State Scientific Center of the Russian Federation
«State Research Institute for Chemistry and Technology of Organoelement Compounds»
(SSC RF JSC «GNIIChTEOS»)

PRODUCT CATALOGUE

38, Entuziastov highway
Moscow 105118, Russia
Tel: +7(495)673-72-00, +7(495) 673-79-91
E-mail: info@eos.su, cct@eos.su

GNIIChTEOS is a comprehensive scientific center for the development of methods for obtaining and creating competitive industrial technologies of inorganic and organic compounds of elements: Si, Al, B, Pb, Ge, Sn, Fe, Mn, etc. and materials based on them.

GNIIChTEOS is a team of highly qualified specialists of the Russian Federation in the field of chemistry and technology of organoelement compounds, it has created and (operates) runs scientific schools "Chemistry and Technology of Organometallic and Hydride Compounds and Unique Materials Based on Them" and "Chemistry of Organoelement Compounds".

GNIIChTEOS has developed scientific foundations, technologies and implemented in industry more than 500 processes, 93% of which are implemented at the level of inventions, and is also the copyright holder of more than 60 patents at present. Based on the developments of the institute, the most important production facilities of the chemical and petrochemical industries have been created.

Contents

1. MONOMERIC ORGANOSILICON COMPOUNDS.

Dimethyldiethoxysilane

Organosilicon monomer, silicone flammable liquid, included in the composition of non-stick coatings. The main application of dimethyldiethoxysilane is the synthesis of other organosilicon compounds. It is part of the organosilicon oligomer used as a non-stick coating. These coatings are used in casting steel, cast iron molds, non-ferrous metal castings, rods. It is used in the chemical industry, in the production of organosilicon varnishes, fillers, resins and plastics, organosilicon varnishes.

Dimethyldimethoxysilane

It is used as a structure control agent in the preparation of silicone rubber. Chain extender in the synthesis of silicone products, raw material for the synthesis of silicone oil.

Methyltriethoxysilane

Methyltriethoxysilane - the content of the main substance is not less than 99%. Transparent, colorless liquid with a smell characteristic of alcohols. In the presence of moisture, it forms reactive silanols. It dissolves well and is used for adhesives, as a sealant, a technological additive, for pigmentation and coating, for silicone resin and silicone rubber.

Methyltriethoxysilane is compatible with polymer binders - acrylics, alkyds, polyesters, phenolic, PVC, epoxies, nitrocellulose, polyurethane, vinyl. Methyltriethoxysilane is used in pharmacology, paint and varnish and fiberglass industries, namely: it is part of drugs; it is used for the production of other polymers, adsorbents and organosilicon products; it is involved in pigmentation as an additive; used for modification of pyrogenic silicon dioxide at 90-220 °C; for surface hydrophobization.

2. ORGANOSILICON LIQUIDS

2.1 POLYMETHYLSILOXANE LIQUIDS (PMS)

They are polymers of linear and branched structure, differing from other organosilicon polymers by a flatter temperature viscosity curve. The viscosity of PMS, depending on their molecular weight, can vary from 1.0 to 1. 106 cSt. The unique properties of PMS allow them to be widely used as surface-active and antifoam additives, anti-adhesives, lubricant bases, heat carriers, etc. In addition, they are corrosion-resistant and have high dielectric properties.

The main properties of polymethylsiloxane liquids and their areas of application:

Mark	Viscosity at 20 °C, cSt	Temperature, °C			Density at 20 °C, g/cm3	Application
		boiling at 1-2 mm Hg.	flashes, not lower	freezing, not higher		
PMS-1r	1.0 – 1.1	-	30	-100	0.819-0.821	Organosilicon liquid is a polymethylsiloxane compound of branched structure, well soluble in aromatic hydrocarbons, insoluble in water. Transparent colorless liquid. Designed for use as a heat carrier in thermal control systems operating in the temperature range from -100 to +100 °C (in a closed system). Used as a damping liquid.
PMS-1.5r	1.5 – 1.7	88.5/20 mm Hg	50	-110	0.85	Cooling, damping and instrument liquid operating in the temperature range down to minus 100 – 110 °C. The only coolant for space rocket thermal control systems and a coolant for radio electronics devices.
PMS-20r	18 – 22	-	200	-100	0.96	An organosilicon liquid that is a branched polymethylsiloxane compound. Instrument liquid and lubricant base for use at temperatures below minus 70 °C

Brand	Viscosity at 20 °C, cSt	Temperature, °C			Density at 20 °C, g/cm3	Application
		boiling at 1-2 mm Hg.	flashes, not lower	freezing, not higher		
PMS-100r	95 -105	> 250	300	-100	0.98	Polymethylsiloxane liquid PMS-100r is a mixture of polymers of linear and branched structure. Appearance - colorless viscous liquid. It has high stability at low and high temperatures, low volatility, high dielectric properties, high oxidation resistance and inertness. The range of working temperatures of application is from minus 40 to plus 200 °C. PMS-100r is used as a component of polishes and various household chemicals, shock absorber, hydraulic, damping liquids.
PMS-10	9,2 – 10,8	> 250	170	-60	0.94	Cooling, damping, instrument liquid for temperatures down to -60 °C
PMS-350	330-370	-	315	-60	0,97	Silicone oil PMS-350 is a linear, non-reactive polydimethylsiloxane with a viscosity of 350 mm2/s (350 cSt), relates to medium-viscosity silicone oils. The basis of heat-resistant anti-adhesive emulsions for molds in the production of tires, rubber products, for lubricating contacts between plastic and rubber. The basis of lubricants for metal-plastic friction systems, mechanical equipment. The basis of wide-range defoamers. Shock absorber, hydraulic, damping and cooling liquid. Dielectric. Can be used in cosmetics.
PMS-50 000	$5*10^4$ - 5± $5*10^3$	-	300	-57	0.98	Silicone oil PMS-50 000 is the basis of heat-resistant anti-adhesive (separating) lubricants for molds, conveyor belts, metal-plastic friction systems, mechanical equipment, and is also used in viscous couplings of the engine cooling system fan. Silicone oils differ from mineral oils in a wide range of operating temperatures from -40 to +200 °C.

Mark	Viscosity at 20 °C, cSt	Temperature, °C			Density at 20 °C, g/cm3	Application
		boiling at 1-2 mm Hg.	flashes, not lower	freezing, not higher		
PMS-200000, PMS-250000	+/- 10	> 200	200	-50	0,96-0,98	PMS-200000 and 250000 are colorless to light yellow liquids. These PMS liquids are used in damping devices of heavily loaded mechanisms, are excellent dielectrics, operate in a wide temperature range from - 50 to + 200 °C, have a low toxicity level, excellent hydrophobicity, and corrosion resistance.
PMS-600 000	600 000	>200	200	-40	0,96-0,98	It is a linear, non-reactive polydimethylsiloxane with a viscosity of 600,000 mm²/s. Minor change in physical properties over a wide temperature range: performance from -40 to 200 °C; excellent hydrophobicity and dielectric properties over a wide range of temperatures and frequencies; low surface tension - quickly covers clean surfaces, making them hydrophobic; at a viscosity above 10 cSt it demonstrates high thermal stability, oxidation resistance, has a very low vapor pressure and a high flash point; non-toxic; odorless; soluble in various types of solvents. Application: release agents, defoamers; hydraulic liquids; surface-active materials; lubricants; cosmetics and leather compositions; polishing and special chemicals; electrical/electronic equipment; additives for plastics.

Brand	Viscosity at 20 °C, cSt	Point of, °C			Density at 20 °C, g/cm3	Application
		boiling at 1-2 mm Hg.	flash, not lower	freezing, not higher		
PMS – 750 000 (liquid 131-11)	750 000	>200	200	-47	0.97-0.98	High-viscosity silicone liquid PMS-750000 (polymethylsiloxane liquid) is a linear, non-reactive polydimethylsiloxane with a viscosity of 750.000 – 1.000.000 cSt. Advantages of PMS-750000 liquid: minor changes in physical properties in a wide temperature range; performance from - 40 °C to 200 °C; excellent hydrophobicity and dielectric properties in a wide range of temperatures and frequencies; non-toxic; odorless; soluble in various types of solvents. PMS – 750.000 is used as a working medium for dampers installed on ships, diesel locomotives, heavy-duty machines, gun carriages, chassis of heavy transport equipment (Kamaz truck)
PMS-1 000 000	1 000 000	>200	200	-57	0.97-0.98	Ultra-high viscosity silicone liquid PMS-1000000 (polymethylsiloxane liquid) is a linear, non-reactive polydimethylsiloxane with a viscosity of 1.000.000 cSt. Advantages of PMS-1000000 liquid: minor changes in physical properties over a wide temperature range; performance from -40 to 200 °C; excellent hydrophobicity and dielectric properties over a wide range of temperatures and frequencies; non-toxic; odorless; soluble in various types of solvents.

2.2 POLYMETHYLPHENYLSILOXANE LIQUIDS

Polymethylphenylsiloxane (PMPS) liquids have enhanced heat resistance, low saturated vapor pressure, low evaporation and high flash point values. The limits of permissible operating temperatures of these liquids, depending on the composition, range from -60 to +250 °C (long-term) and up to +350 °C (short-term).

Main physical and chemical indicators of PFMS and areas of their application:

Brand	Viscosity at 20 °C, cSt	Point of, °C			Density at 20 °C, g/cm3	Application
		boiling at 1-2 mm Hg.	flash, not lower	freezing, not higher		
FM-5,6 AP	20 - 27	290	200	-110	1.067	Dispersion media of low-temperature oils and lubricants, in low-load high-speed ball bearings and freon refrigeration machines, cooling heat carriers.
Copolymer 5	65 – 85	360/0.2 mm	300	-70	1.05	Heat-resistant and low-temperature media in oils and lubricants, operating in a wide range of temperatures and in deep vacuum, heat carriers and liquids for hydraulic systems, dielectrics

2.3 POLYETHYLSILOXANE LIQUIDS

Specific features of polyethylsiloxane liquids are their good compatibility with mineral and synthetic oils, good lubricating properties, low freezing point (below -70 °C) and inertness with respect to most structural materials.

Polyethylsiloxane liquids are colorless, odorless, and chemically inert. They are soluble in aromatic and chlorinated hydrocarbons, and insoluble in lower alcohols and water. Polyethylsiloxane liquids are non-toxic and explosion-proof.

Physicochemical indicators:

Brand	Viscosity at 20 °C, cSt	Point of, °C		Density at 20 °C g/cm3	Freezing Point °C	Refractive index
		Boiling 1-3 mm Hg	Flash not lower			
PES-1	1.5-4.5	-	-	0.86-1.18	-70	-
Liquid 132-455	Not less than 480	>250	270	0.99	-65	-
Liquid132-24	220-300	>250	265	0.95-1.05	-96	1.445

Applications.

PES-1 polyethylsiloxane liquid is a transparent liquid, the mass fraction of silicon is not less than 19.6%, the mass fraction of water is not more than 0.01%. It is used as a cooling and working liquid in hydraulic systems.

Features: provides excellent lubricating properties when metal slides on metal, and retains its properties at lower temperatures compared to polydimethylsiloxane liquid; has a low surface tension; is chemically inert.

Liquid 132-24 is used as a lubricant for metal-to-metal and metal-to-rubber rubbing surfaces and as a base for general-purpose consistent lubricants, including aircraft.

Liquid 132-455 is intended for use in the hydraulic system of a hydraulically driven direct-acting pump unit.

Liquid KRP-1

Liquid KPR-1 is a polyethylsiloxane polymer - a highly viscous dark brown color. Inclusions are allowed. The product is flammable, is related to low-hazard substances. It is used as a filler for semiconductor devices.

2.4 POLYMETHYLETHYLSILOXANE LIQUIDS

LIQUIDS 132-234 BB and 132-244

They are polydisperse mixtures of polyethylmethylsiloxane oligomers with a boiling point above 250 °C and are distinguished by different ratios of methyl and ethyl substituents and ranges of viscosity variation.

