HRS Co., Ltd.
www.hrssilicone.cn www.hrssilicone.com

SILICONE RUBBER
ARTICLE

We will make every effort to meet your service requirements by developing new technologies and products through continuous research and development.

Silicone Technology
HRS

SPECIALIST IN
SILICONE RUBBER TECHNOLOGY

We will make every effort to meet your service requirements by developing new technologies and products through continuous research and development.

C / O / N / T / E / N / T / S

EVERYTHING FOR YOUR LIFE - HRS

HRS Co., Ltd., was established in 1981 and developed silicone rubber compounds for the first time in South Korea. We now provide a variety of silicone rubber products such as Silicone Gum, Vinyl Polymer, HCR, LSR, RTV and silicone rubber molded and extruded articles.

We have focused on developing customized and environmental friendly silicone rubber products for industries such as electric and electronics, IT, automobile, machinery, medical tools and consumer goods and have customers in over 20 countries worldwide. HRS now offers more than 200 products and services under the company's HRS brand.

HRS Co., Ltd, now makes an effort to further expand the markets to come up to various customers' expectations for the qualified and specialized silicone rubber molded and extruded articles based on 32 years know-how about silicone rubber fabrication and basic technologies.

Our specialty is providing technical solutions to customers' needs not only for the raw materials but silicone rubber molded and extruded products.

SEOUL OFFICE

- **Main Businesses**
  - Trading Team
  - Finance Team
  - HR/IR Team
  - Strategy & Planning Team

PYONGTAEK PLANT

- **Main Businesses**
  - HCR Silicone Rubber
  - LSR Silicone Rubber
  - RTV(F/S) Silicone Rubber
  - Silicone Gum/Polymer
  - DM Dental Impression Materialsi

1978~1985

1978. 05 Established Hae Ryong Trading Company (Importing business of silicone rubber)
1981. 07 Incorporated as Hae Ryong (started developing the manufacturing technology of silicone rubber Compound)
1983. 10 Awarded for New Material development by the minister of the Ministry of commerce and industry
1985. 03 Changed the company name to Hae Ryong Silicone Co., Ltd. Moved to the new factory in Gimpo City
1985. 12 Acquired UL-94V0

1986~1990

1986. 08 Developed the technology for primary synthesis of silicone gum for the first time in the country through a collaborate research with korea Advanced institute of Science and technology (KAIST)
1987. 06 Developed the basic technology for silicone gum compounding
1990. 09 Made a contract with Bayer AG in Germany for technological affiliation and sales in Southeast Asia

1991 ~ 1995

1991. 07 Developed the technology to manufacture the silicone rubber for general purpose silicone rubber for general purpose molding. UL standard certification was acquired for that and the sales in domestic and foreign market of it was started. (for the first time in Korea).
1991. 10 Established sales agencies in Southeast Asia (8 Countries including Taiwan and Malaysia)
1993. 05 Supplied and installed Fire Stop Seal for the 3rd and 4th Yeonggwang nuclear power plant (the first localization in the country)
1993. 11 Developed the technology to manufacture the silicone RTV foam (the project to develop basic industrial technologies implemented in collaboration with National Industrial Technology Center)

ASAN PLANT

- **Main Businesses**
  Rubber Article
  Silicone Sheet (S/S)

CHINA PLANT

- **Main Businesses**
  Rubber Article
  Silicone Sheet (S/S)

1995 ~ 2000

1995. 11 Exported silicone rubber amounting more than U$5,000,000.00 for the first time in the country (received the tower of 5 million dollar export as the prize). Awarded the medal of commendation from the governor of Gyeonggi-do for the merits of export (no.2222)
*The tower of 5 million US dollar export
1995. 12 Acquired the certification for EM mark (silicone RTV foam) - National Industrial Technology Center no. 95-61
1996. 10 Acquired ISO 9001 certification.

2000 ~ 2005

2000. 05 Listed in KOSDAQ
2002. 11 The company acquired the patent for the addition- cure type low hardness silicone rubber with excellent magneto-adherence.
2004. 08 The construction of Pyeongtaek factory was completed (production facility for silicone polymer, HCR and LSR)
2005. 06 The patent for shielding silicone rubber of self-adhesive electromagnetic waves was registerd.

