Electronics Material Selection Guide

Version uploaded 28/05/2023

ELECTRONICS MATERIAL SELECTION GUIDE

NuSil Technology is the cutting edge manufacturer of silicone materials for the electronics industry requiring precise, predictable, cost-effective material performance. ISO 900-certified since 1994, NuSil operates state-of-the-art laboratories and processing facilities in North America and Europe, and provides on-site, in-person application engineering support worldwide.

Silicones for Electronics

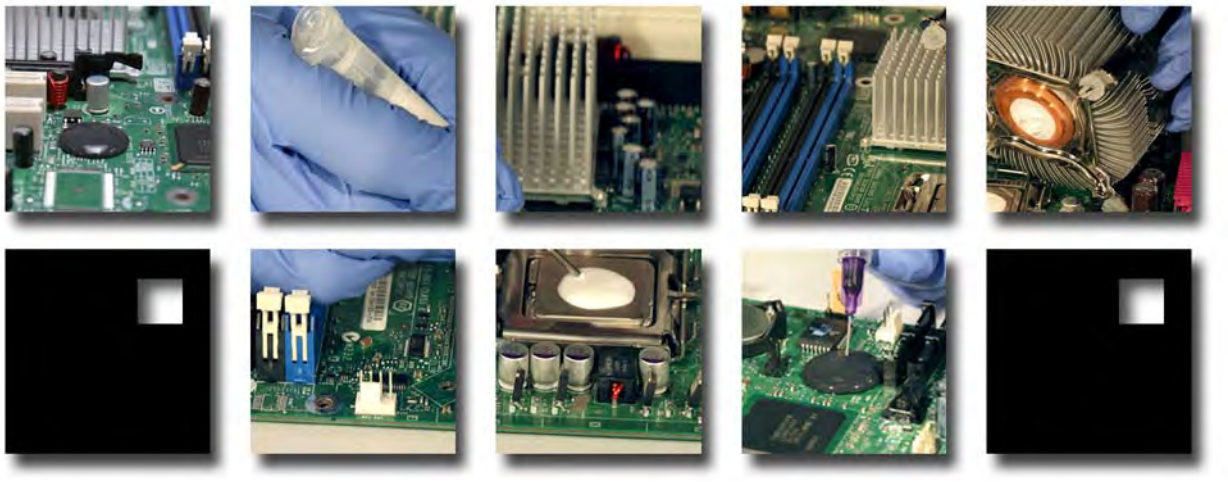
As a low stress alternative for electronic packaging, NuSil Technology's silicones allow the designer to choose from a unique line of silicones for various levels of packaging. We have an extensive line of encapsulants, adhesives, and greases to choose from. These include thermally and electrically conductive silicones for Thermal Interface Materials (TIM) or for EMI and RFI shielding applications.

Benefits of Silicone for electronic packaging applications:

- Wide Operating Temperature Range of -140 ˚C to 315 ˚C
- Low moisture absorption, < 0.4% Typical
- Corrosion Resistance
- High Dielectric Strength > 500 V/mil (0.001 inch) or 20 kV/mm
- Fillers can be added to provide thermal and electrical conductive properties
- Low Modulus (Typically less than 5.5 MPa/800 psi)
- Stable chemical and mechanical properties when exposed to high temperatures
- Low Shrinkage
- Available as gels, elastomers, and greases

Operating Temperature

T h e operating temperature range of a silicone in any application is dependent on many variables, including but not limited to: temperature, time of exposure, type of atmosphere, exposure of the material's surface to the atmosphere, and mechanical stress. In addition, a material's physical properties will vary at both the high and low end of the operating temperature range. Silicone typically remains flexible at extremely low temperatures and has been known to perform at -140 ˚C as well as resist breakdown at elevated temperatures up to 315 ˚C. The user is responsible to verify performance of a material in a specific application.



