OJSC "Efremov Synthetic Rubber Enterprise"

301840, Russia, Tula region, Efremov, Stroiteley str., 2
www.ezsk.ru saa@ezsk.ru, decl1@ezsk.ru

PRODUCT CATALOGUE

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- Low molecular weight polyisobutylene Efrolen P-10E, P-12EF, P-15EF, P-20EF, P-30EF, P-50EF
- Thickening polyisobutylene additive KP-20U-1, KP-20U-2, KP-20S, KP-10
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Experimental products (serial production possible)

- Low molecular weight highly reactive polyisobutylene

High molecular weight polyisobutylene (polyisobutene) Efrolen

Type	Properties							
Efrolen	Appearance	Viscosity of isooctane solution at 20°C		Relative molecular mass		Ash content, max, %	Stabilizer non-staining, max, %	Volatile matter at 105°C, max, %
		Concentration, g/cm^3	Staudinger Index (Io), cm^3/g	*Number-Average Molecular Mass (Mn), x 10^3	* Viscosity-Average Molecular Mass (Mv), x 10^3			
P-80 EF	Rubber-like	0.002	178-236	161-217	619-956	0.04	0.04	0.5
P-85 EF	Rubber-like	0.002	150-260	134-241	476-1110	0.04	0.04	0.5
P-100 EF	Rubber-like	0.002	260-325	192-305	900-1564	0.04	0.04	0.5
P-118 EF	Rubber-like	0.002	265-395	246-376	1143-2112	0.04	0.04	0.5
P-155 EF	Rubber-like	0.001	380-510	361-493	1989-3128	0.04	0.04	0.5
P-220 EF	Rubber-like	0.001	420-600	401-586	2321-4017	0.04	0.04	0.5
P-225 EF	Rubber-like	0.001	550-640	535-628	3512-4435	0.04	0.04	0.5

High molecular weight polyisobutylene is an elastic rubber-like product of the catalytic polymerization of isobutylene in evaporating ethylene. Depending on the molecular weight, seven grades of polyisobutylene are produced.

The product is a saturated polymer of a carbon-chain structure, due to which it is highly resistant to oxygen, ozone, solutions of acids, alkalis and salts, and also withstands the action of oxidizing agents such as bleach, permanganate and potassium bichromate. High molecular weight polyisobutylene does not swell and does not dissolve in ethyl alcohol, acetone and many other oxygen-containing polar solvents, and easily dissolves in aliphatic and aromatic hydrocarbons.

When heated for a long time in air to 100°C, high molecular weight polyisobutylene does not change chemically, but its plasticity increases; at 180–200°C it can be molded. High molecular weight polyisobutylene retains its elastic properties down to −55°C.

Areas of use

High molecular weight polyisobutylene is used in the construction, rubber, and other industries for the production of anti-corrosion, sealing, waterproofing coatings, mastics, pastes, and adhesives.

Packaging and transportation

High molecular weight polyisobutylene is manufactured in the form of bales weighing (25 ± 1) kg or (30 ± 1) kg.
The product is transported by any type of transport.
Guaranteed shelf life is 3 years from the date of manufacture.

Worldwide analogues

Oppanol N80, N100, N150, B200 from BASF (Germany).

Medium-molecular weight polyisobutylene (polyisobutene)

Type	Properties					
Efrolen	Appearance	Staudinger Index (Io), cm^3/g	Viscosity Average Molecular Mass (calculated by formula: $\sqrt[0.65]{((Io \cdot 100) / 3.06)}$)	Ash content, max, %	Stabilizer non-staining, max, %	Volatile matter at 105°C, max, %
P-10 EF	Viscous mass Colour is ranging from pale brown to dark brown.	25-34	30,000 – 48,500	0.04	0.04	0.3
P-12 EF		34-46	48,500 – 77,200	0.04	0.04	0.3
P-15 EF		46-56	77,200 – 104,500	0.04	0.04	0.3
P-20 EF		56-76	104,500 – 167,190	0.04	0.04	0.3
P-30 EF		76-113	167,190 – 307,780	0.04	0.04	0.3
P-50 EF		113-143	307,780 – 442,140	0.04	0.04	0.3

Low molecular weight polyisobutylene are produced by the methods of polymerization of isobutylene or thermomechanical destruction of high molecular weight polyisobutylene. Low molecular weight polyisobutylene is a rubber-like product with cold flow properties. Polyisobutylene is a viscous-transparent mass from colorless to dark brown, odorless and tasteless. Insoluble in water, alcohols, esters and ketones. It dissolves in fats and oils through swelling. Density - 0.88–0.92 g/cm³. Glass transition temperature - minus 68 °C. Flash point: 158°C. Low molecular weight polyisobutylene retains its elastic properties down to −75 °C. Polyisobutylene is a saturated polymer, highly resistant to oxygen, ozone, solutions of acids, alkalis and salts, and withstands the action of strong oxidizing agents.

