



**PLASTICS REFERENCE HANDBOOK**

**REGAL PLASTIC SUPPLY COMPANY**

**PLASTICS REFERENCE HANDBOOK**

regal

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Established in 1954, Regal Plastic Supply Company is considered one of the foremost pioneers in the plastic distribution industry. Throughout the years, the innovative “customer-oriented plan for success” thinking has become a credible trademark our customers rely on. Fortifying that philosophy, Regal introduced its Plastic Materials Reference Guide in 1984. As products and industries continue to evolve, so does this compilation of technical data. We view providing our customers with tools for effective planning and purchasing as important as meeting product “supply and demand”. You will find this guide an invaluable reference source for researching or finding the answer pertaining to your plastic application. The product information contained herein covers the most commonly used materials; it does not reflect our total capacity.

True customer service is a thought process not developed overnight. Our experience and stability in the industry gives Regal the opportunity to assist you in your plastics endeavors as you utilize staff who are accessible, knowledgeable and resourceful with regard to all inquiries.

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Regal Plastic Supply Company thanks all of our customers for their patronage over the years. We will continue in our efforts to provide the best in JIT inventory and personal service. Plastic is in your future and Regal Plastic Supply Company is your best source.

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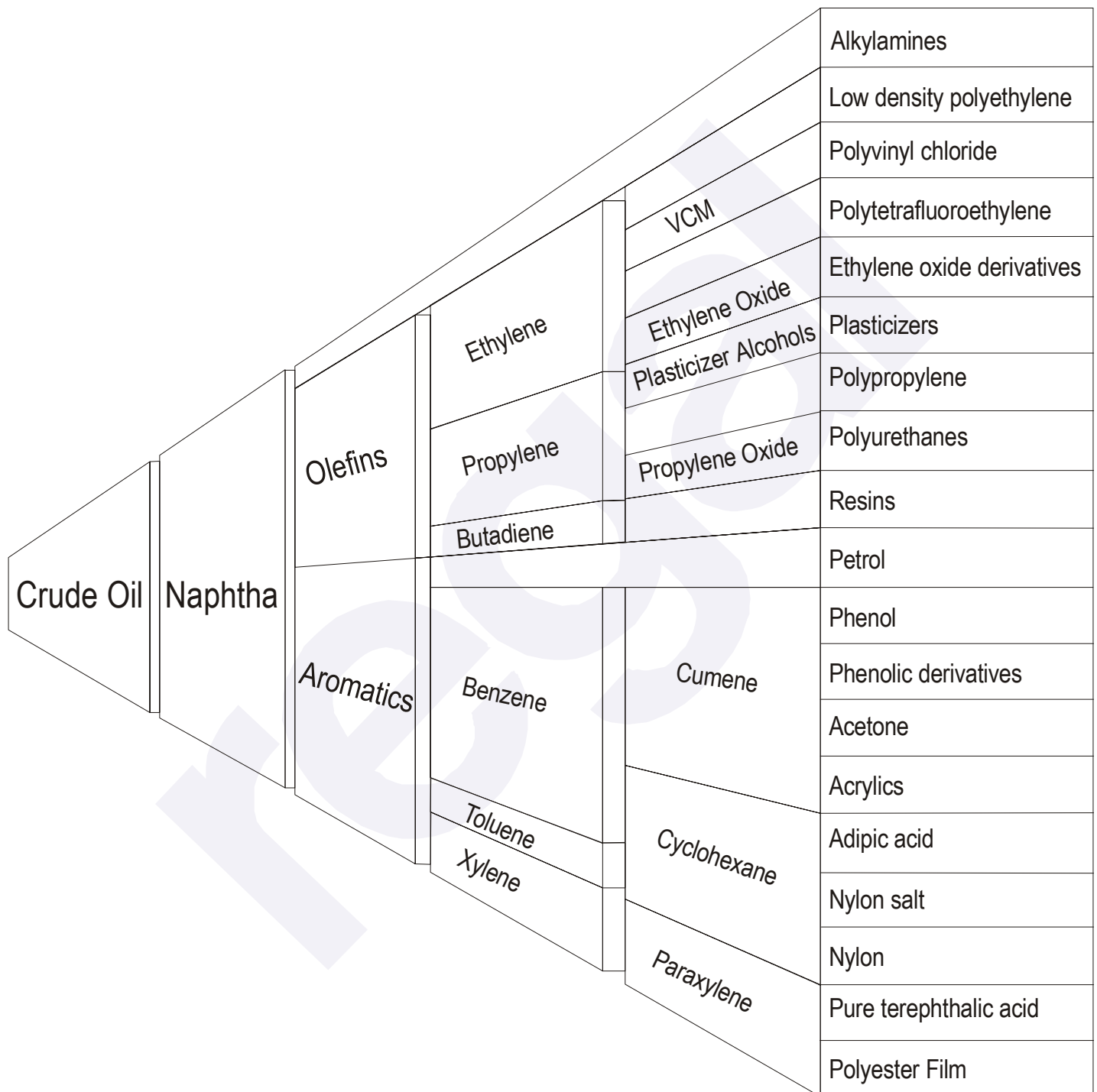
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# INTRODUCTION

## The Origins of Plastic Materials



# INTRODUCTION

## Preface

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### Introduction

PLASTIC-(per Webster)- “Any numerous organic, synthetic, or processed materials that are high molecular weight polymers.”

Polymers are a tribute to man’s creativity and inventiveness. They are truly man-made materials. Like any other material, they have their origins in nature, in such basic chemical elements as carbon, oxygen, hydrogen, nitrogen, chlorine, and sulfur. These elements in turn are extracted from the air, water, gas, oil, coal, or even plant life.

It was man’s inspiration to take these elements and combine them, via various chemical reactions, in an almost unending series of combinations, to produce the rich variety of materials we know today as plastics.

The possibilities of combining chemical elements to create plastics with different properties are almost endless. It is this diversity that has made plastics so applicable to such a broad range of end uses and products today.

### In the Beginning

Given this kind of versatility and the role that plastics play in modern living, it’s surprising to realize that a little over a century ago there was no such thing as commercial plastic in the United States. During the 1850's and 60's, developmental work was going on with hard rubbers and cellulose materials, but the U.S. plastics industry officially dates its beginnings back to 1868, when a product called Celluloid was created as the first commercial plastic in the U.S. The development was in response to a competition sponsored by a manufacturer of billiard balls. It came about when a shortage developed in ivory from which the billiard balls were made, and the manufacturer sought another production method. Celluloid was one of the materials considered, and the U.S. plastics industry was born.

As has been typical of new plastic materials ever since, Celluloid quickly moved into other markets. The first photographic film used by Eastman was made of celluloid: producing the first motion picture film in 1882. The material is still in use today under its chemical name Cellulose nitrate, for making products like eyeglass frames.

Forty years were to pass before the plastics industry took its second major step forward. In 1909, Dr. Leo Hendrik Baekeland introduced Phenol formaldehyde plastics (or Phenolics as they are more popularly known), the first plastic to achieve world wide acceptance.

The third big thrust in plastics development took place in the 1920's with the introduction of Cellulose acetate, ureaformaldehyde, polyvinyl chloride, or Vinyl, and Nylon.

### Evolution

In the World War II years of the 1940's, the demand for plastics accelerated, as did research into new plastics that could aid in the defense effort.

By the start of the 1950's plastics were on their way to being accepted by designers and engineers as basic materials, along with the more conventional ones.

Nylon, Teflon, Acetal, and Polycarbonate became the nucleus of a group in the plastics family known as the engineering thermoplastics. Their outstanding impact strength and thermal and dimensional stability enabled them to compete directly with metals. This group has grown since then to include a number of new plastics, as well as improved variations of older plastics that could similarly qualify for inclusion.

### **The Monomers & Polymers**

Many plastics are derived from fractions of petroleum or gases that are recovered during the refining process. For example: ethylene monomer, one of the more important feedstocks, or starting materials for plastics, is derived in a gaseous form from petroleum refinery gas, liquefied petroleum gases, or liquid hydrocarbons. Although petroleum gas derivatives are not the only basic source used in making feedstocks for plastics, they are among the most popular and economical in use today. Coal is another excellent source in the manufacturing of feedstocks for plastics.

From these basic sources come the feedstocks we call monomers. The monomer is subjected to a chemical reaction known as polymerization; it causes the small molecules to link together into ever increasingly long molecules. Chemically, the polymerization reaction gas turns the monomer into a polymer, and thus a given type of plastic resin.

### **The Product as We See It**

The polymer or plastic resin must next be prepared for use by the processor, who will turn it into a finished product. In some instances, it is possible to use the plastic resin as it comes out of the polymerization reaction. More often, however, it goes through other steps which turn it into a form that can be more easily handled by the processor and processing equipment. The more popular forms of resin for processing are pellet, granule, flake, and powder.

In the hands of the processor, these solids are generally subjected to heat and pressure. They are melted, forced into the desired shape (sheets, rods, and tubes) and then allowed to cure into a finished product. Resins are most readily available in their natural color, but by adding coloring agents, most any color can be achieved during the processing.

Plastics are a family of materials, not a single material. Each has its own distinct and special advantages.

Each day brings new plastic compounds, and new uses for the old compounds.

# INTRODUCTION

## Chronology of Plastic

DATE	MATERIAL	ORIGINAL TYPICAL USE
1868	Cellulose Nitrate	Eye Glass Frames
1909	Phenol-Formaldehyde	Telephone Handsets
1926	Alkyd	Electrical Bases
1926	Analine-Formaldehyde	Terminal Boards
1927	Cellulose Acetate	Tooth Brushes, Packaging
1927	Polyvinyl Chloride	Raincoats
1929	Urea-Formaldehyde	Lighting Fixtures
1935	Ethyl Cellulose	Flashlight Cases
1936	Acrylic	Brush Backs, Displays
1936	Polyvinyl Acetate	Flash Bulb Lining
1938	Cellulose Acetate Butyrate	Irrigation Pipe
1938	Polystyrene or Styrene	Kitchen Housewares
1938	Nylon (Polyamide)	Gears
1938	Polyvinyl Acetal	Safety Glass Interlayer
1939	Polyvinylidene Chloride	Auto Seat Covers
1939	Melamine-Formaldehyde	Tableware
1942	Polyester	Boat Hulls
1942	Polyethylene	Squeezable Bottles
1943	Fluorocarbon	Industrial Gaskets
1943	Silicone	Motor Insulation
1945	Cellulose Propionate	Automatic Pens and Pencils
1947	Epoxy	Tools and Jigs
1948	Acrylonitrile-Butadiene-Styrene	Luggage
1949	Allylic	Electrical Connectors
1954	Polyurethane or Urethane	Foam Cushions
1956	Acetal	Automotive Parts
1957	Polypropylene	Safety Helmets
1957	Polycarbonate	Appliance Parts
1959	Chlorinated Polyether	Valves and Fittings
1962	Phenoxy	Bottles
1962	Polyallomer	Typewriter Cases
1964	Ionomer	Skin Packages
1964	Polyphenylene Oxide	Battery Cases
1964	Polymide	Bearings
1964	Ethylene-Vinyl Acetate	Heavy Gauge Flexible Sheeting
1965	Parylene	Insulating Coatings
1965	Polysulfone	Electrical/Electronic Parts
1970	Thermoplastic Polyester	Electrical/Electronic Parts
1973	Polybutylene	Piping
1975	Nitrile Barrier Resins	Containers



The information contained herein provides product data, suggestions, and guidelines we believe to be reliable. They are offered in good faith but without any guarantee, as conditions, type of product, and methods of product use are beyond our control.