Version uploaded 28/05/2023

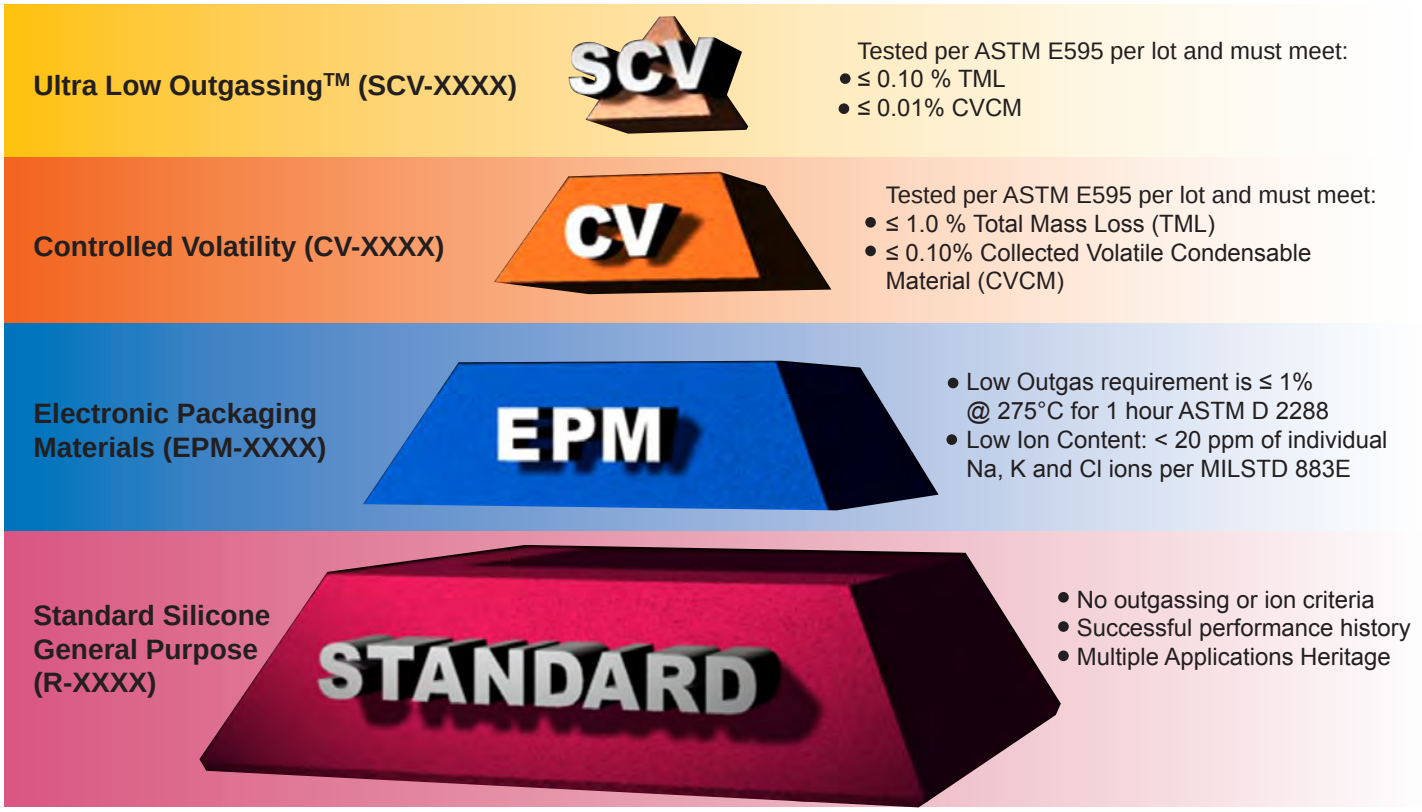
Silicone in Harsh Environments

The world of electronics can be tough, from protecting a cell phone from daily abuse such as drops and falls, to chemically resistant sensors; NuSil Technology specializes in silicones for harsh environments. Silicone can take the heat and is the material of choice for hostile thermal environments such as continuous or fluctuating temperature extremes.

We have over 25 years experience in providing silicones for electronics within the aerospace and aircraft industry. In harsh environments, low outgassing silicones are required to reduce fogging and other problems associated from mobile silicone oils in the cured silicone elastomer. These silicone oils are created during the manufacture of the silicone polymer and can be removed through various degrees of processing.

Low Volatility Silicones

NuSil Technology offers a diverse product line of silicones based on the specification requirements of your application. We can vary the degree of processing needed to meet the desired levels for common contaminants such as ions and low molecular weight species associated with outgassing. The levels of processing are shown in the pyramid below from the bottom, Standard Level, having no outgassing criteria to the top SCV Level being tested per ASTM E595 meeting ≤ 0.10 % TML and ≤ 0.01 % CVCM. All levels in between vary in testing for outgassing requirements.



Thermal Stability

NuSil Technology provides silicones that are able to maintain elastic properties without degradation under continuous high temperature exposure of up to 250 °C. We can meet the requirements needed to withstand other thermal challenging environments such as lead-free solder and eutectic processing temperatures of up to 300 °C. For advanced microelectronic applications, the packages are producing more heat with much more complex designs made from delicate materials. This greatly reduces the common fatigue effects of warping, cracking and delamination. Figures 2 and 3 are examples of silicone used in packaging levels 1 and 2.

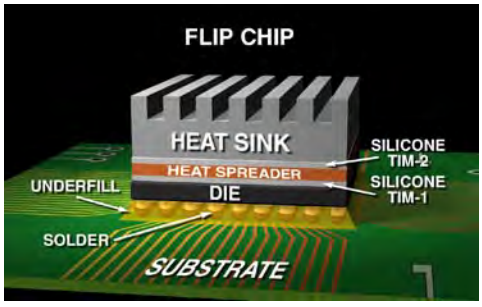


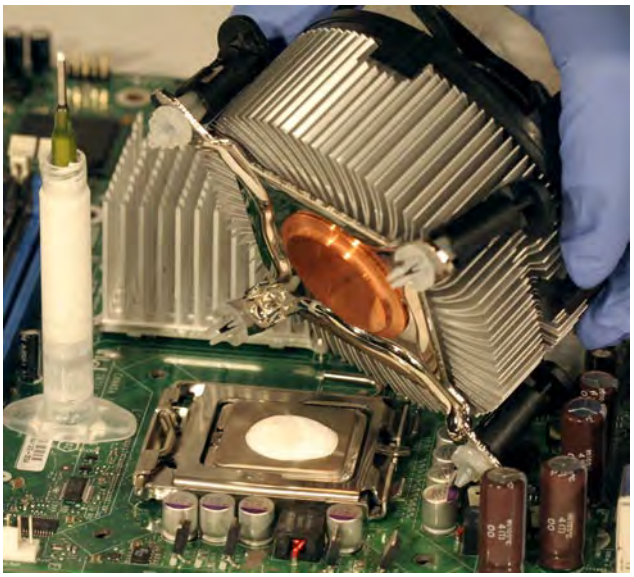
Figure 2. Flip Chip

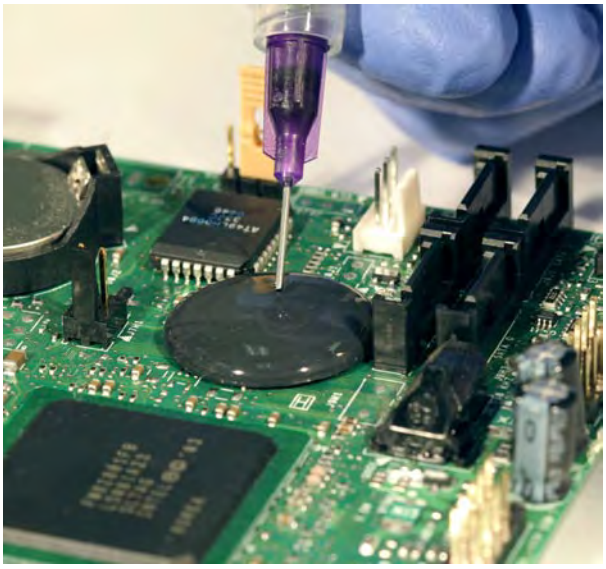
Figure 3. Standard Wire Bond

Chemically Harsh Environment → Chemical Solution

NuSil Technology has the expertise to produce various chemically resistant silicones. The chemical composition of silicone can be modified to meet these common chemical exposure challenges to:

- Fuel
- Cleaning Solutions
- Flux (acidic solutions)
- Photo resist





Version uploaded 28/05/2023

Application Notes

Inhibition

Lightspan™ Brand Gels, Elastomers and Adhesives are designed to provide excellent optical, thermal and mechanical properties. However, some ingredients commonly found in certain adhesives, plastics and elastomers can adversely affect the cure chemistry in these products. NuSil recommends that adhesives, plastics and elastomers be analyzed for cure inhibition prior to selecting the silicone material for use. This evaluation should include materials used in any transfer containers, dispensing hoses, or utensils that come in direct contact with the gel components. For more details read, "Avoiding Cure Inhibition with Lightspan Optical Gels," which is located on our website at: www.nusil.com/whitepapers/resources.