Polymethylethylsiloxane liquids combine the positive properties of both methylsiloxane and ethylsiloxane liquids. They are compatible with mineral oils and synthetic hydrocarbons, non-toxic, corrosion-resistant, and have a low pour point below minus 100 °C. Due to their special composition, methylethylsiloxane liquids have improved performance properties and are a good basis for low-temperature lubricants with a low breakaway torque at subzero temperatures and operating in the temperature range from -100 °C to +200 °C and in deep vacuum.

In addition to their intended purpose, methylethylsiloxane liquids can be used as hydraulic liquids for hydraulic drives, hydraulic lifts, hydraulic brakes, and control systems in various climatic conditions, compressor oil for household refrigeration units, heat carriers, and refrigerants.

3. COMPOSITE MATERIALS BASED ON ORGANOSILICON LIQUIDS, INCLUDING OILS AND LUBRICANTS

Silicone liquids for hydraulic shock absorbers of nuclear power plants of grades 131-209, 133-257 are compositions of oligoorganosiloxanes with additives.

They are used in hydraulic shock absorbers of nuclear power plants, especially in seismically hazardous areas with a load of 50 to 170 tons, and also with an increased load of 170 to 450 tons at domestic nuclear power plants and plants in the Near Abroad since 1985 (Balakovo NPP, Rostov NPP, Kalinin NPP, Armenian NPP). The liquids have unique properties and are successfully used for 8-10 years without replacement.

Anti-adhesive curing compounds are compositions based on oligoorganosiloxane liquids. Anti-adhesive compounds of "hot" (VSK-5 (TU 2257-110-00209013-2012 with amendment No. 1), 131-458) and "cold" (SK-223 (TU 2257-110-00209013-2012 with amendment No. 1)) curing are intended for processing metal molds used in molding composite polymer materials - fiberglass, carbon fiber, boron plastics on epoxy binder, rigid polyurethane foam, polymethyl methacrylates. After curing, they form solid transparent coatings on the mold surface, which have anti-adhesive properties in relation to the molded material. They are used in the formation of products for aircraft, sports and medical purposes (lenses).

Organosilicon liquids – components of unique oils and lubricants

They are oligomers containing a halogen (chlorine or fluorine) in an organic substituent. Depending on the structure and content of polar groups, the properties of the oligomers vary widely.

These polyorganosiloxanes are colorless transparent liquids, insoluble in water, but soluble in ketones, aromatic and chlorinated hydrocarbons; they do not cause corrosion of metals (steel, aluminum, bronze, etc.) in a wide range of temperatures. The limits of permissible operating temperatures are determined by the composition of the liquid and fluctuate from -100 to + (200 ... 300) °C, during continuous operation and up to 350 °C for a short time.

Halogen-containing liquids have improved lubricating properties compared to polymethyl- and polymethylphenylsiloxanes, and high resistance to ionizing radiation.

Liquid 161-44:

colorless transparent liquid - the main component of high-temperature oil VT-301, used as a working liquid in rocket production, as a base for working liquid for lubricating compressors with internal heat sink for microcryogenic systems. The liquid is non-toxic, explosion-proof.

Liquids 161-45 and 161-178:

transparent liquids from colorless to light yellow - working liquids with enhanced lubricating capacity for operation in hydraulic systems of hydraulic direct-acting electric pump units, liquid lubricants for deep watch mechanisms and other devices of high reliability. Liquids are explosion-proof, flame retardant.

Liquid 161-52VV:
transparent colorless liquid without mechanical impurities - liquid lubricant and base for instrument oils and plastic lubricants operating under deep vacuum conditions. Base for effective defoamers for organic media. The liquid is explosion-proof, flame-retardant.

Liquids 169-36 and 169-389:
heat-resistant working liquids, with high lubricating capacity, with reduced flammability, are used in shock absorbers of various types (telescopic, vane) for ground-based heavily loaded transport equipment. The liquids are explosion-proof, flammable, low-hazard.

Liquid OZH-13:
is a specially purified bis(3-methylbutyloxy)dimethylsilane and the resulting product is used as a cleaning liquid and as a heat carrier for laser technology. Liquid OZH-13 has high spectral characteristics. transmittance coefficient determined by spectrophotometric method:

- at a wavelength of 280 nm - 90%
- in the wavelength range from 300 to 340 nm - 93%
- in the wavelength range from 350 nm to 900 nm - 98%

Liquid OZ-17:
is a colorless transparent liquid with a characteristic specific odor. Liquid OZ-17 has high spectral characteristics, the coefficient of light transmission (transmission determined by the spectrophotometric method in the wavelength range from 350 to 1000 nm is not less than 95%).
It is used as a cleaning liquid and as a coolant for laser technology.

Anti-adhesive grease K-21

K-21 grease is non-corrosive, dissolves well in organic solvents and hydrocarbons of aromatic and fatty series. It is intended for treatment of the surface of metal molds to ensure their splitting when molding polymers.

It is used as an anti-adhesive coating:

- interlayer sheets in the production of sheet phenolic fiberglass;
- foam molding in the production of parts from polystyrene, foam plastic, plastics;
- in molding sheets and boards of fiberglass;
- silver reinforcement (facilitates the removal of flashing without damaging the silver layer);
- in the production of reflective film in rolls; in the production of anti-adhesive paper.

High vacuum grease lubricant"Silovak"

"Silovac" grease is a composition of silicone liquid and thickener and is designed to reduce friction and improve the tightness of seals in vacuum and chemical equipment, shut-off valves.

"Silovac" grease is used:

- for lubricating ground joints of glass chemical equipment;
- in mating surfaces made of metal, rubber, plastic, glass in various combinations;
- is operational in the temperature range from minus 40 °C to plus 200 °C, in vacuum (up to 10-6 Torr) and humid environments;
- is resistant to chemically aggressive environment (to most aqueous solutions of inorganic salts and to dilute acids and alkalis), neutral to rubber and plastics.
- "Silovac" grease:
- is insoluble in water, methanol, ethanol, acetone, glycol and glycerin;
- soluble in kerosene, white spirit, benzene, toluene, ethyl or petroleum ether; inert to most vegetable and mineral oils, organic compounds and gases.

"Silovak" grease is chemically inert. According to the degree of impact on the body, it is classified as a low-hazard substance (hazard class 4 according to GOST 12.1.007). The guaranteed shelf life of "Silovak" grease in the manufacturer's container is 5 years from the date of manufacture.

4. ORGANOSILICON EMULSIONS

Polyorganosiloxane liquids form stable oil-in-water emulsions, which are white, creamy masses. Aqueous emulsions of organosilicon liquids are used in diluted form. The original emulsion mixes with water in any proportions, and stability when diluted is more than 24 hours. Organosilicon emulsions are divided into the following according to their intended purpose:

- **Antifoaming;**
- **Lubricating and separating;**
- **Water-repellent**

Main properties and areas of application of emulsions:

ANTIFOAMING EMULSIONS

The active component is liquid organosilicon polymers of various viscosities and paste-like products. Defoaming emulsions are chemically inert, thermally stable, non-volatile, non-toxic, and economical to use. Emulsion consumption ranges from 0.0001 to 0.1% depending on the application conditions and is determined experimentally.

Name	Appearance	Application
Emulsion KE-10-12	Homogeneous white liquid	It is used for aqueous media: • in light industry (for dyeing textile materials), • in the pharmaceutical industry for evaporating extracts of medicinal plants and antibiotic eluates, • chemical industry, • printing industry.
Emulsion KE-10-34	Homogeneous from white to light yellow liquid	It is used for aqueous media: • in the chemical industry for the production of ammonia at the stage of monoethanolamine purification of natural gas from CO2 and other acidic impurities; • in the printing industry for the production of printed circuit boards; • in mechanical engineering for degreasing metal products on jet-type machines.

LUBRICANT AND RELEASING EMULSIONS

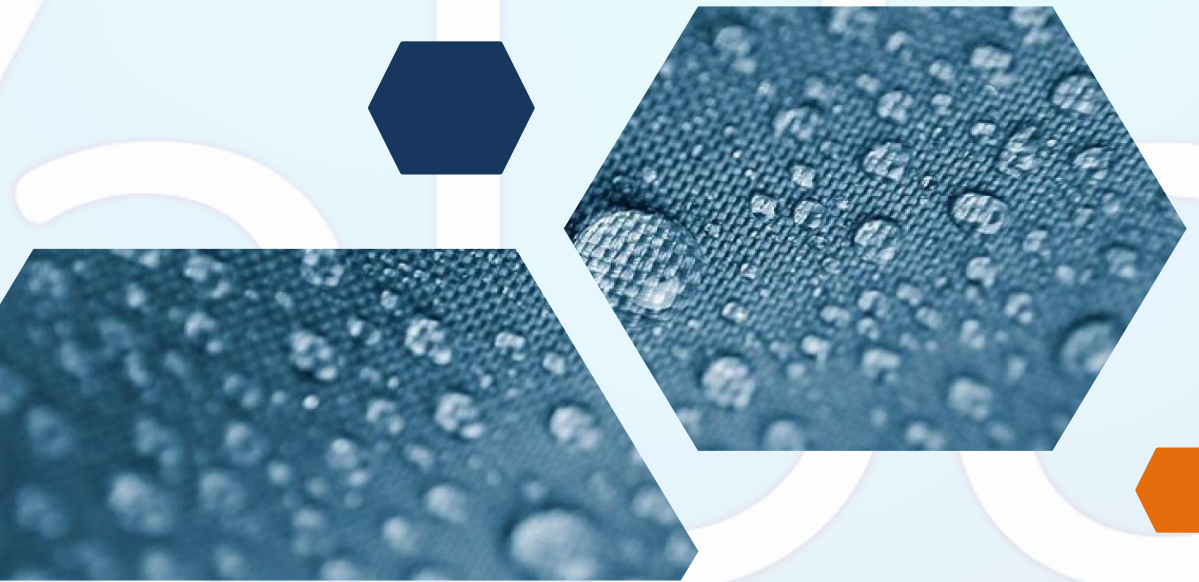
They are used in various industries as lubricants, effective at low consumption. After application to the working surface, the emulsion forms a thin layer of separating silicone coating, which facilitates the use of treated equipment and materials, thus contributing to the improvement of product quality and working conditions.

Name	Appearance	Application
Emulsion KE-10-01	Homogeneous white liquid	• It is used as a release agent for molds in the tire industry; • In the production of rubber and plastics.
Emulsion KE-10-16	Homogeneous white liquid	• It is used as a release agent (anti-adhesive) for molds and mandrels in the tire industry, in the production of rubber products, rubbers and plastics; • It is used as a release agent in the manufacture of rods using hot tooling in foundries; • It is used to cover tables in paint shops - it simplifies and speeds up their cleaning, allows you to save solvents; • It is used in the printing industry; • For silicone coating of rubber stoppers in the pharmaceutical industry; • It is also used for silicone coating of various surfaces, including metal ones.
Emulsion KE-60-50	Oily white liquid	It is used as a release agent (anti-adhesive) in the manufacture of molds in foundries and the production of thermoplastics. It is soluble in water and explosion-proof.

WATER-REPELLENT EMULSIONS

Due to chemical bonding with the base material, a durable protective coating is formed. Emulsion treatment allows to increase the service life of materials and preserve their appearance, while maintaining their gas and air permeability. It gives materials frost and corrosion resistance, easily mixes with water, is environmentally safe, and prevents the appearance of efflorescence.

Name	Appearance	Application
Emulsion KE-30-04	Homogeneous white liquid	It is used for hydrophobization of various materials in construction and textile industry, it is used for protection of building materials and structures from atmospheric influences (rain, snow, high humidity, alternate freezing and thawing). Emulsion treatment allows to increase service life of materials and preserve their appearance.
Emulsion KE-10-15	Homogeneous white liquid	It is used as a softener for high-quality finishing of cotton fabrics.



5. ORGANOSILICON FOAM CONTROLLERS

The main difference between organosilicon foam controllers and antifoam agents is that antifoam agents eliminate foam that has already formed, while foam controllers prevent its formation or can stabilize the foam that has already formed.