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**Sufficient verification and testing to determine the suitability for their own particular purpose of any information or products referred to herein, is strongly recommended.**

### Sealant/Surface Recommendations

Organosilicone chemistry began around 100 years ago. By the early 1930's, industrial development of silicones had begun, and in the 1940's General Electric is credited with becoming the first company to successfully develop an economical procedure for silicone production. First used in military applications during WWII, and then in the aerospace industry, silicones proved their ability to withstand environmental conditions while remaining thermally and chemically stable. The list of applications grew rapidly to include release agents for molding rubber, water repellents, and ingredients for paints, lubricants, and polishes. Today silicones are used everyday for countless applications in numerous industries.

The versatility of silicones is derived from their structure. They are unique polymers that combine an inorganic silicon-oxygen (siloxane) backbone with organic side chains. This hybrid nature is why silicones behave somewhat like organic polymers, yet retain important inorganic properties like heat resistance. As well as being able to withstand heat, silicones are also chemically inert, self-extinguishing, resistant to oxidation and thermal attack, hydrolytically stable, nonstaining, noncorrosive, and very low in toxicity.

G.E. manufactures an entire line of silicone products including one-part RTV silicone sealants and adhesives, and two-part RTV encapsulants and potting compounds.

Construction Material	IS800 Series	RTV100 Series	RTV 5220 Series	RTV 5240 Series	RTV5800 RTV6700	Surface Preparation
<b>Concrete &amp; Masonry</b> Brick Concrete Block Poured Concrete Precast Concrete Mortar Grouts Cement-Asbestos (Factory Made)	Do Not Use Do Not Use Do Not Use Do Not Use Do Not Use Do Not Use Do Not Use	Do Not Use Do Not Use Do Not Use Do Not Use Do Not Use Do Not Use Do Not Use	OK OK OK OK OK OK OK	OK OK OK OK OK OK OK	OK OK OK OK OK OK OK	Surfaces must be dry, sound, dust-free and free of form oils or treatments that prevent adhesion. Stiff bristle brushing, grinding or sandblasting may be required. Surfaces vary greatly from job to job and test applications are recommended to determine degree of preparation required. In some cases, primer may be required for best results.
<b>Stone</b> Granite Marble Limestone	OK Do Not Use Do Not Use	OK Do Not Use Do Not Use	OK OK OK	OK OK OK	OK OK OK	Surfaces must be dry and dust-free. Primer may be required. Test applications are recommended to determine surface preparation, primer need and staining potential.
<b>Glass or Porcelain</b> Sheet, Float or Plate Glass Tinted Glass Reflective Glass Glazed Ceramic Tile Porcelain Coated Metal Vitrified Surfaces	OK OK Test OK OK OK	OK OK Test OK OK OK	OK OK OK Test OK OK	OK OK OK Test OK OK	OK OK Test OK OK OK	Surfaces must be dry and free of dust, oil or other contaminants. Detergent or soap and water treatments are not recommended. Surface should be cleaned with alcohol or other suitable solvent. The solvent used should be checked for compatibility with adjacent materials that it will contact.
<b>Paints</b> Acrylic Latex Acrylic - Thermoset Alkyd Latex Alkyd Enamel Silicone Alkyd Silicone Acrylic Polyurethane Polyvinyl Chloride Polyvinyl Fluoride Kynar 500® Resin† - Based Paints	OK OK OK OK OK OK OK OK OK OK OK	OK OK OK OK OK OK OK OK OK OK OK	OK OK OK OK OK OK OK OK OK OK OK	OK OK OK OK OK OK OK OK OK OK OK	OK OK OK OK OK OK OK OK OK OK OK	Surfaces must be clean and dry. An isopropyl alcohol wipe with clean rag is recommended. Since formulation may change, test application of material to be used on the job is recommended.
<b>Plastics<sup>2</sup></b> Acrylic Sheet Polyester/Fiberglass Epoxy Matrix Panels Polyester Matrix Panels Polystyrene Polyvinyl Chloride Polyvinyl Fluoride Polycarbonate Sheet	OK OK OK OK OK Test OK OK	OK OK OK OK OK Test OK OK	OK OK OK OK OK OK OK OK	OK OK OK OK OK OK OK OK	Do Not Use OK OK OK OK OK OK Do Not Use	Surfaces must be clean and dry Alcohol wipe w/clean rags Alcohol wipe w/clean rags Alcohol wipe w/clean rags Alcohol wipe w/clean rags Alcohol wipe w/clean rags Alcohol wipe w/clean rags Alcohol wipe w/clean rags Alcohol wipe w/clean rags
<b>Rubber</b> Butyl E.P.D.M. Neoprene Polyurethane Polysulfide	Test Test Test Test	Test Test Test Test	Test Test Test Test	Test Test Test Test	Test Test Test Test	Rubber formulations vary greatly and may contain materials that cause staining or chemical reaction. Test applications are required in each case to determine compatibility.
<b>Silicone Sealants</b>						Alcohol wipe to clean surface.
<b>Metals</b> Aluminum - Mill Finish Aluminum - Anodized Aluminum - Lacquered Copper Lead Steel - Red lead primed Steel (Bright/clean) Steel - Weathered Steel - Stainless Steel - Galvanized	OK OK OK Do Not Use Do Not Use OK OK OK OK OK Do Not Use	OK OK OK Do Not Use Do Not Use OK OK OK OK OK Do Not Use	OK OK OK OK OK OK OK OK OK OK OK	OK OK OK OK OK OK OK OK OK OK OK	OK OK OK OK OK OK OK OK OK OK OK	Surfaces must be oil and dust-free Alcohol wipe - removes oils and dust Alcohol wipe - removes oils and dust Sand off oxide-alcohol wipe Alcohol wipe - remove oils and dust Alcohol wipe - remove dust Alcohol wipe - remove oils and dust Wire brush - alcohol wipe Alcohol wipe - remove oils and sut
<b>Woods</b> Unfinished Finished	Do Not Use OK	Do Not Use OK	Do Not Use OK	Do Not Use OK	Do Not Use OK	Unfinished wood is not a proper surface for sealant adhesion. Wood surfaces should be sealed with paint or other coating (see paint recommendations).

<sup>2</sup> Plastics may contain plasticizers which bleed to surface and effect adhesion. Test applications are recommended for solvent attack and adhesion and compatibility with sealants.

† Registered Trademark Pennwalt Corp.

# ADHESIVES & SEALANTS

## G.E. Silicones - One-Part RTV Components

### GE One-Part RTV Silicone Adhesive Sealants

### Alkoxy Cure, Acetoxy Cure & Specialty Grades

Alkoxy cure silicones are neutral cure materials that offer exceptional adhesion. These materials are non-corrosive to most metals. Several grades are non-corrosive to sensitive metals such as copper and brass.

Specialty grade silicones are one-part materials that offer outstanding adhesion coupled with either one or more of the following unique properties:

- Fuel, solvent, chemical and oil resistance
- High temperature performance
- Low volatiles content
- Exceptionally high strength

Primer†	Use For	Use With
SS4004 SS4404	General Purpose	1, 2C
SS4179	Plastics & General Purpose	1
SS4155	General Purpose	1, 1A, 2A, 2C
SS4120	Where Clarity Is Needed	1A, 2A

#### Key

- 1 Use with one-part sealants  
 1A Use with heat cure one-parts  
 2C Use with condensation cure two-parts  
 2A Use with addition cure two-parts  
 † Please ask for CDS1532 or CDS1873 product data sheets for more detailed information.

	Typical Uses	Product Description	Product	Specs (UL, MIL, etc.)
Alkoxy Cure—Totally Non-Corrosive	<b>Economical</b> true neutral with primerless adhesion and long tooling time.	Low Modulus Paste	RTV5222 White RTV5223 Black RTV5229 Gray	
	<b>Fast cure</b> , true neutral with hydrolytic stability, primerless adhesion and UL recognition.	Fast Cure Paste	RTV5242 White RTV5243 Black RTV5249 Gray	•UL File No. E36952
	<b>Non-corrosive protection</b> of printed circuit boards from dirt, dust, moisture & solvents. Coat contact points. Seal exposed wires. Cushion between plastics and metals. Thin-section potting.	Non-Corrosive Pourable	RTV160 White	•UL File No. E36952
	<b>Non-corrosive bonding</b> of capacitors, resistors & integrated circuits to PCBs. Insulate relays, exposed copper wires, terminals. Seal & protect faying surfaces, connectors, miniature circuits.	Non-Corrosive Paste	RTV162 White	•UL File No. E36952 •MIL-A-46146B
	<b>Highest strength adhesive sealant</b> for mechanical or electrical applications. Use on horizontal and vertical surfaces. Excellent electrical insulator.	Non-Corrosive High Strength Paste	RTV167 Gray	•MIL-A-46146* •UL File No. E36952
	<b>Non-corrosive adhesive/sealant/coating</b> for metallic and plastic substrates; for electrical/electronic applications.	Thixotropic Paste Semi Flowable Flowable	TSE392 Translucent TSE397 Translucent TSE399 Translucent	•MIL-A-46146A •MIL-A-46146A •MIL-A-46146A
	<b>Flame retardant, non-corrosive adhesive seal</b> for metallic and plastic substrates; for electrical/electronic applications.	Fast Cure Paste	TSE3940 Gray TSE3941 White	•MIL-A-46146A •UL File No. E36952 •MIL-A-46146A •UL File No. E36952
Specialty Grades: Fuel and High Temperature Resistance	<b>Fluorosilicone adhesive sealant</b> for use in contact with fuel, solvents and chemicals.	Fuel Resistant Paste Acetoxy	FRV1106 Red†† FRV1107 Gray††	
	<b>Heavy bodied adhesive sealant</b> for formed-in-place gasketing. Good oil resistance.	FIPG Acetoxy	FRV1473 Black††	
	<b>Use as a sealant on firewalls or as a flame-retardant coating.</b> Use in switching devices, motors and high-voltage transformers.	Flame Retardant Paste Alkoxy	RTV133 Black	• UL File No. E36952 • UL94 V-0** • AMS 3374
	<b>High-heat applications;</b> encapsulate and seal heating elements. Useful up to 260C (500F).	High Strength High Temperature Paste, Acetoxy	RTV106 Red††	•FDA Compliance •MIL-A-46106* (RTV106 only)
	High Temperature	General Purpose Paste, Acetoxy	ISO806 Red ††	•UL File No. E36952 •NSF •USDA
	High Strength	High Temperature Pourable, Acetoxy	RTV116 Red††	•MIL-A-47040
		High Strength Paste, Acetoxy	RTV159 Red††	
	<b>Low volatile adhesive;</b> use as electronic gasketing adhesive for critical aerospace applications.	Non-Corrosive Paste	RTV142 White	5856053-Navy Sea Sys.
	<b>High strength adhesive;</b> use for gasketing, aircraft maintenance and electrical insulation.	High Strength Paste	RTV157 Gray††	

#### Packaging Key

- 05T / 06T = .22 lb. Tube  
 03T = 2.8 fl. oz. metal tube  
 3TG = 2.8 fl. oz. plastic tube  
 12T = 10.3 fl. oz. tube  
 06S = 5.4 fl. oz. cartridge  
 12C = 10.1 fl. oz. cartridge  
 01Q = 1 quart can (2.2 lbs.)  
 5GP = 5 gallon pail (40 lbs.)  
 55G = 55 gallon drum (450 lbs.)