2006 ~

2006. 08 Change of representative directors (collaborative representative directors; Kang,Seong-ja, Ji, Won-Yeong)
2007. 03 Hae Ryong Silicone Company Limited → HRS Company Limited
2007. 07 Form strategic alliance with Dowcorning Corporation for HCR business
2007. 10 Acquisition of co-patent with Comtech Chemicals Ltd for "Manufacture process of low hardness and low viscosity silicone foam "
2007. 11 Acquired ISO-14001
2008. 10 The construction of Asan factory was begun.
2008. 11 Exported silicone rubber amounting more than U$10,000,000.00
* The tower of 10 million US dollar export
2010. 07 Supply Agreement between Hilti and HRS
2011. 05 SUZHOU HAERYONG SILICONE CO., LTD. was established in china
2012. 10 Acquired the patent for Silicon polymer composition for backlight unit buffer spacer material of LCD

OVERVIEW OF THE SILICONE RUBBER

Silicone rubbers' special features as organosiloxanes polymer are unique in that they carry both inorganic and organic properties in terms of molecular structure unlike ordinary organic rubbers. In other words, due to the inorganic properties pertaining to Si-O as the main chain in terms of the molecular structure, they are superior to ordinary organic rubbers in heat resistance, chemical stability, electrical insulating property, abrasion resistance, weatherability and ozone resistance among others.

As high polymer of long chains, polydimethylsiloxane comprising silicone rubbers creates a spiral structure and provides less inter molecular interactions, resulting in abundance of elasticity and superior compression set, and enhanced cold resistance. The branching organic methyl carries special organic properties such as superior reaction, solubility and processibility, along with surface character including waterproof and contact resistance.

Having armed with these properties, silicone has been widely used to replace petrochemical products in all industries including aerospace, munitions industry, automobile, fine chemicals, construction, electric and electronics, food processing, mechanical engineering, medical and pharmaceutical, cosmetics, home appliances, paper film, solar batteries, and semi conductor. Recently, the scope of silicone application has been expanding at a greater speed.

SILICONE RUBBER ARTICLE

"Silicone rubber material is being used in many different industrial fields and silicone rubber article processing industry makes it possible"

Since HRS was established in 1981, we have not only focused on developing customized and environment friendly silicone rubber compounds but also we provide silicone rubber article products to worldwide customers and industries.

We produce from a simple designed tube to a complicated packing product, what ever our customers are requesting.

HRS can also produce many other customized products, which is specially requested by customers who need many different types of physical properties such as Heat Resistance, Cold Resistance, Weatherability, Electric Conductivity, Flame Retardant, Oil Resistance, Non-Toxic of Silicone rubber.

Silicone rubber article products can be produced by using either extrusion molding or compression molding. Above this, injection molding, transfer molding, calendar and coating can also be used depending on each product's characteristics.

"Specialist in Silicone rubber HRS" We are now well known as the silicone market leader. We will serve you the best with 30years know-how about silicone rubber.

**"For Silicone rubber compounds
For Silicone rubber article products,
HRS always will be there"**

Properties of Silicone Rubbers

Heat Resistance

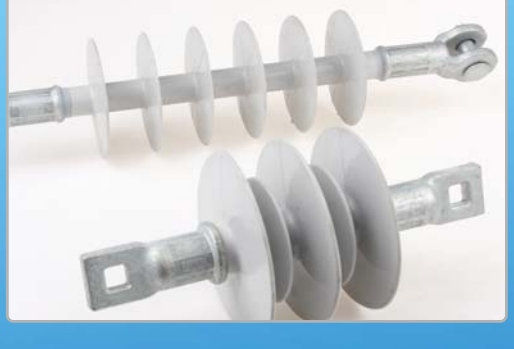
Heat resistance of silicone rubber is the one of its most excellent properties and provides the basis for its creation.
Silicone rubber is far better than organic rubbers in terms of heat resistance. At 150℃, almost no alterations of properties take place that it may be used semi permanently. Furthermore, silicone rubber withstands use for over 10,000 consecutive hours even at 200℃ and, if used for a shorter term, it may also be used at 300℃ as well. Boasting this excellent heat resistance, silicone rubbers are widely used to manufacture rubber components and parts used in high-temperature places.

