ENDÜSTRİ TEKNİK

Silicones Selection Guide

DOW CORNING

XIAMETER
from DOW CORNING

Partner of Dow Corning™
Adhesives and sealants in Europe

ENDUSTRI TEKNIK LTD. STI. isthe Dow Corning Distributor in TURKEY ENDUSTRI TEKNIK is part of DGE Group

Who we are.

We are experts in adhesives and sealants. We work with number 1 Brands. We translate the needs of the different stakeholder partners to co-design products and processes for today and tomorrow.

History expertise

Antala have worked for more than 15 years with its clients in defining assembly solutions.
This close collaboration, involving different partners, allows us to meet the specifications for t[illegible]plicati[illegible]

Our people are involved in production site audits to streamline products and processes to optimize your production and industrial applications.

Comprehensive solution

Our collaboration with manufacturers of dispensing equipment enables our teams to provide you with comprehensive solutions that take all the worries out of implementing lubrication or bonding solutions, from their design to YOUR production.

Selector guide

Antala regularly publishes Selector Guides for various industries, chemistries and technologies. This Silicones Selector Guide is designed to help you find industry-proven solutions.
We know that every application is not the same. If you are ever in doubt, do not hesitate to contact our technical experts for assistance in finding the right solution for your specific applications.
On the following pages you will find information on the basics of sealing and silicone technology as well as a partial list of products categorized by type of sealing and cure chemistry (one-part or two-part). The list also gives the properties and typical applications for each product.





Definition

The purpose of sealing is to prevent or limit the ingress of liquids, solids or gases between environments. Sealants are applied to prevent leaks of fluids or the entry of unwanted solid or liquid bodies.
Sealing is a recurring challenge that is increasingly important in most sectors of industry, including automobile manufacturing, construction, electronics, transportation, household appliances, lighting, and energy.

Sealing solutions come in many types and forms, including welds, paper gaskets, rubber O-rings and adhesive sealants. Generally speaking, these solutions are used to create barriers that prevent liquids, solids or gases from leaking from or into joined objects.

Product index

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Gasketing method

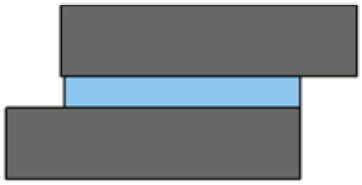
There are essentially two main methods for forming tight seals with silicone-based products. Each has its own advantages and disadvantages. The first thing one must ask is whether the assembly will have to be regularly opened and closed (such as for servicing) or if it can be bonded with an adhesive sealant.

Adhesive gasketing

An adhesive sealant is needed in this case. The gasket is achieved by the adhesive forces between the sealant and the two parts to be assembled. The sealant creates a barrier that achieves the desired seal.

We carry a wide range of adhesive sealants (one-part, two-part, hot melt, heat cure or room-temperature cure, etc).

This gasketing method is also known as **FIPG** (Formed-In-Place Gasketing).



Application examples: bonding and sealing of oven doors, vehicle headlights, sealing of electronic housings and lighting fixtures, etc.

Compression gasketing

The seal is achieved by the mechanical forces exerted on the assembly, which compress the gasket. This method is particularly recommended for assemblies that can be disassembled and reassembled regularly. Typical sealing products are silicone elastomers and silicone foams.

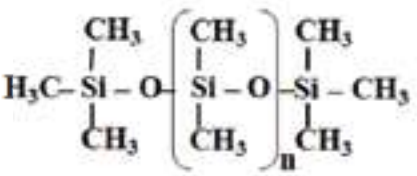
This gasketing method is also known as CIPG (Cured-In-Place Gasketing).

Application examples: gasketing of electrical cabinets, automotive radiator end tanks, etc.

Advantages and disadvantages of both methods

Adhesion (FIPG)		Compression (CIPG)	
			
✗	Permanent assembly	✓	Non-permanent assembly
✓	Sealing and bonding	✗	Requires mechanical fastening
✓	No compression rate control	✗	Compression rate control required
✓	Manual or robotic dispensing	✗	Robotic dispensing only
✗	Not suitable for large joint thicknesses	✓	Large joint thicknesses possible
✓	Withstands differential thermal expansion	✗	Differential thermal expansion must be monitored
✓	Suitable for rough surfaces/uneven gaps	✗	Not suitable for rough surfaces/uneven gaps

Silicone technology



Silicones, or polysiloxanes, are inorganic polymers formed by a silicon-oxygen chain with organic groups attached to the chain atoms.

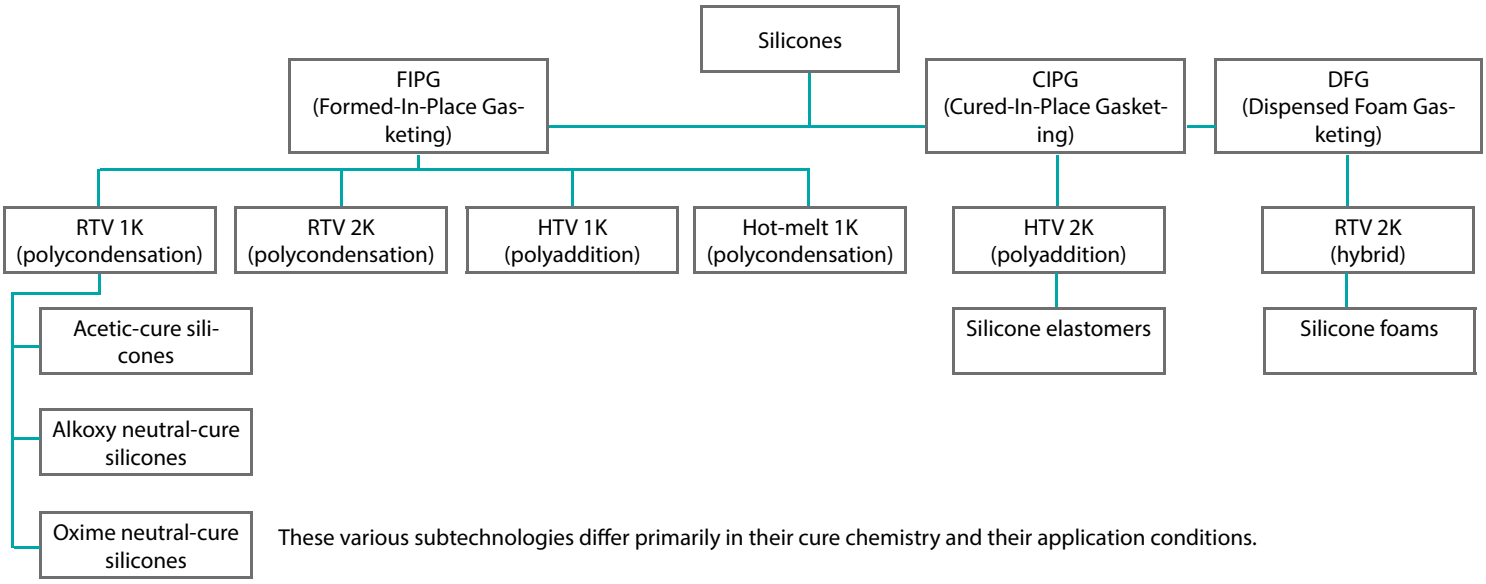
The chemical nature of silicone gives it many advantages over elastomers and organic sealants. The main chemical characteristic of silicone is the presence of a high number of Si-O bonds with a bonding energy that is much greater than that of the C-O and C-C bonds in organic polymers. This gives silicones a number of specific properties:

- High degradation temperature
- Excellent UV resistance
- Excellent resistance to low and high temperatures
- Low flammability materials
- Excellent resistance to chemical attack

However, if a silicone is to come into contact with extremely harsh chemicals (solvents, oils, concentrated acidic solutions, etc.), it is advised to first conduct compatibility tests. DGE can use its experience and that of Dow Corning to guide you in finding the right chemically resistant product for your application.