# ADHESIVES & SEALANTS

## Alkoxy Cure, Acetoxy Cure & Specialty Grades

Key Substrate Adhesion Typical Lap Shear (psi) and/or Peel (ppi)	Useful Temperature Range C (F)	Specific Gravity	Hardness, Shore A Durometer	Tensile Strength, Mpa (psi)	Elongation (%)	Dielectric Strength KV/mm (V/mil)	Dielectric Constrant	Packaging (see key opposite page)
Steel, Glass PVC, Acrylic, Polycarbonate Peel (60)	-60 to 205 (-75 to 400)	1.4	26	2.60 (370)	750	16.5 (420)	3.9 @ 60 Hz	12C, 5GP, 55G
Steel, Aluminum, Glass, Polycarbonate Peel (40)	-60 to 205 (-75 to 400)	1.5	40	2.50 (320)	425	20 (500)	2.8 @ 60 Hz	12C, 5GP, 55G
Copper, Brass Aluminum, Nylon/ PPO®, PC/PBT Lap (100), Peel (30)	-60 to 205 (-75 to 400)	1.04	25	1.86 (275)	230	20 (500)	2.8 @ 60 Hz	12C, 5GP, 55G
Copper, Brass, Aluminum, Poly- carbonate, Polyester (PBT) Lap (150), Peel (40)	-60 to 205 (-75 to 400)	1.09	35	3.73 (550)	400	18 (450)	2.8 @ 60 Hz	03T, 12C, 5GP, 55G
Copper, Brass, Aluminum, ABS, Nylon/PPO Lap (200), Peel (60)	-60 to 205 (-75 to 400)	1.12	37	5.49 (800)	600	20 (500)	2.8 @ 60 Hz	03T, 12C, 5GP
Most metals, plastics	-60 to 205 (-75 to 400)	1.04	30	16 (228)	400	22 (560)	2.9	05T/06T, 12C, 01Q, 5GP
Most metals, plastics	-60 to 205 (-75 to 400)	1.04	20	11 (156)	300	22 (560)	2.9	
Most metals, plastics	-60 to 205 (-75 to 400)	1.04	30	13 (185)	140	20 (500)	2.9	
Most metals	-60 to 205 (-75 to 400)	1.49	40	30 (427)	200	21 (530)	4.5	05T/06T, 12C, 01Q, 5GP
Most metals	-60 to 205 (-75 to 400)	1.65	60	30 (427)	100	22 (560)	4/0	
PC/PBT, Polyester (PBT) Lap (200), Peel (25) Primed	-60 to 205 (-75 to 400)	1.58 1.33	42 35	3.33 (500) 2.35 (350)	230 260	13.7 (351)	6.3 @ 1,000 Hz	06S
Aluminum, Steel, Glass, Ceramic, Polyester (PBT) Lap (200)	-60 to 204 (-75 to 400)	1.06	30	3.14 (450)	500	—	—	12C, 3TG, 5GP
Copper, Brass, Aluminum, PC/ PBT, Polycarbonate, Polyester (PBT) Lap (200)	-60 to 205 (-75 to 400)	1.23	46	4.51 (650)	250	20 (500)	2.8 @ 100 Hz	12C, 5GP, 55G
Aluminum, Steel, Glass, PC/PBT, Polyester (PBT) Lap (200), Peel (30)  Lap (125), Peel (25)  Lap (60)	-60 to 260 (-75 to 500)	1.07	30	2.55 (375)	400	19.5 (500)	2.8 @ 60 Hz	3TG / 12T / 06S / 12C / 5GP / 55G
	-60 to 260 (-75 to 500)	1.05	22	1.67 (250)	425	19.5 (500)	2.9 @ 60 Hz	
	-60 to 260 (-75 to 500)	1.09	28	2.45 (350)	350	19.7 (500)	2.6 @ 60 Hz	
	-60 to 260 (-75 to 500)	1.09	20	7.07 (1025)	350	15.6 (400)	2.8 @ 60 Hz	
Aluminum, Steel, Glass, Polycar- bonate Lap (300), Peel (60)	-60 to 204 (-75 to 400)	1.09	34	3.78 (550)	400	20 (500)	2.8 @ 60 Hz	55G
Aluminum, Steel, Glass, PC/PBT, Polyester (PBT) Lap (60)	-60 to 204 (-75 to 400)	1.09	28	6.21 (975)	825	20.7 (525)	2.9 @ 60 Hz	03T, 06S, 5GP

\* Testing for the referenced MIL Specs is performed in accordance with current GE Silicones quality test methods, laboratory conditions and procedures, frequency, and sampling, which are not necessarily identical with the methods, conditions, procedures, frequency and sampling stated or referenced in the listed specification. A certification will be limited to listed properties and will not imply or state conformity to any other aspect of the referenced specification, including but not limited to marking, packaging, bar coding, testing or sampling. [Contact your nearest Regal Plastic Supply distribution center to obtain a comparison review.](#)

\*\* This rating is based on a standard, small-scale laboratory test and as such is not reliable for determining, evaluating, predicting, or describing the flammability or burning characteristics of the product under actual fire conditions.

†† These sealants are not for use in delicate electrical and electronic applications in which corrosion of copper, brass or other sensitive metals is undesirable.

# ADHESIVES & SEALANTS

## G.E. Silicones - One-Part RTV Components

### GE One-Part RTV Silicone Adhesive Sealants

### Modified Alkoxy Cure & Addition Cure

Modified alkoxy materials cure at room temperature and will outgas a small amount of ammonia and some alcohol during cure. They are generally non-corrosive to metals but could discolor copper if in direct contact.

Acetoxy cure silicones are the most commonly used type of RTV materials and are considered GE Silicones' general purpose product line.

Addition cure RTV silicones are cured by the addition of heat. They offer long work times at room temperature.

Use this guide to find the GE one-part RTV silicone material best suited to your application.

	Typical Uses	Product Description	Product	Specs (UL, MIL, etc.)
Modified Alkoxy Cure	<b>General purpose adhesive sealant</b> for sealing and bonding. Long tooling time. Primerless adhesion to many metals and plastics.	General Purpose Paste	RTV6702 White† RTV6703 Black† RTV6708 Translucent†	●UL File No. E36952 ●AMS 3374
	<b>Primerless adhesion</b> to many plastics including polycarbonate for assembly bonding and sealing.	Industrial Plastic Adhesive	RTV6802 White† RTV6803 Black† RTV6808 Translucent† RTV6809 Aluminum†	●UL File No. E36952
	<b>Fast-curing primerless adhesion</b> to aluminum and steel as well as some plastics for high productivity OEM assembly bonding and sealing.	Fast Cure Paste	RTV5812 White† RTV5813 Black† RTV5818 Translucent†	●UL File No. E36952
	<b>General purpose adhesive sealant</b> for bonding metals, plastics and glass.	General Purpose Paste	RTV122 White† RTV123 Black† RTV128 Translucent†	●UL File No. E36952
Acetoxy Cure	<b>High strength high performance seal</b> against moisture, dust and dirt, vertical & overhead sealing & bonding; electrical insulation; protect leads from mechanical shock; protect components from shock and vibration.	High Strength Paste	RTV102 White†† RTV103 Black†† RTV108 Translucent†† RTV109 Aluminum††	●FDA Compliance ●MIL-A-46146* ●NSF ● USDA ●MIL-S-47162 ● MIL-S-14112
	<b>Use for general-purpose, cost-effective sealing and bonding.</b> Cure-in-place electrical insulation. Applications requiring UL approval.	General Purpose Paste	IS802 White†† IS803 Black†† IS808 Translucent††	●FDA Compliance ●UL File No. E36952 ●NSF
	<b>Thin-section protective coating;</b> seal, bond, insulate and encapsulate.	General Purpose Pourable	RTV112 White†† RTV118 Translucent††	●FDA Compliance ●MIL-A-46146* ●UL File No. E36952 ●NSF ● USDA
	Typical Uses	Product Description	Product	Key Substrate Adhesion Typical Lap Shear (PSI)
Heat Cure	<b>Heat-curable adhesive</b> for sealing and bonding. Thermal barrier for automotive parts. Fabric seam seal.	Non-Corrosive Paste Low Viscosity	RTV6424 White	Aluminum, Steel, Glass, Some Plastics, 300
	<b>Heat-curable adhesive</b> for sealing and bonding. Thermal barrier for automotive parts. Fabric seam seal.	Non-Corrosive High Strength Paste	RTV6445 White	Aluminum, Steel, Glass, Some Plastics, 325
	<b>Heat-curable adhesive</b> for sealing and bonding. Thermal barrier for automotive parts. Fabric seam seal.	Non-Corrosive Flowable	TSE322 Light Blue TSE322B Black	Aluminum, Steel, Glass, Some Plastics, 300
	<b>Heat-curing adhesive</b> for assembly and gasketing applications. High heat applications.	Non-Corrosive Flowable High Temperature	TSE326 Red	Aluminum, Steel, Glass, Some Plastics, 300
	<b>Heat-curing adhesive</b> for general sealing, potting and coating applications needing visual clarity.	Non-Corrosive Flowable	TSE3221 Clear	Aluminum, Steel, Glass, Some Plastics, 285
	<b>Heat-curing adhesive</b> for attaching power component to heat sink attachment and circuit substrate to baseplate adhesive.	One-Component Medium Viscosity Thermally Conductive	TSE3281G	Aluminum, Steel, Glass, Some Plastics, 355

#### Packaging Key

3TG = 2.8 fl. oz. plastic tube  
12T = 10.3 fl. oz. tube  
06S = 5.4 fl. oz. cartridge  
12C = 10.1 fl. oz. cartridge

5GP = 5 gallon pail (40 lbs.)  
55G = 55 gallon drum (450 lbs.)  
200G = 7 fl. oz. metal tube  
01K = 1 qt. can (2.2 lbs.)

02K = 1 qt. can (4.4 lbs.)  
18K = 5 gallon pail (40 lbs.)  
20K = 5 gallon pail (44 lbs.)  
180K = 55 gallon drum (400 lbs.)

200K = 55 gallon drum (440 lbs.)

# ADHESIVES & SEALANTS

## Modified Alkoxy Cure & Addition Cure

Key Substrate Adhesion Typical Lap Shear (psi) and/or Peel (ppi)	Useful Temperature Range C (F)	Specific Gravity	Hardness, Shore A Durometer	Tensile Strength Mpa (psi)	Elongation (%)	Dielectric Strength kV/mm (V/mil)	Dielectric Constant	Packaging (see opposite page)
Aluminum, Steel, Glass, ABS, PC/PBT, Polycarbonate Lap (135), Peel (35)	-60 to 205 (-75 to 400)	1.04	18	1.57 (225)	450	16.0 (410)	2.9 @ 100 Hz	3TG, 12C, 5GP, 55G
Aluminum, Steel, Glass, Nylon/ PPO®, PC/ABS, Polycarbonate Lap (120), Peel (30)	-60 to 205 (-75 to 400)	1.04	18	1.67 (250)	400	19.5 (500)	2.8 @ 100 Hz	3TG, 12C, 5GP, 55G
Stainless Steel, Aluminum, Glass, PC/ABS, Polycarbonate, Polyester (PBT) Lap (125), Peel (45)	-60 to 205 (-75 to 400)	1.04	21	1.86 (275)	500	16.6 (426)	2.8 @ 100 Hz	12C, 5GP, 55G
Aluminum, Steel, PC/ABS, Polycarbonate, Polyester (PBT) Lap (125), Peel (40)	-60 to 205 (-75 to 400)	1.04	30	1.72 (250)	350	20 (500)	2.8 @ 60 Hz	12C, 5GP, 55G
Aluminum, Steel, Glass, Polyester (PBT) Lap (150)	-60 to 205 (-75 to 400)	1.05	30	2.75 (400)	450	19.5 (500)	2.8 @ 60 Hz	3TG 3TG / 12C / 5GP / 55G 12T / 12C / 5GP / 55G 12C / 5GP
Aluminum, Steel, PC/PBT, Polyester (PBT) Lap (140)	-60 to 205 (-75 to 400)	1.05	23	2.06 (300)	450	20 (500)	2.9 @ 60 Hz	3TG 12C 5GP / 55G
Aluminum, Steel, Glass, PC/ PBT, Polyester (PBT) Lap (120), Peel (15)	-60 to 205 (-75 to 400)	1.05	25	2.20 (325)	325	15.6 (400)	2.8 @ 60 Hz	03T, 12T, 5GP, 55G

