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Supplying Butyl Rubber Globally for Growing Industries

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Butyl  Bromobutyl  Chlorobutyl
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LANXESS Butyl Overview

Butyl Rubber is one of the five LANXESS businesses in the Performance Polymers Segment and an important Business Unit for LANXESS globally. We have two major product groups, regular butyl and halobutyl rubber, manufactured at production sites in Zwijndrecht, Belgium (near Antwerp), Sarnia, Canada and Singapore. The plants ship to more than 45 countries worldwide.

LANXESS regular butyl rubber is the basis for all butyl rubber technology. After butyl is polymerized at a temperature of -100°C, it is either dried and baled or dissolved in an organic solvent and made into LANXESS Halogenated Butyl rubber. This is a very sophisticated and complex process that few manufacturers are able to manage successfully.

At LANXESS, supply-side reliability is not just a competitive edge, it is a market necessity. Over the last couple of decades, especially since the introduction of tubeless tires, there has been a particularly sharp increase in demand for our butyl rubber products. LANXESS has been one of the most proactive supply partners in the rubber industry. By identifying trends early on, LANXESS has been implementing process developments, new technology and improved raw material stability to help ensure that our customers have access to a reliable global butyl supply.

LANXESS Butyl Rubber is strongly committed to research and development activities in the rubber industry. Our Research & Development and Technical Service teams are working continuously with our customers, to develop improved applications and future products.

LANXESS Butyl Rubber is your key partner with over 60 years of experience, and will continue to offer you excellent services globally!

For more information on LANXESS Butyl Rubber, visit: www.btr.lanxess.com | www.lanxess.com
The major application area for LANXESS Butyl Rubber products is the tire industry, but its unique properties also make it a key polymer for a variety of technical rubber applications. Butyl vulcanizates offer an attractive range of properties including low permeability, high damping, good ageing, chemical resistance and excellent mechanical properties.

Halogenated grades have a rapid cure rate and can be blended with natural rubber (NR) or synthetic rubbers such as nitrile rubber (NBR), styrene-butadiene rubber (SBR), polychloroprene rubber (CR), ethylene-propylene rubber (EPDM), or butadiene rubber (BR).

**LANXESS Regular Butyl Rubber (IIR)**

Butyl rubbers are copolymers of isobutylene with small amounts of isoprene. The incorporation of isoprene creates double bonds allowing vulcanization with sulfur and other agents. The vulcanize properties of LANXESS Butyl make it particularly suitable for a variety of rubber products, such as tire inner tubes, curing bladders and protective clothing.

**Key Properties**

- excellent ageing stability
- high impermeability to gases
- high resistance to heat
- high hysteresis for energy absorption
- slow vulcanization reactions (low levels of unsaturation)

**LANXESS Halogenated Butyl (HIIR)**

LANXESS Halobutyl Rubber (LANXESS Bromobutyl and LANXESS Chlorobutyl) is produced in a continuous process by reacting bromine or chlorine with butyl rubber. Halogenation allows co-vulcanization and improved compatibility with other diene rubbers in addition to improvements in the vulcanization rates, states of cure and reversion resistance.

Many of the properties of halobutyl vulcanizates are virtually identical, regardless of the halogen employed. With bromobutyl rubber however, the bromine sites are more reactive, resulting in faster cures and better adhesion to unsaturated rubbers. The versatility of halobutyl rubber has led to a significant growth of its use in a diverse range of tire and non-tire applications.

**Key Properties**

- high impermeability to gases
- improved weather and ozone resistance
- improved chemical resistance
- cure versatility
- faster cure rate with lower amount of curatives
- cure compatibility with unsaturated rubbers
- good adhesion to other types of rubber
- heat resistance
The tire industry consumes around 85 percent of the world’s supply of butyl rubber. Global demand is dominated by halogenated butyl rubber (LANXESS Bromobutyl and LANXESS Chlorobutyl).

**Tire Inner Liners and Sidewalls**

Using Halobutyl rubber within the Tire Innerliner helps the tire to maintain proper inflation pressure. It is well known within the tire industry that a tire retaining proper inflation pressure has improved rolling resistance compared to conditions where it is under inflated. LANXESS Bromobutyl and LANXESS Chlorobutyl are well-suited for the production of white sidewall and non-staining black sidewall because of their resistance to weathering, adhesion, bend and flex characteristics.

In addition, the use of lower unsaturation butyl products can improve the flex fatigue properties and extend the curing bladder life.

**Tire Curing Envelopes and Bladders**

Compounds based on LANXESS Bromobutyl and LANXESS Chlorobutyl are ideal for Curing Bladder used in retreading tires due to the low modulus and compression set requirements. Heat and steam resistance and suitability for resin cures also make LANXESS Butyl perfect for Curing Bladders used for tire press-molds.

**Tire Innertubes**

LANXESS Regular Butyl is still used extensively for innertubes in countries where the road infrastructure is not highly developed and in low-speed tire applications such as construction, farm equipment and recreational vehicles.

