ADVANCED ENGINEERING

SPACE GRADE

NuSil

Polymer Systems Technology Limited

PST

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Polymer Systems Technology Limited

SILICONE SALES & TECHNICAL SERVICE SPECIALISTS

When you have Research, Design, Production or Manufacturing problems, it's important to look at the application in depth. PST solve problems when Silicones are paramount.

NUSIL

PST are the authorised representative for NuSil within the UK, Ireland and Benelux regions.

QUALITY

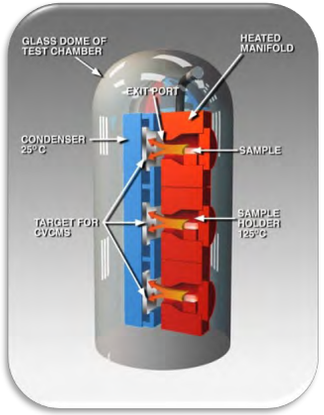
Accreditation from 1997 and proud to hold the latest revision of ISO:9001 essential to our ongoing commitments we sought and achieved registration to the environmental standard ISO:14001.

SAI GLOBAL ISO 14001 Environmental

SAI GLOBAL ISO 9001 Quality

TESTING OF LOW OUTGASSING SILICONES

NuSil Technology performs ASTM E 595 testing to certify all CV and SCV silicones on a lot-to-lot basis. First, the sample material is exposed to 23°C and 50% relative humidity for 24 hours, and then it is weighed and loaded into a test chamber. The sample is then heated to 125°C at less than 5 x 10-5 torr. Any volatile components of the sample that outgas under these conditions escape through an exit port and condense on a collector plate that is maintained at 25°C.



ASTM E 595 Test Chamber of CV-24 Test Stand

After 24 hours the chamber is cooled and depressurized with dry inert gas. The collector plate and samples are then weighed to determine the percentage of weight change, determining % TML and % CVCM.

Additional Resources

Testing data is available for materials tested by NASA and the ESA:
http://outgassing.nasa.gov

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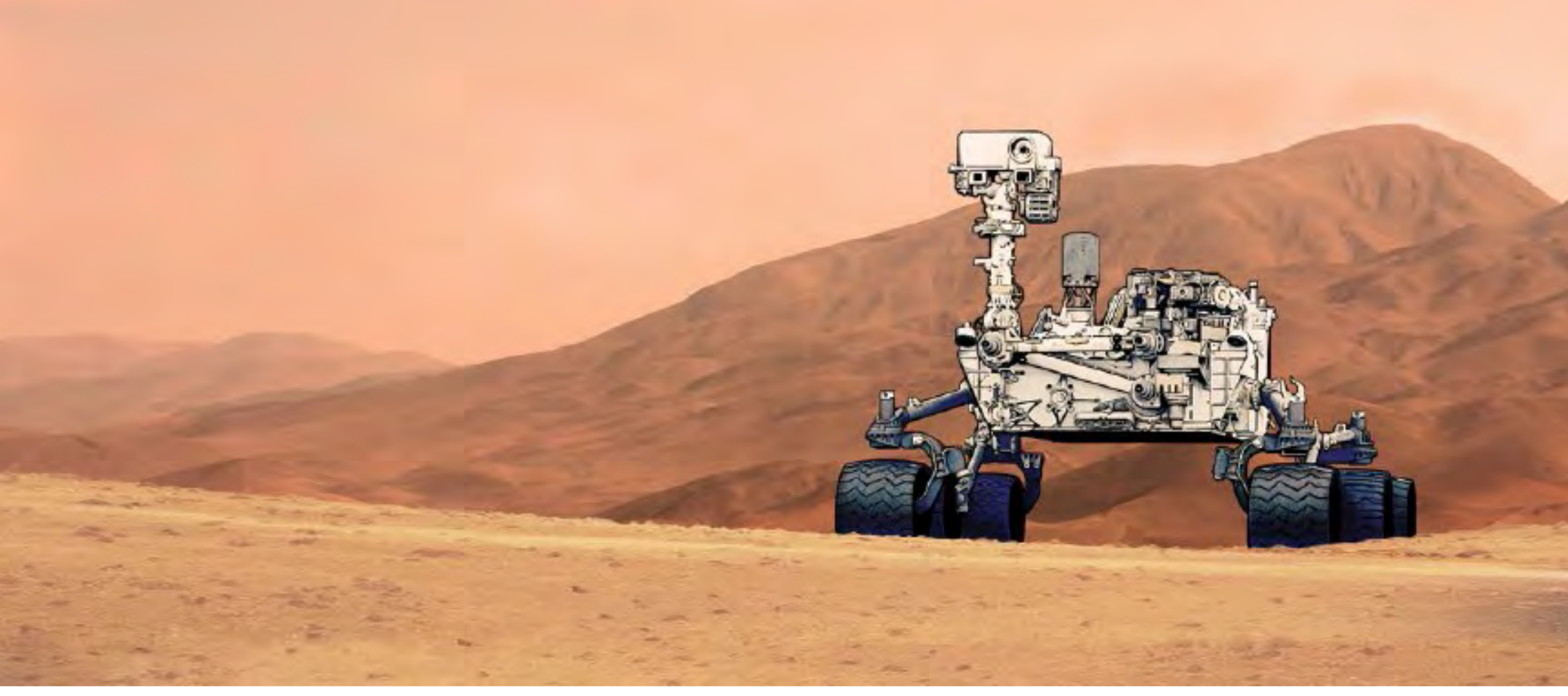