Cure Time (@ 50% RH)**			Specific Gravity	Hardness, Shore A Durometer	Tensile Strength, Mpa (psi)	Elongation (%)	Dielectric Strength kV/mm (V/mil)	Dielectric Constant	Packaging (see opposite page)
100C (212F)	125C (256F)	150C (302F)							
—	45 min.	30 min.	1.17	30	4.65 (675)	550	19.5 (500)	2.9	06S, 5GP, 55G
—	45 min.	30 min.	1.20	38	6.03 (875)	625	19.5 (500)	2.9	06S, 5GP
3 hrs.	45 min.	30 min.	1.28	45	2.93 (425)	200	19.5 (500)	3.1	01K, 20K
2 hrs.	90 min.	1 hr.	1.45	43	3.43 (498)	170	22 (558)	3.3	01K, 20K, 200K
3 hrs.	90 min.	1 hr.	1.03	28	2.35 (341)	290	21 (534)	2.8	01K, 20K, 200K
2 hrs.	90 min.	1 hr.	2.70	83	4.51 (654)	40	26 (660)	5.4	01K

\* Testing for the referenced MIL Specs is performed in accordance with current GE Silicones quality test methods, laboratory conditions and procedures, frequency, and sampling, which are not necessarily identical with the methods, conditions, procedures, frequency and sampling stated or referenced in the listed specification. Any certification will be limited to listed properties and will not imply or state conformity to any other aspect of the referenced specification, including but not limited to marking, packaging, bar coding, testing or sampling. [Contact your nearest Regal Plastic Supply distribution center to obtain a comparison review.](#)

\*\* Cure times tend to be the maximum. By altering the bead size, temperature, and the equipment used, these cure times may be significantly reduced.

† When allowed to cure in enclosed conditions, these sealants may discolor sensitive metals in direct contact.

# ADHESIVES & SEALANTS

## G.E. Silicones - Two-Part RTV Components

### GE Two-Part RTV Silicone Potting & Encapsulating Compounds

#### Addition Cure

Two-part addition cure silicone RTVs can be cured very quickly with the use of high heat, up to 400°F, as well as at room temperature.

Addition cure products have no cure by-products and can be used to unlimited depths.

This chart will guide you to finding the addition cure product best suited to the requirements of your application. [For additional assistance, please contact your nearest Regal Plastic Supply Distribution Center.](#)

	GENERAL PURPOSE				
	RTV615 Clear	RTV627 Dark Gray	RTV630 Blue	RTV 6428 Dark Gray	TSE3033 Clear
<b>Typical Uses</b>	<ul style="list-style-type: none"> <li>Solar cell potting</li> <li>Optical instruments</li> <li>Applications requiring visual identification of potted assemblies</li> </ul>	<ul style="list-style-type: none"> <li>Power supply encapsulation</li> <li>Flyback transformer encapsulation</li> </ul>	<ul style="list-style-type: none"> <li>Encapsulation applications requiring high tensile strength</li> </ul>	<ul style="list-style-type: none"> <li>Power supply encapsulation of temperature limited assemblies</li> <li>"Snap" cure</li> <li>Automotive systems</li> </ul>	<ul style="list-style-type: none"> <li>Low viscosity, clear encapsulation</li> </ul>
Mix Ratio (base to curing agent by weight)	10 : 1	1 : 1	10 : 1	1 : 1	1 : 1
Viscosity, cps (@ 25C/77F)	4,000	1,270	150,000	1,300	1,000
Specific Gravity	1.02	1.37	1.28	1.37	1.01
Refractive Index	1.406	—	—	—	1.406
Hardness, Shore A Durometer	44	62	60	62	30
Tensile Strength, MPa (psi)	6.37 (920)	3.24 (475)	5.69 (820)	3.24 (475)	0.98 (142)
Elongation %	160	60	250	60	130
Tear Resistance (Die B), kg/cm (lb/inch)	—	3.4 (19)	20 (110)	3.4 (19)	—
Useful Temperature Range (continuous), C (F)	(-75 to +400) -60 to +204	(-75 to +400) -60 to +204	(-75 to +400) -60 to +204	(-75 to +400) -60 to +204	(-75 to +400) -60 to +204
Thermal Conductivity, W/m <sup>2</sup> K	0.19	0.31	0.31	0.31	0.17
Coefficient of Thermal Expansion (Linear CTE) cm/cm C (in/in F)	27 x 10 <sup>-5</sup> (15.3 x 10 <sup>-5</sup> )	21 x 10 <sup>-5</sup> (11.4 x 10 <sup>-5</sup> )	21 x 10 <sup>-5</sup> (11.4 x 10 <sup>-5</sup> )	21 x 10 <sup>-5</sup> (11.4 x 10 <sup>-5</sup> )	23 x 10 <sup>-5</sup> (12.5 x 10 <sup>-5</sup> )
Dielectric Strength (75 mils), kV/mm	19.7 (500)	20.1 (510)	17.7 (450)	21 (530)	21 (530)
Dielectric Constant (1 kHz)	2.89	2.97	3.2	3.0	2.8
Dissipation Factor (1 kHz)	0.0004	0.006	0.006	0.0061	0.001
Volume Resistivity, ohm-cm	1.8 x 10 <sup>15</sup>	5.7 x 10 <sup>14</sup>	4.5 x 10 <sup>15</sup>	5.7 x 10 <sup>14</sup>	2 x 10 <sup>15</sup>
Specifications	FDA	UL94 V-0**	—	UL94 V-0**	—
<b>Product Availability (lb. kits)</b>	1 / 10 / 44 / 440	2 / 1M / 22 / 100	1 / 10 / 44 / 495	2 / 1M / 100	2 / 4 / 80
<b>Processing</b>					
Work (Pot) Life (25C/77F)	4 hours	2 hours	4 hours	4 minutes	6 hours
Cure Time (@ 50% RH)					
77F (25C)	7 days	2 days	7 days	30 minutes	—
149F (65C)	4 hours	4 hours	4 hours	15 minutes	—
212F (100C)	1 hour	1 hour	1 hour	10 minutes	1 hour
256F (125C)	45 minutes	45 minutes	45 minutes	5 minutes	45 minutes
302F (150C)	15 minutes	15 minutes	15 minutes	2 minutes	30 minutes

\* Penetration (mm)

\*\* This rating is based on a standard, small-scale laboratory test and as such is not reliable for determining, evaluating, predicting, or describing the flammability or burning characteristics of the product under actual fire conditions.

# ADHESIVES & SEALANTS

## Addition Cure

EXTREME LOW TEMP.	THERMALLY CONDUCTIVE	GELS					
		RTV656 Clear	TSE3331 Dark Gray	RTV6126 Clear	RTV6136 Clear, Red, Yellow, Blue	RTV 6156 Clear	RTV6166 Clear
<ul style="list-style-type: none"> <li>•Aerospace potting, bonding, and sealing where extended low temperature performance is required</li> </ul>	<ul style="list-style-type: none"> <li>•Potting/encapsulation of power supply/transformer assemblies requiring good thermal dissipation</li> </ul>	<ul style="list-style-type: none"> <li>•General purpose potting/encapsulation which requires very fast cure without heat and automated meter/mixing equipment</li> </ul>	<ul style="list-style-type: none"> <li>•Potting connectors for telecon applications</li> <li>•HEPA filter assemblies</li> <li>•"Tough" gel for applications requiring greater tear resistance</li> </ul>	<ul style="list-style-type: none"> <li>•General purpose potting and encapsulation in areas requiring low temperature performance</li> </ul>	<ul style="list-style-type: none"> <li>•Potting automotive components in underhood applications</li> <li>•General purpose gel</li> </ul>	<ul style="list-style-type: none"> <li>•"Tough" gel offering greater tear resistance with longer pot life (8+ hours) than 6136 rendering automated meter/mixing equipment unnecessary</li> </ul>	<ul style="list-style-type: none"> <li>•Potting automotive components</li> <li>•For use in applications requiring fast cure</li> </ul>
10 : 1	1 : 1	1 : 1	1 : 1	1 : 1	1 : 1	1 : 1	1 : 1
4,000	3,500	750	750	750	750	750	750
1.02	1.51	0.98	0.98	0.98	0.98	0.98	0.98
1.406	—	1.41	1.41	1.43	1.41	1.41	1.41
44	60	6.5*	6.0*	4.0*	6.0*	6.0*	6.0*
6.37 (920)	3.24 (475)	—	—	—	—	—	—
160	50	—	—	—	—	—	—
—	3.4 (19)	—	—	—	—	—	—
(-175 to +400) -115 to +204	(-75 to +400) -60 to +204	(-58 to +400) -50 to +204	(-58 to +400) -50 to +204	(-175 to +400) -115 to +204	(-58 to +400) -50 to +204	(-58 to +400) -50 to +204	(-58 to +400) -50 to +204
0.19	0.63	0.19	0.19	0.19	0.19	0.19	0.19
27 X 10 <sup>-5</sup> (15.3 x 10 <sup>-5</sup> )	17 X 10 <sup>-5</sup> (9.2 x 10 <sup>-5</sup> )	27 x 10 <sup>-5</sup> (15.3 x 10 <sup>-5</sup> )	27 x 10 <sup>-5</sup> (15.3 x 10 <sup>-5</sup> )	27 x 10 <sup>-5</sup> (15.3 x 10 <sup>-5</sup> )	27 x 10 <sup>-5</sup> (15.3 x 10 <sup>-5</sup> )	27 x 10 <sup>-5</sup> (15.3 x 10 <sup>-5</sup> )	27 x 10 <sup>-5</sup> (15.3 x 10 <sup>-5</sup> )
19.7 (500)	20 (500)	20.5 (500)	20.5 (500)	20.5 (500)	20.5 (500)	20.5 (500)	20.5 (500)
2.89	3.3	2.8	2.8	2.8	2.8	2.8	2.8
0.0004	0.003	0.001	0.001	0.001	0.001	0.001	0.001
3.2 x 10 <sup>15</sup>	2 x 10 <sup>14</sup>	1 x 10 <sup>15</sup>	1 x 10 <sup>15</sup>	1 x 10 <sup>15</sup>	1 x 10 <sup>15</sup>	1 x 10 <sup>15</sup>	1 x 10 <sup>15</sup>
FDA	UL94 V-0**						
1 / 10 / 44 / 440	1 / 2 / 100	2 / 18 / 80 / 800	2 / 18 / 80 / 800	2 / 18 / 80 / 800	2 / 18 / 80 / 800	2 / 18 / 80 / 800	2 / 18 / 80 / 800
4 hours 7 days 4 hours 1 hour 45 minutes 15 minutes	8 hours — 10 minutes 5 minutes 5 minutes	5 minutes — <1 hour 20 minutes 5 minutes — 2 minutes	30 minutes — <4 hours 2 hours 20 minutes — 10 minutes	1 hour — <18 hours 4 hours 1 hour — 15 minutes	2 hours — <24 hours 4 hours 1 hour — 15 minutes	8+ hours — n/a 4 hours 1 hour — 15 minutes	15 minutes — <2 hours 1 hour 10 minutes — 5 minutes



# ADHESIVES & SEALANTS

## G.E. Silicones - Two-Part RTV Components

### GE Two-Part RTV Silicone Potting & Encapsulating Compounds

#### Condensation Cure

Two-part condensation cure silicone RTVs are designed to cure at room temperature, and can be applied in thicknesses up to one inch. They are very tough materials, highly resistant to contamination, and will not be affected by other chemicals during curing or after.