Processing Highly Filled Silicones

Electrically and thermally conductive silicones typically contain dense ceramic or metallic fillers that can settle over time. Prior to mixing Part A and B together, it is recommended to stir the individual Part A and B containing the dense fillers to ensure the fillers are homogeneously dispersed prior to use. A vacuum chamber should be used to remove the air introduced during mixing. When working with equipment at reduced pressures, ensure container and chamber are rated to withstand the supplier's recommended operational pressure. Before getting started, reference the material's Material Certification for "Work Time" or other pot life parameters to determine time between mixing and applying to application. Place mixed material into appropriate container and fill approximately one quarter of the container's total volume to allow material to rise. It is recommended to slowly apply vacuum up to approximately 28 inches of Mercury (0.95 Barr). Hold vacuum until bubbles are no longer observed forming. Breaking the seal while pulling vacuum will allow bubbles to burst, expediting the process. It is not recommended to remove air via centrifuging from silicones with fillers having a specific gravity > 1. Centrifuging can be used for silicones that do not contain dense fillers.

Improving Adhesion

NuSil Technology specializes in helping our customers solve complex problems related to processing, and adhesion is on the top of the list. Since many substrates are difficult to bond to, the surface of the substrate must be modified to allow good wetting of the adhesive to allow chemical and mechanical interaction. Many substrates need to have the surface "activated" to enhance the adhesive's bond to the substrate. There are, in general, four typical techniques that can be used to improve the adhesive bond: primers, plasma, corona and flame treatment. These surface treatments can greatly enhance the adhesive bond and the type of treatment is dependent on part configuration complexity, silicone adhesive and substrates. Adhesion is a very complex subject that incorporates principles from several scientific disciplines that are beyond the scope of this discussion.

Please visit the "Whitepapers" section of NuSil Technology's website at www.nusil.com for more information on the above subjects and for additional reference material.