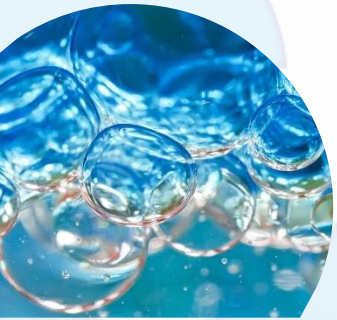
Product "139-282“

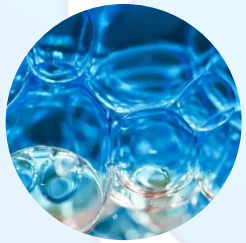
Product "139-282" is a self-emulsifying antifoam composition.

Effective in non-aqueous and aqueous media containing ionic and non-ionic surfactants (surface-active substance). Is readily dispersed in water to form stable emulsions. Is well compatible with organic products.

Used in:

- emulsion polymerization
- distillation of residual monomers from latexes
- development and removal of photoresist in the production of printed circuit boards





Organosilicon Foam controller KEP-2

It is used as a foam stabilizer, for example, in the production of elastic polyurethane foams (PUF), assembly foams, antistatic agents in the production of fibers and textile materials, components of polishing compounds, cosmetics, in the furniture and footwear industry, as an anti-adhesive release agent, etc.

The foam controller is a water-soluble non-ionic surfactant (surface-active substance).

It is a hydrolytically stable oxyalkylene organosiloxane block copolymer with a viscosity of 800 to 3000 cSt.

The KEP-2A grade is used as a foam controller and foam stabilizer in the production of elastic polyurethane foams (PUF) based on polyethers.

The KEP-2B grade is used as a foam regulator and foam stabilizer in the production of various rigid polyurethane foams based on polyethers and polyesters, as well as in the production of polyurethane foam footwear by the liquid molding method, in the production of hydrophilic compositions to prevent glass fogging, as an additive to improve the pouring of paints and varnishes, as an anti-adhesive release composition.

The hydrolytic stability of the foam controllers allows it to be used for the production of confectionary mixtures containing water in the production of PUF.

6. ORGANOSILICON VARNISHES

6.1 ELECTRICAL INSULATING VARNISHES

Organosilicon electrical insulating varnish KO-916K

It is a homogeneous transparent solution of polyorganosiloxane resin modified with polyester. Solvent – xylene.

Organosilicon electrical insulating varnish KO-916K is intended for varnishing electrical steel and manufacturing wires with fiberglass insulation; as covering and adhesive varnishes for enameling copper wire, gluing fiberglass to copper in the manufacture of wires; for coating printed circuits, for the production of flexible mica materials: mica tape, mica and mica-plastic tapes, flexible micanites and micas; for impregnation and lubrication of windings of electrical machines and devices of heat resistance class H, tropical and oil-resistant design.

Features of the paint and varnish material:

- high impregnation capacity due to minimal viscosity, low surface tension;
- high adhesion to metal surfaces;
- well cements individual turns and layers of winding and insulation; forms a glossy, hard, durable film;
- has high thermal conductivity;
- does not have a harmful effect on copper and enamel wire insulation; has high moisture resistance, water resistance and hydrophobicity;
- thermoelastic properties are retained during prolonged heating of the insulation during operation of electrical machines:
- has high heat resistance (class H and higher); has adhesive ability; high dielectric characteristics and corona resistance are practically unchanged under the influence of high temperature and moisture.

Organosilicon electrical insulating varnish KO-926

It is a homogeneous transparent solution of polymethylphenylsiloxane resin in organic solvents.

It is used as a base for heat-resistant electrical insulating impregnating compositions for the production of layered plastic masses for electrical insulating purposes, used in electrical machines and devices with insulation of heat resistance class H.

6.2 HEAT-RESISTANT VARNISHES

Heat-resistant organosilicon varnish KO-08

It is a solution of polymethylphenylsiloxane resin in toluene.

Binder in heat-resistant colored enamels (coatings withstand operating temperatures up to 400 °C, and with the addition of aluminum powder - up to 600 °C). Used as a binder in heat-resistant enamels in combination with inorganic pigments and fillers (operating temperature up to 800 °C). Due to good adhesion to steel, titanium, ceramics, glass and copper, it provides anti-corrosion protection for products made from these materials in any climatic conditions.

Heat-resistant organosilicon varnish KO-116

KO-116 varnish is a solution of polymethylsiloxanes in toluene.
Well soluble in organic solvents, insoluble in water, does not react with water, does not oxidize in air. Used as a binder for preparing light-resistant coatings.

Thermally curable siloxane varnish TSL

TSL is an alcohol solution of polyalkylsilsesquioxanes.
Thermosetting siloxane varnish TSL is designed to form an abrasion-resistant coating on organic glass (PMMA) for aircraft glazing products and other translucent products that is resistant to external factors (mechanical impacts, humidity, high/low temperatures, UV rays).

Composition for external complex barrier coating of aircraft canopy glazing

Designed for external complex barrier coating of glazing of sliding part of airplane canopies, made of polycarbonate.

Consists of two components:

Component No 1

It is a solution of polymethyl methacrylate in a mixture of solvents and is a necessary sublayer for Component No 2.

Component No 2

It is a product of hydrolytic copolycondensation of alkoxysilanes in specially selected solvents.

Copolymer (varnish) K-23-E (3N)

grade A (30%), copolymer (varnish) (3N) grade B (50%)

A product of cohydrolysis of organochlorosilanes. Grade A is used as a binder for non-metallic materials. Grade B is used as an additive in putty materials.

Copolymer GK-10

It has high resistance to moisture and alkalis and sufficient heat resistance. It is used for electrical insulation of functional units and subpanels of electronic equipment, as well as for coating winding products. It is used to protect against corrosion of machine parts made of ferrous and non-ferrous metals operating in aggressive environments (alkaline and acidic) at high temperatures.

7. ORGANOSILICON COMPOUNDS "SIEL"

Unique composite silicone materials, polymerized by the mechanism of polyaddition or under the influence of UV radiation and intended for use in electronics, electrical and radio engineering, fiber optics and optoelectronics, aviation, medicine and other industries.

Main characteristics:

- High chemical purity (total impurity content below 10-3%)
- Biological inertness and non-toxicity
- Range of operating temperatures: from -100 to +300 °C
- Physical state: gel-like, elastomers, glassy
- From transparent to highly filled

7.1 ORGANOSILICON COMPOUNDS FOR ELECTRONIC EQUIPMENT

SIEL compounds for electronic equipment are used as elastic sublayers for protecting p-n junctions of semiconductor devices and equipment, filling materials for printed circuit boards, blocks and modules, protecting electronic circuits with a high degree of integration, and other purposes.

SIEL Compound brand	Performance Values					Note
	Tensile strength, MPa	Relative elongation at break, %	Specific volume electrical resistance, Ohm cm	Electrical strength, kV/mm	Operating temperature range, °C	
159-190 grades A, B	≥1,0	≥70	$\geq 1 \cdot 10^{12}$	25	-60 ÷ +200	One-component compounds, A - translucent; B - greenish. Cured at a temperature of ≥150 °C for 1-3 hours

SIEL Compound brand	Performance Values					Note
	Tensile strength, MPa	Relative elongation at break, %	Specific volume electrical resistance, Ohm cm	Electrical strength, kV/mm	Operating temperature range, °C	
159-191	≥2.0	≥60	$\geq 2 \cdot 10^{11}$	25	-60 ÷ +200	Filled two-component white compound. Cures at a temperature of 120 to 150 °C for 3 - 1 hour, respectively.
159-254	≥2.0	≥100	$\geq 1 \cdot 10^{12}$	≥25	-60 ÷ +200	Transparent two-component compound. Cures at room temperature to 150°C within 24 hours - 1 hour respectively
159-254 M-1	≥0.5	≥120	$\geq 5 \cdot 10^{12}$	≥25	-60 ÷ +200	Transparent two-component compound. Cures at room temperature to 150 °C within 24 hours- 1 hour respectively
159-254 M-2	≥1.0	≥120	$\geq 1 \cdot 10^{11}$	≥25	-60 ÷ +200	Transparent two-component compound. For closed volumes. Cures at room temperature to 150 °C within 24 hours- 1 hour respectively
159-254 M-3	≥2.5	≥100	$\geq 1 \cdot 10^{13}$	≥26	-60 ÷ +200	Transparent two-component compound of high purity. Cures at room temperature to 150 °C for 24 hours - 1 hour respectively

SIEL Compound brand	Performance Values					Note
	Tensile strength, MPa	Relative elongation at break, %	Specific volume electrical resistance, Ohm cm	Electrical strength, kV/mm	Operating temperature range, °C	
159-256	2.5	110	$1 \cdot 10^{13}$	27	-60 ÷ +200	One-component white compound Cures at a temperature of ≥150 °C for 1 - 3 hours
159-306	3.0	110	$3 \cdot 10^{13}$	25	-60 ÷ +220	Transparent two-component compound. Cures at 150 °C for 1 - 3 hours depending on the layer thickness.
159-322 mark A	≥ 1.5	65	$1 \cdot 10^{14}$	27	-60 ÷ +200	Transparent two-component compound. Cures at 150 °C for 3 hours.
159-322 mark Б	≥ 1.5	170	$1 \cdot 10^{14}$	30	-60 ÷ +≥ 200	Viscous, flowing, white two-component compound. Cures at a temperature of 150 °C for 3 hours.
159-322 mark B	1.5	≥65	$1 \cdot 10^{14}$	27	-60 ÷ +200	Transparent two-component compound. Remains viable at 23°C for 180÷250 min. Cures at 80 °C for 2 hours.
159-356	gel	Module 80÷120 kPa	$3 \cdot 10^{14}$	≥25	-60 ÷ +200	Two-component compound is a transparent liquid. It cures at a temperature of 150÷160 °C for 1 hour.

SIEL Compound brand	Performance Values					Note
	Tensile strength, MPa	Relative elongation at break, %	Specific volume electrical resistance, Ohm cm	Electrical strength, kV/mm	Operating temperature range, °C	
159-356	gel	Module 80÷120 kPa	$3 \cdot 10^{14}$	≥25	-60 ÷ +200	The two-component compound is a transparent liquid. It cures at a temperature of 150 ÷ 160 °C for 1 hour.
159-360	3.0	90	$1 \cdot 10^{13}$	30	-60 ÷ +300	Heat-resistant two-component filled white compound
159-377	1.5	65	$1 \cdot 10^{14}$	30	-60 ÷ +200	Transparent two-component compound. Characterized by a reduced content of ionogenic impurities.
159-390	3.0	140	$1 \cdot 10^{9}$	-	-60 ÷ +200	Filled two-component black compound. Cures at a temperature of 120 to 150 °C for 3 - 1 h respectively
159-406	2.5	110	$1 \cdot 10^{10}$	Thermal conductivity - 0.8 W/m·K	-60 ÷ +200	Filled heat-conducting two-component gray-beige compound. Cures at a temperature of 120 to 150 °C for 3 - 1 h, respectively.
159-407	3.0	140	$1 \cdot 10^{4}$	-	-60 ÷ +200	Filled conductive two-component black and gray compound. Cures at a temperature of 120 to 150 °C for 3 - 1 h respectively

SIEL Compound brand	Performance Values					Note
	Tensile strength, MPa	Relative elongation at break, %	Specific volume electrical resistance, Ohm cm	Electrical strength, kV/mm	Operating temperature range, °C	
159-414	2.5	120	$1 \cdot 10^{3}$	-	-60 ÷ +200	Filled conductive two-component silver compound. Cures at a temperature of 120 to 150 °C for 3 - 1 h respectively
159-421	2.5	130	$1 \cdot 10^{14}$	30	-60 ÷ +200	One-component thixotropic white compound . Cures at a temperature of ≥150 °C for 1-3 hours
159-431	-	penetration- 300	$1 \cdot 10^{13}$	20	-60 ÷ +200	gel
159-438	2.0	130	$1 \cdot 10^{5}$	-	-60 ÷ +200	Filled conductive two-component dark gray compound. Cures at a temperature of 120 to 150 °C for 3 - 1 h, respectively.
159-440	3.5	110	$1 \cdot 10^{13}$	27	-60 ÷ +200	Filled two-component white compound. Cures at a temperature of 120 to 150 °C for 3 - 1 h respectively