Silicone elastomers and adhesive sealants

Silicone elastomers and adhesive sealants designed for sealing applications are divided into several technologies depending on their application method (CIPG or FIPG), their cure chemistry (one part [1K] or two part [2K], polycondensation or polyaddition) and their application temperature (room-temperature or heat cure).



These various subtechnologies differ primarily in their cure chemistry and their application conditions.

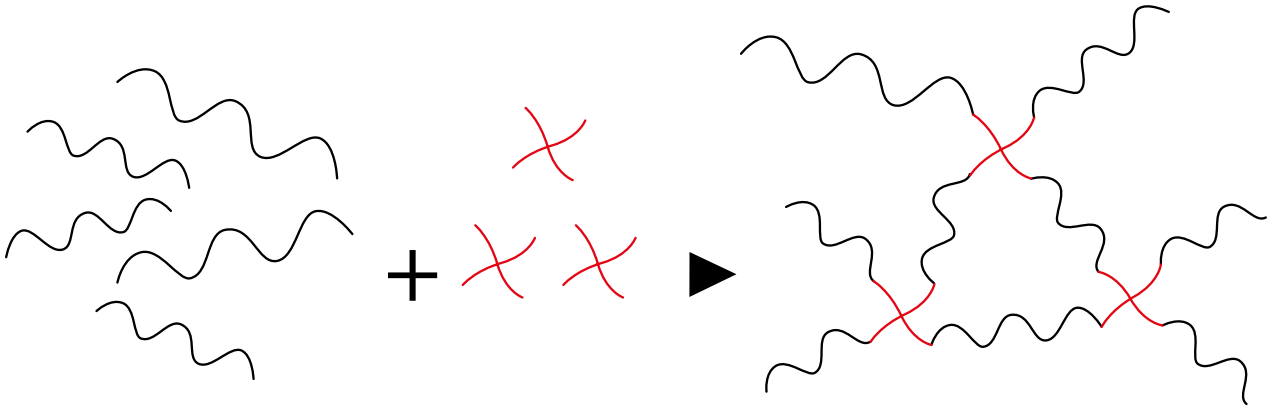
Heat resistance

		Adhesive gaskets				Compression gaskets	
	RTV 1K Acetoxy	Alkoxy RTV 1K	Oxime RTV 1K	HTV 1K	RTV 2K	Silicone elastomers	Foam gaskets
Dry heat < 150°C/302°F	✓	✓	✓	✓	✓	✓	✓
Dry heat < 180°C/356°F	✓	✓	✓	✓	✓	✓	✓
Dry heat < 220°C/428°F	High-temperature SKUs	✗	✓	✓	✗	✓	-
Dry heat < 275°C/527°F	High-temperature SKUs	✗	✓	✓	✗	✗	✗
Wet heat <90°C (194°F)	✓	✓	✓	✓	✓	✓	✓
Wet heat <140°C (284°F)	✓	✓	✓	✓	✓	✓	✓
Wet heat < 180°C (356°F)	High-temperature SKUs	✗	✗	✓	✓	✓	✗
Engine fluids <90°C (194°F)	✓	✓	✓	✓	✗	✓	✗
Engine fluids <150°C (302°F)	High-temperature SKUs	✗	✗	✓	✗	✓	✗
Spirits, nonpolar solvents, hydrocarbons	Fluorosilicones only	✗	✗	✗	✗	✗	✗

*Special engine oil SKUs only

Crosslinking

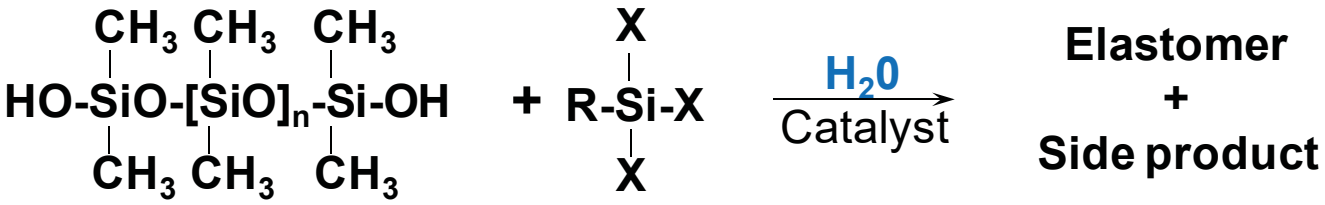
Silicone elastomers, foams and sealants share the same basic principle of crosslinking. In their initial state, these materials are made up of PDMS polymer chains and crosslinking agents (or crosslinkers). The PDMS chains are terminated by reactive groups that react with the crosslinkers to form three-dimensional networks. It is the three-dimensional network that gives silicone its flexibility and elasticity.



Depending on the chemical nature of the crosslinkers and the PDMS reactive groups, crosslinking occurs under different conditions and methods known as polyaddition and polycondensation.

Polycondensation

In the case of polycondensation silicones, the reactive group at the end of the PDMS chain is an alcohol group and the crosslinkers are organosilanes. When water and a catalyst (tin salt) are present, the crosslinkers bond with the PDMS chains to form an elastomer by releasing a reaction by-product that evaporates.

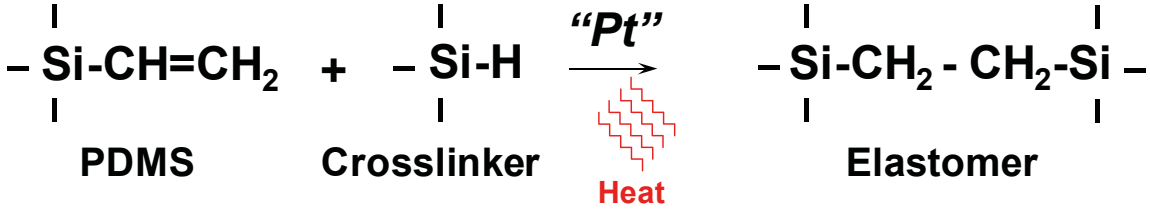


The nature of this by-product depends on the crosslinkers present in the formulation of the material. Depending on the crosslinker used, acetic-cure silicones, oxime neutral-cure silicones or alkoxy neutral-cure silicones are obtained.