Areas of use

It is used in the oil, electrical, and chemical industries for the production of adhesives, oils, pastes, sealants, sealing material, softeners and other materials.

Packaging and transportation

Low molecular weight polyisobutylene is packaged in corrugated cardboard boxes with an internal anti-adhesive layer with a net weight of 20 kg or in consumer containers.
The product is transported by any type of transport.
Guaranteed shelf life is 2 years from the date of manufacture.

Worldwide analogues

Oppanol B10, B11, B12, B13, B14, B15, B30, N50 from BASF.
SDG of Zhejiang Shunda New Material Co., ltd.
HRD of Shandong Hongrui New Material Technology Co., Ltd.

Thickening polyisobutylene additive KP-20U-1, KP-20U-2, KP-20S, KP-10

Specification				
Properties	**Values for grades**			
	KP-20U-1	**KP-20U-2**	**KP-20S**	**KP-10**
Mass fraction of polyisobutylene, %, not less	10	15	20	30
Kinematic viscosity at 100°C, mm²/s, no more	5000	5000	5000	1000
Flash point determined in an open crucible, °C, not less	140	140	140	150
Thickening capacity, mm²/s, not less	10.0	13.0	13.0	3.5-11.0
Mass fraction of mechanical impurities, %, no more	0.1	0.1	0.1	0.1
Mass fraction of ash, %, no more	0.08	0.08	0.08	0.08

Thickening polyisobutylene additive KP-20U-1, KP-20U-2, KP-20S, KP-10 is an oil-filled polyisobutylene. Industrial, transformer and base oils are used to fill polyisobutylene.

Areas of use

It is used as one of the raw materials in the production of thickened motor and other mineral oils, as well as greases and various sealants.

Transportation and storage

Transportation and storage of the thickening additive is carried out in accordance with GOST 1510.

The guaranteed shelf life of the additive is three years from the date of manufacture.

Low molecular weight butadiene rubber SKDSN with a high content of 1,2-vinyl

Specification	
Properties	**Value**
Dynamic viscosity at 50°C, Pa·s	30.0 … 80.0
Mass fraction of ash, %, no more	0.3
Weight loss during drying, %, no more	0.7
Mass fraction of water-soluble part of ash, %, no more	0.1

SKDSN rubber is a low-molecular-weight product of the polymerization of butadiene in solution under the influence of an anionic catalyst, providing a content of 1,2-vinyl units in the polymer chain of at least 40%. Rubber at ordinary temperatures is a thick viscous mass. SKDSN has high heat resistance and retains its properties when heated repeatedly for a long time.

Areas of use

Coagent in EPDM rubber compounds, solid electrical sealants, defoamers for paint coatings, reactive plasticizer for UV-curable flexographic printing plates, automotive sealants and adhesives cured with sulfur or hydrogen peroxide, coagent in rubbers and elastomers, curable by sulfur or hydrogen peroxide.
SKDSN is also used in the electrical industry as a component of quick-hardening dielectric coatings, impregnating resins, etc., as well as in the tire and rubber industries as an additive - a plasticizer that improves the adhesive properties of rubber. Polymer adhesion enhancers based on this type of polybutadiene and especially those containing functional groups are well compatible with almost all types of synthetic and natural rubbers.

Packaging and transportation

SKDSN rubber is packaged in steel barrels with a capacity of 200 to 275 dm^3.
The product is transported by any type of transport.
The guaranteed shelf life of rubber is three years from the date of manufacture.

Worldwide analogues: LBR-305 of Kuraray Co., Ltd. (Japan), Ricon 134 of Cray Valley (USA), Lithene Ultra PH, LitheneActive 1000 of Synthomer (UK).