ELECTRONICS MATERIAL SELECTION GUIDE

General Purpose	Reporting Standards	NuSil Product Number	Comments	Cure System	Mix Ratio	Color	Work Time	Tack Free Time	Cure Time/ Temp °C	Specific Gravity	Durometer Type A	Tensile psi (mPa)	Elongation %	Tear ppi (kN/m)	[*27] Ionic Content Cl / K / Na ppm	Lap Shear psi (mPa)	CTE ppm/°C	Dielectric Strength V/mil	[*28] Volume Resistivity ohm·cm	Flow (Inches) Viscosity (cP/mPa·sec) Extrusion (g/min)
COATINGS	CV	CV-1144-0	60% Solids, Conformal Coating	Oxime	-	Clear	-	60 m	7 d / R.T., H	1.00	-	-	-	-	-	-	-	930	-	240
		CV2-1147	55% Solids, Non-blocking Overcoat, Set-up Time 24 h	Oxime	-	Trans	-	60 m	7 d / R.T., H	1.07	-	-	-	-	-	-	-	-	-	1,750
		CV-1152	Solventless Coating, Protective Overcoat	Oxime	-	Clear	-	60 m	7 d / R.T., H	1.01	-	-	-	-	-	-	-	500	1×10^{15}	7,300
	Standard	R-1009	RTV Dispersion Coating / Conformal, 33% Solids	Oxime	-	Trans	-	60 m	7 d / R.T., H	1.10	40	1,200 (8.3)	650	95 (16.8)	-	-	-	-	-	6,500
		R3-1075	RTV Dispersion Coating / Conformal, 60% Solids	Oxime	-	Trans	-	80 m	7 d / R.T., H	1.06	40	700 (4.8)	350	40 (7.1)	-	-	-	1250	-	3,300
		CF19-2615	Solventless, low viscosity clear coating	Platinum	-	Trans	4 h	-	30 m / 150	-	30	120 (0.9)	100	-	-	-	-	500	-	A:1,300 / B:800
ADHESIVE & SEALANTS	Controlled Volatility	CV-1142	Spot Bonding, Available in Black & White	Oxime	-	Trans	-	20 m	7 d / R.T., H	1.11	45	700 (4.85)	300	-	-	-	320	1,100	1×10^{15}	35 g/min
		CV3-1142	Spot Bonding, Available in Black & White	Oxime	-	Trans	-	30 m	7 d / R.T., H	1.11	40	650 (4.48)	300	-	-	-	-	-	-	Non-slump
		CV7-1142-1	High temperature applications. Flow Rate 0.66" with 0.375" Plunge	Oxime	-	White	-	30 m	7 d / R.T., H	1.12	40	700 (4.85)	300	65 (11.46)	-	-	320	1,180	-	25 g/min
		CV-2187	Tough, Flowable, Fast Cure	Platinum	10:1	Trans	90 m	10 h	15 m / 150	1.10	35	850 (5.86)	400	55 (9.70)	-	-	-	500	1×10^{15}	A:100,000 / B:5,000
		CV-2289	Fast cure and designed for high temperature applications	Platinum	1:1	Trans	30 m	4 m	15 m / 150	-	25	650 (4.48)	350	-	-	400	-	500	1×10^{15}	A:60,000 / B:40,000
	EPM	EPM-2410	Ideal for Static Mix and Dispense Applications. Available in Black and White	Platinum	1:1	Trans	30 m	4 h	15 m / 150	-	30	800 (5.5)	350	-	<5 / <2 / <4	-	-	-	1×10^{15}	A:60,000 / B:40,000
	Standard	R-1130	RTV Adhesive, Non-slump	Oxime	-	Trans	-	25 m	7 d / R.T., H	1.10	35	850 (5.9)	325	40 (7.1)	-	[*1] 485 (3.6)	-	-	-	0.5 Inches
		R1-2145	High Strength, Young's Modulus 300 psi (2.1 mPa)	Platinum	1:1	Gray	60 m	-	2 h / 65	1.16	45	1,000 (6.9)	400	190 (33.5)	-	[*4] 625 (4.3)		825	-	A:280 g/min / B:290 g/min
		R-2160	High Temperature Elastomer	Platinum	10:1	Red/Trans	50 m	-	10 m / 150	1.20	20	750 (5.2)	625	150 (25.5)	-	-	-	500	-	A:250,000 / B:650
		CF16-2186	Quick cure, clear adhesive	Platinum	10:1	Trans	15 m	-	60 m / 100	1.12	30	1,175 (8.1)	550	80 (14.1)	-	-	-	900	-	A:70,000
		CF20-2186	Longer Work Time	Platinum	1:1	Trans	3 h	-	60 m / 100	1.10	30	1,100 (7.6)	600	80 (14.1)	-	-	-	900	-	A:80,000 / B:50,000
		R32-2186	Flowable, Fast Cure Adhesive, Longer Work Time	Platinum	1:1	Trans	15 h	-	15 m / 150	1.12	15	1,000 (6.9)	800	125 (21.2)	-	[*4] 150 (1.0)	-	905	-	A:80,000 / B:Thixotropic
		CF1-6755	Tough Elastomer	Platinum	1:1	Trans	2 h	-	30 m / 150	1.14	30	675 (4.7)	275	40 (7.1)	-	-	-	-	-	A:40,000 / B:35,000
		R2-6755	Better Adhesion to Polycarbonate	Platinum	1:1:0.1	Clear	-	-	30 m / 150	1.14	30	750 (5.17)	300	30 (5.29)	-	-	-	-	-	A:37,250 / B:32,000 / C:1,350