Acetoxy	X =	(O-CO-CH3)	▸ Acetic acid
Oxime	X =	(O-N=CMeEt)	▸ Methyl ethyl ketoxime
Alkoxy	X =	(O-CH3)	▸ Methanol

Polyaddition

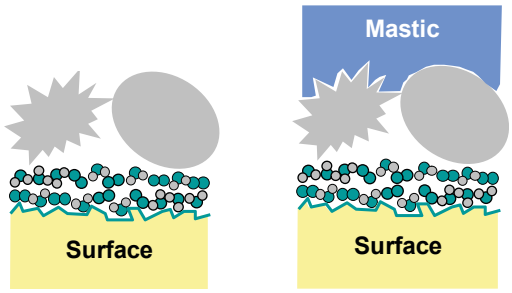
In the case of polyaddition silicones, the PDMS chains are terminated by C=C insaturations and the crosslinkers are silanes. When a platinum-based catalyst is present, the crosslinking agents react with the PDMS chains to form a three-dimensional network. Unlike with polycondensation, no by-products are released and thus no shrinkage occurs. Another advantage of this crosslinking method is that there is no possibility of reversion.



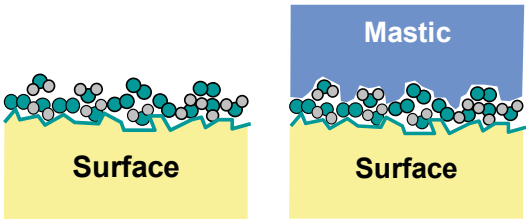
Surface preparation

Whether a compression gasket or an adhesive gasket is needed, good bonding practices must be followed before applying a material.

Among the good bonding practices, preparation of the host substrates is essential. Unprepared substrates may be covered with contaminants such as dust, lipids, metal oxides, release agents or plasticizers. These contaminants form a barrier that prevents silicone from adhering to unprepared substrates. It is therefore essential that substrates be **clean** , **free of grease and dry**.



Unprepared surface: surface contaminants prevent silicone from adhering



Prepared surface: improved silicone adhesion

Furthermore, some plastics – primarily polyethylene, polypropylene, Teflon and silicone – are known to be difficult to bond. There are a number of surface treatments that improve the adhesion of adhesives and sealants on these types of plastic:

• Plasma treatment: Surfaces are exposed to an inert gas (such as argon, helium, hydrogen or oxygen) at low pressure to increase their porosity and energy and create reactive sites that improve adhesion.

• Flame treatment: Surfaces are exposed to flame to oxidize them and burn away any contaminants from them.

• Corona treatment: (or, corona discharge) Substrates are exposed to a stream of charged particles to increase their surface roughness.
This treatment also oxidizes surfaces and increases the number of sites able to react with the silicone sealant (formation of hydrogen bonds).

• Primer: A coating with a strong affinity with substrates and adhesives and which forms a chemical bridge. Primers typically consist of silane-based compounds in a solvent solution. They must be applied in very thin coats and allowed to dry so that the solvent can evaporate and the silanes can react (always follow the drying times recommended by the primer manufacturer)

Primers for silicone adhesives and sealants

SKUs	Color	Solvent	Flash point (°C/°F)	VOC (g/l)	For use with	Surfaces	Packaging* & SKUs
Dow Corning® **1200OS**	Colorless/ Red	Volatile siloxanes	27/80.6	110	All condensation- or addition-cure silicones	Wide range of surfaces, including FR-4	500 ml 5 L
Dow Corning® **PR-1200**	Colorless/ Red	Naphta	13/55.4	719	Most condensation- or addition-cure silicones	Glass, ceramic, FR-4, most metals and some plastics	500 ml
Dow Corning® **92-023**	Colorless	Heptane	-13/+8.6	681	Non-pigmented two-part addition-cure silicones	FR-4, most metals and ceramics	500 ml
Dow Corning® **PR-2260**	Colorless	Heptane	9/48.2	729	Most condensation- and addition-cure silicones	Ceramics, several types of metals, a few types of plastics	340 g 2.7 kg 13.6 kg

Adhesive gasketing

Basic principle

Adhesive gaskets are generally made by dispensing sealant (either manually or robotically) on the surface of one of two parts. When the parts are mated, the sealant spreads across the mating surfaces and fills in any gaps, voids, scratches and surface irregularities.
The sealant then cures to form a flexible, elastic gasket that acts as a barrier and provides a long-lasting seal and a permanent bond without the need for any mechanical fastening.

Non-structural adhesive sealants are generally used to create adhesive seals. Their excellent elasticity makes them flexible enough to withstand differential thermal expansion, which occurs when dissimilar materials are bonded together.

Generally speaking, good bonding practices must be followed when making an adhesive gasket, i.e., parts to be bonded must be clean, dry and free of grease. Some materials – primarily polyethylene, polypropylene, Teflon and silicone – are known to be difficult to bond and must be applied to host surfaces that have been specially treated (plasma, corona, flame, priming, etc.).

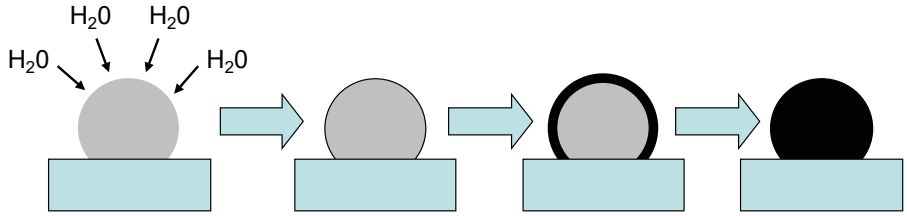
This assembly method creates tight bonds that last throughout the useful service life of parts. However, separating the bonded parts will destroy the gasket. As a result, it is intended only to form seals on systems that do not need to be disassembled.
This method is also known as FIPG (Formed-In-Place Gasketing).

DGE carries Dow Corning's entire range of products, including every type of silicone technology used in industry for this assembly method.

One-part RTV silicones

One-part RTV silicones cure by polycondensation at room temperature. They absorb moisture from ambient air, form a skin, then cure from the surface of the bead inward, releasing by-products in the process.

They cure slowly under normal conditions of temperature and humidity (to a depth of 3 mm in 24 hours at 25°C [77°F] and 50% relative humidity). It is therefore recommended to avoid using one-part RTV silicones with gaps greater than 10 mm. Curing can be accelerated by increasing the relative humidity and/or the temperature.



Once the sealant is dispensed, it absorbs moisture from the air and starts to cure

Skin formation

Cure from the outside inward

Fully cured sealant

One-part RTV silicones can be applied manually or robotically. Parts to be bonded together must be mated before the skin forms and the resulting assembly must not be exposed to mechanical strain during cure.