EXTREME ENVIRONMENTS WHERE PURITY IS ESSENTIAL

The extremes of outer space pose challenges where standard solutions rarely apply. We proudly offer custom products in unique form factors at the lowest volatility levels—and a willingness to innovate where others won't.

In the early days, NuSil supported solar arrays on the space station. Today, NuSil are the leading supplier of silicones for commercial space exploration.

Our unparalleled expertise in ultra low outgassing and customization allow us to meet the needs of an industry with an unforgiving margin of error.

With decades of flight heritage in Geosynchronous Earth Orbit (GEO), Lower Earth Orbit (LEO) and beyond, our space grade silicones are the industry choice.

SPACE GRADE

NuSil's silicones are highly purified to perform in the harsh conditions of outer space. We offer the lowest levels of volatility in the industry, making us the world leader in Space Grade silicones.

Polymer Systems Technology Limited

SPACE GRADE SILICONES – THE LOWEST IN OUTGASSING

NuSil's space grade silicones remain elastic at low temperatures and resist breakdown at high temperatures, offering excellent utility in space where materials are repeatedly exposed to extreme temperatures.

Low Outgassing (Controlled Volatility)
To mitigate volatile materials condensing on important surrounding devices, NuSil's Low Outgassing and Ultra Low Outgassing™ silicones are used by leading space programs to provide the resilient protection they require to prevent contamination and material degradation. NASA and ESA require materials to be tested per ASTM E595 prior to use in space and must meet specifications outlined in NASA SP-R-0022A and ESA PSS-014-702, with a Total Mass Loss (TML) of ≤ 1.00% and Collected Volatile Condensable Material (CVCM) of ≤ 0.10%.NuSil's Low Outgassing materials meet or exceed these requirements, and our Ultra Low Outgassing™ materials exceed these standards by an order of magnitude, ≤ 0.10% TMLs and ≤ 0.010% CVCM.

ULTRA LOW OUTGASSING ADHESIVES & SEALANTS—TWO PART

NUSIL PRODUCT NUMBER	CURE SYSTEM	VISCOSITY (cP/mPa sec) EXTRUSION (g/minute)	LAP SHEAR psi (MPa)	DUROMETER TYPE A	TENSILE psi (mPa)	ELONGATION %	WORK TIME (TACK FREE TIME)	COLOUR	BROAD OPERATING TEMPERATURE	SPECIAL FEATURES
TWO PART										
SCV-2585	PLATINUM	49,500	475 (3.3)	35	700 (4.8)	300	1 h	TRANSLUCENT	•	Pourable
SCV-2586	PLATINUM	325,000	175 (1.2)	45	225 (1.6)	150	4 h	RED	•	Low density
SCV-2590	PLATINUM	8,800	375 (2.6)	45	950 (6.6)	125	-	OPTICALLY CLEAR	•	Pourable
SCV-2590-2	PLATINUM	9,500	400 (2.8)	50	950 (6.6)	150	4.5 h	BLACK	•	Low viscosity, fast cure
SCV1-2590	PLATINUM	3,300	175 (1.2)	50	925 (6.4)	90	4 h	OPTICALLY CLEAR		Formulated to minimize UV degradation
SCV2-2590	PLATINUM	6,100	250 (1.7)	45	475 (3.3)	85	-	OPTICALLY CLEAR	•	High refractive index