Low molecular weight butadiene rubber SKDSN-S with an average content of 1,2-vinyl

Specification	
Properties	**Value**
Dynamic viscosity at 25°C, Pa s	6.5…10
Presence of inclusions (cross-linked polymer, mechanical)	Absence
Density at 20 °C, g/cm3	0.895…0.898
Color according to Hazen (according to Pt-Co standard), units, no more	50

SKDSN-S rubber is a low-molecular-weight product of the polymerization of butadiene in solution under the influence of an anionic catalyst. Rubber at ordinary temperatures is a transparent, thickly viscous mass from colorless to light yellow. Microstructure: 35-50% 1,2-vinyl, 30-40% 1,4-trans, 15-25 % 1,4-cis.

Areas of use

Coagent in EPDM rubber compounds
Solid Electrical Sealants
Defoamers for paint and varnish coatings
Reactive plasticizer for UV-curing flexographic printing plates
Automotive sealants and adhesives cured with sulfur or hydrogen peroxide
Coagent in rubbers and elastomers cured with sulfur or hydrogen peroxide.

Packaging and transportation

SKDSN-S rubber is packaged in steel barrels with a capacity of 100 to 275 dm^3, IBC.
The product is transported by any type of transport.
The guaranteed shelf life of rubber is 12 months from the date of manufacture.

Worldwide analogues: LBR-352 of Kuraray Co., Ltd. (Japan), Lithene Ultra PH of Synthomer (UK).

Low molecular weight 1,4-cis-butadiene rubber SKDN-N

Specification		
Properties	**Value**	
	Grade 1	**Grade 2**
Transparency, cm^3, not less	175	100
Purity	no rash	
Conditional viscosity, s	170 … 215	170...300
Dynamic viscosity at 20°C, mPa·s	700…860	700…1200
Weight loss during drying, %, no more	0.2	0.5
Acid number, mg potassium hydroxide per 1 g, not more	0.3	0.5
Mass fraction of ash, %, no more	0.1	
Color on the iodometric scale, mg iodine, no more	5	

Low molecular weight cis-butadiene rubber SKDN-N is a liquid product of the polymerization of butadiene under the influence of a catalytic system based on nickel salts and organoaluminum compounds.

Areas of use

Adhesive and sealing compositions, polymer printing forms, inks for offset printing, plasticizer for rubber compounds, binders for recycled rubber compounds, electrical insulating and sealing compounds, release agents for polyurethane foam, modifier of resin systems, modifier of vegetable oils, synthesis of binder for anodic coatings by immersion , synthesis of chlorinated rubber, synthesis of binder for oxidatively dried varnishes, binder for oxidatively dried alkyd resins, binder for pulverized and dry quartz sand, binder for soil stabilization, impregnation of mineral substrates, impregnation of cylinder head gaskets. SKDN-N rubber is also a raw material for the production of electrophoresis materials.

Packaging and transportation

SKDN-N rubber is packed hermetically in steel barrels with a capacity of 100, 200 or 275 dm^3, or IBC.
The product is transported by any type of transport.

The guaranteed shelf life of SKDN-N rubber for grade 1 is three years, for grade 2 - one year from the date of manufacture.

Worldwide analogue: polybutadiene Polyvest 110 of Evonik (Germany).

Low molecular weight 1,4-cis-butadiene rubber SKDN-N-S

Specification	
Properties	**Value**
Dynamic viscosity at 20°C, mPa s	2700…3300
Acid number, mg KOH per 1 g of rubber, no more	0.3
Color on the iodometric scale, mg I_2/100 cm^3, no more or color according to the Gardner scale, eG, no more	5 3
Iodine number, g I_2/100 g rubber	420…480
Flash point, °C, not less	200
Density at 20°C, g/cm3	0.90…0.92

Low molecular weight cis-butadiene rubber SKDN-N-S is a liquid product of the polymerization of butadiene under the influence of a catalytic system based on nickel salts and organoaluminum compounds.

Areas of use

Adhesive and sealing compounds, polymer printing forms, inks for offset printing, plasticizer for rubber compounds, binders for recycled rubber compounds, release agents for polyurethane foam, cell opening for polyurethane foam, defoamers, resin systems modifier, vegetable oil modifier, synthesis of chlorinated rubber, binder for dusty and dry quartz sand.

Packaging and transportation

SKDN-N-S rubber is packed hermetically in steel barrels with a capacity of 100, 200 or 275 dm^3, or IBC.
The product is transported by any type of transport.