Use this chart as a guide to finding the condensation cure two-part silicone sealant that best fulfills your application requirements. [For additional assistance, please contact your nearest Regal Plastic Supply Distribution Center.](#)

	General Purpose			
	RTV11 White	RTV12 Clear	RTV21 Pink	RTV41 White
Typical Uses	<ul style="list-style-type: none"> <li>•Medical molds / instruments</li> <li>•High voltage power supply potting</li> <li>•General purpose electrical potting</li> </ul>	<ul style="list-style-type: none"> <li>•General purpose potting requiring clear, RT cure, and offering primerless adhesion</li> </ul>	<ul style="list-style-type: none"> <li>•Aerospace thermal insulation</li> <li>•Thick-section potting</li> <li>•Pour-in-place gasketing</li> </ul>	<ul style="list-style-type: none"> <li>•Release coating on metal panels and other substrates</li> </ul>
Mix Ratio (base to curing agent by weight)	100 : 0.5	20 : 1	100 : 0.5	100 : 0.5
Viscosity, cps (@25C/77F)	11,000	1,500	26,000	39,000
Specific Gravity	1.19	1.00	1.32	1.31
Hardness, Shore A Durometer	41	18	45	47
Tensile Strength, MPa (psi)	2.06 (300)	—	2.16 (310)	2.16 (310)
Elongation %	160	200	180	180
Tear Resistance (Die B), kg/cm (lb/inch)	3.5 (20)	—	7.1 (40)	5.2 (29)
Linear Shrinkage, %	0.6	2	0.6	0.6
Useful Temperature Range (continuous), C (F)	(-65 to +400) -54 to +204	(-65 to +400) -54 to +204	(-65 to +400) -54 to +204	(-65 to +400) -54 to +204
Thermal Conductivity, W/m°K	0.29	0.17	0.31	0.31
Coefficient to Thermal Expansion (Linear CTE) cm/cm C (in/in F)	25 x 10 <sup>-5</sup> (14 x 10 <sup>-5</sup> )	29 x 10 <sup>-5</sup> (16 x 10 <sup>-5</sup> )	20 x 10 <sup>-5</sup> (11 x 10 <sup>-5</sup> )	20 x 10 <sup>-5</sup> (11 x 10 <sup>-5</sup> )
Dielectric Strength (75 mils), kV/mm (V/mil)	20.3 (515)	15.7 (400)	16.5 (420)	20.3 (515)
Dielectric Constant (1 kHz)	3.3	3.0	3.8	3.7
Dissipation Factor (1 kHz)	0.006	0.001	0.02	0.007
Volume Resistivity, ohm-cm	1.1 x 10 <sup>15</sup>	1.0 x 10 <sup>13</sup>	2.6 x 10 <sup>14</sup>	1.6 x 10 <sup>14</sup>
Specifications	FDA — —	— — —	— — —	FDA — —
Product Availability (lb. kits)	1 / 12 / 50 / 500	1 / 42 / 420	1 / 12 / 50 / 500	12 / 50 / 500
Processing				
Work (Pot) Life (25C/77F)	1.5 hours	1.6 hours	1 hour	1 hour
Cure Time (@ 50% RH)				
77F (25C)	24 hours	24 hours	24 hours	24 hours
149F (65C)	n/a	n/a	n/a	n/a
212F (100C)	n/a	n/a	n/a	n/a
256F (125C)	n/a	n/a	n/a	n/a
302F (150C)	n/a	n/a	n/a	n/a

# ADHESIVES & SEALANTS

## Condensation Cure

General Purpose			Extreme High Temperature				Extreme Low Temperature			
RTV8111 White	RTV8112 White	RTV8262 Red	RTV31 Red	RTV60 Red	RTV88 Red	RTV560 Red	RTV566 Red	RTV511 White	RTV567 Translucent	RTV577 White
<ul style="list-style-type: none"> <li>Meets requirements of MIL-S-23586E Type I, Class I, Grade BI</li> </ul>	<ul style="list-style-type: none"> <li>Meets requirements of MIL-S-23586E Type I, Class 2, Grade A</li> </ul>	<ul style="list-style-type: none"> <li>Meets requirements of MIL-S-23586E Type II, Class 2, Grade A</li> </ul>	<ul style="list-style-type: none"> <li>Potting surge protectors on telephone poles</li> <li>Potting industrial filters</li> <li>High temp. electrical potting applications</li> <li>Mechanical protection</li> </ul>	<ul style="list-style-type: none"> <li>Aerospace applications such as potting, encapsulating, coating and cushioning</li> </ul>	<ul style="list-style-type: none"> <li>Potting surge protectors</li> <li>Aerospace applications such as sealing, bonding, and gasketing on vertical or overhead surfaces</li> </ul>	<ul style="list-style-type: none"> <li>Aerospace applications such as potting, sealing, and bonding, where extreme high/low temperature service is required</li> </ul>	<ul style="list-style-type: none"> <li>Ideal for applications such as aerospace requiring a low outgassing product</li> </ul>	<ul style="list-style-type: none"> <li>Potting, encapsulating, and coating electronic assemblies and components</li> </ul>	<ul style="list-style-type: none"> <li>Applications requiring a low outgassing product</li> </ul>	<ul style="list-style-type: none"> <li>Aerospace applications such as sealing and insulating</li> <li>Vertical and overhead surfaces</li> </ul>
100 : 2	100 : 5	100 : 5	100 : 0.5	100 : 0.5	100 : 0.5	100 : 0.5	100 : 0.1	100 : 0.5	100 : 0.1	100 : 0.5
9,900	11,000	47,000	25,000	47,000	880,000	30,000	42,700	16,000	3,900	700,000
1.18	1.19	1.47	1.42	1.48	1.47	1.42	1.49	1.21	1.00	1.35
45	42	52	54	57	58	55	61	42	20	48
2.45 (350)	2.06 (300)	4.02 (580)	5.98 (870)	6.86 (990)	5.79 (830)	4.71 (690)	5.49 (800)	2.65 (380)	—	3.04 (440)
160	160	150	170	120	120	120	120	170	—	150
4.3 (24)	4.8 (27)	7.7 (43)	5 (29)	7 (40)	8 (42)	5.5 (31)	—	3.8 (21)	—	6.8 (38)
1.0	1.0	0.6	0.6	0.6	0.6	1.0	0.6	1.3	0.6	0.65
(-65 to +400) -54 to +204	(-65 to +400) -54 to +204	(-65 to +500) -54 to +260	(-65 to +500) -54 to +260	(-65 to +500) -54 to +260	(-65 to +500) -54 to +260	(-175 to +500) -115 to +260	(-175 to +500) -115 to +260	(-175 to +400) -115 to +204	(-175 to +400) -115 to +204	(-175 to +400) -115 to +204
0.29	0.29	0.31	0.31	0.31	0.31	0.31	0.31	0.26	0.29	0.31
25 x 10 <sup>-5</sup> (14 x 10 <sup>-5</sup> )	25 x 10 <sup>-5</sup> (14 x 10 <sup>-5</sup> )	20 x 10 <sup>-5</sup> (11 x 10 <sup>-5</sup> )	20 x 10 <sup>-5</sup> (11 x 10 <sup>-5</sup> )	20 x 10 <sup>-5</sup> (11 x 10 <sup>-5</sup> )	20 x 10 <sup>-5</sup> (11 x 10 <sup>-5</sup> )	20 x 10 <sup>-5</sup> (11 x 10 <sup>-5</sup> )	20 x 10 <sup>-5</sup> (11 x 10 <sup>-5</sup> )	22 x 10 <sup>-5</sup> (12 x 10 <sup>-5</sup> )	25 x 10 <sup>-5</sup> (14 x 10 <sup>-5</sup> )	20 x 10 <sup>-5</sup> (11 x 10 <sup>-5</sup> )
19.7 (500)	18.7 (475)	18.5 (470)	17 (430)	17.7 (450)	17.4 (400)	21.2 (540)	21.2 (540)	20.5 (520)	20.3 (515)	18.5 (470)
3.3	4.02	3.9	4.4	4.0	4.3	3.9	3.9	3.6	3.3	3.98
0.0055	0.007	0.017	0.03	0.02	0.03	0.02	0.02	0.005	0.006	0.02
1.0 x 10 <sup>15</sup>	2.7 x 10 <sup>15</sup>	4.4 x 10 <sup>14</sup>	1.6 x 10 <sup>14</sup>	4.4 x 10 <sup>14</sup>	2.8 x 10 <sup>14</sup>	2 x 10 <sup>14</sup>	2 x 10 <sup>14</sup>	2 x 10 <sup>14</sup>	1.1 x 10 <sup>15</sup>	5.6 x 10 <sup>14</sup>
MIL-S-23586E* Type I, Class I Grade BI	MIL-S-23586E* Type I, Class 2 Grade A	MIL-S-23586E* Type II, Class 2 Grade A	— — —	— — —	— — —	— — —	Low Volatile — —	— — —	Low Volatile — —	— — —
1 / 12 / 55G	1 / 1P / 12	G12 / 1P / 12	1 / 12 / 50 / 500	1 / 12 / 50 / 500	1 / 12 / 13 / 50 / 55 / 500	12	1	1 / 12 / 50 / 500	1	1 / 12
30 minutes	2 hours	2 hour	2 hours	2 hours	45 minutes	2.25 hours	1.5 hours	1.5 hours	9 hours	2 hours
24 hours n/a n/a n/a n/a	24 hours n/a n/a n/a n/a	24 hours n/a n/a n/a n/a	24 hours n/a n/a n/a n/a	24 hours n/a n/a n/a n/a	24 hours n/a n/a n/a n/a	24 hours n/a n/a n/a n/a	24 hours n/a n/a n/a n/a	24 hours n/a n/a n/a n/a	7 days n/a n/a n/a n/a	24 hours n/a n/a n/a n/a

\*Testing for the referenced MIL Specs is performed in accordance with current GE Silicones quality test methods, laboratory conditions and procedures, frequency, and sampling, which are not necessarily identical with the methods, conditions, procedures, frequency and sampling stated or referenced in the listed specification. Any certification will be limited to listed properties and will not imply or state conformity to any other aspect of the referenced specification, including but not limited to marking, packaging, bar coding, testing, or sampling. [Contact your nearest Regal Plastic Supply distribution center to obtain a comparison review.](#)