POTTING AND ENCAPSULATING MATERIALS	Ultra Low Outgassing	SCV-2590	Clear and pourable for applications where transparency is needed	Platinum	10:1	Clear	2 h	-	15 m / 150	1.02	50	1,000 (6.9)	125	-	-	-	-	500	1×10^{15}	A:8,000
		SCV-2590-2	Low viscosity and black for applications requiring light blocking	Platinum	10:1	Black	2.5 h	-	15 m / 150	1.05	50	900 (6.2)	150	-	-	-	-	370	850	-	A:8000
		SCV1-2590	Phenyl free for better resistance to UV exposure	Platinum	1:1	Clear	3 h	-	15 m / 150	1.02	50	800 (5.51)	90	-	-	[*4] 225 (1.58)	400	550	-	A:3,700 / B:2,600
		SCV2-2590	Low / High Temperature	Platinum	10:1	Clear	2 h	-	4 h / 65	1.04	40	625 (4.31)	125	-	-	[*4] 180 (1.2)	490	550	1×10^{15}	A:3,500
	Controlled Volatility	CV4-2500	Clear, pourable and low Durometer	Platinum	1:1	Clear	2 h	24 h	1 h / 65	1.01	25	350 (2.4)	125	-	-	-	-	550	1×10^{15}	2,000
		CV10-2500	High Durometer	Platinum	1:1	Clear	3 h	5 h	15 m / 150	1.02	50	1,000 (6.89)	130	-	-	-	-	550	1×10^{15}	8,000
		CV14-2500	Primerless Adhesion	Platinum	1:1	Clear	-	-	1 h / 65	1.01	30	400 (2.75)	150	-	-	-	-	-	-	2,450
		CV15-2500	Curable at low temperatures to reduce cure stress	Platinum	1:1	Clear	3 h	6.5 h	15 m / 150	1.02	50	850 (5.9)	90	-	-	[*4] 225 (1.6)	400	550	1×10^{15}	A:3,700 / B:2,550
		CV16-2500	[4] Primed Lap Shear 225 psi (4.1 mPa)	Platinum	10:1	Trans	2 h	-	4 h / 65	1.04	40	600 (4.1)	125	-	-	[*4] 200 (4.1)	490	550	1×10^{15}	3,600
		CV-2566	Thermally Stable, Pourable RTV Cure	Alkoxy	100:0.5	Red	4 h	-	7 d / R.T., H	1.49	55	950 (6.6)	150	40 (7.1)	-	[*1] 575 (4.0)	330	825	1×10^{15}	56,800
		CV-2568	Long Work time, Low Density, for potting solar cells	Alkoxy	100:0.5	Red	-	-	7 d / R.T., H	0.65	50	175 (1.2)	65	-	-	[*1] 115 (0.8)	180	645	1×10^{15}	138,000
		CV10-2568	Fast Cure, Low Density for potting solar cells	Platinum	1:1	Red	3 h	-	30 m / 150	0.76	40	235 (1.6)	170	-	-	[*4] 175 (1.2)	245	860	-	A:125,000 / B:80,000
	EPM	EPM-2420	Low Viscosity, Self-leveling Adhesive to Polyester and Polyether	Platinum	1:1	Clear	5,000 cPs max after	-	60 m / 65	1.01	30	400 (2.8)	150	-	<2 / <1 / <8	-	-	-	-	A:2,450 / B:1,200
		EPM-2421	Low Viscosity, Self-leveling, General Adhesive and Encapsulate	Platinum	1:1	Clear	3 h	-	15 m / 150	1.02	50	850 (5.9)	90	-	<5 / <2 / <4	-	400	[*23] 550	1×10^{15}	A:3,700 / B:2,550
		EPM-2422	1.43 Refractive Index	Platinum	10:1	Clear	7,000 cPs max after	-	4 h / 65	1.04	40	625 (4.3)	125	-	<5 / <1 / <1	[*4] 180	490	[*23] 550	1×10^{15}	A:3,500
		EPM-2423-2	Black Self Leveling Silicone	Platinum	10:1	Black	3 h	6 h	30 m / 150	1.05	50	950	150	-	<5 / <5/ <5	-	-	-	-	A:8,500
		EPM-2423	Legacy materials used for adhering solvent cells to composite substrates	Platinum	10:1	Clear	2 h	-	15 m / 150	1.02	50	1000 (6.9)	125	-	-	[*29] 400 (2.8)	-	-	-	A:8,000
	Standard	CF2-2186	Medium Viscosity, All Purpose Potting & Encapsulant	Platinum	10:1	Trans	2 h	-	10 m / 150	1.10	20	900 (6.2)	600	70 (12.3)	-	-	-	500	-	A:38,000 / B:18,000
		R-2187	Designed for Extreme Temperatures	Platinum	10:1	Trans	-	-	2 h / 70	1.12	42	790 (5.4)	175	50 (8.8)	-	-	-	-	-	23,000
		R-2188	Low viscosity, Low Modulus Elastomer	Platinum	1:1	Trans	15 h	-	10 m / 150	1.05	20	475 (3.3)	675	-	-	-	-	450	-	A:13,000 / B:9,000
		R-2615	Pourable and self leveling. Adjustable cure.	Platinum	10:1	Clear	4 h	-	15 m / 150	1.03	50	1,300 (9.0)	100	20 (3.5)	-	-	-	500	-	A:6,000 / B:90
		R-2615-3	Low Viscosity , RTV Elastomer	Platinum	1:1	Red	2 h	-	24 h / 150	1.06	50	1,000 (6.9)	100	-	-	-	-	830	-	A:6000 / B:2500