Cold Resistance

Cold resistance of silicone rubber is the finest among organic rubbers. It provides a critical reason behind the creation of silicone rubbers. Natural and ordinary rubbers demonstrate significant changes in formation depending on temperatures. They become soft at high temperatures and hard at low temperatures so that they may not be able to used any more. While other organic rubbers may only be used up to -20℃ or -30℃, silicone rubber maintains its elasticity between -55℃ and -70℃. Some of the products even withstand temperatures as extremely low as under -100℃.

Weatherability

Silicone rubber has superb ozone resistance. Due to corona-discharged ozone, other organic rubbers become soften at a higher speed, but silicone rubber is rarely affected. Furthermore, even long-term exposures to UV rays, winds, or rain silicone rubber's physical properties will not be changed substantially.



Electric Properties

Silicone rubber is being used for insulation materials at high temperature with its superior insulation properties. It is particularly known for wide range in temperature and volume resistance between $10^{14}\,\Omega \cdot$ cm and $10^{16}\,\Omega \cdot$ cm. Silicone rubber experiences lowest change in performance in wet condition and is the best fit for being used as insulation materials. By adding special conductive fillers, conductive silicone may also be manufactured. In particular, silicone rubber is strongly resistant against corona discharge compares to others, while being widely used for insulation purposes in high voltage environments.

Electric Conductivity

Conductive silicone rubber is a compound comprising conductive materials such as carbon black, silver and copper. Depending on the type of silicone rubber, they range in resistance level from a few $\Omega \cdot$ cm to $10^{3}\,\Omega \cdot$ cm. One of the properties is that its electric properties are not much affected by variance in temperatures. No rubber materials are not found yet to match the electric properties of silicone rubber over 200℃. Conductive silicone rubber is also being used for keyboard interfaces, antistatic parts, and shield materials for high voltage cables.

Radiation Resistance

Compares to other organic rubbers, ordinary (dimethyl) silicone rubber has no special performance in terms of anti radiation. However, methyl phenyl silicone rubber adopting phenyl group in polymer molecules does have radiation resistance to be used for cables at nuclear power plants and connectors.

Properties of Silicone Rubbers

Steam Resistance

Silicone rubber absorbs only 1% of moisture even after experiencing long exposure to water without being affected in mechanical strength or electric properties. Generally, silicone rubber does not deteriorate even after having contact with steam under atmospheric pressure. In high pressure steam over 150°…, siloxane polymer is cut off and rubber properties decline. Such a property may be improved by the composition of silicone rubber, selection of curing agent, and the post curing. Other modified products are also available with improved steam and boiling water resistance.

Flame Retardancy

Silicone rubber does not easily burn when in contact with a flame, but would burn out consistently once ignited. However, by adding a small amount of flame retardant, it may become flame retardant and self-extinguisher. Flame retardant silicone rubbers presently in use would scarcely produce toxic gas during combustion since they do not contain organic halogen compounds discovered in organic polymers.

Oil Resistance

Silicone rubber is inferior to ordinary organic rubber in oil resistance at room temperature. However, for automobiles or aircrafts that require high temperature resistance, it demonstrates higher performance. Even when in contact with automobile oil, silicone rubber does not inflate significantly by reason of swelling. It swells in non polar organic compounds such as benzene, toluene, and gasoline. But its materials do not disintegrate or dissolve unlike ordinary organic rubbers. If solvent is removed, it would be restored to the original conditions.

Non Toxic

Silicone rubber is physiologically inert, and is thus used for baby nipple and stoppers in medical application. Silicone rubber is also very ideal elastomer for making swimming caps and goggles.

Thermal Conductivity

Silicone rubber has an excellent thermal conductivity property as it is filled with special heat conductive materials to give an excellent heat transfer. Its main function is to transfer the heat from the heat source to the heat sink and normally applied between them. It provides cushioning effect on components and very adhesive as it's very soft. It also has a property of self-adhesion so no need to treat with any other adhesive material.