# ADHESIVES & SEALANTS

## Shin-Etsu - One-Part RTV Components

	Product	Product Description	Typical Uses	Specs (UL, MIL, etc.)	Key Substrate Adhesion
Acetone Cure**	KE 3418 RTV Black	non-sag thixotropic paste	<b>High temperature (300°C) resistant</b> , non-corrosive, condensation cure, for encapsulating, bonding, sealing, insulating, and aerospace gasketing		glass, wood, ceramic, clean metals, other silicone elastomers, ABS, polycarbonate, and PVC
	KE 3417 RTV Black	self-leveling, medium viscosity			
	KE 3490 RTV Gray	non-sag thixotropic paste	<b>Non-flammable</b> , non-corrosive, condensation cure, for encapsulating, bonding, sealing, and form-in-place gasketing	● UL 94 V-0* 0.79mm V-1; 1.57mm V-1;	glass, wood, ceramic, clean metals, other silicone elastomers, ABS, polycarbonate, and PVC
	KE 3494 RTV Gray	self-leveling, medium viscosity			
	KE 347 RTV Translucent & White	Medium viscosity, flowable	<b>General purpose</b> , non-corrosive, condensation cure, for use in electronics, transportation and aerospace applications, with excellent adhesion to a variety of substrates		glass, wood, ceramics, clean metals, other silicone elastomers, ABS, polycarbonate, and PVC
	KE 348 RTV Translucent & White	non-sag thixotropic paste, extrudable			
	KE 3498 RTV Translucent & White	very difficult to extrude, high green strength	<b>General purpose</b> , non-corrosive, condensation cure, with self priming properties for a wide variety of substrates		glass, ceramic, steel, aluminum, iron, copper, tin chrome, vinyl, paints, epoxy, and polyester resins
Conformal Coatings Translucent	Available in a wide variety of viscosities, cure types, and tack times. Consult with your nearest Regal Plastic Supply distribution center for product specifics and availabilities.	<b>For use in the standard coating application methods:</b> automated dip, bulk spray, selective spray, flow coat, brush, and manual dip.			
Addition Cure	KE 1820 RTV, Translucent	thixotropic paste, high strength	<b>Self-priming, addition cure</b> , 100% solids with no cure by-products, no exotherm with adhesion capabilities to a wide variety of plastics, metals, and ceramics. Used in electronic applications, i.e. (insulation, sealing, bonding, potting, and encapsulating), and automated assembly applications. <b>Note:</b> Shin-Etsu self-priming adhesives must be cured at temperatures of 100°C or above.		glass, wood, ceramics, clean metals, other silicone elastomers, ABS, polycarbonate, and PVC
	KE 1830 RTV Off-white	high viscosity liquid, high strength			
	KE 1840 RTV Translucent	low viscosity liquid			
	KE 1843 RTV Black	flowable liquid, good adhesion to PPS			
KE 1862 RTV Gray	low viscosity, solventless (no by-products)	<b>Self-priming</b> , addition cure, flexible, thermally conductive, suited for applications involving transformers, power supplies, coils, relays, general purpose modules, and thermal dot printer heads		Wide variety. Contact your nearest Regal Plastic Supply distribution center for particulars regarding your application.	
Oxime Cure**	KE 40 RTV Gray / White	non-sag	<b>Condensation cure, with self-priming properties</b> , for consumer electronic applications. Should not be used around sensitive electronic components.	● UL94 V-0	glass, ceramic, steel, aluminum, iron, copper, tin, chrome, vinyl, paints, epoxy, and polyester resins
	KE 402 RTV Gray / White	flowable			
	KE 44 RTV Translucent	flowable, low corrosion, self-leveling	<b>General purpose</b> , condensation cure, electrical grade for thin section potting, coating, and sealing		glass, wood, ceramics, clean metals, silicone resins, vulcanized silicone rubber, natural and synthetic fibers, as well as painted and many plastic surfaces.
	KE 441 RTV Translucent				
	KE 443 RTV Translucent / White				
	KE 445 RTV Translucent				
	KE 446 RTV Translucent				
KE 45 RTV Translucent, White, Black, Aluminum, Red, Bronze, Blue	thixotropic paste, low corrosion, low odor	<b>General purpose</b> , condensation cure, used for general sealing, bonding, gasketing, and electrical insulation	● MIL-A-46106A, Amend 2, Type 1 ● TTS-001543C Class A ● TTS-00230C Class A	glass, ceramic, steel, aluminum, iron, copper, tin, chrome, vinyl, paints, epoxy and polyester resins	
Specialty Grades	KE 420 RTV	non-sag, acetic acid cure	<b>Optically clear</b> , condensation cure		
	KE 4899 RTV	non-sag paste, alcohol cure (methanol cure by-product)	<b>High strength</b> , condensation cure	● MIL-A-46146A, Type III	
	FE 61 RTV	high viscosity, flowable fluorosilicone	<b>Resistant to many fuels and fluids</b> , addition cure, self-priming to many substrates		
	FE 125 RTV Red	thixotropic fluorosilicone, acetic acid cure	<b>Resistant to many fuels and fluids</b> , condensation cure, can be specified to AMS 3375 (fuel tank sealants). Use in applications that have high temperature exposure along with fuel, solvents, or vapors and where there is no need for deep section cure.	● AMS 3375	
	FE 2000 RTV Translucent	fluorosilicone thixotropic paste, alcohol cure	<b>Non-corrosive</b> , condensation cure		

\*Yellow card is maintained under File No. E48923

\*\*Acetone and Oxime cure products will yellow in the primary package as well as in application, but does not affect function or physical properties of products.

# ADHESIVES & SEALANTS

## Shin-Etsu - One-Part RTV Components

Useful Temperature Range C (F)	Specific Gravity @ 25°C	Tack-free Time (minutes)	Hardness, Shore A Durometer	Tensile Strength psi	Elongation (%)	Dielectric Strength V/mil	Dielectric Constant (60 Hz)	Dissipation Factor (60 Hz)	Packaging
Up to 300 (572)	1.09	5	40	360	300	500	3.4	0.0015	100g tube, 350g cart., 17kg pail
	1.20	3	40	500	400	600	3.2	0.01	100g tube, 380g cart., 17kg pail 100g tube, 460g cart., 20kg pail
	1.05	3-5	30	285 355	300 410	500	2.5	0.001	3.0oz tube, 10.3oz cart., 17kg pail 100g tube, 330ml cart., 17kg pail
	1.05	3	45	600	600	28(KV/mm)	3.9 @ 50 Hz	0.004	100g tube, 330ml cart., 17kg pail
-55 to 200 (-67 to 392)	1.10		40	850	700	25 (KV/mm)			1kg can, 20kg pail
	1.27		40	575	350				1 kg can, 20kg pail
	1.03		25	250	180				<a href="#">Contact Regal Plastic Supply</a>
	1.25		18	220	300				<a href="#">Contact Regal Plastic Supply</a>
	2.2		70	850	70				<a href="#">Contact Regal Plastic Supply</a>
	1.59	20	60	510	200	23 (KV/mm)	3.9 @ 50 Hz	0.0017 (50 Hz)	3.0oz tube, 10.3oz cart., 20kg pail
	1.61		55	400	180	25 (KV/mm)	3.1 @ 50 Hz		150g tube, 500g cart., 20kg pail
	1.04	7	25	355	300	23 (KV/mm)	2.8	0.001	100g tube, 330ml cart, 17kg pail
	1.04	40	20	280	250	20 (KV/mm)	2.5	0.001	100g tube, 330ml cart, 20kg pail
	1.04	10	32	420	250	20 (KV/mm)	2.8	0.001	<a href="#">Contact Regal Plastic Supply</a>
	1.05	15	25	280	200	20 (KV/mm)	2.6	0.001	100g tube, 330ml cart
	1.05	10	25	300	200	20 (KV/mm)	2.8	0.001	<a href="#">Contact Regal Plastic Supply</a>
	1.05	7	30	280	310	500	2.6	0.001	3.0oz tube, 20.3oz cart, 17kg pail, 200kg drum
	1.05		25	390	400				100g tube, 330ml cart
	1.08	30	33	750	620	500	2.8	0.001	<a href="#">Contact Regal Plastic Supply</a>
	1.44		22	230	170				100g tube, 1kg can
-57 to +260 (-70 to +500)	1.50	20 60 (AMS method)	40	760	240				5.4 oz SEMCO, 430g cart
	1.34	20	34	280	250	18 (KV/mm)	6.4 @ 50 Hz	0.02 (50 Hz)	<a href="#">Contact Regal Plastic Supply</a>

# ADHESIVES & SEALANTS

## Shin Etsu - Two-Part RTV Components

	Addition Cure						Moldmaking	
	KE 109 RTV Translucent	KE 1800 RTV Translucent	KE 1861 RTV Gray	SES 403 RTV Transparent	SES 406 RTV Transparent	KE 1204 RTV A (Red) B (White)	KE 1300 RTV Translucent	KE 1310ST RTV Translucent
<b>Typical Uses</b>	<ul style="list-style-type: none"> <li>Self-priming, low viscosity sealant for use on potting applications requiring optical clarity</li> </ul>	<ul style="list-style-type: none"> <li>Self-priming, semi-sag paste adhesive/sealant for use on substrates such as glass, metals, and many plastics</li> </ul>	<ul style="list-style-type: none"> <li>Low viscosity, self-priming, solventless, and reversion resistant for use in potting and encapsulating</li> </ul>	<ul style="list-style-type: none"> <li>Low viscosity, optically clear, solventless, low shrinkage, designed primarily for use as a potting material</li> </ul>	<ul style="list-style-type: none"> <li>Low viscosity, optically clear, solventless, low shrinkage, used for potting or encapsulating</li> </ul>	Low viscosity, non-flammable, silicone elastomer for: <ul style="list-style-type: none"> <li>Encapsulating</li> <li>Potting</li> </ul>	<ul style="list-style-type: none"> <li>Clear, high strength, variable catalyst system, low shrinkage moldmaking silicone</li> </ul>	<ul style="list-style-type: none"> <li>Chemical additive providing urethane and epoxy resin resistance, clear, low shrinkage, variable catalyst system, moldmaking silicone</li> </ul>
Mix Ratio (base to curing agent by weight)	1 : 1	1 : 1	1 : 1	10 : 1	10 : 1	1 : 1	10 : 1	10 : 1
Viscosity, cps ( @ 25C/77F)	10	2,750	45,000	1,000	3,500	(A) 60 (B) 40	75,000	75,000
Specific Gravity ( @ 25C/77F)	1.02	1.11	2.2	0.97	1.02	1.54	1.07	1.07
Refractive Index (25°C)	—	—	—	1.405	1.405	—	—	—
Hardness, Shore A Durometer	20	25	70	20	55	70	40	40
Tensile Strength, die C (psi)	210	420	850	60	1,200	500	850	850
Elongation %, die C percent	150	500	70	100	120	90	400	340
Tear Resistance (Die B), kg/cm (lb/inch)	—	—	—	—	—	—	—	—
Useful Temperature Range (continuous), C (F)	—	—	—	—	—	(-67 to 482) -55 to 250	—	—
Thermal Conductivity Cenco-Fith. 77-212°F (25-200°C), gm cal/cm <sup>2</sup> sec—(degrees C/cm)	—	—	.0025	—	0.17	.00072	—	—
Coefficient of Thermal Expansion (Linear CTE), cm/cm C (in/in F)	—	—	—	—	—	—	—	—
Volume Expansion, 77-302°F (25-150°C), cc/cc/degrees °C	—	—	—	9.5 x 10 <sup>-4</sup>	9.5 x 10 <sup>-4</sup>	—	—	—
Dielectric Strength (V/mil)	25 (KV/mm)	25 (KV/mm)	—	475	600	685	—	—
Dielectric Constant (@ 77°F/25°C) 100 Hz 1 KHz	2.9 (1 MHz)	2.9 (1 MHz)	—	2.5 (50Hz / 1MHz)	2.4 / 2.3 (50 Hz / 1MHz)	3.3 (1 MHz)	—	—
Dissipation Factor (@ 77°F/25°C) 100 Hz 1 KHz	7 x 10 <sup>-4</sup> (1 MHz)	7 x 10 <sup>-4</sup> (1 MHz)	—	0.001	0.0014	1 x 10 <sup>-4</sup> (1 MHz)	—	—
Volume Resistivity, 500 V DC, ohm-cm	1 x 10 <sup>14</sup>	1 x 10 <sup>14</sup>	5 x 10 <sup>13</sup>	3 x 10 <sup>14</sup>	3 x 10 <sup>14</sup>	2 x 10 <sup>14</sup>	—	—
Specifications			—	—	—	UL 94 V-0	—	—
<b>Product Availability</b>	1kg can, 16kg pail	<a href="#">Contact Regal Plastic Supply</a>	1kg can, 22kg pail	1kg can, 16kg pail	1kg can, 18kg pail, 180kg drum	1kg can, 25kg pail	1kg can, 20kg pail, 200kg drum	1kg can, 20kg pail, 180kg drum
<b>Processing</b> Work (Pot) Life (25C/77F) Standard Fast Cure Time (25C/77F) Standard Fast	8 hrs	6 hrs		2 hrs	2 hrs	2 hrs	1.5, 2, 16 hrs (catalyst is determinate)	1.5, 2, 16 hrs (catalyst is determinate)