ADHESIVES & SEALANTS—ONE PART

NUSIL PRODUCT NUMBER	CURE SYSTEM	VISCOSITY (cP/mPa sec) EXTRUSION (g/minute)	DUROMETER TYPE A	TENSILE psi (mPa)	ELONGATION %	WORK TIME (TACK FREE TIME)	COLOUR	BROAD OPERATING TEMPERATURE	SPECIAL FEATURES
LOW OUTGASSING									
CV-1142	OXIME	35g / minute	45	700 (4.85)	300	(20 m)	TRANSLUCENT	•	Spot bonding, also available in black & white
CV1-1142	OXIME	13,000	30	400 (2.75)	200	-	TRANSLUCENT	•	Self-levelling, also available in black & white and with UV tracer
CV1-1142-4	OXIME	60g / minute	35	350 (2.4)	200	-	TRANSLUCENT	•	Self-levelling, Built-in UV tracer
CV2-1142	OXIME	Non-slump	50	-	-	(15 m)	TRANSLUCENT	•	Also available in black & white
CV3-1142	OXIME	Non-slump	45	675 (4.7)	300	-	TRANSLUCENT	•	Spot bonding, also available in black & white
CV7-1142-1	OXIME	20g / minute	40	700 (4.85)	300	(20 m)	WHITE	•	-
CV9-1142	OXIME	35g / minute	55	400 (2.75)	85	(25 m)	TRANSLUCENT	•	High durometer, low density
CV-1143	OXIME	Non-slump	45	800 (5.5)	400	(15m)	TRANSLUCENT	•	Non-slump
~~**CV-2189-2**~~	~~PLATINUM~~	~~225,000~~	~~17~~	~~750 (5.17)~~	~~700~~		~~BLACK~~		~~Thixotropic~~

g/minute = grams per minute

h = hours
m = minutes

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Polymer Systems Technology Limited

EQUIPMENT & ACCESSORIES

From dispensing tips to mixing machines, PST have a wide range of equipment and accessories available to help our cus-

For more information, please contact us with your requirements.