SIEL Compound brand	Performance Values					Note
	Tensile strength, MPa	Relative elongation at break, %	Specific volume electrical resistance, Ohm cm	Electrical strength, kV/mm	Operating temperature range, °C	
159-440 M	3.0	120	$1 \cdot 10^{13}$	26	-60 ÷ +200	Filled two-component white compound of low viscosity. Cures at a temperature of 120 to 150 °C for 3 - 1 h, respectively.
159-442	2.5	140	$1 \cdot 10^{14}$	30	-60 ÷ +200	Thixotropic, white, highly viscous
COMPOSITION OF SIEL VP-1	≥ 2.0	60÷20	$1.59 \cdot 10^{15}$	Dissipation factor of a dielectric at a frequency of 1 MHz ≤ 0.0001	-60 ÷ +200	Thixotropic, moisture-resistant, vacuum-tight, pasty, two-component white composition with reduced gas emission. Can be cured at room temperature
COMPOSITION OF SIEL VP-1(4)	≥ 2.0	≥ 20	-	-	-60 ÷ +200	Thixotropic, moisture-resistant, pasty, two-component, pink compound with improved adhesion. Can be cured at room temperature

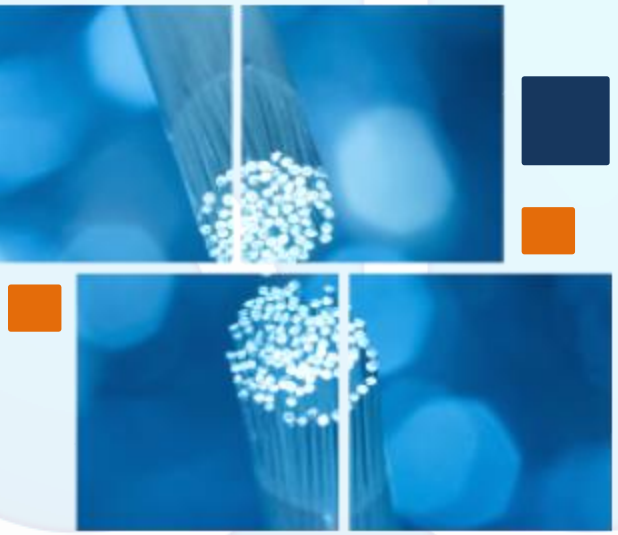
7.2 ORGANOSILICON COMPOUNDS FOR OPTICS

SIEL compounds for optics are used in the technology of producing fiber optics as reflective, filtering, buffering and protective-strengthening shells, as well as in other optical devices and products.

	Performance Values						Note
	Refractive index, n_D^{20}	Tensile strength, MPa %	Relative elongation at break, %	Shore hardness, A, conventional units	Operating temperature range, oC	Drawing speed, m/min	
159-254	1.405±0.005	≥2.0	≥100	-	-38÷+200 (for fiber optics)	≥30	Transparent two-component compound for reflective coatings of optical fibers and electronic devices
159-254 M-3 (highly purified)	1.405±0.005	≥2.0	≥100	-	-38÷+200 (for fiber optics)	≥30	Transparent two-component compound for reflective coatings of optical fibers and electronic devices
159-274	1.460±0.005	12.0	≥80	≥10	-60÷+250	≥15	Transparent two-component compound (coating) for filter shells of optical fibers, plug-in units, semiconductor devices
159-274 M	1.460±0.005	≥1.0	≥100	-	-60÷+250	≥15	Transparent two-component compound (potting) for filter shells of fiber optics, plug-in units, semiconductor devices
159-275	1.510±0.005	≥0.6	≥80		-70÷+280	≥10	Transparent two-component compound for filter shells of optical fibers, detachable assemblies, semiconductor devices

SIEL Compound brand	Performance Values						Note
	Refractive index, n_D^{20}	Tensile strength, MPa %	Relative elongation at break, %	Shore hardness, A, conventional units	Operating temperature range, oC	Drawing speed, m/min	
159-305	1.395±0.005	≥2.0	≥100	≥20	-90÷ +200	≥40	Transparent two-component compound for reflective coatings of optical fibers. Frost-resistant
159-306	1.4250±0.005	≥2.0	≥80	≥10	-50÷ +220 (for fiber optics) -60÷ +220 (for electronic devices)	≥30	Transparent two-component compound (coating) for buffer sheaths of optical fibers and sealing of electronic devices.
159-306 M	1.4250±0.005	≥2.0	≥90	≥12	-50÷ +220 - 60÷ +220 (for electronic devices)	≥30	Transparent two-component compound (filling) for buffer shells of optical fibers and sealing of electronic devices
159-358	1.420±0.005	-	-	≥90 (D, nominal units)	-60÷ +250	-	Transparent two-component compound for fixing optical fibers and other fiber optic mounting devices
159-452	1.382±0.002	≥1.2	≥90	≥20	-100÷ +220	≥25	Transparent two-component compound for reflective coatings of optical fibers. Frost-resistant.
159-470	1.4150±0.005	≥2.0	≥120	-	-60 +150		One-component UV-curable compound for optical bonding of glass optical components
159-492	≥1.47	≥0.8	-	-	-60 +140	≥90	One-component UV-curable compound for protective and strengthening coating of quartz optical fibers

SIEL Compound brand	Performance Values						Note
	Refractive index, n_D^{20}	Tensile strength, MPa %	Relative elongation at break, %	Shore hardness, A, conventional units	Operating temperature range, oC	Drawing speed, m/min	
159-496	≥1.50	≥1.0	≥55	≥30	-70÷ +280	-	Transparent two-component compound with high refractive index (nD20 ≥1. 50) and hardness ≥ 30
159-497	≥1.50	-	-	≥ 30 (D, nominal units)	-70÷ +220	-	Transparent two-component casting compound for forming light-extracting lenses and for optoelectronics
159-497 M	≥1.45	-	-	≥40 (D, nominal units)	-70÷ +220	-	Transparent two-component potting compound for forming light-extracting lenses and for optoelectronics
159-498	1.430 ±0.005	≥6.5	≥120	45	-115÷ +200	-	Transparent two-component potting compound



7.3 ORGANOSILICON COMPOUNDS FOR MEDICINE

SIEL compounds for medicine are used in plastic and reconstructive surgery, ophthalmology, cardiac devices, maxillofacial surgery, dentistry, etc.

SIEL Compound brand	Performance Values						Note
	Refractive index, n_D^{20}	Tensile strength, MPa	Relative elongation at break, %	Shore hardness, A, nominal units	Individual characteristics	Viability at n/u, h	
159-254 M-3 (high purity)	1.405±0.005	≥2,0	≥100	≥25	Good adhesion to metals, ceramics, glass	4-6	Transparent two-component compound for the production of protective shells for pacemakers and other devices
159-330	1.460±0.005	≥2.0	≥100	≥20	It is possible to introduce a UV absorber	≥6	Transparent two-component compound for intraocular lenses (IOL)
159-485 med	1.410±0.005	Gel-like material	-	<1,0 (OO, nominal units)	Stickiness in conventional units ≥ 4	≥3	Transparent two-component compound with high adhesiveness for the production of plasters (burns, keloid scars, etc.)
159-356	1.410±0.005	Gel	Penetration 100÷350 n. u. Modulus of elasticity 3÷9 kPa	-	Good adhesion to polyurethane film	≥7	Two-component beige compound is a viscous liquid . Is cured at a temperature of 150 °C÷160 °C for 1 hour

Tamponade in eye microsurgery – “light silicone” and “heavy silicone” substances. Among polymethylsiloxanes, a special place is occupied by oligomethylsiloxane in the form of a “light silicone” substance, used as a component of operations performed in eye microsurgery for severe forms of retinal detachment complicated by eye trauma or diseases and previously classified as inoperable cases. Such eyes are characterized by a severe condition – gross destruction of the vitreous body, degenerative changes in the retina, clouding of the lens, etc.

The drug's indicators fully correspond to the foreign analogue produced by the company "Adatomed".

"Light silicone" during the treatment is always located in the upper part of the eyeball, which allows it to be used for upper ruptures and tears of the retina, as well as changes in the periphery of the fundus.

Based on the copolymer of polydimethylsiloxane and methyl- γ -trifluoropropylsiloxane of a linear structure, a variant of the substance "heavy silicone" was prepared.

The substance "heavy silicone" is used with positive results in the treatment of eyes complicated by trauma and diabetic retinopathy.

8. ORGANOSILICON WATER REPELLENTS

Organosilicon water repellent "Liquid 136-41"

"Liquid 136-41" is developed on the basis of a unique polyethylsiloxane and has much higher water-repellent properties compared to other water repellents.

The effect of using the organosilicon water repellent "Liquid 136-41":

- Increase in frost resistance of concrete by 7 times.
- Increase in water resistance of concrete up to W=16.
- Decrease in water absorption of concrete by 12 times.
- Increase in service life of concrete and reinforced concrete structures up to 10 times (50 years or more).
- Reduced costs of repair work.
- Reduced heat loss of buildings and structures due to low thermal conductivity of dry concrete.
- Improved decorative properties of structures due to the absence of efflorescence on the surface.

Application areas: construction, special industries.

Organosilicon water repellent Aquastop T

Aquastop-T Organosilicon water repellent Aquastop-T is used as a surface treatment for porous building materials such as brick, tile, flower pots. Aquastop-T is used as an additive to concrete and mortars, and is part of paints and varnishes. Aquastop-T does not change the appearance of the material, maintains gas and air permeability; imparts frost- and corrosion resistance, lightfastness to the material, prevents surface contamination; is economized, since Aquastop-T is used as an aqueous solution when the commercial form is diluted with water more than 10 times. Aquastop-T is a non-flammable and explosive material. Flammability group - hardly flammable material. Appearance - color - transparent liquid from colorless to light yellow. Aquastop-T is used to protect against moisture in the construction of all parts of buildings, as well as concrete, asbestos-cement slate, cinder blocks and aerated concrete, gypsum fiber and gypsum board materials, in the production of cement-sand screeds, paving slabs, curbstones and other products.

Organosilicon water repellent Aquastop R

Aquastop-R belongs to the generation of modern organosilicon functional materials that are able to penetrate into the deep layers of the structure and create a protective film. At the same time, gas exchange is not disturbed, and moss and mold do not grow. This composition has a number of properties that indicate the need to use Aquastop-R during construction and installation: prevents the appearance of darkening and efflorescence on block and brick structures, prevents the penetration of excess moisture into structures; increases the resistance of materials to corrosion, the development of fungi and bacteria; reduces thermal conductivity and increases frost resistance;

The composition has antiseptic properties, is characterized by fungal resistance, eliminates the risk of destruction of structures and prevents the development of corrosion processes. When applied to walls, foundations and other structures, it leaves no traces and does not disturb the aesthetic appearance.

The use of the product reduces moisture absorption by products many times, which preserves the appearance and extends the service life. Water-repellent properties are demonstrated when processing bricks, concrete, blocks, paving slabs, natural and artificial stone, which is very important for regions with high humidity.

Organosilicon water repellent Aquastop S

Aquastop-S is a powdered alkali metal methylsiliconate used as a water-repellent additive for surface and bulk treatment of building materials.

Using Aquastop-S reduces moisture absorption by products many times, which preserves their appearance and extends their service life. Water-repellent properties are evident when treating bricks, concrete, blocks, paving slabs, natural and artificial stone, which is very important for regions with high humidity.

Aquastop-S has antiseptic properties and is able to prevent the appearance of fungi, reduce the risk of destruction and stop corrosion processes. When applied to walls, foundations and other structures, it leaves no traces and does not spoil the aesthetic appearance. Aquastop-S is used to treat masonry (especially non-frost-resistant bricks), porous rocks, and house facades.

Liquid 136-163

It is used as a highly effective solvent-borne water-repellent dielectric (easily diluted with white spirit). It can be used as a component of injection waterproofing, for impregnating capacitors and filling piezoelectric sensors. When emulsifiers are added, the product is emulsified in water to form emulsions with a given concentration of the active matter.

AMSR-3

Organosilicon liquid AMSR-3 is an aqueous solution of potassium aluminomethylsiliconate.