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*These items are provided as general information only. They are approximate values and are not considered part of the product specifications.

**As with any product, use of the products mentioned in this publication in a given application must be tested (including field testing, etc.) by the user in advance to determine suitability.
LANXESS Butyl for Non-Tire Applications

LANXESS Butyl for the Pharmaceutical Industry

The demands by the medical and pharmaceutical sectors on elastomers and their compounds and vulcanizates are extremely high. LANXESS Halobutyl is widely used in pharmaceutical rubber products, such as closures for infusion containers, injection vials, lyophilization and blood collection tubes. Manufactured to stringent requirements, pharmaceutical closures often come into direct contact with pharmaceutical products, either dissolved or in other forms. Therefore, they must comply with existing standards and regulations relating to the contact of rubber articles with pharmaceuticals.

LANXESS Halobutyl is generally preferred because they ensure adequate protection of sterile pharmaceutical products against external contamination during storage and use. LANXESS halogenated grades are also found as O-rings and gaskets in a variety of aerosol containers, personal care and cosmetic spray pumps and inhalers. In addition, they are used in plungers for applications such as infusion pumps, pre-filled syringes, insulin injectors and dental anesthetics. LANXESS Regular Butyl also plays a significant role in the medical and pharmaceutical industry in respirator masks and tubes.

LANXESS Butyl for the Food Industry

LANXESS Butyl 101-3 is a specialty product manufactured for the chewing gum industry. This application requires LANXESS to apply the most stringent quality controls consistent with national food regulations and standards worldwide.

Because of its low permeability, flavor is retained longer than with natural rubber-based products and the transmission of air and water are minimized. Its low-temperature flexibility prevents it from becoming brittle and shattering, even in heavily filled compounds. Butyl’s outstanding stability and resistance to aging can resist hardening during shelf storage, thus helps retaining the soft texture required for stick gums. It also serves as a hydrophobic plasticizer, providing softness and smoothness to enhance chewing.

Food contact: Information concerning compliance with FDA, BfR and other global food contact regulations can be obtained upon request from your LANXESS Butyl Rubber Sales or Technical Marketing contact.

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LANXESS Butyl for Body Mounts and Sound Damping

The unique combination of properties, such as high permeation barrier, high damping, resistance to ozone and heat ageing make LANXESS Butyl rubber ideal for many automotive non-tire applications. Among the largest of these applications are vibration control applications and dynamic parts including body mounts. LANXESS Halogenated butyl is widely used because of their high damping, fast reversion-resistant cures and excellent ageing properties, especially with respect to hot flex fatigue. Compared to regular butyl, LANXESS Halogenated butyl can also be formulated to have an intermediate level of oil resistance for use in engine and transmission mounts and automotive exhaust hanger compounds.

LANXESS Butyl for Automotive Air-conditioning Systems

Automotive air-conditioning systems use rubbers in seals around the fittings and shafts, and in hoses that conduct both gaseous and liquid refrigerant. LANXESS Halobutyl rubbers are considered by many air-conditioning hose manufacturers as the base polymer for this application, because of their excellent permeation resistance to the refrigerant R-134a, high damping of low frequency vibrations, excellent low temperature properties and excellent heat ageing. The vulcanisates based on LANXESS Halobutyl rubbers, when correctly compounded, meet the most stringent specification requirements and prevent the ingress of moisture into the air conditioning system.

LANXESS Butyl for Protective Clothing and Equipment

Protective clothing made with LANXESS Regular Butyl and Halobutyl rubber not only has very good barrier properties, but it is light weight and maintains a high degree of flexibility. With excellent tear and abrasion resistance, LANXESS Butyl vulcanizates allows the material to drape naturally and not crack as easily as plastic. LANXESS Butyl products are well suited for Nuclear, Biological, Chemical (NBC) clothing as well as face masks and respirators that must remain impervious to gases, yet be flexible enough to deliver a positive mask seal.

LANXESS Butyl for Tank Linings

Halobutyl rubbers from LANXESS have high resistance to numerous chemicals, making them an ideal material for the production of linings where chemical resistance is required. In addition, they offer cure versatility, easy bonding and very low volume swell in contact with various chemicals.

LANXESS Butyl for Rubber Closures of Electrical Condensers in Electrical Appliances

The assembly of an electrical condenser (or capacitor) is sealed by a rubber closure to prevent leakage of the content. LANXESS Regular Butyl rubbers are the choice for this application primarily because of the excellent impermeability to the electrolyte, which provides good seal ability.

LANXESS Butyl for Sport Balls and High-End Shoe Soles

LANXESS Bromobutyl offers excellent air retention, making it a key component in ball bladders used in the sporting goods industry. LANXESS Butyl and LANXESS Bromobutyl can be blended with natural rubber to improve spliceability and cure rates, while still retaining good air retention properties. LANXESS Bromobutyl can be blended with other polymers to improve the wet grip properties of high-end shoe soles, while retaining wear and durability characteristics for applications such as hiking and climbing footwear, river fishing and running shoes.