d = day
m = minutes
R.T.= Room Temperature
H = Humidity

Trans = Translucent

[*1] Primed with SP-120
[*4] Primed with CF1-135
[*23] Tested per ASTM D149
[*27] Tested per MIL STD 883E
[*28] Tested per ASTM D257
[*29] Primed with CF1-135 and Tested at 4 H / 60°C (140°F)

g/min = Grams Per Minute

Version uploaded 28/05/2023

ELECTRONICS MATERIAL SELECTION GUIDE

General Purpose	Reporting Standards	NuSil Product Number	Application Comments	Cure System	Mix Ratio	Color	Work Time	Tack Free Time	Cure Time/ Temp °C	Specific Gravity	Durometer Type A	Tensile psi (mPa)	Elongation %	Tear ppi (kN/m)	[*27]Ionic Content Cl / K / Na ppm	Lap Shear psi (mPa)	CTE ppm/°C	Dielectric Strength V/mil	[*28]Volume Resistivity ohm·cm	Flow (Inches) Viscosity (cP/mPa·sec) Extrusion (g/min)
STATIC DISSIPATIVE	ULO	SCV-2596	Use for extreme temperature and hermetic applications.	Platinum	10:1	Black	2 h	-	30 m / 150	1.19	70	325 (2.2)	75	-	-	[*4] 250 (1.7)	580	-	1.67	-
	CV	CV-1500	[*30]350 psi (2.4 MPa) primed adhesion w/SP-120,[*25] 0.32 W/m·K	Oxime	-	Black	-	10 m	7d / R.T., H	1.25	75	675 (4.7)	20	-	-	[*1] 350 (2.4)	435	-	3.5	Thixotropic
		CV-2640	Carbon Fiber,[*30]250 psi (2.4 MPa) primed adhesion w/CF1-135	Platinum	10:1	Black	2 h	-	30 m / 150	1.19	70	450 (3.1)	90	-	-	[*4]250	580	-	0.167	-
		CV1-2640	High viscosity and tough to relieve shear stress	Platinum	10:1	Black	-	-	2 h / 65	1.07	40	525 (3.6)	225	-	-	-	-	-	20	A:300 g/min / B:150 g/min
		CV2-1148	Solventless Coating, Also Available as a Dispersion	Oxime	-	Black	-	60 m	7 d / R.T., H	1.08	-	-	-	-	-	-	-	30	-	Non-slump
		CV2-2640	Use for extreme temperature. Flowable and RTV	Platinum	1:1	Black	60 m	-	24 h / R.T., H	-	30	550 (3.8)	400	30 (5.3)	-	-	-	-	900	A:1,250,000 / B:100,000
	EPM	EPM-2461	Carbon black filled for EMI shielding applications	Platinum	1:1	Black	60 m	-	24 h / R.T., H	-	30	550 (3.8)	400	30 (5.3)	<5 / <1 / <6	-	-	-	900	A:1,250,000 / B:100,000
	Standard	R-1505	Used for "form-in-place" gaskets for EMI shielding	Oxime	-	Black	-	10 m	7 d / R.T., H	1.24	75	550 (2.4)	20	-	-	-	-	10	30	Non-slump
		R-2630	Used for "form-in-place" gaskets for EMI shielding	Platinum	10:1	Black	10 h	-	30 m / 150	1.09	60	700 (4.8)	95	35 (6.2)	-	-	-	10	2.0	9,400
		R-2631	Low durometer, high strength, adjustable cure	Platinum	1:1	Black	8 h	-	60 m / 65	1.07	40	600 (4.5)	275	50 (8.8)	-	-	-	-	50	100 g/min
THERMAL INTERFACE MATERIALS (TIMs) ELECTRICALLY CONDUCTIVE	ULO	SCV1-2596	Recommend for hermetically sealed and other applications where contamination is of concern.	Platinum	20:1	Tan	2.5 h	-	30 m / 150	3.36	80	500 (3.4)	-	-	-	-	215	-	0.006	Paste
	CV	CV-2644	[*25]1.2 W/m·K	Platinum	20:1	Tan	2.5 h	-	30 m / 150	3.36	80	500 (3.4)	-	-	-	-	215	-	0.006	Paste
	EPM	EPM-2462	[*25]1.20 W/m·K, good adhesion to Aluminum	Platinum	20:1	Tan	3 h	-	30 m / 150	3.38	80	500 (3.4)			<5 / <7 / <5		215	-	0.006	Paste
		EPM-2463	1.5 W/m·K, remains conductive over broad operating temperature range	Tin	100:0.5	Green-Gray	2 h	-	7 d / R.T., H	3.30	80	300 (2.1)	75	55 (9.7)	<5 / <10 / <5	[*1] 175 (1.2)		-	0.002	4 inches
		CV2-2646	For RFI and EMI shielding in electronic and space applications	-	20:1	Green-Gray	2.5 h	-	30 m / 150	3.05	80	500 (3.4)	100	-	-	185 (1.3)	-	-	0.003	4 inches
	Standard	R-2634	Low/High temperature for gap filling. Convenient Semco packaging	Tin	100:0.5	Tan	3 h	-	7 d / R.T.	3.36	80	250 (1.72)	90	50 (8.81)	-	195 (1.3)		-	0.001	Smooth Paste
		R-2637	RF and EMI shielding applications. Flows when mixed.	Platinum	20:1	Tan	4 h	-	30 m / 150	3.60	60	210 (1.44)	275	-	-	-		5	0.006	Smooth Paste
	ULO	SCV1-2599	[*25] Thermal Conductivity 1.46 W/mK	Platinum	15:1	White	2 h	-	7 d / R.T.	1.53	75	190 (1.31)	30	-	-	[*4]160 (1.0)	225	540	5.3 x10^{14}	Paste
	CV	CV-2900	[*25]0.6 W/m·K, Low Temperature	Oxime	-	White	-	25 m	3 d / R.T., H	2.29	65	375 (2.6)	150	-	-	-	-	-	-	30 g/min
		CV-2942	[*25] 0.84 W/m·K	Platinum	20:1	Gray	2.5 h	4.5 h	24 h / R.T.*	2.40	90	625 (4.31)	15	55 (9.70)	-	[*4] 350 (2.2)	185	430	1.4 x 10^{14}	Paste
		CV-2946	[*25]1.46 W/m·K	Platinum	15:1	White	2 h	4 h	7 d / R.T., H	1.53	75	200 (1.38)	30	50 (8.80)	-	[*4] 165 (1.1)	225	540	5.3 x 10^{14}	Paste
		CV2-2946	[*25]0.59 W/m·K, BLT of 50 µn, Boron Nitride filled	Platinum	20:1	White	3 h	-	30 m / 150	-	55	400 (2.75)	200	55 (9.70)	-	-	-	-	-	140 g/min
		CV1-2960	[*25]1.04 W/m·K, Low Viscosity	Platinum	10:1	White	2 h	4 h	4 h / 65	1.45	75	200 (1.37)	60	60 (10.6)	-	-	-	-	-	A:850,000
	EPM	EPM1-2493	Low viscosity for complex geometries 1 W/m·K	-	1:1	White	-	13 h	15 m / 150	2.34	65	180 (1.2)	50	-	-	120 (0.8)	-	-	-	36,000 cP, 15 m
		EPM-2401	[*25]0.70 W/m·K , BLT <0.5 µn, Zinc filled	-	-	White	-	-	-	2.30	-	-	-	-	<5 / <2 / <4	-	-	[*24]13 kV @ 0.10 inch	1 x 10^{15}	Medium Grease
		EPM-2491	Thermally Conductive; Electrically Insulating	-	10:1	White	2.5 h	4.5 h	4 h / 65	1.45	75	225 (1.6)	55	55	-	-	-	-	-	A: 900,000
		EPM-2492	[*25]0.62 W/m·K, BLT 200 µn, BN filled	Platinum	10:1	White	2 h	-	4 h / 65	-	75	200 (1.4)	250	-	<5 / <1 / <1	[*4]205	275	-	-	A:350,000
		EPM-2890	Thermally Conductive, non-Corrosive RTV Silicone Adhesive	Oxime	-	White	-	40 m	72 h / R.T., H	2.33	65	400 (2.8)	150		<5 / <5 / <5	225 (1.6)	221	-	-	40 g/min
	Standard	R-2930	[*25]1.46 W/m·K. Boron Nitride filled	Platinum	15:1	White	3 h	-	30 m / 150	1.55	80	260 (1.72)	20	-	-	-	-	880	-	Paste
		R-2940	[*23]0.84 W/m·K, High Durometer, Does not contain Boron Nitride	Platinum	20:1	Gray	5 h	24 h	30 m / 150	2.41	90	700 (4.8)	35	65 (11.5)	-	-	-	450	-	Paste
		G-9340	230 mm Cone Penetration	-	-	White	-	-	-	2.20	-	-	-	-	-	-	3.7 @ 100 KHZ	500	1 x 10^{14}	0.14", 5 minutes
TAPE AND FILMS	CV	CV-2680-12	Two part film adhesive; 0.012 inches. Applies low shear stress during thermal cycling.	Platinum	See Profile	Trans	4 hours minimum	-	4 h / 65	1.10	-	[*10] 1450 (10.0)	[*10] 850	[*10]115 (20.3)	–	260	465	-	-	-
		CV4-1161-5	Double Side Tape, Kapton® liner in center 0.005 inches (0.127 mm).180° peel strength 2.0 ppi	-	-	Trans	-	-	-	-	-	-	-	-	-	-		-	-	-
SILICONE RESINS	Standard	CF2-4721	Precatalyzed and high temperature resistant. High dielectric strength encapsulant for capacitors and optic cables	Peroxide	-	Lt. Amber	-	-	15 m / 150	1.09	75 - 90 D	-	-	-	-	-	-	-	-	130