It is intended: - for processing proofing boards and conveyor belts in the baking industry;

- in oil production:
- for modifying drilling liquids,
- to reduce water ingress into the drill fluid,
- to increase oil recovery.

Water repellent AMSR-3 is used in cement-sand mortars and as a means for eliminating efflorescence; as a lubricant for aluminum bread molds; as a reagent for processing textile, leather and paper products and materials in order to impart water-, dust- and dirt-repellent properties to them; for hydrophobic treatment of rock in the bottomhole zone of wells to isolate water inflows.

9. ORGANOSILICON SEALANTS (ADHESIVES AND SEALANTS)

9.1 GENERAL PURPOSE

Silicone neutral one-component adhesive sealant "GERSILAST 137-83"

"Gersilast 137-83" is a paste-like viscous-flowing composition based on low-molecular rubber, catalyst and fillers, vulcanizing upon contact with atmospheric moisture to form a rubber-like material. Optimum performance is achieved during vulcanization under conditions of relative humidity of 50-70% for 5 days.

It is intended for bonding and sealing parts made of steel, aluminum, bitumen and roofing materials, aerated concrete, silicate and ceramic materials, decorative plaster products, chimneys, polystyrene, polypropylene, polyethylene, polycarbonate, foam, glass, plexiglass, polyurethane foam, gutter joints, adjoining areas to ceramic, silicate and concrete surfaces.

Application area:

- In everyday life: for bonding and sealing products made of steel, aluminum, silicate glass, ceramics, as well as as protective coatings from the above materials. Ideally bonds rubber to rubber.
- During repairs: sealing seams and joints of ceramic tiles, for external sealing of windows, for sealing as a liquid gasket in various connections (gutter joints, adjoining areas to ceramic, silicate surfaces).
- In industry: for bonding surfaces and sealing connectors of machines, mechanisms and units (pumps, compressors, engines, etc.) and as a protective coating for surfaces made of metals, ceramics, glass, rubber, sealing gas ducts of boiler units of power units and turbogenerators, as well as vacuum systems of turbines of state district power plants and thermal power plants. In radio and electric engineering for filling and sealing uncased electrical/radio components, places of soldering wires in products of special and household radio equipment, during electrical insulation work.

Silicone neutral one-component adhesives and sealants "Gersilast 137-352 brand A" "Gersilast 137-352 brand B“

Gersilast 137-352 brand A and B is a paste-like viscous composition based on low-molecular rubber, catalyst and fillers, vulcanizing upon contact with atmospheric moisture to form a rubber-like material.

It is intended for bonding and sealing metal and non-metal surfaces. There is positive experience of using Gersilast 137-352 brands A, B when bonding headlights made of polycarbonate, polyamide and silicate glass. In this case, the working characteristics are achieved in 24 hours.

Adhesive sealant Gersilast 11-01 (brand A and B)

Silicone adhesive-sealant "Gersilast 11-01" brands "A", "B". Homogeneous paste-like mass from white to light gray. Vulcanizes at room temperature in the presence of air moisture to form a rubber-like material.

Optimum physical, mechanical and adhesive properties are achieved after 5 days at a relative air humidity of 60% -75%. Workable in the temperature range from minus 60 °C to plus 200 °C.

Gersilast 11-01 brand A is used for gluing and sealing parts made of steel, aluminum, copper, organic and silicate glass, ceramics, concrete, as well as protective coatings for products made of the above materials. Gersilast 11-01 brand B is used for gluing vulcanized rubbers made on the basis of various types of silicone rubbers to each other and gluing them to metals (steel, duralumin, titanium) using a P-11 sublayer.

Product "Avtogermesil"

Universal silicone adhesive-sealant (liquid gasket), neutral, oil-heat-resistant, dielectric.

Application: in everyday life during plumbing works for gluing and sealing plumbing fixtures, sealing the places where sinks, bathtubs and kitchen furniture adjoin walls and floors. For bonding various materials, repairing electrical appliances, as well as for electrical insulation work, repairing and sealing building seams and joints of reinforced concrete panels in prefabricated housing, eliminating leaks in building structures, for gluing tiles made of any material, for bonding and sealing a glass diffuser with a polycarbonate housing of a headlight unit, for eliminating leaks in metal boats, for eliminating water, antifreeze and oil leaks in detachable units of a car, instead of cardboard, cork and rubber gaskets, as well as in the repair of plumbing equipment, bonding and sealing concrete parts, bonding and sealing glass parts, bonding and sealing window frames, glass, aquariums.

9.2 SPECIAL PURPOSE

9.2.1 Frost-resistant

Silicone neutral one-component adhesives and sealants "Gersilast 137-175M" "Gersilast 137-175M-1“

Adhesives and sealants, "Gersilast 137-175M", "Gersilast 137-175M-1", are paste-like viscous-flowing frost-resistant compositions based on low-molecular silicone rubber, catalyst and fillers, vulcanizing upon contact with atmospheric moisture to form a rubber-like material. Optimum performance is achieved during vulcanization under conditions of relative humidity of 50%-70% for 5 days. Frost resistance of the adhesive-sealant "Gersilast 137-175M" up to -90 ° C.

Designed for bonding metallic and non-metallic materials, including thermal insulation materials, operating in air and vacuum environments at temperatures up to 300 °C (at 300 °C – 50 h).

Adhesives and sealants have a glass transition temperature of minus 108 °C - 110 °C. When gluing TZI materials of the BTS product, the adhesive ensures the operability of the joint at temperatures down to minus 130 °C.

Frost-resistant adhesives and sealants also include:

Neutral one-component organosilicon sealant "Gersilast 137-180" grade A (for full information, see the "optically transparent" section);

Neutral one-component organosilicon sealant "Gersilast 137-182 M" (for full information, see the "heat-conducting" section).

9.2.2 Heat-conducting

One-component neutral silicone adhesive sealant "Gersilast 137-182" "Gersilast 137-182 M"

"Gersilast 137-182" is a paste-like composition based on low-molecular rubber, catalyst and fillers, vulcanizing upon contact with atmospheric moisture to form a rubber-like material. Optimum performance is achieved during vulcanization under conditions of relative humidity of 50%-70% for 5 days. "Gersilast 137-182" has frost resistance up to -60 °C, "Gersilast 137-182 M" up to - 80 °C.

It is intended for installation and fastening of electronic radio components and integrated circuits in various branches of science and industry. It significantly improves thermal operating conditions of devices and equipment. In the vulcanized state it is resistant to solvents (gasoline, toluene, alcohol, acetone, etc.).

Two-component neutral silicone adhesive sealant "Gersilast 137-242"

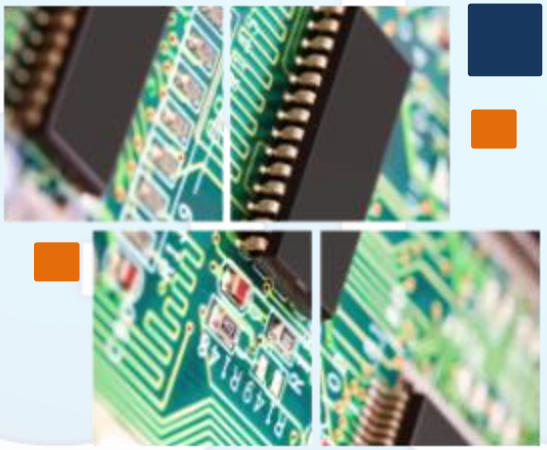
"Gersilast 137-242" is a paste-like 2-component composition based on low-molecular rubber and fillers, vulcanizing when mixed with a vulcanization catalyst (K-68) to form a rubber-like material. Optimum performance is achieved within 24 hours.

It is used as a 2-component heat-conducting adhesive-sealant for heat removal from heating elements and electrical insulation in electronics, electrical engineering, instrument making and mechanical engineering in conditions of limited air access

Silicone neutral one-component adhesive sealant "Gersilast 137-490"

"Gersilast 137-490" is a paste-like composition based on low-molecular rubber, catalyst and fillers, vulcanizing upon contact with atmospheric moisture to form a rubber-like material. Optimum performance is achieved by vulcanization under conditions of relative humidity of 50-70% for 5 days.

It is intended for installation and fastening of electronic and radio elements and integrated circuits in various branches of science and industry. It significantly improves thermal modes of operation of devices and equipment. In the vulcanized state it is resistant to the action of solvents (gasoline, toluene, alcohol, acetone, etc.).



9.2.3 Low-modular building adhesive sealants

Silicone neutral one-component adhesive sealant "GERSILAST 137-181"

"Gersilast 137-181" is a paste-like thixotropic composition based on low-molecular siloxane rubber, plasticizer, catalyst and fillers, vulcanizing upon contact with atmospheric moisture to form a rubber-like material. Optimum performance is achieved during vulcanization under conditions of relative humidity of 50%-70% for 5 days.

Designed for sealing concrete joints, including in large-panel building structures, parts made of steel, aluminum, glass, ceramics, as well as a protective coating for products made of the above materials in construction. There is positive experience of using the sealant at a Moscow construction site.

9.2.4 Fungus resistant

Silicone neutral one-component adhesive sealant "Gersilast 137-481"

"Gersilast 137-481" is a paste-like thixotropic composition based on low-molecular rubber, catalyst and fillers, vulcanizing upon contact with atmospheric moisture to form a rubber-like material. Optimum performance is achieved during vulcanization under conditions of relative humidity of 50%-70% for 5 days.

One-component fungus-resistant silicone adhesive-sealant "Gersilast 137-481" of RTV is intended for gluing, sealing and compacting metal and non-metal materials in industrial and household products used in places with high humidity. First of all, the adhesive-sealant is of interest to construction organizations engaged in sealing and compacting building structures, sanitary equipment, etc. in places with high humidity. In addition, the material may be of interest to various industries (radio engineering, electronics, aviation, shipbuilding, etc.) as an adhesive-sealant for products used in high humidity conditions. Fungus resistance tests were conducted at the Federal State Unitary Enterprise State Research Center of the Russian Federation "VIAM".

9.2.5 Optically clear

Silicone neutral one-component adhesive sealant "Gersilast 137-180" brands A and B

"Gersilast 137-180" is a one-component composition based on low-molecular rubber, a catalyst and special additives, vulcanizing upon contact with atmospheric moisture to form a rubber-like material. Optimum performance is achieved during vulcanization under conditions of relative humidity of 50%-70% for 5 days.

Recommended as an optically transparent adhesive-sealant for bonding and sealing optical systems, for surface sealing of strain-sensitive elements of electronic devices.

Two-component organosilicon sealant "Gersilast AK-28“

The sealant "Gersilast AK-28" is intended for gluing and sealing various parts of metal and non-metal materials, including for framing and sealing of cockpit glazing products for SSJ NEW and MS-21 family aircraft.

9.2.6 Oil resistant

Black silicone sealing gasket "PS-1"

Black silicone sealing gasket "PS-1" is produced in plastic buckets or cartridges for a construction gun. It is used to seal detachable joints where good oil resistance and high resistance to mutual movement of mating parts are required (sealing of stamped oil pans, timing covers, etc.).

When heated to plus 250 ° C, it does not spread, does not burn and does not lose its adhesive properties, and therefore can be used in moving mechanisms during their heating and vibration. Oil-and-gasoline-resistant sealant is a dark homogeneous thixotropic paste free from inclusions, lumps and clots. Silicone paste-like adhesive-sealant vulcanizes under the influence of atmospheric moisture.

It has good adhesion to metals, ceramics, plastics, wood, glass, concrete. Reliably seals and tightens flanges of all types, threaded connections, various detachable parts, seals detachable seams. Has high resistance to water, oils, gasoline and other aggressive environments, impacts and vibrations; does not have corrosive activity; can be used at temperatures from minus 50 °C to plus 250 °C.

10. ORGANOSILICON ADHESIVES

Glue KT-30

KT-30 glue is a solution of polyorganosilazane resin in toluene. The glue is one-component, cures at room temperature for 48 hours. The adhesive joint is corrosion-, fungus-, water- and weather-resistant, and is operable in the temperature range from -60 °C to 300 °C. When curing, the glue does not emit volatile compounds, and retains its properties unchanged under the influence of ozone, corona discharge, sunlight and radiation. Purpose: used for gluing vulcanized rubbers based on organosilicon rubbers and for attaching them to metals, as well as an adhesive sublayer for sealants and enamel coatings, metals with metals, ceramics, silicate and organic glass, wood, leather, etc.