Manual or robotic dispensing

Assembly

Removal of excess material, or smoothing (optional)

Curing ▶ Typically requires approx. 24 h

Full cure

There are two main types of RTV silicones. The difference in these types is the nature of the by-product produced during cure:

• Acetic-cure silicones release a small amount of acetic acid (characteristic vinegar odor) as they cure. This can create problems on corrosion-sensitive metals (crude steel, aluminum, copper, etc.). They are therefore not recommended for use on these metals and should never be used near PCBs or electronic components.
• Fluorosilicone sealants are a subset of acetic-cure sealants. Replacing the polymer's methyl groups by fluoromethyl groups makes these sealants highly resistant to hydrocarbons and polar solvents.
• Alkoxy neutral-cure silicones release methanol as they cure. Unlike acetic-cure silicones, alkoxy neutral-cure silicones are suitable for use on all types of metal without any risk of corrosion. There are also oxime neutral-cure silicones, which release methyl ethyl ketoxime (MEKO). Although oxime neutral-cure silicones withstand temperatures better than alkoxy neutral-cure silicones, they are known to induce stress-cracking in some plastics (polycarbonate and acrylic plastics).

	Acetic-cure silicones	**Alkoxy neutral-cure silicones**	**Oxime neutral-cure silicones**
Maximum temperature	+200°C/+392°F (+275°C/+527°F for high-temperature SKUs)	+180°C (+356°F)	+220°C (+428°F)
Odor	Strong (vinegar)	Slight	Slight
Unsuitable substrates	Corrosion-sensitive metals (copper, crude steel, crude aluminum, iron, zinc, lead, etc.)	None	Polycarbonate and PMMA (stress cracking) • copper (discoloration)
Smoothing agent	Soapy water/Silicone liquids	Silicone liquids	Silicone liquids

ACETIC-CURE SILICONE ADHESIVES SEALANTS

Product name	**Temperatures (°C/°F) (peak)**	Skin-over time	Tensile strength / Elongation	Color	Shore hard-ness	Features	Packaging* & SKUs
ACETIC							
Dow Corning® **AP**	-50°C +180°C (-58°F) (+356°F)	11 min	2.2 MPa/540%	Clear White/Black	A25	Multi-purpose • PMUC version for silicone AP available on request clear (PMUC No.: 16-089/17-285)	310 ml
Dow Corning® **752**	-50°C +200°C (-58°F) (+392°F)	10-15 min	2.4 MPa/490%	Clear White/Black	A24	Multi-purpose	90 ml, 300 ml
Dow Corning® **732**	-60°C +180°C (-76°F) (+356°F)	7 min	2.3 MPa/540%	Clear/ White/Black	A25	NSF Multi-purpose with FDA, NSF 51, NSF 61 & UL 94-HB approv-als • **MIL-A-46106**	90 ml, 310 ml
Dow Corning® **734**	-65°C +180°C (-85°F) (+356°F)	7 min	1.5 MPa/315%	Clear White	A27	NSF **Self-leveling with FDA, UL 94-HB, NSF 51 approvals • MIL-A-46106**	90 ml, 310 ml
Dow Corning® **736**	-60°C +260°C (-76°F) (+500°F)	10 min	2.4 MPa/600%	Red	A26	NSF High temperature with FDA, UL 94-HB, NSF 51 approvals • **MIL-A-46106**	90 ml, 300 ml
Dow Corning® **Q3-1566**	-50°C +275°C (-58°F) (+527°F)	5 min	3.6 MPa/340%	Black	A43	**Ultra-high temperatures**	310 ml
Xiameter® **SLT-3445**	-50°C +260°C (-58°F) (+500°F)	10 min	1.5 MPa/300%	Red	A25	Self-leveling • High temperatures • FDA food grade	25 kg
Dow Corning® **Q3-3463**	-65°C +200°C (-85°F) (+392°F)	10 min	1.9 MPa/400%	Blue	A29	**Blue housing sealant**	90 ml, 310 ml
ACETIC/FLUOROSILICONE							
Dow Corning® **730 FS**	-65°C +260°C (-85°F) (+500°F)	12 min	3 MPa/195%	White	A40	Good resistance to hydrocarbons, solvents, and chemical attack	90 ml
Dow Corning® **Q4-2817**	-55°C +260°C (-67°F) (+500°F)	11 min	4.5 MPa/375%	Red	A43	Good resistance to hydrocarbons, polar solvents, chemical attack • Non-flowing	5.4 oz Semco cartridge

NEUTRAL SILICONE ADHESIVE SEALANTS

Product name	Temperatures (°C/°F) (peak)	Skin-over time	Tensile strength / Elongation	Color	Shore hard-ness	Features	Packaging* & SKUs
Dow Corning® **AS7096N**	-50°C (-58°F) +150°C (+302°F)	10 min	1 MPa/500%	Clear	A13	**Clear** • Excellent wettability on PMMA • Alkoxy group	310 ml
Dow Corning® **7091**	-55°C (-67°F) +180°C (+356°F)	15 min	2.5 MPa/680%	White/Black/ Gray	A37	**Good mechanical strength** • Alkoxy group	310 ml
Dow Corning® **7092**	-50°C (-58°F) +150°C (+302°F)	20 min	2 MPa/435%	White/Black	A55	**High tack - instant bond** • Alkoxy group • UL94 HB	310 ml 20 l
Dow Corning® **7093**	-55°C (-67°F) +180°C (+356°F)	15 min	1.7 MPa/700%	White/Black/ Gray	A30	Multi-purpose, low modulus • Alkoxy group • PMUC version available on request (PMUC No.: 7093 white: 16-090/17-296)	310 ml
Dow Corning® **7094**	-55°C (-67°F) +180°C (+356°F)	25 min	1.1 MPa/220%	Black	A19	**Self-leveling** • Alkoxy group	310 ml
Dow Corning® **748**	-55°C (-67°F) +177°C (+350.6°F)	15 min	1.9 MPa/350%	White	A35	NSF Alkoxy group • Approvals: NSF 51/61 • FDA, UL94-HB	90 ml 300 ml
Dow Corning® **3140**	-50°C (-58°F) +180°C (+356°F)	15 min	3.1 MPa/425%	Clear	A34	Alkoxy group • **Self-leveling** UL94-V1 approval • FDA • **MIL-A-46146**	90 ml 310 ml
Dow Corning® **3145**	-55°C (-67°F) +180°C (+356°F)	15 min	7.1 MPa/650%	Clear/Gray	A51	**High mechanical strength** • Alkoxy group • **MIL-A-46146**	90 ml 310 ml
Dow Corning® **3559**	-40°C (-40°F) +220°C (+428°F)	25 min	1.6 MPa/400%	Black	A40	**High temperature** • Oxime group	310 ml
Dow Corning® **3-0100**	-55°C (-67°F) +180°C (+356°F)	24 min	2.2 MPa/455%	Black	A37	**Designed for engine block main seals** • Withstands new engine oils and their additives • Alkoxy group	305 ml 22.8 kg
Dow Corning® **3-0110J**	-55°C (-67°F) +180°C (+356°F)	7 min	2.7 MPa/375%	Gray	A47	**Designed for engine block main seals.** Withstands new engine oils and their additives • Blowout resistance • **Rapid cure** • Alkoxy group	305 ml 21.9 kg
Dow Corning® **3-0115**	-55°C (-67°F) +180°C (+356°F)	10 min	2.8 MPa/375%	Gray	A50	**Designed for engine block main seals** • Withstands new engine oils and their additives • Blowout resistance • Alkoxy group	305 ml 22 kg
Dow Corning® **FIRESTOP SEALANT 700**	-55°C (-67°F) +180°C (+356°F)	15 min	0.4 MPa/430%	White/Gray/ Black	A27	**Fire-resistant sealant for expansion joints** • Approvals: SNJF/Euroclass B as per EN 13501-1 • Fire rating of 2-4 hours as per EN-1366-4	310 ml
Dow Corning® **FIRESTOP SEALANT 800**	-55°C (-67°F) +180°C (+356°F)	15 min	0.6 MPa/1000%	White/Gray/ Black	A15	**Fire-resistant sealant for expansion joints** • Self-leveling • Approvals: SNJF/Euroclass B as per EN 13501-1 • Fire rating of 2-4 hours as per EN-1366-4	310 ml

One-part hot-melt silicones

Dow Corning also manufactures hot-melt silicone sealants (application temperature: 120°C/248°F).
These alkoxy neutral-cure silicones have high tack upon application to create instant bonds and significantly increase production rates.