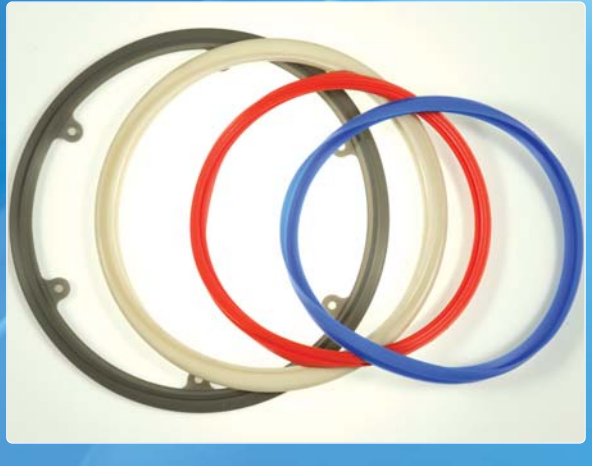
Electromagnetic Absorption

Recently the technologies of electronic equipments are advancing at a very fast-growing. Due to this reason EMC has become one of the hot issue in the electronic industrial. Electromagnetic absorption material is manufactured by filling the high performance metal powder with silicone rubber. It absorbs electromagnetic wave and changes the electromagnetic wave into the heat then vanish it.

Silicone Compression Molding

Silicone Compression Molding

Compression molding is one of the fabricating methods. Depending on the shape of molding plate, different shape of silicone rubber article can be produced. Heat and pressure are need in compression molding. Compression molding is most commonly used as the working operation can be set up either in manual system or automation system.



[Application]

O-Ring, High temperature Gaskets, Electronic parts,
Automotive Parts, Food contact parts,
General Industrial Parts, Baby Nipple, Rollers, Sheet,
Silicone Sponge Medical tubing etc.

[Feature]

- Low compression set
- Very High mechanical properties
- Very soft touching feel
- Flame retardant
- Non-Toxic, odorless, good high temperature resistant

SIZE SPEC(m/m)	THINKNESS(mm)	TOLERANCE(mm)	
300 × 300	1 ~ 30	0.5	- Hardness : 15 ~ 80 - Tensile Strength : 30 ~ 110Kgf/㎠ - Elongation : 20 ~ 800% - Rebound : 30 ~ 70%
500 × 500	1 ~ 30	0.5	
700 × 700	1 ~ 30	1.5	
1,000 × 1,000	1 ~ 30	1.5	

Silicone Extrusion

Silicone Extrusion

According to the molding method and mixing ratio, silicone hose products, which require a mass production, are convenient to add special filler (heat resistance, flame retardant, weatherability, oil resistance, non-toxic etc).
Also exact size, color and shape of products can be produced depending on the customers needs.





[Application]

Water Purifier Gaskets, Plate glass Gaskets,
Vacuum windows and doors, Refrigerator,
Drier and Freezer Gaskets, Medical hoses,
Electric insulator hoses, Vacuum and High voltage hoses.

[Features]

- Heat resistance : Can be used between 150℃ ~ 250℃
- Cold resistance : Can be used up to -100℃
- Low compression set : Good elastic stability 100℃~250℃
- Weatherability, Oil resistance, and Flexibility
- Very soft touching feel and light
- Excellent recovery
- Non-toxic and odorless
- Flame retardant
- Variable color and shape available

Item No.	Inside diameter	Outsde diameter	Length
1 x 2	1 m/m	2 m/m	100M
2 x 3	2 m/m	3 m/m	100M
2 x 4	2 m/m	4 m/m	100M
3 x 5	3 m/m	5 m/m	100M
4 x 5	4 m/m	5 m/m	100M
4 x 6	4 m/m	6 m/m	50M
5 x 6	5 m/m	7 m/m	50M
5 x 7	5 m/m	7 m/m	50M
6 x 8	6 m/m	8 m/m	50M
7 x 9	7 m/m	9 m/m	50M
8 x 10	8 m/m	10 m/m	50M

Silicone Sponge Extrusion

Silicone Sponge Extrusion

When a pyrolyed-blowing agent and heat are added at the same time in the process of mixing silicone, a silicone sponge form can be produced. To produce this silicone sponge form, high advanced skills, techniques, equipments and processing know-how are needs.