# ADHESIVES & SEALANTS

## Shin Etsu - Two-Part RTV Components

Condensation Cure							Gels				
KE 1604 RTV Blue / Off White	KE 10 RTV White	KE 66 RTV Off-White	KE 67 RTV Off-White	KE 68 RTV Off-White	KE 108 RTV Transparent	KE 113 RTV Red	SES 412 RTV White	DIMETHYL Gels	PHENYL Gels	FLUORO Gels	SPECIALTY Gels
<ul style="list-style-type: none"> <li>High strength, high modulus moldmaking / potting compound with high durometer hardness and low shrinkage</li> </ul>	Pourable with low shrinkage for: <ul style="list-style-type: none"> <li>Encapsulating</li> <li>Potting</li> <li>Coating</li> <li>Molding</li> </ul>	Low viscosity, self-priming, low shrinkage for: <ul style="list-style-type: none"> <li>Encapsulating</li> <li>Potting</li> </ul>	Medium viscosity, self-priming, low shrinkage for: <ul style="list-style-type: none"> <li>Encapsulating</li> <li>Potting</li> </ul>	Non-flowing paste, low shrinkage, self-priming adhesive	Low viscosity, optically clear, low shrinkage, solventless for: <ul style="list-style-type: none"> <li>Potting</li> <li>Encapsulating</li> <li>Electric insulation</li> </ul>	Low viscosity with low shrinkage for: <ul style="list-style-type: none"> <li>Encapsulating</li> <li>Potting</li> <li>Coating</li> <li>Molding</li> </ul>	Medium viscosity with low shrinkage for: <ul style="list-style-type: none"> <li>Encapsulating</li> <li>Potting</li> <li>Coating</li> <li>Molding</li> </ul>	General purpose, transparent, available in a variety of formulations and cure types	Low temperature, transparent, available in several formulations and cure types, one and two part systems	Solvent resistant, translucent, yellow transparent, available in several formulations and cure types, one and two part systems	Low volatility and thermally conductive formulations, transparent, white, one part systems
10 : 1	Varies	100 : 2 (standard)	100 : 2 (standard)	100 : 2 (standard)	100 : 5	Varies	Varies	1 : 1	Varies	Varies	—
100,000	300	5,000	35,000	—	700	70	120	Varies	Varies	Varies	Varies
1.26	1.15	1.25	1.25	1.25	0.98	1.49	1.30	0.97	0.99	Varies	Varies
—	—	—	—	—	1.45	—	—	—	—	—	—
60	55	35	30	35	30	65	40	—	—	—	—
1,000	480	210	210	280	150	850	355	—	—	—	—
170	150	150	200	200	150	120	160	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	(-75 to +400) -60 to +204	—	—	—	—	—	—	-55° to 200°	-120° to 200°	-55° to 200°	-55° to 200°
—	.00070	—	—	—	0.17	-0.0075	.00070	.00039	.00039	.00039	.0022
—	—	—	—	—	—	—	—	—	—	—	—
—	70 x 10 <sup>-5</sup>	—	—	—	9.5 x 10 <sup>-4</sup>	50 x 10 <sup>-5</sup>	50 x 10 <sup>-5</sup>	—	—	—	—
—	600 (1/16 sample)	—	—	—	500	600 (1/16 sample)	600 (1/16 sample)	20 (KV/mm)	20 (KV/mm)	20 (KV/mm)	20 (KV/mm)
—	3.3 3.3	3.41 / 3.32 (60Hz / 1MHz)	3.41 / 3.32 (60Hz / 1MHz)	3.41 / 3.32 (60Hz / 1MHz)	2.4 (50 Hz / 1MHz)	3.8 3.8	3.1 3.1	2.7 (60 Hz)	2.7 (1 part) 3.0 (two-part) (60 Hz)	7 (60 Hz)	Varies
—	.013 .010	0.013 / 0.0035 (60Hz / 1MHz)	0.013 / 0.0035 (60Hz / 1MHz)	0.013 / 0.0035 (60Hz / 1MHz)	0.0012	.030 .025	.015 .011	2 x 10 <sup>-4</sup> (60 Hz)	2 x 10 <sup>-4</sup> (60 Hz)	Varies	Varies
—	1 x 10 <sup>13</sup>	5 x 10 <sup>14</sup>	5 x 10 <sup>14</sup>	5 x 10 <sup>14</sup>	2 x 10 <sup>13</sup>	5 x 10 <sup>13</sup>	1 x 10 <sup>13</sup>	2 x 10 <sup>15</sup>	Varies	Varies	1 x 10 <sup>14</sup>
—	MIL-S-23586 MIL-I-16923C	—	—	—	—	MIL-S-23586 MIL-I-16923C	MIL-S-23586 MIL-I-16923C	—	—	—	—
1kg can, 20kg pail, 180kg drum	<a href="#">Contact Regal Plastic Supply</a>	1kg can, 20kg pail	1kg can, 20kg pail	1kg can, 20kg pail	1kg can, 16kg pail	<a href="#">Contact Regal Plastic Supply</a>	1kg can, 20kg pail, 180kg drum	—	<a href="#">Contact Regal Plastic Supply</a>	—	—
1.5 hrs	1 hr 15 min  8 hrs 8 hrs  (catalyst is determinate)	2 hrs (max) 1 hr (max)  24 hrs 10 hrs	2 hrs (max) 0.5 hr (max)  15 hrs 5 hrs	1 hr (max) 0.5 hr (max)  15 hrs 5 hrs	6 hrs	1.5 hrs 1 hr  10 hrs 6 hrs  (catalyst is determinate)	30 min 15 min  8 hrs 4 hrs  (catalyst is determinate)	Varies	Varies	Varies	—

# ADHESIVES & SEALANTS

## Moldmaking

### Moldmaking Silicones

Silicone rubber molds have become very popular in moldmaking industries. Silicones are not only the most versatile moldmaking material, but they also outperform their competitors (epoxies, urethane and latex rubber), in temperature, oxidation, and mechanical stress resistance. Silicone rubber molds can also be used to form polyester, acrylic, and urethane foams, concrete, waxes and plasters, and even low temperature melting alloys, like pewter.

Moldmaking formulas are designed for the widest array of applications including:

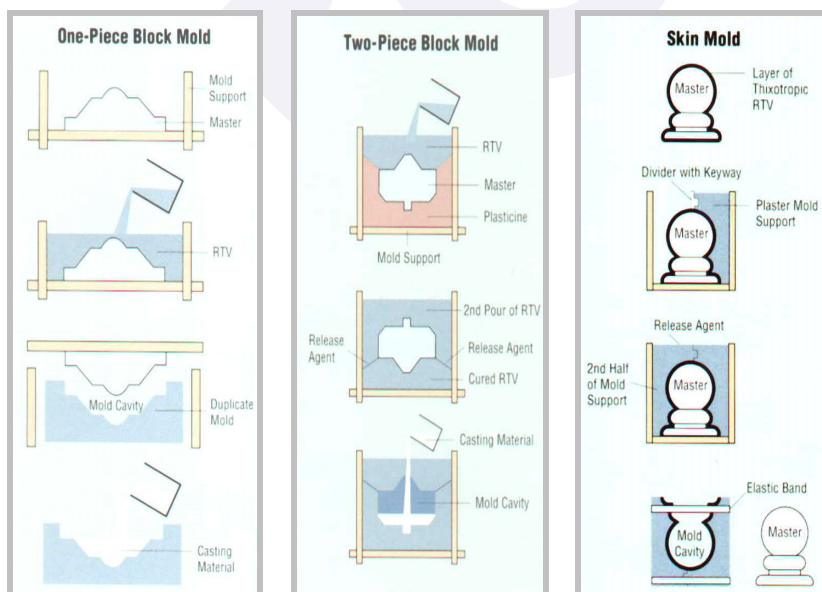
- figurines
- sculptures
- decorative objects
- holiday ornaments
- architectural and furniture molding
- entertainment props, skins, and special effects.
- large, thick molds in closed systems, for example structural columns
- architectural millwork
- furniture
- mirror and picture frames
- prototype parts
- release rolls
- candy
- print pads

Block molds are made by forming a mold support around the master. The RTV silicone is then poured so it covers the master and fills the mold support. After curing and removing the master, the mold cavity is used for casting.

Skin molds can be either poured or applied by brush. When a skin mold is poured, the master is covered with a layer of clay and then surrounded by a mold support. The mold support is then filled with plaster and split. Next, the clay is removed and the resultant gap between the master and the plaster is filled with RTV silicone to form the mold. Brush applied skin molds use layers of RTV silicone and are reinforced with cloth which adds strength and extra tear resistance. Brush application speeds up mold making because a fast curing catalyst can be used.

[For assistance with your particular moldmaking application, contact your nearest Regal Plastic Supply Distribution Center.](#)

**The two most common types of silicone rubber molds are block molds and skin or glove molds.**



There are many types of adhesives, and among them are silicones, epoxies, cyanoacrylates, urethanes and polymers. Extremely popular today for bonding plastics as well as other substrates, adhesives offer many advantages over traditional assembly methods, including reduced weight, assembly costs, cycle times, and safety concerns.

There are a wide variety of adhesives to choose from including one-part, two-part, heat-cured, room temperature cured, and hot melts. There are also a variety of dispensing methods which include squeeze bottles, squeeze tubes, hot melt and caulk guns.

As with all chemicals, caution must be used when handling adhesives. Avoid contact with eyes and skin by wearing safety glasses and proper clothing, including gloves. If rubber gloves are worn, wear a cotton pair underneath. Replace contaminated clothing promptly, and wash hands immediately following application. Make sure to use adhesives in a ventilated area and dispose of properly. Store away from heat and possible ignition, as some grades are flammable.

### Surface Preparation for Adhesive Bonding

In order for adhesives to work correctly, all surfaces to be joined must be thoroughly cleaned and prepared. Even a thumbprint on an otherwise clean surface can prevent the adhesive from spontaneously wetting and spreading.

Organic contaminants are removed by degreasing, while loose deposits are dislodged by scraping or washing with acids, alkali solutions or other such chemicals. Nonmetallic, nonporous materials should be degreased with a detergent or clean solution, rinsed thoroughly with clean water, and dried. Hand-sand or sandblast the surface to give it a rough texture, then clean away the particles and dust.

Metals are best cleaned by vapor degreasing with trichloroethane, followed by sandblasting or, preferably, by chemical etching. Chemical treatments may be confined to the bonding areas, but degreasing should be done to the entire assembly. A cleaned assembly should be bonded as soon after the cleaning operation as possible.

In order to test a metal for cleanliness, pour a small amount of water on the surface. If it distributes evenly then the adhesive should bond well. If it beads or crawls, clean the surface again and re-test.

In order to protect the cleaned surfaces, coat them with adhesive primer. When the primer is dry the parts can be stored for at least a month if protected from dust and dirt.

If storage is necessary, all parts should be tightly wrapped or placed in airtight containers. Etched surfaces must never be touched with bare hands—even wiping the surface with a clean towel can affect the bond. Wear clean cotton gloves and use clean tools.

Bonding should be performed in rooms separate from other manufacturing operations. When bonding is done in the same area as plastic or rubber molding, a physical barrier should be erected between the two operations to prevent airborne mold lubricants from depositing on the metal. Similar hazards are presented by spray painting, electroplating, etching, and machining with coolants. Storage and assembly areas should be enclosed, and air to these areas filtered and under slight pressure.