Glue 151-31

It is a one-component product without a solvent. Purpose: for fastening rubbers based on fluorosiloxane and siloxane rubbers to metals during vulcanization. The adhesive joint obtained with glue 151-31 with strict adherence to the gluing technology is operable in the temperature range from minus 50 °C to plus 300°C, resistant to the effects of TC-1 fuel and 7-50C-3 hydraulic liquid at temperatures up to plus 150 °C.

11. ORGANOSILICON VASELINES AND PASTES

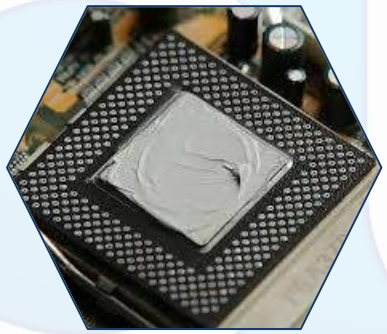
Silicone vaselines and pastes are plastic suspensions, the dispersion medium of which is polyorganosiloxanes, and the dispersed phase is various fillers. Specific consumer properties are determined by the type of polyorganosiloxane liquid and the chemical nature of the fillers. All silicone pastes and vaselines are characterized by hydrophobicity, a wide range of operating temperatures (-90 °C to +250 °C), low dependence of viscosity on temperature, low surface tension energy, high dielectric properties and, when using special fillers, thermal conductivity. All vaselines and pastes are chemically inert, explosion-proof, non-flammable, non-toxic.

11.1 HEAT-CONDUCTING PASTES

Thermally conductive organosilicon paste KPT-8

KPT-8 (Heat-conducting organosilicon paste) is an organosilicon paste manufactured in accordance with the requirements of GOST 19783-74. The KPT-8 organosilicon heat-conducting paste is chemically inert, explosion-proof, non-flammable, and has no irritating or general toxic effect on the body. The paste significantly reduces contact thermal resistance and is recommended for use in the operating temperature range from minus 60 to plus 180 °C. It is used to improve heat exchange between the contacting surfaces of powerful components of electronic circuits and radiators. It is a heat-resistant white mass of high viscosity.

Thermally conductive organosilicon paste 131-179

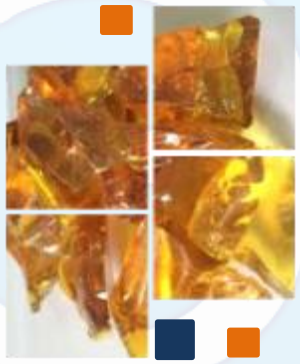


It is prepared by mixing polymethylsiloxane liquid with inorganic fine powders until a homogeneous viscous, dense gray mass is obtained. It is used for effective heat removal from heating elements in electronics, computers, radio and special equipment. Operating temperature range -60 °C to 180 °C. Thermal conductivity coefficient is not less than 1.8 W/m×deg. Non-toxic, explosion-proof.

12. ORGANOSILICON BINDERS AND RESINS

Organosilicon resins are capable of transforming into a non-melting and insoluble state when exposed to heat. As a result of molding resins in mixtures with mineral fillers, compositions with unique properties are formed. The main properties of organosilicon resins are presented below.

Resin brand	Volatile content, %, not more than	Duration of polymerization at 200 °C, min	Softening temperature, °C	Application
K-9 Brand «A»	3.0	50-180	85	They are used for the production of fiberglass for radio engineering purposes, heat-resistant putties and molding materials
K-9-O	3.0	-	-	It is used as an active solvent for thermosetting organosilicon resins, as a structuring agent for organosilicon sealants.
K-101	4.5	4-25	65-125	It is used for the production of structural fiberglass
K-101-O	1.0	-	125	It is used as an active solvent for K-101 resin in the production of fiberglass, additives to paints and varnishes, and also as a vulcanizing agent for sealants based on organosilicon polymers.



Organosilicon resin K-42

K-42 resin is intended for the production of mica insulation. It is a polymethylphenylsiloxane.

Shelf life: the guaranteed shelf life of K-42 resin in the manufacturer's container is 6 months from the date of manufacture.

Phenol-formaldehyde resin FS-117

Phenol-formaldehyde resin FS-117 is intended for use as a binder in the production of a fire-resistant composition used in aircraft engineering. FS-117 resin is available in two grades: grade A and grade B. FS-117 resin grade B additionally contains a modifier.

Resin 133-101

Organosilicon resin 133-101 is non-toxic, flammable, explosion-proof and does not emit toxic chemicals into the air of the working area that have an adverse effect on human health. Resin 133-101 does not irritate the skin.

It is used to produce molding glass mica and glass micapolium in the aircraft engineering and aerospace industry.

Resin 136-320

Organosilicon resin 136-320 (solution) is used as a binder for preparing light-resistant coatings.

Resin 139-240

Organosilicon resin 139-240 does not dissolve in water, does not react with water and does not oxidize in air. Resin 139-240 is used as a binder for preparing heat-resistant enamels, primers and a film-forming component.

Resin 143-115A

Resin 143-115 (solution) is used as an impregnating material for the production of fiberglass based on organosilicon resins, as well as a hardener for epoxy, epoxy-silicon and polyorganosiloxane resins in the production of fiberglass molding compositions and adhesives with increased heat and water resistance with improved physical and mechanical properties and high dielectric properties.

Resin 2F

Resin 2F is used as a starting component for the production of special equipment.

Resin B-1

It is used for the preparation of heat-protective compositions.

Silicasol-25

Aqueous colloidal sol of silicic acid, used as a binder for preparing ceramic shells in precision casting. It has unique properties and is widely used as a catalyst carrier, to impart strength and water resistance to fibrous materials, in the manufacture of glass, and as a coagulant in wastewater treatment.

In the mining and chemical industry, colloidal silica sol is used for the silicification of rocks.

13. SILICONE RUBBERS

Low molecular weight rubber SKTNF grade A

SKTN rubber is intended for the production of filling, enveloping and foamed compounds, sealants with high dielectric properties and operating at temperatures from minus 70 °C to plus 250 °C in high humidity conditions.

The rubber is non-toxic and safe for the environment. It cures at room temperature with organosilicon or organotin catalysts. It retains elasticity and dielectric properties at temperatures from minus 70 °C to plus 250 °C.

Appearance: colorless, opalescent viscous liquid.

Low molecular weight rubber SKTNF grade B

Unlike organic rubbers, silicone rubber SKTNF grade B is more economical, reliable and durable even under extreme operating conditions. It maintains elasticity for a long time in a wide range of temperatures and is easy to process.

The rubber hardens at room temperature in the presence of catalysts.

Materials made on the basis of SKTNF grade B rubber have high hydrophobicity, chemical inertness, dielectric properties, vibration resistance, resistance to fungi and microorganisms, resistance to ozone, oxidizers and ultraviolet rays.

The range of operating temperatures of use is from minus 90 °C to plus 300 °C. SKTNF grade B rubber is non-toxic. Does not contain solvents. Appearance - colorless, opalescent viscous liquid. SKTN rubber grade B is used to produce sealants, filling and enveloping compounds, rubber-like coatings, foam sealants, impregnating compositions. It is also used to produce gas-selective membranes, fillings and gaskets for mechanisms and devices.

Organosilicon rubber "Bitral"

Organosilicon rubber "Bitral" is a viscous white liquid. It is not hazardous to human health, fire- and explosion-proof material. It is included in the group of hardly flammable materials, resistant to moisture, radiation, ozone, chlorine, sulfur and nitrogen oxides, does not cause corrosion of silver, chromium, cadmium, tin, copper and aluminum alloys; the range of operating temperatures is from minus 60 °C to plus 300 °C.

Based on the rubber "Bitral" adhesives-sealants and compounds are produced, which in thin layers can be used in coating, insulating adhesive compositions, and in thick layers as gasket materials and sealants. It is intended for cased and uncased filling of strain-sensitive products and devices of electronic, radio engineering, electrical equipment of ground and airborne design, intended for operation in all climatic zones.

Organosilicon rubber "Ledsil"

It is intended for filling various products and devices of electronic, engineering, electrical equipment, intended for operation in extreme climatic conditions. Rubber "Ledsil" is resistant to ionizing radiation, moisture, ozone, chlorine, sulfur and nitrogen oxides, does not cause corrosion of metals and their alloys. The range of working temperatures is from minus 60 °C to plus 250 °C. Rubber "Ledsil" is not hazardous to human health (hazard class 4 according to GOST 12.01.007), fire- and explosion-proof material. Flammability group - hardly flammable material. On the basis of Ledsil rubber, adhesives, sealants and compounds are manufactured, which in thin layers can be used in various adhesive compositions, and in thick layers as gaskets and sealants.

Low-molecular rubber SKTNFT-50

Fluorosiloxane rubber SKTNFT-50 is used for the manufacture of gasoline-and-oil-resistant, fuel-resistant sealants, casting and enveloping compounds. Frost-, heat-, oil-resistant rubber is a polymer base for rubber sealants.

The rubber is intended for the manufacture of gasoline-and-oil-resistant, fuel-resistant sealants, monolithic, casting and enveloping compounds, operable in the temperature range from minus 60 °C to plus 250 °C and possessing high dielectric properties.

14. ORGANOSILICON HARDENERS AND STABILIZERS

Product 119-95

Product 119-95 is an organosilicon liquid. It is used in the production of electrical insulating organosilicon varnishes and stabilized binders for fiberglass. The liquid is dark brown, dissolves well in organic solvents, hydrolyzes with water, and decomposes in the light. The refractive index at 20 °C is 1.49-1.51. Product 119-95 is explosion-proof.

Product ADS-5

Product ADS-5 is an organosilicon liquid. A prescription-added hardener for various epoxy resins for sealing purposes, which imparts elasticity to the polymer. It is used in aircraft construction, rocket construction, shipbuilding (submarines), and building construction.

It is used as a hardener and modifier in the production of electrical insulating varnishes and stabilized binders for fiberglass in aircraft, cable industry and various areas of the defense industry. It is used as a hardener for epoxy resins, as well as a binder in the production of fiberglass.

Product SM-2

Product SM-2 is used as an antistructuring additive (stabilizer) in the preparation of mixtures based on siloxane and highly active fillers.

Serves as a stabilizer, widely used in the rubber industry. It is intended for the development of elastomeric materials with a sealing purpose. The introduction of product SM-2 into the reaction mixture up to 10% by weight makes it possible to improve the physicochemical properties of vulcanizates and preserve their technological properties during their storage.

Product TMFT

Product TMFT is a transparent liquid. It is intended for use as a binder and hardener in heat-protective compositions, as well as for the manufacture of special-purpose adhesives.

Product 111-269

Product 111-269 is a homogeneous liquid mixture of tin diethyl dicaprylate, urethane and tetraethoxysilane. It cures silicone compounds both on the surface and in volume (i.e. it is used for both coating and pouring), giving the compounds elasticity in the temperature range from minus 60 °C to plus 150 °C. It is used in aircraft and rocket engineering for sealing high-voltage and high-frequency assembly units of radio-electronic equipment of rocket communication equipment.

15. OTHER ORGANOSILICON PRODUCTS

Destructor for polymer coatings

Destructor for polymer coatings. Translucent liquid from light yellow to light orange without mechanical impurities. Designed to remove organosilicon (silicone) polymer materials (coatings) used in fiber optics, microelectronics, electrical engineering, construction or in household conditions. Can be used at different temperatures, and also locally or completely remove the coating. Can be diluted with anhydrous butyl alcohol.

Oligomer 137-248B

Oligomer 137-248 is used for heat-resistant materials and the development of coatings based on compositions of organosilicon polymers, as well as - as a component in the manufacture of sealants, adhesives, high-temperature heat-protective coatings.

Methylsilane

Methylsilane is a new unique chemical material required for preparing high-quality silicon carbide nanocomposites and nanoceramics of the carbon-silicon carbide type and coatings with unique indicators of oxidation and corrosion resistance, maintaining operational properties at high temperatures (up to 1900ºC).