The guaranteed shelf life of SKDN-N-S rubber is three years from the date of manufacture.

Worldwide analogue: polybutadiene Polyvest 130 of Evonik (Germany).

Low molecular weight polyisoprene NMPI

Specification		
Properties	**Value for grades**	
	NMPI-70	**NMPI-500**
Dynamic viscosity at 38°C, Pa·s	35…75	300…700
Ash content, wt.%, no more	0.5	0.3
Weight loss (105°C), %, no more	no more than 0.7	
Mass fraction of antioxidant, % Irganox 1010/1010FF	0.1…0.5	

Low molecular weight polyisoprene NMPI is a liquid polymerization product of isoprene with a number average molecular weight (Mn) of about 55,000 g/mol for the NMPI-500 and about 30,000 g/mol for the NMPI-70. Polymerization of isoprene is carried out in solution under the action of an anionic catalyst.

Areas of use

Low molecular weight polyisoprene NMPI is successfully used as a reactive plasticizer for nitrile, isoprene, styrene-butadiene, butadiene and isoprene-isobutylene rubbers in the production of tires, conveyor belts, seals and other rubber products. The product can be used for the manufacture of pressure-sensitive adhesives, automotive sealants, coatings, and light-curing polymer compositions. Partial or complete replacement of plasticizer oil with low molecular weight polyisoprene in the formulations of rubber compounds in the production of tires and various rubber goods provides the following advantages: increased processability of rubber compounds, increased adhesion to steel cord, improved extrudability, reduced shrinkage of rubber compounds during processing in rubber mixing equipment and increasing the mechanical strength of vulcanizates.

Packaging and transportation

Low molecular weight polyisoprene NMPI is packaged in clean, dry, tightly closed steel barrels of type 1A2 in accordance with GOST 13950 with a capacity of 100 to 216.5 dm^3 or IBC with a capacity of 1.0 m^3, or tank trucks. Guaranteed shelf life is 4 years from the date of manufacture.

Worldwide analogues: LIR-30, LIR-50 of Kuraray Co., Ltd (Japan), ISOLENE 40-S, ISOLENE 400-S of H.B.Fuller (USA).

Low molecular weight modified cis-butadiene rubber SKDN-N(M)

Low molecular weight cis-butadiene rubber SKDN-N(M) is a liquid product of the polymerization of butadiene under the influence of a catalytic system based on nickel salts and organoaluminum compounds. It has improved adhesion.

Specification	
Properties	**Value**
Conditional viscosity, s	170 … 250
Dynamic viscosity (20°C), mPa·s	700...1040
Transparency, cm^3, not less	100
Purity	no rash
Weight loss during drying, %, no more	0.5
Acid number, mg KOH per 1 g, no more	0.5
Mass fraction of ash, %, no more	0.2
Color on the iodometric scale, mg iodine/100 cm^3, no more	5

Areas of use

It has high chemical and water resistance, low temperature stability, dissolves well in aliphatic, aromatic hydrocarbons and ethers, and is compatible with hydrocarbon and wood resins.

It is used for the production of high-quality varnishes, paints, in the production of insulating, anti-corrosion, protective, decorative and protective coatings. Coatings based on SKDN-N(M) rubber are characterized by higher adhesion to metal, concrete and other structural materials compared to SKDN-N rubber.

SKDN-N(M) is most widely used as a modifier for redispersible polymer powders (RPP), in particular, based on copolymers of vinyl acetate, ethylene, butyl acrylate, vinyl laurate and vinyl chloride, as well as copolymers of styrene with butadiene and butyl acrylate. Dry building mixtures prepared using modified RPP are characterized by increased adhesion to the base and water resistance.

At the customer's request, samples of SKDN-N(M) can be provided for testing, both in the form of “dry” rubber and in the form of stable aqueous emulsions (dispersions) with a polymer content of at least 60% by weight.

Packaging and transportation

SKDN-N(M) rubber is packed hermetically in steel barrels with a capacity of 100-200 dm^3 or IBC containers with a volume of 1000 dm^3.

The product is transported by any type of transport.

Warranty period of storage

The guaranteed shelf life of SKDN-N(M) rubber is three years.

Low molecular weight polybutadiene hydroxylated EFRODIENE DIOL

EFRODIENE DIOL rubber is a low molecular weight liquid polybutadiene containing two functional hydroxyl groups per polymer macromolecule and at least 20% 1,2-vinyl units.