Trans = Translucent

R.T. = Room Temperature
H = Humidity
d = day
h = hour
m = minutes
* Post-cure 15 m / 150

*1) Primed with SP-120
*4) Primed with CF1-135
*10) Tested on base material, not film
*21) Tested per ASTM C1045
*22) Tested per ASTM C177
*23) Tested per ASTM D149
*24) Tested per ASTM D877
*25) Tested per ASTM E1530, Bulk Thermal Conductivity. Typical sample thickness is 0.075" (2 mm)
*27) Tested per MIL STD 883E
*28) Tested per D257
*29) Tested per ASTM C1045
*30) Tested per ASTM D1002

g/min = Grams Per Minute

Version uploaded 28/05/2023

ELECTRONICS MATERIAL SELECTION GUIDE

General Purpose	Reporting Standards	NuSil Product Number	Comments	Cure System	Mix Ratio	Color	Work Time	Tack Free Time	Cure Time/ Temp °C	Specific Gravity	Durometer Type A	Tensile psi (mPa)	Elongation %	Tear ppi (kN/m)	*27)Ionic Content Cl / K / Na ppm	Lap Shear psi (mPa)	CTE ppm/°C	Dielectric Strength V/mil	*28)Volume Resistivity ohm·cm	Flow (Inches) Viscosity (cP/mPa·sec) Extrusion (g/min)
GELS	CV	CV-8151	Penetration 3.5 mm	Platinum	1:1	Clear	>30 h	-	30 m / 150	-	-	-	-	-	-	-	-	-	1×10^{14}	3,000 (mixed)
		CV1-8151	Penetration 0.3 - 0.5 mm	Platinum	1:1	Clear	24 h	-	30 m / 150	-	-	-	-	-	-	-	-	-	1×10^{14}	A:15,000 / B:9,000
		CV-8251	Low/High Temperature, Penetration 3 mm	Platinum	1:1	Clear	24 h	-	40 m / 150	-	-	-	-	-	-	-	-	-	1×10^{14}	1,800 (mixed)
	EPM	EPM-2480	Useful for Potting Intricate Assemblies Due to Low Viscosity	Platinum	1:1	Trans	24 h	-	30 m / 150	-	Firm Gel	-	-	-	<5 / <1 / <2	-	-	-	1×10^{14}	3,000 (mixed)
		EPM-2481	Tough Firm Gel	Platinum	1:1	Trans	24 h	-	30 m / 150	-	Very Firm Gel	-	-	-	<5 / <1 / <2	-	-	-	1×10^{14}	A:15,000 / B:9,000
		EPM-2482	Power Electronics	Platinum	1:1	Trans	24 h	-	40 m / 150	-	Firm Gel	-	-	-	<5 / <1 / <4	-	-	-	1×10^{14}	1,800 (mixed)
	Standard	GEL-8100	Medium firm gel. Can be used for pressure sensors	Platinum	1:1	Trans	> 24 h	-	1 h / 100	0.97	-	-	-	-	-	-	-	500	-	525
		GEL-8150	Firm gel, Penetration 5 mm	Platinum	1:1	Trans	4 h	-	30 m / 100	0.97	-	-	-	-	-	-	-	500	-	500
		GEL1-8155	Firm gel, Penetration 0.4 mm, Longer Work Time	Platinum	1:1	Trans	-	-	30 m / 150	-	-	-	-	-	-	-	-	-	-	14,500
		GEL-8170	High Purity for cable connectors	Platinum	1:1	Trans	-	-	90 m / 80	0.97	-	-	-	-	-	-	-	500	-	600
		GEL-8250	Low / High Temperature, Penetration 5 mm	Platinum	1:1	Clear	2 h	-	30 m / 100	-	-	-	-	-	-	-	-	500	-	Mixed: 650
GLOB TOPS	CV	CV-2189-2	Shear Thinning Index 2.5	Platinum	-	Black	-	-	15 m / 200	1.16	18	750 (5.2)	700	55 (9.7)	-	-	-	*23) 400	-	325,000
	EPM	EPM-2411-2	Glob Top encapsulant. Shear Thinning Index 2.5	Platinum	-	Black	>8 h		15 m / 200	1.16	17	750 (5.2)	700	55 (9.7)	-	-	-	*23) 400	-	300,000
	Standard	R-1400	Low Durometer, Glob Top encapsulant. Shear Thinning Index > 3	Platinum	-	Black	-	-	15 / 200	1.18	18	800 (5.5)	750	75 (13.2)	-	-	-	400	-	Viscosity: 300,000 cP Extrusion: 120 g/min
		R-1600	Low / High Temperature	Oxime	-	Clear	-	30 m	7 d / R.T., H	1.10	45	650 (4.5)	300	60 (11.4)	-	*1)205 (1.4)	-	-	-	Non-slump
FLUOROSILICONES	Standard	GEL-3500	Fuel Resistant Gel, Durometer -Type '00' 50	Platinum	1:1	Trans	12 h	-	45 m / 150	-	See comments	-	-	-	-	-	-	-	-	A:12,000 / B:10,500
		CF1-3510	Fuel / Solvent Resistant potting compound	Platinum	10:1	Red	6 h	-	30 m / 150	1.50	25	175 (1.2)	150	-	-	-	-	-	-	A:70,000 / B:10
		CF2-3521-2	Fuel resistant potting compound	Platinum	1:1	Black	60 m	-	48 h / R.T.	1.28	35	600 (4.1)	265	-	-	*4)350 (2.4)		-	-	Paste
		CF3-3521	Liquid Injection Molding, Fuel resistant	Platinum	1:1	Trans	10 h	-	30 m / 150	1.26	30	700 (4.8)	375	-	-	-	-	-	-	A:75 gpm / B:125 g/min
		CF5-3521-2	Liquid Injection Molding, Fuel resistant	Platinum	1:1	Black	3.5 h	-	48 h / R.T., H	1.30	30	550 (3.8)	275	35 (6.2)	-	-	-	-	-	240,000
		R7-3521-11	Grey, Solvent resistant adhesive	Platinum	1:1	Gray	60 m	-	48 h / R.T., H	1.27	30	500 (3.4)	260	35 (6.2)	-	-	-	-	-	-
		CF1-3710-2	Fuel / Solvent resistant foam, 50 lb/ft^3 (800 Kg/m)	Platinum	1:1	Gray	-	10 m	1 to 4 h / R.T., H	-	-	-	-	-	-	-	-	-	-	-
		CF1-3800	Thermally Conductive *22)1.25 W/m·K, Fuel resistant	Platinum	15:1	White	2 h	-	30 m / 150	1.52	50	125 (0.86)	50	-	-	-	-	-	-	Paste
		R-3900	Cure: 8 h / 25 °C : 45 m / 75 °C : 135 M m / 150 °C Dispersion Coating, 20% Solids	Platinum	1:1	Trans	-	-	See Comments	-	50	1,200 (8.3)	900	275 (48.5)	-	-	-	-	-	1,900
SILICONE FOAMS	Standard	R-2350	Flame Resistant, 22 lb/ft^3 (0.350 g/cm^3)	Platinum	1:1	Gray	-	-	45 m / 100	0.35	-	-	-	-	-	*4)38 (0.26)	-	190	-	A:28,000 / B:12,500
		SFM5-2350	Flame Resistant, 25 lb/ft^3 (0.400 g/cm^3)	Platinum	1:1	Gray	22 m	-	45 m / 100	0.35	-	-	-	-	-	-	-	190	-	A:55,000 / B:45,000
		R-2370	Low Density, Soft, 10 lb/ft^3 (0.16 g/cm^3)	Tin	100:6	Tan	-	-	10 m / R.T., H	-	-	-	-	-	-	-	-	-	-	4,700
		R-2380	Medium Density, Soft, 19 lb/ft^3 (0.31 g/cm^3)	Tin	100:6	Tan	-	-	10 m / R.T., H	-	-	-	-	-	-	-	-	-	-	3,600
	CV	CV-2391	Low density, Soft, 10lb/ft^3 (0.16g/cm^3)	Platinum	1:10	White	-	-	1 h / R.T., H.	-	-	-	-	-	-	-		-	-	3,000
PRIMERS	Standard	SP1-204	1 and 2 part RTV System, 3.3% S.	-	-	Trans	-	-	-	0.79	-	-	-	-	-	-	-	-	-	-
		SP-120	General Purpose, 4.1% Solids	Hydrolysis	-	Clear	-	-	1 h / R.T.	0.77	-	-	-	-	-	-	-	-	-	1
		CF1-141	Addition Cure Systems, 6% Solids in Isopropyl Alcohol	Hydrolysis	-	Red	-	-	1 h / R.T.	0.80	-	-	-	-	-	-	-	-	-	1
		SP-142	Platinum Cure Systems on Polycarbonates	Hydrolysis	-	Trans	-	-	1 h / R.T.	0.80	-	-	-	-	-	-	-	-	-	1
		SP-270	Addition Cure Systems, Difficult Substrates, 15% Solids	Hydrolysis	-	Trans	-	-	1 h / R.T.	0.77	-	-	-	-	-	-	-	-	-	1