ONE-PART HOT-MELT SILICONE ADHESIVE SEALANTS

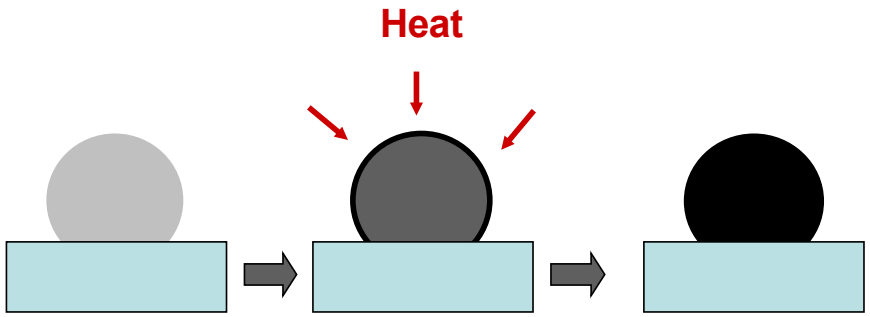
Product name	Temperatures (°C/°F) (peak)	Skin-over time	Tensile strength / Elongation	Color	Shore hard-ness	Features	Packaging* & SKUs
Dow Corning® **HM-2500**	-45°C (-49°F) +150°C (+302°F)	15 min	2.4 MPa/1000%	Clear	A60	Reactive hot-melt silicone / Instant green strength / Viscosity: 210,000 mPa·s at 120°C (248°F)	22 kg 205 kg
Dow Corning® **HM-2510**	-45°C (-49°F) +150°C (+302°F)	15 min	2.7 MPa/760%	Clear	A47	Reactive hot-melt silicone / Instant green strength / Viscosity: 105,000 mPa·s at 120°C (248°F) /	22 kg 205 kg
Dow Corning® **HM-2520**	-45°C (-49°F) +150°C (+302°F)	15 min	4.8 MPa/1000%	Clear	A33	Reactive hot-melt silicone / Instant green strength / High mechanical strength / Viscosity: 110,000 mPa·s at 120°C (248°F)	22 kg 205 kg

One-part HTV silicones

One-part HTV silicones cure by polyaddition when exposed to high temperatures of around 150°C (302°F).

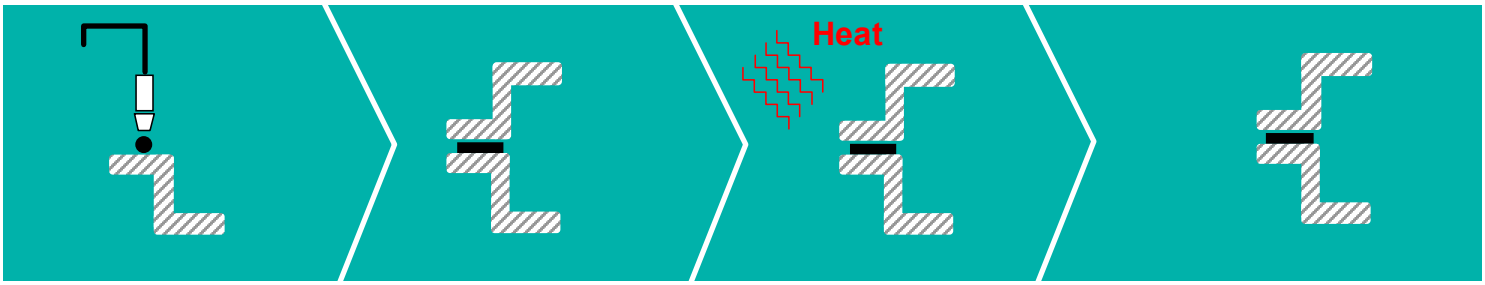
Unlike one-part RTV silicones, one-part HTV silicones do not require ambient moisture to cure and produce beads that homogeneously cure throughout (this is known as bulk polymerization).

As a result, they are suitable for use in areas with little air and can be used to form very thick gaskets. In addition, their fast cure time speeds up and production rates.



The sealant is deposited | Bulk polymerization occurs when the sealant is exposed to a heat source | Fully cured sealant

One-part HTV silicones can be applied manually or robotically. Parts to be bonded together must be mated prior to heat cure and the resulting assembly must not be exposed to mechanical strain during cure in the oven.



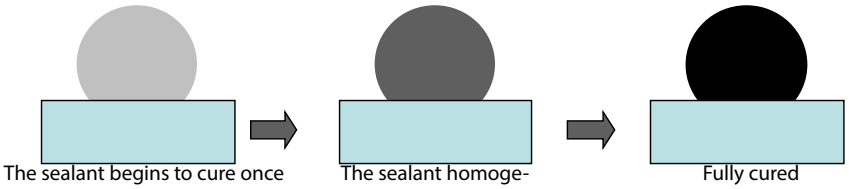
Manual or robotic dispensing | Assembly | Exposure to a high temperature | Complete cure

ONE-PART HTV SILICONE ADHESIVE SEALANTS

Product name	Temperatures (°C/°F) (peak)	Viscosity	Tensile strength / Elongation	Cure time	Color	Shore hard-ness	Features	Packaging* & SKUs
Xiameter® **ADH-6066**	-55°C (-67°F) +200°C (+392°F)	33,000 MPa·s	2.5 MPa/210%	20 min at 180°C (356°F) 30 min at 150°C (+302°F) 60 min at 120°C (+248°F)	Red	A38	Self-leveling • High temperature	310 ml
Dow Corning® **3-6096**	-40°C (-40°F) +250°C (+482°F)	Non-flow-ing	3.7 MPa/215%	5 min at 180°C (+356°F) 15 min at 150°C (+302°F) 60 min at 120°C (+248°F)	Black	A45	Non-flowing • Very high temperature • Rapid cure	310 ml
Dow Corning® **866**	-45°C (-49°F) +200°C (+392°F)	50,000 MPa·s	6.4 MPa/300	30 min at 150°C (+302°F) 60 min at 125°C (+257°F)	Gray	A57	Self-leveling • High tensile strength	1 kg 25 kg

Two-part RTV silicones

Two-part RTV silicones cure after their two parts are mixed.
The main advantage of these silicones is their fast cure time, which both shortens process times and increases production rates.
Unlike one-part RTV silicones, two-part RTV silicones are suitable for use in confined spaces (no access to ambient moisture) and may be used on large thicknesses.
They homogeneously cure throughout when dispensed.



