> Trust Bluestar Silicones for electrical applications

- **Recognized expertise**
  With more than 50 years experience in the silicones rubbers, Bluestar Silicones proposes a wide range of specialized products for electrical applications. This range is composed by specific products for the production of electrical cables, composite insulators, surge arresters, cable ends but also by products for potting, conformal coating, insulator impregnation, etc. In order to obtain products always more powerful and adapted to all needs, Bluestar Silicones is working closer with you to define your specific requirements for the research and development of new products right through to the development of exclusive solutions.

- **A worldwide presence**
  With production sites in all the continents and a worldwide logistics chain, Bluestar Silicones can supply quality products and services consistent in terms of performance level and adaptable to each specific use throughout the world.

- **Technical service: specialized teams in elastomers technology**
  At Bluestar Silicones, electrical industry segment is managed by specialists who have an in depth knowledge of Silicones and their applications and many years of experience. Upon request, they are supporting customers for specific applications and guidance. Electrical industry teams are coordinated and supported by Tech Service Laboratory and its resources in Research, data-base and performance evaluation.

- **Analytical capabilities and approved industry sector tests**
  With state-of-the-art equipment and unique know-how, our teams are able to select the best solutions in the laboratory before testing on-site. This helps to determine, with your team, the optimal solution for your needs.

- **Regulatory assistance adapted to the most demanding markets**
  Our specialists have detailed knowledge of the evolution of standards and current regulations. They are capable of guiding you in terms of legislation as well as giving you regulatory assurance for all the most demanding applications.

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> In order to be closer to your needs, Bluestar Silicones has specialized formulation and packaging units: the Mix & Fix Centers®.

Specialized in heat curing silicone rubbers (HCR), the Mix & Fix Centers® are located at the center of major rubber and elastomer converter regions. Besides selling master batches and other products, these centers develop, within extremely short lead times, products according to your specifications and your equipments.

Bluestar Silicones Mix & Fix Centers® network

The Rhodorsil® HCR range can be utilized in two ways:

- Make up your own silicone elastomer batches
- Call your Mix & Fix Center® to
  > Propose batch formulations.
  > Prepare samples.
  > Deliver ready-to-use compounds in the colors, presentation, and curing system of your choice.
  > Formulate compounds containing some exclusive additives and catalysts (such as platinum catalyst).
An ongoing commitment to safety, protection of health and the environment

Bluestar Silicones is committed to manufacturing its products and carrying out its operations with a continuous focus on improving safety and protecting health and the environment.

Silicone Elastomers: General Guide

Bluestar Silicones proposes a wide range of Silicone Elastomers for the rubber industry. You can find all those products in the Silicone Elastomers General Guide.

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Rhodorsil®
Electrical applications guide
> Why choosing Silicone Elastomers for electrical applications?

**Macromolecules with unlimited structural possibilities**
Silicones (or polyorganosiloxanes) have a chemical structure based on alternating units of silicon and oxygen. The originality of silicones compared with natural silica lies in the organic, carbon-containing groups that are included in their molecular framework.
According to the type of organic groups attached in this way, and the production and compounding methods used, a great variety of products can be obtained: their final texture can be free flowing, viscous or paste-like, elastomeric or even rigid.

**A mineral-plastic hybrid**
The difference between silicones and other organic polymers (i.e. plastics) lies in the fact that they contain a semi-inorganic element, silicon bonded to oxygen atoms with Si-O- bonds.
The bonds formed between the silicon and oxygen atoms go to make up the macromolecular framework and are exceptionally stable. They are much more difficult to break than the carbon-carbon bonds found in organic polymers.

**Stable, pure and high performance polymers for a wide range of applications in electrical industries**
Thanks to specific properties of Si-O-Si bond and ingredients purity, Silicone Elastomers show unique properties for many different electrical applications:
> Electrical cable, junctions and cable ends: High insulating performances with resistivity range from $10^{15}$ to $10^{16}$ W.cm.
> Safety cable: Thermo oxidative stability bringing high fire resistance, high ashes cohesion and non toxic smokes.

**Composite insulators and surge arresters:**
The excellent level of hydrophobicity and the outstanding recovery of hydrophobic properties after pollution, combined with UV and IR resistance means that Silicones are top performers in the polymers world.

**Potting:**
Very good fluidity of liquid Silicones (RTV-1 and RTV-2) and high insulating performances are particularly recommended in electric and electronic fields.

**Conformal coating and insulator impregnation:**
Remarkable spreadability of Silicone resins and adhesives associated with excellent temperature resistances are widely used for the protection of many supports.

