



ARLANXEO

Performance Elastomers

BAYPREN®

PRODUCT PORTFOLIO

Chloroprene rubber from ARLANXEO, the first class all-round performer for a wide range of applications.

www.arlanxeo.com

WHAT IS BAYPREN®

Baypren®

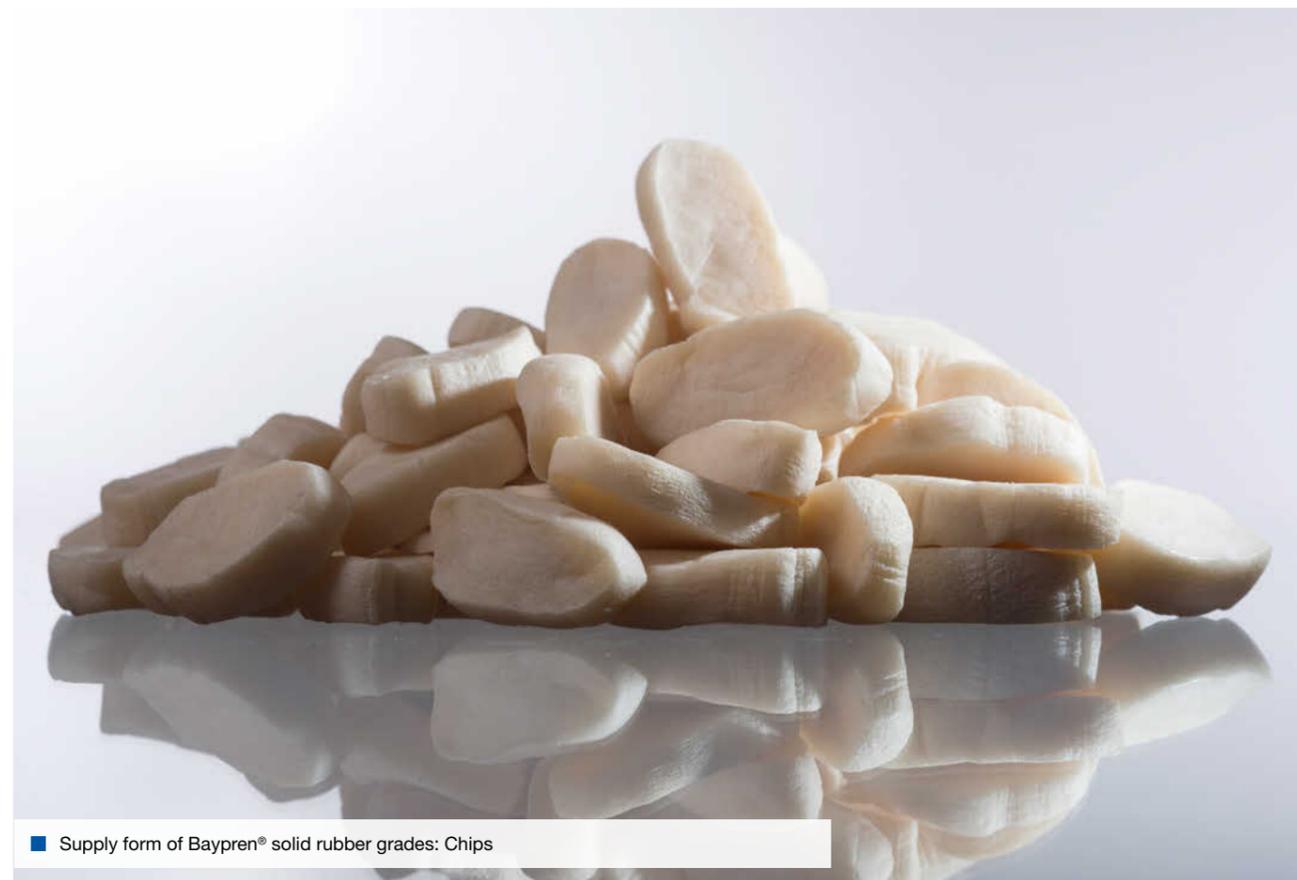
About Baypren®

Chloroprene rubber (international abbreviation: CR) is a high-performance material with a wide diversity of applications. Baypren® is the name of the ARLANXEO range of polymers based on 2-chloro-1,3-butadiene (chloroprene), which are manufactured by water-based emulsion polymerization. The importance of Baypren® is derived essentially from its attractive combination of key technical properties which are unmatched by any other kind of rubber at a comparable price. This has led to the development of many product variants to meet diverse requirements.