The sealant begins to cure once it is mixed and dispensed | The sealant homogeneously cures throughout | Fully cured sealant

In general, two-part RTV silicones are intimately mixed then dispensed by robotic systems.
Parts to be bonded must be mated quickly before the sealant has time to harden and the resulting assembly must not be exposed to mechanical strain during cure.

Automatic mixing and dispensing of both parts | Assembly | Removal of excess material, or smoothing (optional) | Ambient-temperature cure ▸ Fast (less than one hour) | Complete cure

TWO-PART RTV SILICONE ADHESIVE SEALANTS

Product name	Temperatures (°C/°F) (peak)	Viscosity	Tensile strength / Elongation	Mix color	Shore hardness	Features
Dow Corning® **Q3-3526**	-40°C (-40°F) +190°C (+374°F)	200,000 MPa·s	2.0 MPa/280%	Gray/Black	A40	Polycondensation / Mix ratio: 100 parts: 10 w/w / Non-flowing
Dow Corning® **Q3-3636**	-40°C (-40°F) +175°C (+347°F)	200,000 MPa·s	1.8 MPa/300%	Gray/Black/ Special Black	A35	Polycondensation / Mix ratio 100 parts: 13 w/w / Non-flowing / Fast cure / Low fogging
Dow Corning® **EA-2626**	-40°C (-40°F) +190°C (+374°F)	205,000 MPa·s	1.9 MPa/200%	Gray/Black/ Special Black	A43/A45	Polycondensation / Mix ratio: 100 parts 13 w/w / Non-flowing / Fast cure / Good high-temperature resistance
Dow Corning® **EA-4747**	-40°C (-40°F) +150°C (+302°F)	50,000 MPa·s	1.0 MPa/190%	Gray/Black	A26	Polycondensation / Mix ratio: 100 parts 14 w/w / Low viscosity / Fast cure

Part

	Name	Property	Color	Packaging* & SKUs
BASE	Dow Corning® **Q3-3526 BASE**	For use with Dow Corning® **Q3-3526 catalyst**	Base color: white	25 kg 250 kg
BASE	Dow Corning® **Q3-3636 BASE**	For use with Dow Corning® **Q3-3636 catalyst**	Base color: white	25 kg 250 kg
BASE	Dow Corning® **EA-2626 BASE**	For use with Dow Corning® **Q3-3636 catalyst**	Base color: white	25 kg 250 kg
BASE	Dow Corning® **EA-4747 BASE**	For use with Dow Corning® **Q3-3636 catalyst**	Base color: white	25 kg 250 kg
CATALYST	Dow Corning® **Q3-3526 CATALYST GREY**	For use with Dow Corning® **Q3-3526 base**	Mix color RAL 7000 Gray	25 kg
CATALYST	Dow Corning® **Q3-3526 CATALYST BLACK**	For use with Dow Corning® **Q3-3526 base**	Mix color RAL 7016 Anth. Gray	25 kg
CATALYST	Dow Corning® **Q3-3636 CATALYST GREY**	For use with Dow Corning **Q3-3636**, **EA-2626** or **EA-4747 bases**	Mix color RAL 7000 Gray	25 kg
CATALYST	Dow Corning® **Q3-3636 CATALYST BLACK**	For use with Dow Corning **Q3-3636**, **EA-2626** or **EA-4747 bases**	Mix color RAL 7016 Anth. Gray	25 kg
CATALYST	Dow Corning® **Q3-3636 CATALYST SPECIAL BLACK**	For use with Dow Corning **Q3-3636**, **EA-2626** or **EA-4747 bases**	Mix color RAL 7021 Black Gray	25 kg
CATALYST	Dow Corning® **Q3-3636 CATALYST SPECIAL BLACK FAST CURE**	For use with Dow Corning **Q3-3636**, **EA-2626** or **EA-4747bases**• Fast-curing mixture for fast rates	Mix color RAL 7021 Black Gray	25 kg

Compression gasketing

Basic principle

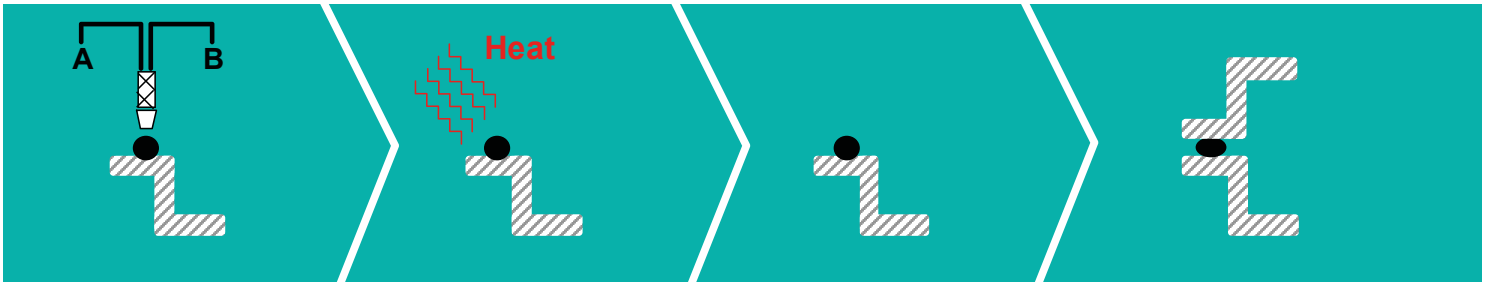
Compression gaskets are generally made by dispensing a material on the surface of one part and allowing it to cure to a flexible, elastic product that deforms under load. The part is then fastened (with clips, screws, etc.) to a second part, compressing the gasket and causing it to fill and seal the gap between both parts.

This gasketing method is also known as CIPG (Cured-In-Place Gasketing).
CIPG is particularly used to make assemblies that have to be regularly opened and closed (such as for servicing). When such assemblies are reopened, the compressed gasket returns to its original shape (this ability is known as recovery) and can be recompressed.

Dow Corning and DGE offer the two silicone technologies typically used for CIPG: silicone elastomers and silicone foams.

Silicone elastomers

Silicone elastomers are highly viscous two-part materials. Once both parts are mixed and dispensed (most often robotically), the materials must be subjected to high temperature (for a few minutes at 150°C/302°F, for example) to allow them to cure by polyaddition and harden.



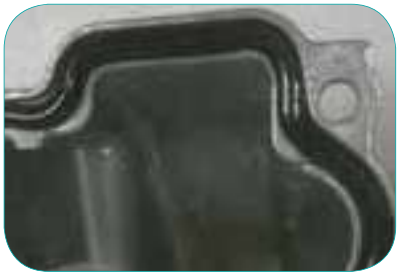
Automatic mixing and dispensing of both parts

High-temperature treatment

The cured elastomer is ready to be compressed

Assembly and compression of the elastomer

Cured silicone elastomers have a hardness ranging between 20 and 50 Shore A and must be compressed at a rate of 25 to 35% to ensure a tight seal. This hardness is particularly suitable for assemblies subjected to high clamping forces.