NUSIL PRODUCT NUMBER	CURE SYSTEM	VISCOSITY (cP/mPa sec) EXTRUSION (g/minute)	DUROMETER TYPE A	TENSILE psi (mPa)	ELONGATION %	WORK TIME (TACK FREE TIME)	COLOUR	BROAD OPERATING TEMPERATURE	SPECIAL FEATURES
LOW OUTGASSING									
CV-2187	PLATINUM	90,000	35	925 (6.4)	400	3 h	TRANSLUCENT		Tough, Flowable, Fast cure
CV-2287	PLATINUM	85,000	30	725 (5.0)	400	3.5 h	TRANSLUCENT	•	Low / High Temperature, Flowable, Fast cure
CV-2289	PLATINUM	60,800	30	750 (5.2)	350	(4 h)	TRANSLUCENT	•	Also available in black & white
CV-2289-1	PLATINUM	A: 60,000 B: 40,000	30	700 (4.8)	350	30 m	WHITE	•	Pourable Elastomer
CV-2289-2	PLATINUM	A: 65,000 B: 40,000	30	750 (5.2)	400	30 m	BLACK	•	Pourable Elastomer
CV1-2289-1	PLATINUM	A: 65,000 B: 40,000	30	750 (5.2)	350	-	WHITE	•	-
CV2-2289-1	PLATINUM	12,300	30	450 (3.1)	250	(20 h)	WHITE	•	Low viscosity
CV3-2289-1	PLATINUM	14,900	35	175 (1.2)	125	(12 h)	WHITE	•	Low viscosity, added micro-balloons for bond line control
CV4-2289-1	PLATINUM	1,300,000	30	650 (4.5)	400	30 m	WHITE	•	Non-flowable
CV7-2289-1	PLATINUM	230,000	30	700 (4.8)	375	-	WHITE	•	Improved primerless adhesion
CV-2500	PLATINUM	8,300	50	1,000 (6.9)	125	2 h	OPTICALLY CLEAR		Pourable, optically clear
CV-2500-2	PLATINUM	8,500	50	950 (6.6)	150	3 h	BLACK		Low viscosity, fast cure
CV3-2500	PLATINUM	3,000	40	950 (6.6)	100	3 h	OPTICALLY CLEAR		Low viscosity, potting & encapsulating, optically clear
CV4-2500	PLATINUM	1,500	25	-	-	2 h	OPTICALLY CLEAR		Low durometer, low viscosity, optically clear
CV10-2500	PLATINUM	7,500	50	1,000 (6.9)	130	3 h	OPTICALLY CLEAR		High durometer, optically clear
CV14-2500	PLATINUM	2,600	30	425 (2.9)	150	-	TRANSLUCENT		Improved primerless adhesion
CV15-2500	PLATINUM	3,200	50	850 (5.9)	90	3 h	OPTICALLY CLEAR		Formulated to minimize UV degradation
CV16-2500	PLATINUM	5.300	40	650 (4.5)	100	2 h	OPTICALLY CLEAR		High refractive index
CV-2501	PLATINUM	7,500	50	900 (6.2)	150	10 h	OPTICALLY CLEAR		Longer work time, optically clear
~~**CV-2502**~~	~~PLATINUM~~	~~0.3 Inches (flow)~~	~~40~~	~~800 (5.5)~~	~~200~~	-	~~TRANSLUCENT~~		~~Low flow~~
CV-2510	ALKOXY	45,000	45	600 (4.1)	200	4 h	WHITE	•	Low / High temperature, flowable
CV-2566	ALKOXY	55,000	55	950 (6.6)	150	3 h	RUST RED	•	Pourable RTV cure
CV1-2566	ALKOXY	45,000	50	900 (6.2)	160	3 h	RED	•	-
CV2-2566	ALKOXY	THIXOTROPIC	55	900 (6.2)	140	2 h	RED	•	-
CV-2567	ALKOXY	5,000	21	80 (0.6)	150	6.5 h	TRANSPARENT	•	Diluent for Tin condensation CV silicones
CV-2568	ALKOXY	125,000	50	175 (1.2)	60	4 h	RED	•	Low Density, long worktime
CV10-2568	PLATINUM	A: 125,000 B: 80,000	40	235 (1.62)	170	3 h	RED	•	Low Density, fast cure

h = hours m = minutes

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Polymer Systems Technology Limited

FROM THERMAL MANAGEMENT TO PROCESS EFFICIENCIES

Thermal Management
Our space grade, thermally conductive silicones aid in the movement of heat from electronic devices without adding stress to the systems. Unlike thermal pads, our thermally conductive silicone adhesives and encapsulants conform to complex geometries, making them ideal for use in a wide array of electronic assemblies.

Process Efficiencies
NuSil's low outgassing silicone pressure sensitive adhesives (PSAs) and curable film adhesives are superior solutions to traditional liquid adhesives: they offer bond line control and ease of use with no mixing required and minimal clean-up. NuSil's PSAs offer peel-and-stick application for instant adhesion, whereas our film adhesives offer more aggressive bonds. None of NuSil's tapes and film adhesives require special storage con-

THERMALLY CONDUCTIVE MATERIALS

NUSIL PRODUCT NUMBER	THERMAL CONDUCTIVITY W /(mk)	VISCOSITY (cP/mPa sec) EXTRUSION (g/minute)	CURE SYSTEM	LAP SHEAR psi (MPa)	DUROMETER TYPE A	TENSILE psi (mPa)	ELONGATION %	WORK TIME	BROAD OPERATING TEMPERATURE	SPECIAL FEATURES
ULTRA LOW OUTGASSING										
SCV1-2599	1.6	THIXOTROPIC	PLATINUM	-	75	200 (1.4)	30	2 h		White
SCV2-2599	0.644	141 g / minute	PLATINUM	-	55	400 (2.75)	225	3 h		White, Syringe-dispensible
LOW OUTGASSING										
CV-2900	0.609	40 g / minute	OXIME	-	65	400 (2.8)	150	-	•	White
CV-2942	0.999	THIXOTROPIC	PLATINUM	375 (2.6)	85	650 (4.5)	15	2.5 h		Aggressive bonding, grey paste
CV-2943	1.22	THIXOTROPIC	ALKOXY	475 (3.3)	90	750 (5.17)	35	2 h		Aggressive bonding, grey paste
CV-2946	1.49	THIXOTROPIC	PLATINUM	165 (1.0)	75	200 (1.38)	30	2 h		White paste
CV2-2946	0.644	140 g / minute	PLATINUM	-	55	400 (2.8)	225	3 h		Thin bond line, white
CV4-2946	0.95	122 g / minute	PLATINUM	27 (1.1)	36 '0'	-	-	5.5 h		Reworkable gel
CV-2948	1.95	THIXOTROPIC	ALKOXY	150 (1.0)	80	250 (1.72)	30	2.5 h	•	White paste
CV-2960	0.828	124,000	PLATINUM	205 (1.4	60	200 (1.38)	110	1.5 h		White
CV1-2960	1.11	683,000	PLATINUM	-	75	250 (1.72)	60	2 h		Spreadable, white
CV1-2964	0.95	50,000	PLATINUM	120 (0.8)	65	180 (1.2)	50	-		White
CV-2961	0.791	256,000	PLATINUM	205 (1.4)	75	275 (1.9)	40	2 h	•	White
CV-2963	0.64	THIXOTROPIC	PLATINUM	275 (1.9)	60	425 (2.9)	250	2 h		White paste