Articles made from appropriately formulated Baypren® compounds are suitable for moldings and extrudates of all kind, such as reinforced hoses, roll covers, belts, including

conveyor belts, air spring bellows, cable sheathing and insulation for low-voltage cables, foams, including open and closed-cell foamed rubber, corrosion-resistant linings, sheeting, fabric proofings and footwear (boots). The inherent flame-retardant behavior of Baypren® vulcanizates can be adjusted to meet special requirements.

Bayer started the production of Baypren® in 1957, since 2005 Baypren® has been produced and distributed by LANXESS and since 2016 by ARLANXEO.



■ Supply form of Baypren® solid rubber grades: Chips

PROPERTIES OF BAYPREN®

Crystallization

A key distinguishing feature of the raw polymers is their tendency to crystallize. While virtually all liquids – water, for example – have a clearly defined temperature at which they undergo spontaneous crystallization on cooling (solidification point), some high molecular-weight products, such as natural rubber and a number of synthetic rubber grades, do not have a clearly defined crystallization point. Instead, they harden slowly as the temperature falls.

In case of these rubber grades, this behavior is caused by a partial orientation of the macromolecules (crystallization). This hardening overlaps the stiffening when approaching the glass transition temperature. Hardening due to crystallization is a fully reversible process that can be removed by subjecting the crystallized material to heat or dynamic stress. Unvulcanized polymers and compounds display a strong tendency to crystallize. Vulcanization, however, considerably slows down the extent of hardening resulting from crystallization in rubber articles.

The tendency of the polymers to crystallize can be influenced by appropriately controlled production processes. For this reason, rubber articles made from Baypren® grades with a low tendency to crystallize display virtually no increase in hardness due to crystallization even after exposure to low temperatures for long periods. In contrast, polymers with a particularly pronounced tendency to crystallize display a clear increase in hardness even after a relatively short time.

Modification

The properties of Baypren® rubber are influenced by the type of modification of the raw polymer.

Effect of pre-crosslinking

- reduction of the elastic resilience (snappiness) of the raw rubber and uncured compound
- reduction of the die swell
- improvement in calendaring behavior
- improvement of the surface smoothness of injection-molded articles
- improvement of the dimensional stability, e. g. of uncured profiles

Effect of sulfur modification

- facilitates mastication of the rubber, permitting the production of soft compounds with good building tack
- only magnesium oxide (MgO) and zinc oxide (ZnO) required for vulcanization
- better tear resistance than standard grades
- better adhesion to fabrics than standard grades

Effect of XD (xanthogen disulfide) modification

- lower elasticity (less “nerve”) means easier processing (by calendaring or extrusion)
- better mechanical properties than standard grades in the same formulation
- higher filler loadings possible



■ Air springs

Properties of vulcanizates based on Baypren®

With the correct formulation, finished products made of Baypren® display the following characteristic outstanding properties in addition to their excellent rubber-elastic behavior:

- resistance to weathering, both in dry and humid climates
- excellent combustion behavior
- good ageing and heat resistance
- good tensile strength, tear and wear resistance
- high dynamic fatigue resistance
- resistance to water and a large number of chemicals over a long period
- good adhesion to reinforcing substrates consisting of textiles, metals or glass fibers
- resistance to fungi and soil bacteria
- low gas permeability

The suitability of a Baypren® compound for a particular application should be established by relevant testing. Thanks to its excellent set of properties, Baypren® is being used for the production of highly stressed rubber articles in many sectors, primarily in the automotive industry, mechanical engineering, plant construction, ship-building, mining and mineral oil production. The properties of Baypren® vulcanizates are influenced by the type of modification of the raw polymer (see above).

Ageing and heat resistance

Baypren® vulcanizates display excellent ageing resistance, especially those with an optimized antioxidant system. They neither soften nor harden at high temperatures or over long periods of stress and remain elastic and serviceable. The heat resistance of Baypren® vulcanizates is considerably better than that of natural rubber vulcanizates. It corresponds roughly to the heat resistance of nitrile rubber.