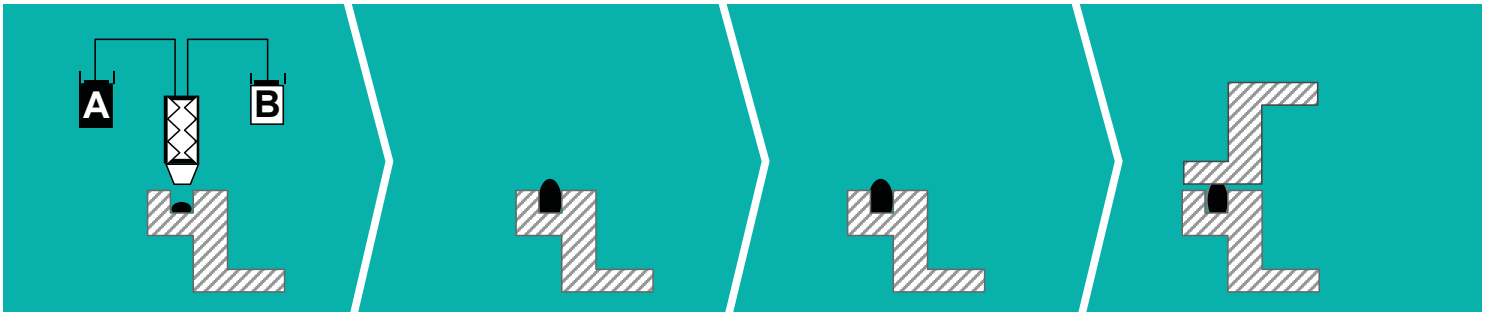


SILICONE ELASTOMERS

Product name	Temperatures (°C/°F) (peak)	Cure time	Viscosity	Tensile strength / Elongation	Color	Shore hardness	Features	Packaging* & SKUs
Xiameter® **RBL-9496-20P**	-50°C (-58°F) +200°C (+392°F)	5 min at 150°C (+302°F)	Non flowing	5.3 MPa/925%	Black	A21	Ratio: 1:1 w/w - Best when used on plastics	Inquire for details
Xiameter® **RBL-9496-30P**	-50°C (-58°F) +200°C (+392°F)	5 min at 150°C (+302°F)	Non flowing	7.2 MPa/820%	Gray	A32	Ratio: 1:1 w/w - Best when used on plastics	Inquire for details
Xiameter® **RBL-9496-45M**	-50°C (-58°F) +200°C (+392°F)	5 min at 150°C (+302°F)	Non flowing	7.3 MPa/600%	Black	A45	Ratio: 1:1 w/w - Best when used on metals	Inquire for details

Silicone foams

Silicone foams are flowable two-part liquids. Once both components are robotically mixed and dispensed into a groove, the foam quickly cures by polyaddition at ambient temperature. As the mixture cures, it evolves dihydrogen, which allows the silicone to swell and form a cellular foam (consisting of around 70% open cells).



Automatic mixing and dispensing of both components

Room-temperature cure, evolution of H2 and swelling of the silicone to form a cellular foam

The cured silicone foam is ready to be compressed

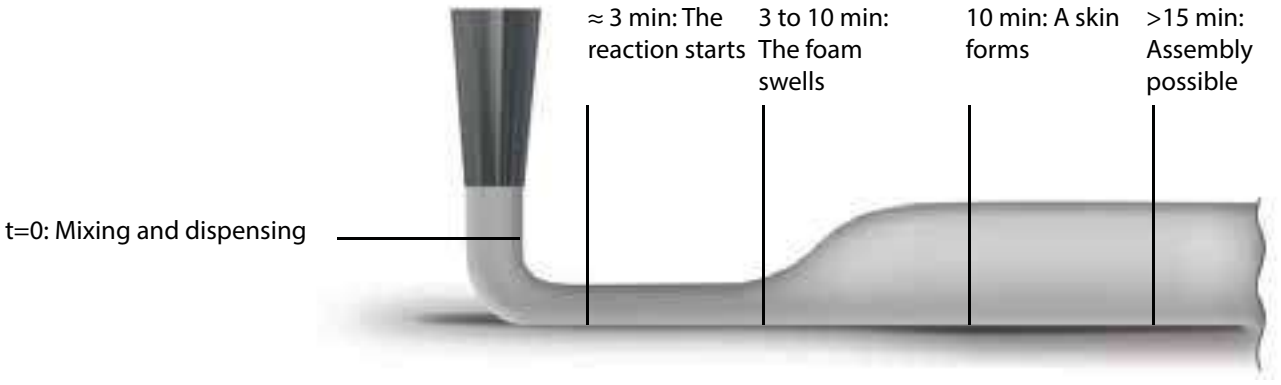
Assembly and compression of the foam

Cured silicone foams have a hardness ranging between approx. 30-70 Shore 00, making them easily compressible products that require only moderate clamping forces. Their optimum compression rate for proper sealing is between 45% and 55%.

SILICONE FOAMS

Product name	Temperatures (°C/°F) (peak)	Viscosity	Foam density	Color	Shore hardness	Features	Packaging* & SKUs
Dow Corning® **3-8209**	-60°C (-76°F) +200°C (+392°F)	15,000 MPa·s	0.2 to 0.28 g/cm3	Light gray	45 to 50 Shore 00	Ratio: 1:1 w/w • Self-leveling	Inquire for details
Dow Corning® **3-8219 RF**	-55°C (-67°F) +180°C (+356°F)	30,000 MPa·s	0.2 to 0.28 g/cm3	Gray	30 to 35 Shore 00	Ratio: 1:1 w/w • Flowing	Inquire for details
Dow Corning® **3-8259 RF**	-55°C (-67°F) +180°C (+356°F)	55,000 MPa·s	0.3 to 0.36 g/cm3	Dark gray	65 to 70 Shore 00	Ratio: 1:1 w/w • Flowing	Inquire for details
Dow Corning® **3-8257 Black**	-55°C (-67°F) +180°C (+356°F)	20,000 MPa·s	0.15 to 0.20 g/cm3	Black	NG	Ratio: 1:1 w/w • Self-leveling	Inquire for details
Dow Corning® **3-6548**	-55°C (-67°F) +180°C (+356°F)	60,000 MPa·s	0.22 to 0.32 g/cm3	Black	NG	Ratio: 1:1 w/w • Low viscosity • High fire resistance	SEMCO 6 oz

Explanatory diagram of the cure times of silicone foam sealants



Compression rate control

The main parameter that must be controlled is the compression rate:
• an insufficiently compressed gasket will not completely fill the gap between parts and will leave voids for liquids to fill.
• overcompression will, upon opening, cause gaskets to lose their ability to return to their original shape, which can lead to leakage issue during reassembly.

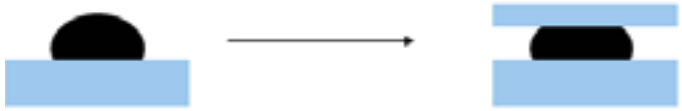
Inhomogeneous distribution of mechanical loads ▶ Risk of leakage

Homogeneous distribution of mechanical loads ▶ Limited risk of leakage

Generally speaking, silicone gaskets should be compressed at between 25% and 35% and foam gaskets at between 45% and 55%.