[Application]

A door of a gasket of high temperature curing machine(up to 300℃),
Packings, which require heat and cold resistance,
Sealing Gaskets, Food containers,
High and Low temperature insulators,
Printers and copying machines parts, Body protection pads,
Sports equipment (Anti-Shock and cushion function)

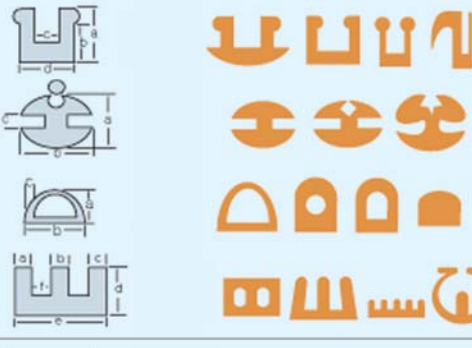
[Features]

- Very soft and light
- Excellent sealing
- Flame retardant UL94V-0
- Good protection against dust and noise
- Very flexible easy to install
- Possible to seal in an irregular space
- Post cure must be done for any silicone sponge products

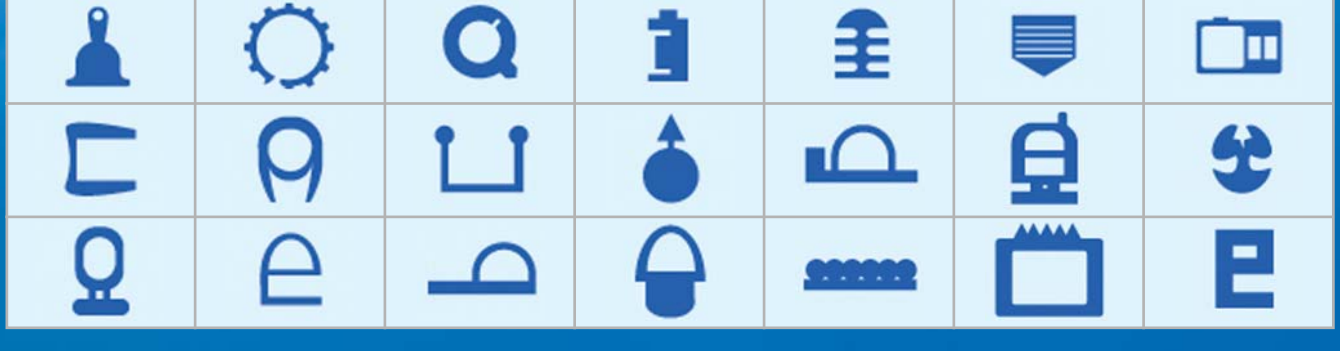
Standard Size.	Rubber Thinkness	Hardness 00 Type
200 ×500	2 ~ 10 (mm)	20 ~ 40
450 ×450	2 ~ 10 (mm)	20 ~ 40
500 ×500	2 ~ 10 (mm)	20 ~ 40
500 ×1000	2 ~ 10 (mm)	20 ~ 40
1000 ×1000	2 ~ 10 (mm)	20 ~ 40
1000 ×2000	2 ~ 10 (mm)	20 ~ 40
Special Size	Customer Size	

It' s possible to produce any complicated shape of silicone articles by using injection molding. Silicone rubber is widely used in many different industries due to its physical properties such as good heat and cold resistance, good electrical properties etc. Each silicone rubber has different functions and features and by using other special process techniques of special raw material mixing ratio and compression molding, Sponge products can be produced.