Main area of application: special branches of the space, aircraft and nuclear industries

.

16. HIGH THERMAL CONDUCTIVE INSULATING SILICONE DIELECTRIC GASKETS

They are designed for uniform heat removal from heating elements in electronics, radio engineering and instrument making. They are a heat-conducting gasket based on a silicone binder and special fillers.

16.1 Thermal conductivity gaskets TP-1, TP-2

Heat-conducting gaskets TP-1 and TP-2 are silicone heat-conducting polymer composite materials. Gasket TP-1 consists of a filled polymer applied to fiberglass and is supplied in the form of sheets measuring 200x300 mm.

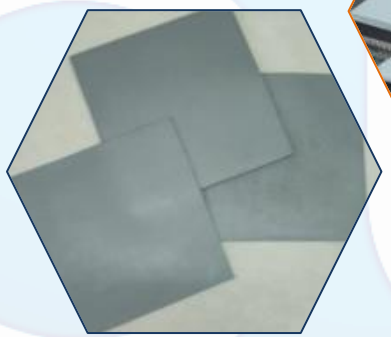
The TP-2 gasket is a two-layer filled silicone polymer with a reinforced and soft non-reinforced layer, supplied in the form of plates, 0.5 to 6.0 mm thick, 150x150 mm in size.

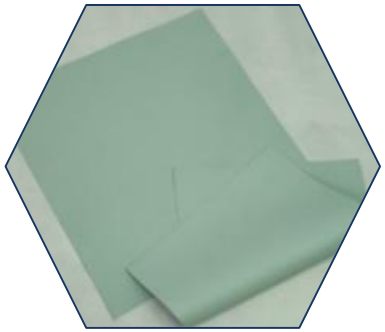
These materials are designed to remove heat from heating elements in electronics, radio engineering and instrument making.

16.2 High thermal conductivity gasket based on special fillers (TP-4)

Highly thermally conductive dielectric gasket material based on special fillers (TP-4) with a thermal conductivity coefficient of at least 3 W/(m·K) is designed to remove heat from heating elements in electronics, radio engineering and instrument making. It is a silicone gasket 1.5-4.0 mm thick, prepared by curing a silicone binder filled with thermally conductive fillers.

Supplied in the form of plates measuring 230x230 mm.





16.3 High thermal conductivity gasket based on special fillers (TP-5)

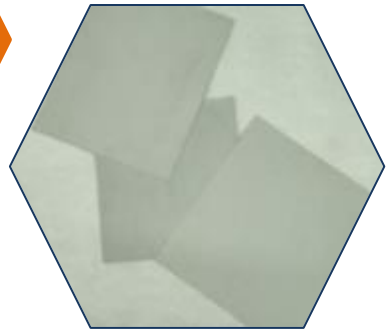
Highly thermally conductive dielectric gasket material based on special fillers (TP-5) with a thermal conductivity coefficient of at least 3.5 W/(m·K) is designed to remove heat from heating elements in electronics, radio engineering and instrument making. It is a silicone gasket 0.38 mm thick, prepared by curing a silicone binder filled with highly thermally conductive fillers.

Supplied in the form of plates measuring 230x230 mm.

16.4 High thermal conductivity gasket based on special fillers (TP-6)

Highly thermally conductive dielectric gasket material based on special fillers (TP-6) with a thermal conductivity coefficient of at least 5.0 W/(m·K) is designed to remove heat from heating elements in electronics, radio engineering and instrument making. It is a silicone gasket with a thickness of 0.5-3.0 mm, prepared by curing a silicone binder filled with highly thermally conductive fillers.

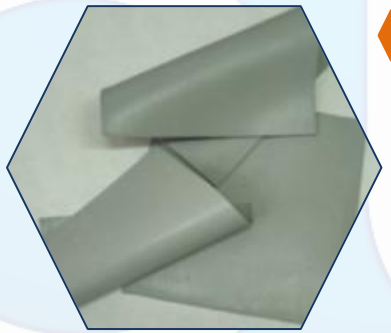
Supplied in the form of plates measuring 230x230 mm



16.5 High thermal conductivity gasket based on special fillers (TP-7)

Highly thermally conductive dielectric gasket material based on special fillers (TP-7) with a thermal conductivity coefficient of at least 5.0 W/(m·K) is designed to remove heat from heating elements in electronics, radio engineering and instrument making. It is a silicone gasket 0.5-1.5 mm thick, prepared by curing a silicone binder filled with thermally conductive fillers.

Supplied in the form of plates measuring 230x230 mm.



16.6 High thermal conductivity gasket based on special fillers TP-8

Highly thermally conductive dielectric gasket material based on special fillers (TP-8) with a thermal conductivity coefficient of at least 3.5 W/(m·K) is designed to remove heat from heating elements in electronics, radio engineering and instrument making.

It is a silicone gasket with a thickness of 0.38; 0.5; 1.0; 1.5; 2.0; 3.0; 4.0 mm, prepared by curing a silicone binder filled with highly thermally conductive fillers and, at the customer's request, can have an adhesive layer on either one or both sides.

Supplied in the form of plates measuring 230x230 mm.

17. SILAZANES

17.1 POLYORGANOSILAZANE RESINS

Marks: 174-71, 174-72, 174-73, 174-74

PURPOSE:

Organosilicon resin grade 174-71 is a viscous light yellow liquid. Hydrophobic and strengthening agent for various lime materials.

Organosilicon resin grade 174-72 is a viscous light yellow liquid. It is used as a microencapsulating agent for various types of powders.

Organosilicon resin grade 174-73 is a viscous yellow liquid. Hardener-stabilizer for organosilicon resins.

Organosilicon resin grade 174-74 is a viscous brown liquid. It is used as a binder for enamel and varnish coatings.

Application: innovative materials.

17.2 POLYSILAZANE RESINS

"Hydrosil", "OMGS"

Description and purpose:

"Gidrosil" is a solution of oligoperhydrosilazane in diethyl ether, is a pre-ceramic precursor of silicon nitride Si_3N_4.

"OMGS is a solution of oligomethylhydridesilazan in toluene, is a pre-ceramic precursor of carbonitride SiCxNy and silicon carbide SiC.

Application: Ceramic matrices of composite materials, oxidation-resistant ceramics, chemical engineering, innovative materials.

"Polysil-04", "Polysil-04M"

Description and purpose:

"Polysil-04" is a solution of polymethylvinylhydride silazane in toluene.

It is used as a binder and impregnating component in the production of ceramic materials.

"Polysil-04M" is a solution of a mixture of polymethylvinylhydride silazane in toluene. It is used as a binder and impregnating component in the production of oxidation-resistant ceramic materials, including ceramic matrices of composite materials.

Application: "Polysil-04", "Polysil-04M" - ceramic matrices of composite materials,

oxidation-resistant ceramics, chemical engineering, innovative materials.

Organosilicon pre-ceramic polymer grade PS-17(3)

Description and purpose:

"Polysilazane PP grade PS-17(3)" is a 60-80% mass solution of polymethylvinylhydridesilazane in toluene. Organosilicon pre-ceramic polysilazane is used to form a ceramic matrix of silicon carbonitride SiCxNy.

Application: ceramic matrices of composite materials, oxidation-resistant ceramics, chemical engineering, innovative materials.

17.3 POLYSILAZANE WATER REPELLENTS

Liquid 141-50K brand A

Description and purpose:

Product 141-50K grade A is a mixture of oligoorganosilazanes in gasoline or toluene and is intended for use as a sublayer under organosilicon compounds.

Application: radio engineering, electronics, restoration.

18. ORGANOELEMENT PRODUCTS

Lightweight high-temperature multifunctional combined protective systems (KZS) for energy saving and life support

KZS is a new class of high-temperature multifunctional combined thermal insulation materials developed at GNIIChTEOS, consisting of fibrous oxide refractories protected by highly heat-resistant coatings based on filled modified silicones. The use of KZS will allow for a comprehensive solution to the problems of multi-purpose thermal protection, reduce the weight of structures, and also increase the productivity of equipment many times over by reducing the "heating-cooling" cycle and reducing the duration of repair work, in addition, it will provide an energy-saving effect of up to 50%.

KZS complies with international quality certificates, its features exceed those of known analogues in terms of a combination of thermophysical and operational characteristics.

Application areas:

- Automotive, aviation industry, shipbuilding;
- Electric and thermal power engineering;
- Metallurgy, ceramic, chemical industry, construction, communications;
- Energy-saving heat and fire protection of thermal equipment;
- Multifunctional environmental protection of premises, elevators, rescue rooms, boxes for data transmission;
- Multifunctional environmental protection of transport;
- Multifunctional environmental protection of power plants, including nuclear technologies;
- High-temperature equipment with a “clean” working chamber.
- Multifunctional fire protection and life support systems;
- Aerospace engineering technologies, including spacecraft;
- Erosion-resistant thermal insulation of heavily thermally loaded elements of launch and propulsion systems;
- Lightweight fire and thermal protection of mobile vehicles, including overcoming areas with radiation hazard.

Binder "Alumox“

"ALUMOX" is a finished silica-free binder for the production of casting mold that do not interact with highly reactive poured metal at temperatures up to 2000 °C.

Main area of application: metallurgy - production of ceramic shell molds for high-precision complex-profile casting (up to 2000 °C) using investment casting patterns (blades of gas turbine engines with directional and single-crystal structure) of critical-purpose products made of high-alloy steels, titanium, heat-resistant alloys and refractory metals.

YMg-alumoxane

The introduction of MgO and Y2O3 additives has a positive effect on the mechanical properties and microstructure of alumina ceramics, and it is the composite additive that includes MgAl2O4 (spinel) and Y3Al5O12 (yttrium aluminum garnet) that is effective, rather than MgO or Y2O3 oxides separately. YMg-alumoxane is soluble in organic solvents, has fiber-forming properties, its pyrolysis leads to the formation of high-purity ceramics based on aluminum, yttrium and magnesium oxides and, therefore, can be used as precursors of components (fibers, binders, coatings, powders, etc.) of highly heat-resistant ceramic composites of oxide composition. JSC GNIIChTEOS received Russian patent No. 2776286 2022 "Method for producing ceramic fibers of mixed oxide composition MgAl2O4/Y3Al5O12". In addition, YMg-alumoxane is a highly effective sintering additive for liquid-phase sintering of SiC ceramics, the introduction of only 0.5 vol. % of the sintering additive increases the strength of the composite by 2.2 times, microhardness by 2.4 times, and the crack resistance coefficient by about 1.3 times. Dense ceramic composites were prepared by hot molding of MoSi2 with a sintering additive YMg-alumoxane from 1 to 10 wt.%. The density of MoSi2 +1 wt.% YMg-alumoxane composites is 5.45 g/cm3 and MoSi2 +10 wt.% YMg-alumoxane is 5.95 g/cm3 with a decrease in the open porosity of ceramics from 3% to 1.2%.

SiC/W fiber with carbon coating

The physical and mechanical characteristics of silicon carbide fibers determine their use as a reinforcing component in composite materials with a titanium or intermetallic matrix, which are used to develop products for aircraft and space technology.

Yttriumoxanealumoxane 30% alcohol solution

It is a binder for the manufacture of ceramic heat-resistant melting crucibles and casting molds, minimizes physical and chemical interaction and significantly (5 times) reduces the size of the alpha layer on the surface of titanium products, improving their quality and service properties.

The peculiarity of using the yttriumoxane-alumoxane solution for sintering Si3N4 powder instead of sintering additives of aluminum and yttrium oxide powders is the uniform distribution of aluminum and yttrium oxides in Si3N4 ceramics and the chemical activity of the yttrioxane-alumoxane pyrolysis products, including amorphous nanosized oxides on the surface of the Si3N4 powder.

The density, porosity, microstructure and degree of purity of the polished surface of the prepared ceramics indicate its potential for use as blanks for high-quality rolling elements.

Boron fibers

Boron **fibers** today remain one of the most popular reinforcing materials with high mechanical characteristics, working under compression and tension. They are used in the manufacture of prepreg tapes with an epoxy binder as a matrix. Such tapes are used in aircraft for the manufacture of horizontal and vertical stabilizers, tail units, spar frames, and fasteners.