g/minute = grams per minute

TAPES, FILM ADHESIVES & PSAs

NUSIL PRODUCT NUMBER	ADHESION LAP SHEAR psi (MPa)	THICKNESS (INCHES)	CURE SYSTEM	SPECIAL FEATURES
LIQUID PRESSURE SENSITIVE ADHESIVES				
~~**CV-1161**~~	~~Peel: 7.5 (1.3)~~	-	~~NON-CURING~~	~~50% solids, ethyl acetate~~
~~**CV2-1161**~~	-	-	~~PEROXIDE~~	~~High temperature, 35% solids~~
CV3-1161	Peel: 1.5 (0.26)	-	PEROXIDE	Non-VOC solvent, tert butyl acetate, 37% solids
ONE PART DOUBLE SIDED TAPE				
CV4-1161-5	Peel: 2.5 (0.44)	0.005	CURED	Double-sided tape, Kapton® center
CV5-1161-7	Peel: 2.1 (0.37)	0.007	CURED	One-sided tape, conductive Kapton® center
TWO PART CURABLE FILM ADHESIVES				
CV-2680-12	Lap Shear: 250 (1.7)	0.012	PLATINUM	Versatile bond over a variety of substances
CV-2681-12	Lap Shear: 70 (0.48)	0.013	PLATINUM	Volume resistivity, 125 ohm cm

FOAM

NUSIL PRODUCT NUMBER	FOAM DENSITY lbs/ft³ (g/mL)	VISCOSITY (cP/mPa sec)	APPLICATION LIFE (MINUTES)	COLOUR	CURE SYSTEMS
CV-2391	20 (0.320)	3,000	6	WHITE	PLATINUM

GELS

NUSIL PRODUCT NUMBER	VISCOSITY (cP/mPa sec)	PENETRATION (mm)	WORKTIME	COLOUR	SPECIAL FEATURES
CV-8251	1,800	3.0	24 h	OPTICALLY CLEAR	Broad operating temperature
CV-8151	2,500	4.0	30 h	OPTICALLY CLEAR	Self-levelling, flowable
~~**CV1-8151**~~	~~19,800~~	~~0.4~~	-	~~OPTICALLY CLEAR~~	~~Firm gel~~

All materials are Platinum Cure

h = hours

Polymer Systems Technology Limited

MAINTAINING CONDUCTIVITY AT EXTREME TEMPERATURES— FOR ANY CONFIGURATION

Electrical Conductivity and Static Dissipation
Static accumulation and discharge can damage sensitive electronic components. We incorporate electrically conductive additives into our space grade silicones, allowing the material to carry a current. This enables static to dissipate continuously rather than allowing it to accumulate and discharge rapidly. The electrical conductivity is measured by volume resistivity (Ω·cm) and is used to gauge the shielding effectiveness of the material.

Broad Operating Temperature
NuSil's broad operating temperature silicones are optimized to remain flexible at extremely low temperatures and to resist breakdown at elevated temperatures. Our silicones are proven in these environments through heritage in Low Earth Orbit (LEO) and Geosynchronous Orbit (GEO).