[Types and drawing]

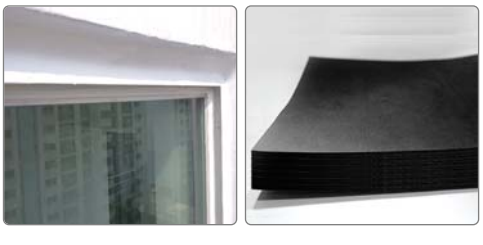
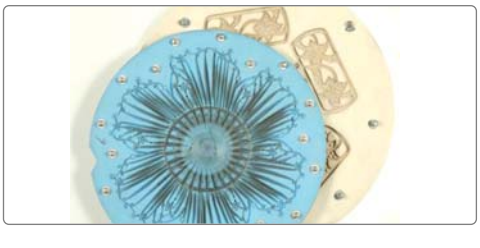
Rounded gasket		Mainly used gasket, diameter from 1.5mm,used for flange's gaskets
Angled gasket Parallel gasket		Typical gasket, can be produced continuously
Window gasket		Mainly used for a door, special grass and sash
P type gasket		Mainly used for door packing, refrigerator etc.
Protection gasket		Mainly used to protect window and door from rain, wind
Door frame gasket (closing)		Mainly used for door packing, refrigerator etc.
Window frame (closing)		Mainly used to protect from wind, water rain etc.
Sluice gate gasket		Mainly used for Sluice gate, dam and construction site

It' s possible to produce any shape of packing



Applications by Industry

Classification	Application	Features
Electronic/IT	   LCD/LED Holder, Thermal conductivity Pad & sheet	Heat Resistance Flame Retardant Thermal Conductivity
Sports	   Swimming Goggles & Caps, Diving Snorkels & Mask	High Transparency High Tear Strength Non Toxic
Medical/ Baby Products	   Baby Nipple, Medical Rubber Articles, Dental Impression Materials	Non Toxic High Tear Strength Extrusion Heat Resistance
Electric Properties	   Heater Wire, High-Voltage Cable, Insulator	Heat Resistance Cold Resistance Weatherability Electric Insulator Flame Retardant Electric Conductivity Low Compression set
Automotive	   Ignition Cable, Plug Boots, Oil-seal	Heat Resistance Oil Resistance Low compression set Cold Resistance Oil-Bleed

Classification	Application	Features
Kitchen Ware/ Bakery	 Kitchenware, Food Container Packing, Ice-Tray	Non-Toxic & odorless Low Compression set Heat Resistance Cold Resistance
Home Appliances	 Electric rice cooker Gasket, Door frame gasket(Microwave)	Steam Resistance Low Compression set Heat Resistance Very High mechanical properties Flame retardant Non-Toxic, odorless, good high temperature resistant
Silicone Sheet	 Thermal Conductivity Pad & sheet, ACF Sheet, AMOLED Pad	Thermal Conductivity Electric Conductivity Heat Resistance Low Compression set
Architecture	 Section Seal, Sound Proof Materials	Cold Resistance Heat Resistance Sound Proof
Die Castion	 Accessory Molding, Toy Molding	High Tear Strength Heat Resistance High Strength

GLOBAL NETWORK

Behind the silicon rubber industry's myth, there has been HRS's invisible effort to support the silicon rubber industry by stable supply and demand of great quality products.
A new leader of silicon rubber industry led by infinite challenge, infinite passion-HRS

- EUROPE
- SOUTH AFRICA
- CHINA
- IRAN
- BANGLADESH
- JAPAN
- PAKISTAN
- VIETNAM
- INDIA
- THAILAND
- PHILIPPINES
- MALAYSIA
- INDONESIA
- AUSTRALIA
- NEWZEALAND
- CANADA
- CHICAGO
- OHIO
- L.A
- SOUTH AMERICAN

CERTIFICATES

中华人民共和国外商投资企业

批准证书

CERTIFICATE OF APPROVAL

FOR ESTABLISHMENT OF ENTERPRISES WITH FOREIGN INVESTMENT IN THE PEOPLE'S REPUBLIC OF CHINA

Ratified certificate

企业法人

营业执照

注册号：320500400040608

成立日期：2011年5月9日

登记机关

二零一二 年二 月十四 日

名 称 苏州海龙硅胶有限公司

住 所 苏州相城经济开发区康元路777号

法定代表人 金镇成

注册资本 310万美元

实收资本 310万美元

公司类型 有限责任公司(外国法人独资)

经营范围 许可经营项目：无。
一般经营项目：硅胶制品的加工、生产；销售本公司自产产品。

股东(发起人)
HRS Co., Ltd.

营业期限 自 2011年05月09日

至 2061年05月08日

Business license

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