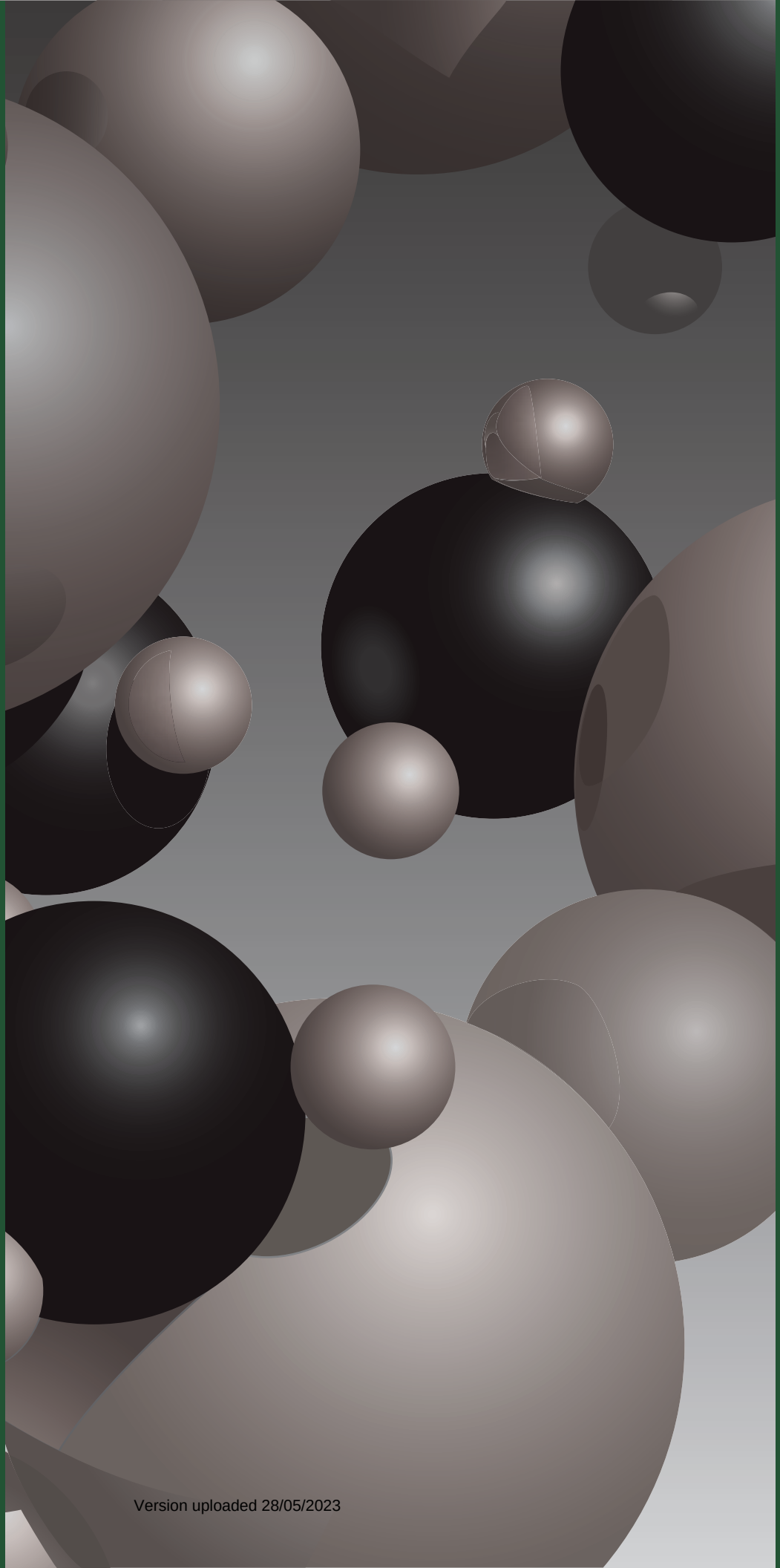
Trans = Translucent

R.T. = Room Temperature
H = Humidity
d = day
h = hour
m = minutes
* Post-cure 15 m / 150

*1) Primed with SP-120
*4) Primed with CF1-135
*23) Tested per ASTM D149
*27) Tested per MIL STD 883E
*28) Tested per ASTM D 257

*22) Tested per ASTM C177
g/min = Grams Per Minute

Version uploaded 28/05/2023



Version uploaded 28/05/2023

Silicone Sales & Services
UK - Ireland - Benelux

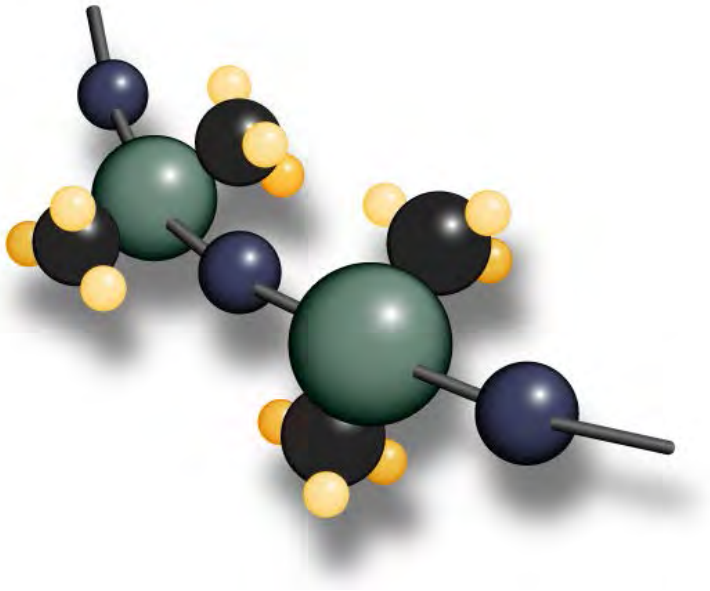
© 2023 - Polymer Systems Technology Limited™

Unit 2. Network 4. Cressex Business Park,
Lincoln Road, High Wycombe, Bucks. HP12 3RF

tel: +44 (0) 1494 446610

web: https://www.silicone-polymers.com

email: sales@silicone-polymers.co.uk



Version uploaded 28/05/2023