Weathering and ozone resistance

While vulcanizates produced from many other rubber types tend to crack and harden relatively quickly and degrade when exposed to weathering and/or ozone, suitably formulated Baypren® vulcanizates do not exhibit any significant deterioration, even after many years of exposure to atmospheric influences such as light, UV, rain, industrial gases and oxygen. By extrapolating the change in mechanical properties after many years of weathering in an ozone-rich atmosphere, it can be concluded on the basis of current technology that technical rubber goods made of Baypren® can be expected to display sufficient elasticity for the majority of static applications (for example structural profiles) after more than 50 years.

Resistance to water and chemicals

By employing specially formulated compounds, it is possible to obtain Baypren® vulcanizates that are resistant to water, acids, alkaline solutions and a large number of industrial chemicals. With a good resistance to hydrocarbons, Baypren® vulcanizates show sufficient performance in contact with mineral oils to make them suitable for many applications. The corresponding volume change in mineral oils decreases with increasing naphthenic and, in particular, paraffinic content of the oil. Baypren® vulcanizates cannot match the very high swelling resistance to hydrocarbons of similarly formulated nitrile rubber vulcanizates, but their swelling resistance is considerably better than that of vulcanizates based on styrene-butadiene rubber, natural rubber or ethylene-propylene diene rubber.

Resistance to fungi and bacteria

Items made of rubber that are in contact with soil for long periods of time are susceptible to attack by soilborne bacteria and fungi. In the long term, this can lead for example to destroyed underground cables. In contrast to the majority of other rubber types, Baypren® displays superior resistance to these microorganisms. This resistance can be enhanced still further through suitable compound formulation.

Abrasion resistance

Baypren® vulcanizates are highly wear-resistant. Their abrasion resistance is similar to that of nitrile rubber.

Resilience

Suitably formulated Baypren® vulcanizates possess very good resilience, although they do not attain the level of natural rubber. Very good resilience values are achieved in vulcanizates with a relatively high hardness.

Dynamic fatigue resistance

Baypren® vulcanizates are highly resistant to dynamic fatigue. Special grades are available to meet extremely stringent specifications, such as those applied to drive belts. The loss factor and hence the heat build-up under dynamic load are low.



■ Wiper blades



■ Hydraulic hoses

BAYPREN® APPLICATIONS IN THE BUILDING AND THE CABLE AND WIRE INDUSTRY

Deformation properties

Baypren® vulcanizates have a low compression set over a wide temperature range. The low-temperature compression set is a key value employed in the assessment of vulcanizates for use in seals. At higher temperatures, where ageing also plays a role, the compression set curves are lower than those of a large number of other elastomers.

Combustion behavior

Baypren® vulcanizates can be compounded for improved combustion behavior. The good combustion behavior of the polymer itself means that even stringent end-user specifications can be met. Limiting oxygen index (LOI) values in excess of 50 % can be attained with Baypren®. The requirements placed on the flame retardance of conveyor belts for underground mining applications can be met with properly compounded Baypren®.

Low-temperature flexibility

The glass transition temperature of Baypren® polymers remains fairly constant almost irrespective of the polymers' tendency to crystallize. The brittleness temperature and the glass transition temperature of Baypren® vulcanizates can be reduced to below -50 °C by appropriate compound formulation. Where rubber parts made of Baypren® are required to remain flexible at low temperatures over long periods, grades with a low crystallization tendency are recommended.

Electrical properties

Baypren® is highly suitable for cable sheathing and, in many cases, for low-voltage insulation. It is recommended for use in cables that must have resistance to weathering, ozone, oil and ageing as well as good combustion resistance. The thermal conductivity and coefficient of thermal expansion of Baypren® vulcanizates are comparable with other elastomers. The values obtained are, of course, largely influenced by the compound formulation. The thermal insulation is also similar to that of the majority of plastics used in the construction industry today.

Gas impermeability

Baypren® vulcanizates have a very low gas permeability, which is roughly equivalent to that of nitrile rubber.



