M _l (delta torque) | ASTM D5289 | dNm | 8.4 |
| Tc ₁₀ (time to 10% torque increase) | ASTM D5289 | minutes | 0.6 |
| Tc ₅₀ (time to 50% torque increase) | ASTM D5289 | minutes | 1.3 |
| Tc ₉₀ (time to 90% torque increase) | ASTM D5289 | minutes | 2.9 |
| Cure rate (peak rate) | ASTM D5289 | dNm/min | 5.2 |
| Stress strain properties | | cure time ³ 12 minutes at 160°C | |
| Tensile strength | ASTM D412 | MPa | 10.1 |
| Elongation at break | | % | 530 |
| Modulus 100% | | MPa | 1.2 |
| Modulus 200% | | MPa | 3.1 |
| Modulus 300% | | MPa | 5.6 |
| Energy to break | | joules | 7.5 |
| Tear strength (die B) | ASTM D624 | kN/m | 34.0 |
| Hardness | ASTM D2240 | shore A | 43 |
| Fatigue to failure (cycles) | ExxonMobil method | kilo cycles at 136% strain | 100.0 |
| Oxygen permeability coefficient at 40°C | ExxonMobil method | cc*mm (m ² -day-mmHg) | 0.53 |

1. Parts per hundred rubber.

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

3. Samples cured Tc 90 + 2 at 160°C.

©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

T102 - B0218-030E49

ExxonMobil
Energy lives here™