Joint designs

Joint design is a crucial factor in ensuring proper gap and compression rate control.
A few examples:



Flat surface: Although the easiest to use, this design does not allow proper control of the compression rate or gasket deformation.

Grooved surface: Facilitates gasket dispensing and use and allows better control of gasket deformation.

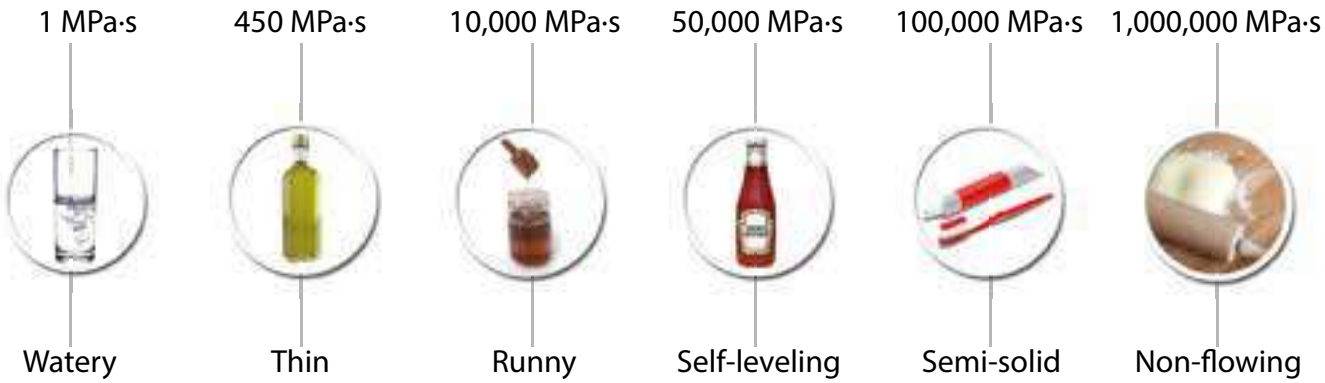
Flat surface with compression limiter: The raised area helps to control the thickness of the compressed gasket and, indirectly, the compression rate.

Void-volume: Likewise, the compression limiters help to control the thickness of the compressed gasket and, indirectly, the compression rate. Furthermore, the second compression limiter provides better control of gasket deformation This type of joint design is particularly suited to silicone foams.

Tongue-in-groove: This joint design allows the best adjustment of the gap between parts and the compression rate. This type of joint design is particularly suited to silicone foams.

ANTALA can guide you in designing your parts so that they best meet your needs.

Viscosity comparison chart



ESTIMATED CONSUMPTION LEVELS

Bead lengths, in meters, by packaging type and diameter of extrusion

Packaging		Bead diameter, in mm									
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Tube	90 ml	113.1	28.71	12.47	7.25	4.5	2.9	2.6	1.8	1.4	1.1
Cartridge	310 ml	390	99	43	25	15.5	10.3	7.8	6.2	4.9	4
Bulk	20 l	25200	6400	2800	1600	1000	680	520	400	316	256
	200 l	252000	64000	28000	16000	10000	6800	5200	4000	3160	2560
	Gap (in mm)	Width of compressed bead, in mm (FIPG only)									
	0.5	1.6	6.3	14.1	25.1	39.3	56.5	77.0	100.5	127.2	157.1
	1	0.8	3.1	7.1	12.6	19.6	28.3	38.5	50.3	63.6	78.5
	1.5	0.5	2.1	4.7	8.4	13.1	18.8	25.7	33.5	42.4	52.4
	2	0.4	1.6	3.5	6.3	9.8	14.1	19.2	25.1	31.8	39.3
	2.5	0.3	1.3	2.8	5.0	7.9	11.3	15.4	20.1	25.4	31.4
	3	0.3	1.0	2.4	4.2	6.5	9.4	12.8	16.8	21.2	26.2

DISPENSING EQUIPMENT

Antala guides you in finding the best dispensing equipment for your applications, such as PC Cox applicators, which are compatible with Dow Corning™ cartridges.

310 ml

POWERFLOW COMBI CARTRIDGE MANUAL APPLICATOR

310 ml CARTRIDGE
Trigger ratio: 18:1
Antala Item No. 10700003

600 ml

POWERFLOW COMBI SACHET MANUAL APPLICATOR

600 ml SACHET
Trigger ratio: 12:1
Antala Item No. 10700015

310 ml

AIRFLOW-1 CARTRIDGE PNEUMATIC APPLICATOR

310 ml CARTRIDGE
6,8 bar 1,35 kN
Antala Item No. 10700009

310 ml

ELECTRAFLOW PLUS COMBI ELECTRICAL APPLICATOR

310 ml CARTRIDGE
18V, 1.5Ah Li-Ion
2 battery-charger
Antala Item No. 10700158

Smoothing agents

Product name	Flash point	Features	Properties	Packaging* & SKUs
Xiameter® **PMX-200 100 cSt**	>120°C (+248°F)	Silicone fluid with very low evaporation rate	Flammable • May be used as a smoothing agent	500 ml, 4 kg
Dow Corning® **OS-20**	34°C (+93.2°F)	Very fast evaporating methylsiloxane	Highly flammable • May be used to clean surfaces prior to bonding or as a smoothing agent	500 ml, 3.1 kg
Dow Corning® **OS-30**	57°C (+134.6°F)	Medium fast evaporating methylsiloxane	Flammable • May be used to clean surfaces prior to bonding or as a smoothing agent	500 ml, 15 kg

Sealant cleaners

Product name	Flash point	Features	Properties	Packaging* & SKUs
Pt Technologies® **PF AquaForte**	-	**Water-based surface preparation wipes• Removes uncured elastomers**	Wipe-on/wipe-off cleaning• Non-toxic, nonflammable • No logistics issues: classified as "non-hazardous", no storage or transportation requirements	24 units, 150 units
Pt Technologies® **PF-SR** *(Sealant Remover)*	56°C (+132.8°F)	Solvent-impregnated cleaning wipes, for surface preparation • **Removes semi-cured sealant**	High-resistance, low-linting fabric • 100% volatile solvent, no residue • Low toxicity • Reduces VOC emissions • No logistic issues: no storage or transport requirements	24 units, 250 units
Dow Corning® **DS-2025**	>90°C (+194°F)	Digests silicone deposits through depolymerisation• Removes fully cured silicone residues (4 hrs of immersion required)	Nonflammable • Free of aromatic and halogenated solvents • Dissolves all cured silicone residues in 4 hours • Reusable	25 kg
Dow Corning® **DS-1000**	-	Water-based surfactant blend • Removes uncured elastomers	Aqueous solvent, non-flammable • To be diluted in water (10%) water • Emulsifies silicone oils, greases, and uncured elastomers	25 kg

SMOOTHING SPATULA

Used to smooth and make variable-radius fillet joints.

REPLACEMENT NOZZLES

Replacement nozzles for sealant cartridges.