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**Main outstanding properties of silicone elastomers**
- Excellent dielectric properties
- Very high heat stability: -50°C up to 300°C (using specific additives).
- Outstanding resistance to natural aging agents (spray, bad weather, UV radiation, ozone, salt fog, etc.) as well as to climatic and industrial pollution.
- High long-term water repellency and outstanding ability to recover hydrophobic properties.
- Excellent tracking and erosion resistance.
- Excellent fire resistance and low emission of smoke.
- Non toxicity of residual gas.
Bluestar Silicons offers a complete range of silicone elastomers for the electrical industry including numerous different technologies.

**Rhodorsil® HCR**
Heat cure silicone elastomers are basically made from reactive silicone gums, linear and specific silica fillers. HCR have outstanding properties and are far superior to conventional organic elastomers. They exhibit exceptional mechanical strength at temperatures ranging from - 50°C to + 300°C. The aging resistance of these elastomers highlights their fundamental qualities such as the fact they are chemically inert, their photo-oxidative stability and the absence of residual reactive groups once cured. A wide range of coloring is available. HCR are available as rubbery breads and supplied in two forms: master batches (without incorporated catalyst) or as ready to use compounds (through Bluestar Silicons’ Mix & Fix Centers®).

**Rhodorsil® RTV-2**
Rhodorsil® RTV-2's are two-component liquid silicone elastomers. Their cure rate is generally slow at ambient temperature (pot life), but very quick at high temperature. The curing rate doubles every 10°C. Rhodorsil® RTV-2 cure by a polyaddition reaction. They have two parts (A and B), mixed in a ratio of 100/100 (catalyst in A part) or 100/10 (catalyst in B part). Mixing the two components is obtained manually for small quantities and mechanically for quantities over 1 kg, in a rotary mixer or using dispenser pumps. These elastomers cure without releasing any by-products and there is consequently very little shrinkage.

**Rhodorsil® LSR**
LSR are bi-component systems (80/10 or 50/50) which viscosities are generally included between 10 000 and 10^7 mPas. This type of formulation forms an elastomeric network thanks to reactions of polyaddition in the presence of a platinum catalyst. The processing and product performance advantages of liquid silicon rubbers (LSR) are utilized in many existing and new applications. This type of rubbers can associate essential properties of silicon polymers and easy injection molding processing. After mixing A and B parts in a static or dynamic mixer, the largest means of transformation are injection-molding machines working at medium or high pressures, or pumps directly feeding a mold at ambient pressure. These mixtures are vulcanizable from 60°C to around 150°C.

**Rhodorsil® Resins & Adhesives**
Rhodorsil® resins are silicone polymers characterized by their three-dimensional branched-chain structure. Their preparation involves hydrolysis and polycondensation of silanes (mono, di and tri-functional silanes and sometimes even tetra-functional silanes). These “polymers”, after completion of the reactions of polycondensation and cross linking under the combined action of heat and catalysts (siccatives), yield flexible or rigid films, always hydrophobic and capable of resisting decomposition over long periods of time under high temperature without depolymerisation.

**Rhodorsil® RT Gel**
Rhodorsil® RT Gel are two-component silicone oils curing by polyaddition reaction. The viscosities of the two parts are generally included between 700 and around 7000 mPas. This low level of viscosity allows a very easy mixing of two components which can be performed manually or mechanically for higher quantities (over 10Kg).

In order to answer all your needs in term of electrical insulation, Bluestar Silicons has developed a complementary range including three different technologies.

**Rhodorsil® CAF (RTV-1)**
CAF are one component liquid silicone elastomer curing at room temperature on contact with atmospheric humidity. On contact with air moisture, CAF cure liberating an oxime, an alcohol or acetic acid depending on their cure type. Processing is particularly easy, since the products are delivered ready to use. Application can be carried out either manually or using robotic equipment. Their cure rate can be considerably accelerated by increasing temperature and humidity. After curing, CAF are transformed into silicone elastomers offering very good mechanical properties, good heat stability and high dielectric properties.

**Rhodorsil® Pastes**
Rhodorsil® Pastes are made of a polydimethyl siloxanic oil thickened with inert fillers. Rhodorsil® Pastes are mainly used as sealants and electrical insulants. Their main properties are:
- High dielectric properties.
- Excellent resistance to high temperatures, without hardening or degradation.
- Exceptional resistance to water and many chemical agents.
- Good resistance to oxidation.
- Strong anti-adherent characteristic.

**Rhodorsil® ESA**
Rhodorsil® ESA are two component Adhesive Silicone Elastomers (ESA) curing very quickly (within a few minutes) at high temperatures (+ 120°C to 200°C) - (Polyaddition reaction). After polymerisation, Rhodorsil® ESA form a flexible adhesive film which is particularly resistant to thermal, climatic and environmental attacks. Rhodorsil® ESA are designed for bonding to silicone elastomers, metal or plastic surfaces in Electrical industries.