■ Conveyor belts

Cables and wires

- Rubber-sheathed flexible cables for heavy-duty applications in hoisting gear and transport and conveyor systems
- Rubber-sheathed flexible cables for heavy-duty applications in underground and surface mining applications
- Rubber-sheathed flexible cables for use in dry and wet conditions in domestic appliances and light-duty workshop equipment
- Rubber-sheathed flexible cables with suspension unit for elevators and conveyor systems
- Trailing cables for use in dry and wet conditions and also in underground applications where service conditions are severe
- Theater cables for mobile light fittings and light support structures
- Welding cables
- Flat flexible power and control cables for use in dry and wet conditions and also outdoors, especially for hoisting gear, transport systems, machine tools and processing machines
- Flat flexible lighting cables



■ Cables

BAYPREN® APPLICATIONS IN THE AUTOMOTIVE AND GENERAL INDUSTRY

Hoses

- Hydraulic hoses for high pressure and ultra-high pressure
- Reinforced hoses for medium pressure and low pressure
- Brake hoses
- Oil and fuel hoses
- Hoses for use in the petroleum industry
- Floating hoses

Molded parts

- Bellows and dust caps
- Axle boots
- Round-section sealing strips, O-ring seals and flat seals
- Membranes
- Air springs
- Dampers and bearings with and without metal inserts, e.g. load bearing pads for high buildings and bridges
- Windshield wiper blades

Conveyor and transmission belts

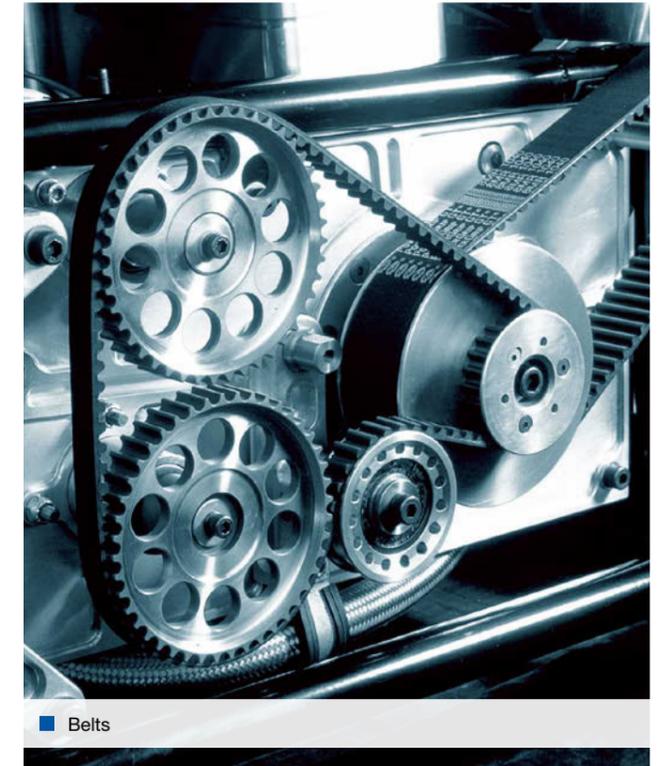
- Power transmission belts for the automotive and general industry
 - Poly-V-belts
 - Raw-edge V-belts
 - Jacketed V-belts
 - Timing belts
- Conveyor belts with steel cord and textile reinforcement for underground mining applications, steel works, mineral processing plants and the chemical industry

Other

- Foamed rubber sheets for wet suits and for the production of punched seals
- Covers for rollers in the printing industry and also in the textile and paper sectors
- Rubberized fabrics for all types of tarpaulins, containers and boats, and membranes in the automotive sector