Boron fibers are widely used in sports equipment: fishing rods, tennis rackets, skis, and hockey sticks. However, the main purpose of boron threads is the manufacture of metal composite materials based on aluminum as a matrix, which are successfully used to manufacture spacecraft frames, including reusable spacecraft.

Quality indicators:

Average strength, MPa — not less than 3300

Strength variation coefficient, % — not more than 20

Average diameter, μm — 135-145

POFT-3 modifier

It is used as a hardener and stabilizer for polyorganosiloxanes, silicon epoxy resins, polyorganosiloxysilazanes, silazanes and epoxy resins. The curing and modification of these products with the introduction of POFT-3 can occur both at room temperature and at temperatures up to 200 °C.

Polycarbosilane PKS-M

Ceramic-forming organosilicon polymer. During pyrolysis, it forms silicon carbide (SiC). It is intended for use as a binder, coatings, matrices and SiC-based fibers for the manufacture of composite materials. It is a solid, brittle, transparent substance from yellow-green to brown. There are no non-melting inclusions. The guaranteed shelf life is 1 year from the date of manufacture.

Product MFSS-8

The product MFSS-8 is a solution of methylphenylspirosiloxane in acetone. It is used to increase the operating temperature of polymer compositions, fiberglass, ceramics, including by the method of surface and volume impregnation. It is used to obtain electrical insulating materials.

19. Pigments

Magnetic series pigments: "GZB brand 14", "GZB brand 254", "GZB brand 25M", "LKN“

The pigments are intended for preparing magnetic paints of different colors. They differ in magnetic properties. Magnetic pigments for professional series paints are a fundamentally new product developed specifically for those who want the magnetic effect to be the strongest. Magnetic paints are used for offices, stores and educational institutions.

Product 319-03-2T

Finely dispersed iron oxide of high purity, used for metallothermy in the nuclear industry. The standard mass fraction of total and divalent iron oxides for product 319-03-2T is not less than 98%.

Iron oxide powder grade PTR

Iron oxide, a bulk additive to ceramic products for red-burning and white-burning clays when fired above 1000 degrees, gives bricks (and other ceramics) a color from burgundy to cherry. The recommended additive rate is from 5% to 10% of the mass. It is also used in the production of paints and varnishes and the glass industry.

Iron oxide

Finely dispersed trivalent iron oxide, which is a homogeneous red or red-brown powder. It is used in the production of ferrites for electronics and radio engineering and ferrites of especially high purity.
Qualification marking - "ch“ (pure) is applied to the packaging and label. Characterized by a high content of iron oxide.

Magnetic water paste for magnetic flaw detection

Magnetic water paste is a black water-based magnetic powder concentrate for the preparation of magnetic powder suspension. Magnetic water paste is used for magnetic particle testing, which is a non-destructive testing method for detecting and localizing surface and subsurface defects of ferromagnetic materials (important - the measured materials must have a relative magnetic permeability of at least 40).

20. CATALYSTS

Catalyst K-1 (dibutyl tin dilaurate)

Transparent liquid with a yellow tint. It is one of the elements of two-component adhesive systems or sealants. Supplied in plastic packaging. The basis of the K-1 catalyst is a solution of complex organotin compounds in orthosilicic acid esters. During the polymerization process, it combines with low-molecular silicone polymers, as well as silane modified with polyolefins.

Can be used both independently and in combination with amine catalysts. It is used in industry for the production of: urethane polymers, sealants, adhesives, silicone polymers.

Widely used in construction, design, industrial purposes. It is used for pouring panels and fabricating sandwich blocks. Household use of the product is not recommended.

Catalyst K-18

K-18 is used as a catalyst and vulcanizing agent at room temperature to obtain the compound "Viksint K-18", sealant "Viksint U-1-18", foam sealants VPG, as well as for the manufacture of anti-adhesive coatings based on polymethylaluminosiloxanes and other purposes.

Catalyst K-18 A

K-18 A is used as a catalyst and vulcanizing agent at room temperature to obtain anti-adhesive coatings based on polymethylaluminosiloxanes, in particular low-molecular rubber AC-300.

Catalyst 213-23

Catalyst 213-23 is used as a non-toxic catalyst for RTV silicone rubbers.

Catalyst 230-19 (Tin octoate)

Catalyst 230-19 is a salt of divalent tin 2-ethylhexanoic acid. Catalyst 230-19 is well soluble in ether, toluene, benzene, chloroform and other organic solvents, insoluble in water, hydrolyzed by water. Low-toxic, explosion-proof, flammable. Catalyst 230-19 is produced as stabilized paraoxydiphenylamine.

Catalyst 230-19 is used in the production of elastic polyurethane foam. It has good solubility in polyether and most organic solvents. Catalyst 230-19 is considered worldwide as a reference catalyst in the production of elastic block PU foam based on polyesters due to its exceptional ability to accelerate the reaction of urethane formation between NCO groups of isocyanate and hydroxyl groups of polyether polyol.

The use of catalyst 230-19 ensures the production of high-quality foam rubber, uniform in its

properties. The addition of Stannous Octoate to the recipe allows the production of large quantities of elastic block foam of excellent quality and the organization of economical and high-speed production. Catalyst 230-19 has the strongest effect among gelation catalysts.

Catalyst 230-15 (tin diethyl dicaprylate)

Catalyst 230-15 is a liquid, which is a promoter and is related to the group of chemicals.

It actively reacts with a mixture of organosilicon polymers.

The main area of application is industrial. Catalyst 230-15 is used as a promoter and helps to start the process of RTV of organosilicon polymers in the production of polyurethanes. Under its influence, liquid substances are converted into a rubber-like material that acquires plastic, water-repellent and air-impermeable properties.

Organosilicon rubbers are also prepared by RTV using Catalyst 230-15. They are used to produce sticky lubricants and gaskets that do not require additional gluing to the surface.

Stabilizer 222-08

Stabilizer 222-08 is designed for RTV of silicone rubbers, polyvinyl chloride plastics and other purposes.

Stabilizer 222-09

Stabilizer 222-09 is a colorless or slightly colored substance without additional elements and mechanical inclusions. It is designed to accelerate the chemical reaction without changing the composition of the final product. It is used in industrial production and everyday life.

It is a chemical special-purpose liquid with a weak odor, colorless or dark yellow. Stabilizer 222-09 interacts well with such products as compounds and sealants. The main property is the curing of the material used. It is designed to accelerate curing of paints and varnishes and epoxy resins. The solution gives the product high wear resistance, resistance to mechanical action and ultraviolet radiation. It can also effect the appearance, giving a glossy or silky shine. Provides good moisture protection and physical and mechanical properties. Hardening occurs at room temperature. It has a number of advantages - minimal shrinkage; high durability; excellent adhesion to various materials. It is used for moisture, heat, vibration and electrical insulation sealing; in the production of gaskets and fillers; as a vulcanizing agent; in the manufacture of anti-adhesive coatings.

Trioctylphosphine oxide

Trioctylphosphine oxide (TOPO) is an organophosphorus compound. Often written as TOPO, it is used as an extraction or stabilizing agent. It is an air-stable white solid matter at room temperature.

The main application of TOPO is in solvent extraction of metals, especially uranium. High lipophilicity and high polarity are key characteristics for this application. Its high polarity, which is a result of the dipolar phosphorus-oxygen bond, allows this compound to bind to metal ions. The octyl groups impart solubility in low-polarity solvents such as kerosene.

In the research laboratory, TOPO is often used as a capping ligand to prepare quantum dots, such as those made of CdSe. In these cases, TOPO serves as a solvent for the synthesis and solubilizes the growing nanoparticles. TOPO coated quantum dots are typically soluble in chloroform, toluene, and (to a lesser extent) hexane. These quantum dots are also used in biological applications as part of a protective barrier to prevent degradation when passing through the severe climate.

Trioctyl phosphate

A chemical compound from the group of phosphoric acid esters. Miscible with mineral oils and gasoline, immiscible with water.

Used as a flame retardant, a plasticizer for polyvinyl chloride and cellulose nitrate, as an alkylation agent for heterocyclic nitrogen compounds, and as a catalyst for the production of phenolic and urea resins. Also used as an antifoam and a cosolvent in the production of hydrogen peroxide.

21. ORGANOBORON PRODUCTS

Product DKK-K (potassium salt of bis(dicarbollide) cobalt)

Product DKK-K is a crystalline powder from yellow to orange, non-volatile. Melting point is above 350 °C. The product is difficult to combust, resistant to light, oxygen, air moisture. It is used in medicine, ion-selective electrodes, in the extraction of radionuclides, as a high-energy additive.

1,7-Di(oxymethyl)-m-carborane

Crystalline substance from white to light purple. Melting point 193 °C. 1,7-Di(oxymethyl)-m-carborane is resistant to moisture and air, soluble in most organic solvents.

It is used as a monomer in the production of highly heat-resistant polymers and adhesives.

Polyethercarborane

A solid waxy substance with a softening point of no more than 85 °C. Under normal temperature conditions, polyethercarborane is low-toxic, explosion-proof, non-volatile, flammable. The decomposition temperature is above 260 °C.

It is intended for use as a base for obtaining heat-resistant adhesive compositions.

Sublimated O-carborane

It is an organoboron compound. The most famous carborane. It was considered for a wide range of applications - from heat-resistant polymers to medicine. This is a solid crystalline white or light gray substance (powder) with a specific odor. Melting point 296 °C. Toxic.

It is possible to synthesize and sell its structural isomers: meta-carborane and para-carborane.

Chlorinated cesium salt of bis(dicarbollide) cobalt (HDK-Cs)

The HDK product is a crystalline, powder from light orange to dark red with white and green inclusions. The product is stable, resistant to oxygen and air moisture. Hard-to-combust. Toxic. It is used as an extractant for the extraction of cesium and strontium radionuclides from high-level waste (HLW).

Amminboran

A solid substance under normal conditions, an inorganic analogue of ethane. Synonyms: Ammine-borane complex, borazane, chemical formula - NH3BH3. Molar mass - 30.866 g/mol. Density - 0.78 g/cm3. A solid source of hydrogen, as it contains 19.6% hydrogen by weight. A stereoselective reducing agent for carbonyl compounds in protic and aprotic environments. It can also be used to obtain boron nitride coatings and extract metals (Ag, Pd, Au, Ni) from solutions of their salts.

22. ALUMINUM AND BORON HYDRIDES

Decaborane

Decaborane is a binary inorganic compound of boron and hydrogen. A solid crystalline, powdery substance of white or yellowish color with a specific odor. In the solid state it is stable, in the molten state it spontaneously ignites in air. Slowly reacts with water, volatile. Decaborane is the main raw material for the synthesis of heat-resistant polymers and carboranes, a source of boron for ion-implantation processes. A component of highly effective rocket fuels.

Toluene solution of decaborane

It is a transparent liquid from light brown to orange. Toluene solution of decaborane is toxic, flammable, explosive. The mass fraction of decaborane in the solution is 15% - 20%. It is used in chemistry as a ready-made solution for the synthesis of ortho-carborane and other carborane compounds.

23. Ge-BASED PRODUCTS

Astragerm-C (1-hydroxygermatrane monohydrate)

1-hydroxygermatran is used as a raw material for the production of biologically active food supplements.

Application areas: perfume and cosmetic industry, food industry, medicine, agriculture.

Examples of application: it is a component in biologically active supplements "Astrogerm", "Aqua", "Germanorm", "Longevity Balm", "Vitality Restoring Balm", "Biococktail" and perfume and cosmetic products "Expansion of Passion", "Expansion of Beauty", a series of creams for hand, foot, face and body care. It has shown a positive effect when used as a component of toothpastes.

Phenyltrichlorogermane

Application areas:

It can be used as a modifier of organoelement oligomers and polymers (for introducing phenylgermoxane units into the structure).

For the synthesis of biologically active compounds.

Diphenyldichlorogermane

Application areas:

It can be used as a modifier of organoelement oligomers and polymers (for introducing phenylgermoxane units into the structure).

For the synthesis of biologically active compounds.