LANXESS Butyl for Adhesives

LANXESS Butyl’s tack, ageing resistance and low permeability make it the ideal polymer for a variety of adhesive and sealing applications. Our Butyl products are used in adhesive formulations for transparent tapes, hot melt pressure sensitive adhesives, mastic for pipe wrap tapes, vinyl floor tile adhesives and roofing adhesives. They are also used for self-fusing, semi-conducting electrical splicing tapes, eliminating the need for separate adhesive coats.

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LANXESS Butyl Grades at a Glance

Product range and typical properties

**Butyl Rubber (IIR)**

<table>
<thead>
<tr>
<th>LANXESS Butyl Grade</th>
<th>Level of unsaturation (mol %)</th>
<th>Mooney viscosity (ML(1+8) 125 °C)</th>
<th>Density (g/cm³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Butyl Rubber (IIR)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LANXESS BUTYL 100</td>
<td>0.90</td>
<td>33</td>
<td>0.92</td>
</tr>
<tr>
<td>LANXESS BUTYL 301</td>
<td>1.85</td>
<td>51</td>
<td>0.92</td>
</tr>
<tr>
<td>LANXESS BUTYL 402</td>
<td>2.25</td>
<td>33</td>
<td>0.92</td>
</tr>
<tr>
<td>LANXESS BUTYL 101-3</td>
<td>1.75</td>
<td>51</td>
<td>0.92</td>
</tr>
<tr>
<td></td>
<td>(Food grade)</td>
<td></td>
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</tr>
</tbody>
</table>

**Halobutyl Rubber (HIIR)**

<table>
<thead>
<tr>
<th>LANXESS Butyl Grade</th>
<th>Halogen content (wt %)</th>
<th>Mooney viscosity (ML(1+8) 125 °C)</th>
<th>Density (g/cm³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bromobutyl Rubber (BIIR)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LANXESS BROMOBUTYL 2030</td>
<td>1.80</td>
<td>32</td>
<td>0.93</td>
</tr>
<tr>
<td>LANXESS BROMOBUTYL 2230</td>
<td>1.95</td>
<td>32</td>
<td>0.93</td>
</tr>
<tr>
<td>LANXESS BROMOBUTYL 2040</td>
<td>1.80</td>
<td>39</td>
<td>0.93</td>
</tr>
<tr>
<td>LANXESS BROMOBUTYL X2</td>
<td>1.80</td>
<td>46</td>
<td>0.93</td>
</tr>
<tr>
<td>Chlorobutyl Rubber (CIIR)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LANXESS CHLOROBUTYL 1240</td>
<td>1.25</td>
<td>38</td>
<td>0.92</td>
</tr>
</tbody>
</table>

* These items are provided as general information only. They are approximate values and are not considered part of the product specifications. For product technical and safety data sheets please contact your LANXESS Butyl Rubber contact or visit us at www.techcenter.lanxess.com.
The World of LANXESS Butyl

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For more information about LANXESS Butyl grades,
Health and Safety Information

Product Safety:
Relevant safety data and references as well as the possibly necessary warning labels are to be found in the corresponding safety data sheets.

Health and Safety Information:
Appropriate literature has been assembled which provides information concerning the health and safety precautions that must be observed when handling the LANXESS products mentioned in this publication. For materials mentioned which are not LANXESS products, appropriate industrial hygiene and other safety precautions recommended by their manufacturers should be followed. Before working with any of these products, you must read and become familiar with the available information on their hazards, proper use and handling. This cannot be overemphasized. Information is available in several forms, e.g., material safety data sheets and product labels. Consult us through your LANXESS Butyl Rubber representative.

Regulatory Compliance Information:
Some of the end uses of the products described in this publication must comply with applicable regulations, such as the FDA, BfR, NSF, USDA and CPSC. If you have any questions on the regulatory status of these products, contact your LANXESS Butyl Rubber representative.

The manner in which you use and the purpose to which you put and utilize our products, technical assistance and information (whether verbal, written or by way of production evaluations), including any suggested formulations and recommendations, are beyond our control.

Therefore, it is imperative that you test our products, technical assistance and information to determine to your own satisfaction whether they are suitable for your intended uses and applications.

This application-specific analysis must at least include testing to determine suitability from a technical as well as health, safety, and environmental standpoint. Such testing has not necessarily been done by us. Unless we otherwise agree in writing, all products are sold strictly pursuant to the terms of our standard conditions of sale. All information and technical assistance is given without warranty or guarantee and is subject to change without notice. It is expressly understood and agreed that you assume and hereby expressly release us from all liability, in tort, contract or otherwise, incurred in connection with the use of our products, technical assistance and information.

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Note: The information contained in this publication is current as of August 2013. Please contact your LANXESS representative to determine if this publication has been revised.