■ Air springs



■ Belts



■ Hydraulic hoses



■ Diving suits

Product	Crystallization	Mooney viscosity ⁽¹⁾ UML (1+4) 100 °C	Density (g/cm ³) approx.	Packaging	Remarks
General purpose grades (M-modified grades)					
Baypren® 110	very low	41 ± 5	1.23	paper	25 kg paper bags with PE inner bags (0.05 mm thick, Vicat softening point DIN EN ISO 306, ca. 75°C); 40 bags pallet = 1,000 kg net / 35 bags pallet = 875 kg net. Also available only on request: 20 kg PE bags; 50 bags per pallet = 1,000 kg net / 40 bags per pallet = 800 kg net / 25 kg PE bags; 40 bags per pallet = 1,000 kg net
Baypren® 110	very low	49 ± 5	1.23	paper/PE	
Baypren® 110	very low	65 ± 7	1.23	PE	
Baypren® 112	low	41 ± 8	1.23	paper	
Baypren® 210	medium	43 ± 4	1.23	paper/PE	
Baypren® 210	medium	48 ± 4	1.23	paper/PE	
Baypren® 211	medium	39 ± 4	1.23	paper	
Baypren® 230	medium	100 ± 8	1.23	paper	
Baypren® 230	medium	108 ± 10	1.23	paper	
Baypren® GF M220 VP ⁽²⁾	medium	50 ± 6	1.23	paper	
Baypren® GF M220 VP ⁽²⁾	medium	60 ± 6	1.23	paper	
XD-modified grades					
Baypren® 116	very low to low	43 ± 5	1.23	paper	see above excellent mechanical properties due to formation of perfect network
Baypren® 116	very low to low	49 ± 5	1.23	paper	
Baypren® 126	very low to low	70 ± 7	1.23	paper	
Baypren® 216	medium	43 ± 5	1.23	paper	
Baypren® 216	medium	49 ± 5	1.23	paper	
Special grades – Precrosslinked grades					
Baypren® 114	very low	62 ± 0	1.23	PE	see above especially designed for extrusion application
Baypren® 214	medium	55 ± 6	1.23	paper	
Baypren® 215	medium	50 ± 6	1.23	paper/PE	
Sulfur-modified grades					
Baypren® 510	low to medium	42 ± 5	1.23	paper	see above suitable for mastication; easy to process; for dynamic applications
Baypren® 611	low to medium	43 ± 6	1.23	paper	
Baypren® 611	low to medium	48 ± 6	1.23	paper	
Baypren® 711	low to medium	43 ± 6	1.23	PE	
Baypren® 711	low to medium	48 ± 6	1.23	PE	

⁽¹⁾ unmassed (ISO 289) ⁽²⁾ new finishing grades (VP = Versuchsprodukt, trial product)

Nomenclature of the Baypren® solid rubber grades	
First figure: Tendency to crystallize	Third figure: Special properties
1 = low	0 = standard grades
2 = medium	1+2 = special characteristics, e.g. regarding viscosity or crystallization
5+6+7 = Sulfur-modified grades	4 = pre-crosslinked grades
Second figure: Viscosity	5 = pre-crosslinked and XD-modified grades
1 = low ("soft" grades)	6 = XD-modified grades
2 = medium	
3 = high ("hard" grades)	

Nomenclature of Baypren® new finishing rubber grades	
Baypren group	Viscosity index
GF = Green finishing	1 = <35 MU
Type of transfer agent	2 = 35 to 80
M = M-modified grades	3 = >80 MU
X = XD-modified grades	Trial Product
S = Sulfur	VP = Versuchsprodukt
Crystallinity index	
0 = very low	
1 = low	
2 = medium	
3 = high	

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Make use of our experience!

Inventing the future together
Research and development plays a key role at ARLANXEO. The High Performance Elastomers business unit has research and technical centers with testing facilities on almost every continent. Whether you are looking for better compounding ideas or are thinking about developing a new product, our experts will be happy to assist you.

For direct information, please contact our technical support service. Our Baypren® experts are looking forward to answer your questions.

ARLANXEO

Performance Elastomers

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Trial product:

(VP = Versuchsprodukt = trial product). The information contained herein is merely preliminary. Testing to properties and applications is not final. Further information, including data which could change or add hazards with use, may be developed by the manufacturer, the user or a third-party institute. Such information may be needed to properly evaluate or use this product. Use is undertaken at the sole risk of the user.

Quality & Environmental Management:

Baypren® is produced under strict control regarding safety, environmental protection and quality. The whole supply chain, from production to customer service, is covered by ISO 9001 and ISO 14001 certification.

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 ARLANXEO products mentioned in this publication. For materials mentioned which are not ARLANXEO 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 ARLANXEO representative or the Health, Safety, Environment and Quality Department (HSEQ) of ARLANXEO.

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 ARLANXEO 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.

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