### Anaerobics

Anaerobics are liquid adhesives which, when applied, polymerize to high molecular weight plastics. These tough and thermoset type adhesives are one-part, room temperature cure exhibiting excellent chemical resistance on water, gasoline, alcohols, fuels, salt water, cutting oils, lubricants, oils, and weak acids and alkalis. They are not resistant to high concentrations of acids, alkalis, and highly chlorinated solvents. Typical applications include:

- Threadlocking
- Threadsealing
- Bearing Retaining
- Pipe Sealing

### PRODUCT AVAILABILITY

The Titan line of anaerobic adhesives produced by Cy-bond are available in 10 ml, 50 ml, 250 ml, 1 liter, and 10 kg for threadlocking and retaining compounds. Gasketing products are available in 50 ml, 200 ml, 300 ml, and 850 ml.

### Cyanoacrylates

Cyanoacrylates, better known as instant adhesives or “super glues,” are one part, solvent-free, room temperature curing adhesives which are available in viscosity ranging from water-thin liquids to thixotropic gels. They can “fix” in as little as 5 seconds, curing into a rigid thermoplastic which adheres to most substrates. Cure is initiated by ambient moisture present on the bonding surface, and both the cure speed and bond strength of cyanoacrylates are affected by humidity. The best bonds are achieved when relative humidity is 40 to 60%. Lower humidity slows the cure; higher humidity accelerates cure but may impair bond strength.



# ADHESIVES & SEALANTS

## Cyanoacrylates ■ Epoxies ■ Hot Melts

Unmodified cyanoacrylates normally have a maximum operating temperature of 180°F., but newer thermally resistant formulations offer continuous service up to 250°F. Rubber-toughened cyanoacrylates are formulated for dramatically increased peel and impact strength, and increased thermal resistance up to 200°F.

Surface insensitive cyanoacrylates cure rapidly on acidic surfaces that might severely inhibit the cure of unmodified instant adhesives. Low odor/ low bloom cyanoacrylates offer decreased vapor pressures which minimize the potential for "blooming," a process that produces white, chalky deposits around the bond line which affect the aesthetic quality of certain end products.

Cyanoacrylates bond metals, plastics, ceramics, wood, rubber and glass, and they are currently used in a variety of applications including:

- Potting
- Sealing
- Fixturing
- Speaker component bonding
- Gasket and seal bonding
- Wiper blades and other metal to rubber
- Name plates and gear shift indicators

### PRODUCT AVAILABILITY

Cyanoacrylates are available in a wide range of sizes starting at less than one ounce.

### Epoxies

Epoxies are resins called polyethers that can be reacted by curing or crosslinking to become thermoset resins. These resins then, can be reinforced with glass fibers and fabrics or other materials and cured into high quality adhesives. They can then be formulated to bond a wide variety of dissimilar and "hard to bond" substrates such as ceramic to stainless steel or rubber to aluminum. During cure, epoxy resins do not release water or other by-products and, therefore, can be used in thin, void free, leakproof bond lines. Cured epoxy adhesives exhibit low creep, allowing them to be used not only as sealants, but as structural components. They are commonly used as compounds for lamination, compression molding, filament winding, injection molding, continuous lamination and pultrusion.

#### Typical Applications:

- Printed circuit boards
- Copper clad laminates
- Corrosion resistant pipe

- Petroleum pipe
- Aerospace composites
- Commercial and military aircraft
- Switches and relays
- Electrical bushings
- Archery equipment
- Golf clubs
- Fishing rods
- Snow and water skis
- Pressure vessels
- Bullet-resistant sheets

### PRODUCT AVAILABILITY

Epoxies are available in a wide range of sizes such as 50, 200 and 400 ml. cartridges, 1 and 5 gallon pails, several can sizes, kits, and foil packs.

### Hot Melts

Solvent-free adhesives that rapidly set upon cooling, hot melts have low viscosity above 180°F and are characteristically solid below 180°F. There are a wide range of hot melt formulations with the most common being:

- ethylene vinyl acetate (EVA) copolymers
- styrene-isoprene-styrene (SIS) copolymers
- styrene-butadiene-styrene (SBS) copolymers
- ethylene ethyl acrylate copolymers (EEA)
- polyurethane reactive (PUR)

Compatible with most materials, hot melts are clean and easy to handle and are unaffected by water, moisture or humidity.

**Note:** If applied to a damp or wet surface a poor bond may result.

Hot melt adhesives cannot be used with heat sensitive substrates or in applications where exposure to heat cannot be avoided.

Industry	Application
Construction	manufacture of laminated wood panels; kitchen countertops
Non-Rigid Bonding	bonding of woven and non-woven fabrics; manufacture of athletic shoes, books, and sporting goods
Packaging	manufacture of cartons, boxes and corrugated boards; bags, envelopes, disposable products (diapers, paper products); cigarettes; and labels, stamps

### PRODUCT AVAILABILITY

A wide variety of formulations are manufactured and available in shaped adhesives for hand held applicators, pellets and slugs for bulk applicators, and 5 and 55 gallon drums for drum unloading systems.

### Solvent Cements

Solvent cements are low cost adhesives which will bond to a variety of materials including plastics, glass, aluminum, wood, masonry, cloth, rubber and other materials. Special formulas are also available which only bond plastic to plastic, and which are widely used in sign industries. Solvent cements can also be used as a protective coating over grouting in mosaics and tile. It can be applied by brush, dauber, squeeze bottle or syringe.

### PRODUCT AVAILABILITY

1 oz. and 5 oz. tubes, 4 oz. jars, 1/2 pints, pints, quarts and gallons.

### ENVIRONMENTAL/SAFETY ISSUES FOR SOLVENT-BASED ADHESIVES

Environmental statutes and international treaties affecting adhesives include:

- U.S. Clean Air Act and 1990 amendments which regulate ground-level ozone smog precursors such as volatile organic compounds (VOCs). This Act also regulates 188 chemicals that emit Hazardous Air Pollutants (HAPs). At least 50 solvents used in adhesives are found among these 188 chemicals. The Ozone Depletion rules of this Act ban the manufacture and use of certain substances, including trichloroethane (TCA) also known as methyl chloroform.
- United Nations Economic Commission for Europe's 1979 Convention on Transboundary Air Pollution - commits to reducing VOC emissions 30 percent by the year 2000.

### Liquid Urethane

Commercially introduced in 1954, urethanes are now widely used and available in a number of forms. As coatings they protect wood, metals, rubber, textiles, concrete, leather, plastics, and many other materials. As adhesives they form tough, high peel bonds with polycarbonate, acrylic, PVC, polysulfone, ABS, and most other plastics. They are also used for making rugged, flexible molds, forming dies, cast parts and non-scratching holding-fixtures, as well as abrasion and noise-resistant linings and encapsulating parts.

As with all chemicals, follow correct procedures for handling and storage. Urethanes contain trace amounts of free isocyanates which produce fumes that irritate the respiratory tract. Avoid breathing fumes or air-borne mist. Adequate ventilation which pulls fumes away from handler is necessary. Wear gloves and proper eye protection. Do not store urethane products contaminated with water or hardeners in closed containers. Uncontrolled reactions may create hazardous internal pressures.

### PRODUCT AVAILABILITY

These products are normally available in quarts and in 1, 5, and 55 gallon containers.

#### DO YOU KNOW?

1958 - The first experimental plastic Coke bottle is produced from acrylonitrile plastic; a suitable commercial version won't be available for almost another 20 years.

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**Acknowledgements**

The following companies have assisted in the development of this plastics reference guide by providing product specific and general technical information.

**A. L. Hyde Company**

**Alusuisse Composites, Inc.**

**Coroplast Division, Great Pacific Enterprises**

**Cyberbond L.L.C.**

**CYRO Industries**

**DSM Engineering Plastic Products**

**Sheffield Plastics, Inc.**

**Elf Atochem North America, Inc., atoglas™ division**

**Ensinger Engineering Products**

**General Electric Company  
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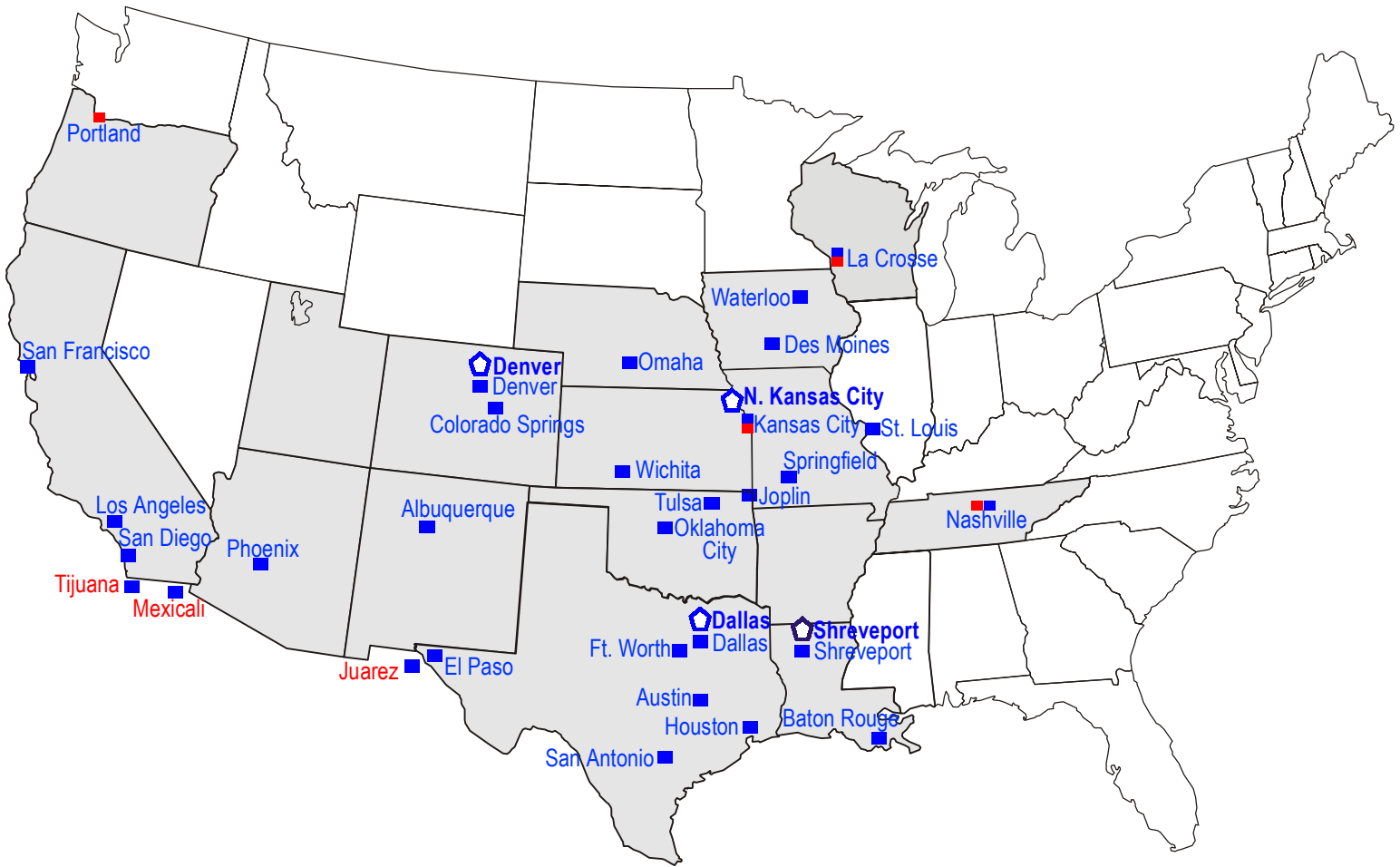
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