Specification			
Properties	**Value for grades**		
	Efrodiene Diol-48	**Efrodiene Diol-56**	**Efrodiene Diol-73**
Content of hydroxyl groups, mmol KOH/g (mg KOH/g)	0.44 ... 0.53 (25 … 30)	0.49…0.64 (27 … 36)	0.71…0.75 (40 … 42)
Dynamic viscosity at 40°C, Pa s	≤ 9.5	≤ 8.5	≤ 3.5
Number average molecular weight, Mn (GPC)	3800…4600	3300 … 4100	2700 … 3300
Water content, wt.%	≤ 0.5		
Content of peroxide compounds (as H_2O_2) (m/m), %	≤ 0.04	≤ 0.04	≤ 0.05
Mass content of antioxidant Irganox 1010 (or its analogue), %	0.1-0.4		

Areas of use

Due to the high content of double bonds and low molecular weight, it retains mobility at low ambient temperatures. The product does not mix with water and alcohols; it is soluble in non-polar organic solvents, oils, and bitumen. It exhibits reactivity both with respect to double bonds contained in the main polymer chain and with hydroxyl groups. It is widely used as a hydroxyl-containing component of polyurethane systems. Used in the production of adhesives, polyurethane coatings, sealants, thermoplastics, injection molded urethane elastomers, as a coupling agent for elastomers, to increase the hydrolytic stability of polyurethanes.

Packaging and transportation

EFRODIENE DIOL rubber is packaged in steel barrels with a capacity of 100 to 275 dm³, IBC and tank trucks. The product is transported by any type of transport.

Guaranteed shelf life of rubber

Three years from date of manufacture.

The closest worldwide analogues: Evonik Polyvest HT (Germany), Tanyun Chemical Research Institute Co.,Ltd HTPB (China), Cray Valley Poly bd R45 HTLO (USA), Krasol LBH (Czech Republic).

Composite material LENPRENE

The LENPRENE material is a vulcanizable composition based on liquid polyisobutylene and polyisoprene. Does not contain solvent.

Specification

Properties	Value for grades					
	1035	**1020**	**2035**	**2020**	**3035**	**3020**
Appearance	Homogeneous viscous mass, light gray color to dark brown					
Volume index of melt flow (130°C, 10 kg), cm_3/10 min	600-1700		50-650		40-450	
Unsaturation, % mol	2.0-3.5	9.5-11.5	2.0-3.5	9.5-11.5	2.0-3.5	9.5-11.5
Weight loss (105ºC), %	≤ 0.3					
Mass fraction of ash, %	≤ 0.10					
Thickening capacity, mm^2/s	≥ 5.0		≥ 15.0			

The combination of chemical resistance, gas impermeability, weather resistance and water resistance of the material of the indicated grades makes it possible to use it as the main polymer or an effective additive for the manufacture of the following products:
- construction sealants, chemically resistant sealants and glues, adhesives;
- fire-resistant, moisture-resistant and chemically resistant coatings for tanks, marine vessels, roofing coverings;
- as reactive plasticizers for rubber compounds based on butyl rubber in the production of tires and car inner tubes;
- as rheological properties modifiers (additives) for oils.

Packaging and transportation
The composite material is packaged in 20 kg cardboard boxes, steel barrels with a capacity of 100 dm^3 to 230 dm^3, or consumer containers.
The product is transported by any type of transport.

Warranty period of storage – 2 years from the date of manufacture.

Low molecular weight polybutadiene Efrodiene-73

Efrodiene-73 is a product of the polymerization of 1,3-butadiene in the presence of an organolithium catalyst in a toluene solution.
It is used in the production of film-forming agents in the paint and varnish industry, electrophoresis primers, anti-corrosion ebonite coatings, abrasives, rubber products, for modifying rubbers and plastics.

Specification

Properties	Value
Appearance	Viscous transparent colorless or light yellow liquid
Transparency, cm^3, not less	180
Microstructure,%: 1,2-vinyl 1,4 (cis-, trans-)	 20-30 70-80
Dynamic viscosity, Pa·s, at 25 °C	1.0 – 2.5
Weight loss during drying, %, no more	0.5
Mass content of ash, %, no more	0.5
Mass content of antioxidant Irganox 1010 (or its analogue), %	0.1 – 0.4

Packaging and transportation

Efrodiene-73 is packaged in steel barrels with a capacity of 100 dm^3 to 230 dm^3, IBC or consumer containers. The product is transported by any type of transport.

Warranty period of storage – 3 years from the date of manufacture.

Low molecular weight polybutadiene Efrodiene-1585

Efrodiene-1585 is a product of the polymerization of 1,3-butadiene in the presence of an organometallic catalyst in an aromatic solvent.
It is used in the production of defoamers (for example, polymer defoamers of type BYK-057) and film-forming agents in the paint and varnish industry, electrophoresis primers, anti-corrosion coatings, abrasives, rubber products, for the modification of rubbers and plastics.

Specification

Properties	Value
Appearance	Viscous transparent colorless or light yellow liquid
Microstructure,%: 1,2-vinyl 1,4 (cis-, trans-)	 5-10 90-95
Dynamic viscosity, Pa·s, at 20 °C, no more	6.0
Weight loss during drying (105 °C), %, no more	0.3
Mass content of ash, %, no more	0.1

Packaging and transportation

Efrodiene-1585 is packaged in steel barrels with a capacity of 100 to 230 dm^3, IBCs or consumer containers. The product is transported by any type of transport.

Warranty period of storage – 1 year from the date of manufacture.

Synthetic low molecular weight butadiene rubber Efrodiene-73K

Efrodiene-73K is a product of the polymerization of 1,3-butadiene in the presence of an organolithium catalyst in a toluene solution.
It is used in the production of tires and rubber products as a reaction plasticizer for rubber compounds, automotive sealants, coatings and adhesives.

Specification

Properties	Value
Appearance	Viscous transparent colorless or light yellow liquid
Content of 1,2-vinyl, %	23 – 30
Dynamic viscosity, mPa·s, at 38 °C	550 – 750
Weight loss during drying (105 °C, 2 hours), %, no more	0.5
Number average molecular weight, Mn	2600 – 3800
Polydispersity coefficient, Mw/Mn, no more	1.2

Packaging and transportation

Efrodiene-73K is packaged in steel barrels with a capacity of 100 dm^3 to 230 dm^3, IBC or consumer containers. The product is transported by any covered type of transport.

Warranty period of storage – 2 years from the date of manufacture.

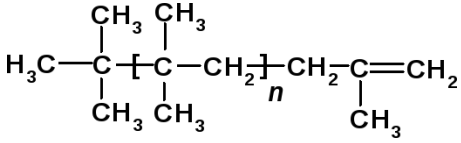
Worldwide analogue - LBR-302 of Kuraray (Japan)

Low molecular weight highly reactive polyisobutylene

(experimental product, construction of a pilot plant with a capacity of 1,500 tons per year is underway, commissioning - 2nd quarter of 2025)

Low molecular weight highly reactive polyisobutylene is a product of solution polymerization of isobutylene using a special catalytic complex and contains at least 70 % mol. of terminal vinylidene groups.

Structural formula:



Technical data

Properties	Value for grades				
	PIB-350	PIB-650	PIB-1000	PIB-1300	PIB-2300
Appearance	**Viscous transparent colorless mass**				
Number average molecular weight Mn, g/mol	250-500	501-800	801-1200	1201-1600	2000-2500
Kinematic viscosity, at 100 °C, mm2/s (cSt)	10-20	21-180	181-400	400-800	1400-2000
Flash point in an open crucible, °C, not lower	120	120	120	160	180
Acid number, mg KOH/g, no more	0.10	0.10	0.10	0.10	0.10
Mass content of ash, %, no more	0.05	0.05	0.05	0.05	0.05
Mass content of water, %, no more	0.01	0.01	0.01	0.01	0.01

Application area:

Low molecular weight highly reactive polyisobutylene is intended for the production of succinimide additives and use as a thickening additive for fuels, lubricating oils and greases, an adhesive agent in the manufacture of stretch films, a modifier for vulcanizable and other elastomers, in the manufacture of adhesives and sealants, as well as emulsifiers in the production of industrial explosives substances.

Packaging and transportation

The product is packaged in clean, dry, tightly closed steel barrels, welded or sealed, with a removable top bottom 1A2 with a capacity of 85 to 275 dm^3 according to GOST 13950, IBC. The product is transported by any type of transport.

Guaranteed shelf life

Two years from date of manufacture.