ELECTRICALLY CONDUCTIVE / STATIC DISSAPATIVE

NUSIL PRODUCT NUMBER	VOLUME RESISTIVITY (ohm cm)	VISCOSITY (cP/mPa sec) EXTRUSION (g/minute) FLOW (inches)	CURE SYSTEM	DUROMETER TYPE A	TENSILE psi (mPa)	ELONGATION %	WORK TIME	BROAD OPERATING TEMPERTURE	THERMALLY CONDUCTIVE	SPECIAL FEATURES
ULTRA LOW OUTGASSING										
SCV1-2596	0.005	THIXOTROPIC	PLATINUM	85	450 (3.1)	-	2.5 h		•	-
SCV-2596	2.5	-	PLATINUM	75	475 (3.3)	90	2h	•		-
LOW OUTGASSING										
CV-1500	3.0	THIXOTROPIC	OXIME	80	650 (4.5)	20	-	•		Black
CV-2640	2.5	-	PLATINUM	75	475 (3.3)	90	2 h	•		Black
CV1-2640	25	280 g / minute	PLATINUM	40	525 (3.62)	225	-			Pumpable
CV2-2640	1.0 minimum	105,000	PLATINUM	30	500 (3.4)	350	60 m	•		Carbon black filled
CV3-2640	2.2 x 10^6	12,200	PLATINUM	25	70 (0.48)	120	-	•		Black
CV-2644	0.005	THIXOTROPIC	PLATINUM	85	525 (3.6)	-	2.75 h		•	Tan
CV2-2644	0.004	THIXOTROPIC	PLATINUM	85	500 (3.4)	100	2.5 h			Conductive at elevated temperature, tan
CV-2646	0.007	THIXOTROPIC	ALKOXY	80	400 (2.8)	90	3.5 h	•	•	Tan
CV1-2646	0.005	THIXOTROPIC	ALKOXY	90	-	-	3.5 h	•		Grey/Green
CV2-2646	0.003	4 inches	ALKOXY	75	300 (2.06)	70	2 h	•	•	Certified conductivity at 200oC
CV1-1148	9 x 10^9	5,000	OXIME	-	-	-	-	•		Sprayable
CV2-1148	9 x 10^9	THIXOTROPIC	OXIME	-	-	-	-	•		Spot bonding

COATINGS*

NUSIL PRODUCT NUM-BER	VISCOSITY (cP/mPa sec)	% SOLIDS	COLOUR	TACK FREE TIME	SPECIAL FEATURES
CV1-1144-0	850	50	TRANSLUCENT	10 m	-
CV3-1144-1	900	60	WHITE	-	-
CV-1146-2	2,400	72	BLACK	1 h	-
CV2-1147	2,000	60	TRANSLUCENT	2 h	Non-blocking overcoat
CV-1148	7,500	70	BLACK	1 h	-
CV1-1148	5,000	40	BLACK	40 m	-
CV2-1148	Non-slump	100	BLACK	-	-
CV-1152	7,300	100	TRANSLUCENT	50 m	Protective overcoat

h = hours m = minutes

* VM&P Naptha Solvent. All products serve as an atomic oxygen protective overcoat

PRIMERS*

NUSIL PRODUCT NUMBER	% SOLIDS	SPECIAL FEATURES
SP1-204	3.3	Use with addition or condensation cure, contains toluene, translucent.
SP-120	4	General purpose, clear
SP-121	3.5	General purpose, red
CF1-135	4.5	Addition cure systems, clear
CF2-135	4.5	Addition cure systems, clear
CF6-135	8.7	Addition cure systems, inhibiting environments, translucent
CF1-141	6	Platinum cure systems, dispersed in IPA, Red
SP-270	15	Platinum cure systems, inhibiting substrates, translucent
SP-271	20	Addition cure systems, difficult substrates, translucent

* VM&P Naptha Solvent

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ABOUT POLYMER SYSTEMS TECHNOLOGY LIMITED

Polymer Systems Technology Limited was established in 1994, and is located in High Wycombe, approximately 25 miles west of London. The company has grown progressively since then, moving to newly built premises consisting of 6,000 square feet in 2005.

PST is a company committed to meeting the agreed requirements of our customers, both internal and external, on time, every time, and to be a diligent supplier of polymers without detrimental harm to the environment.

Product quality and safety in use are of paramount concern to us. It is for this reason that registration to the approved quality standards was sought.

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THE NETHERLANDS

LUXEMBOURG

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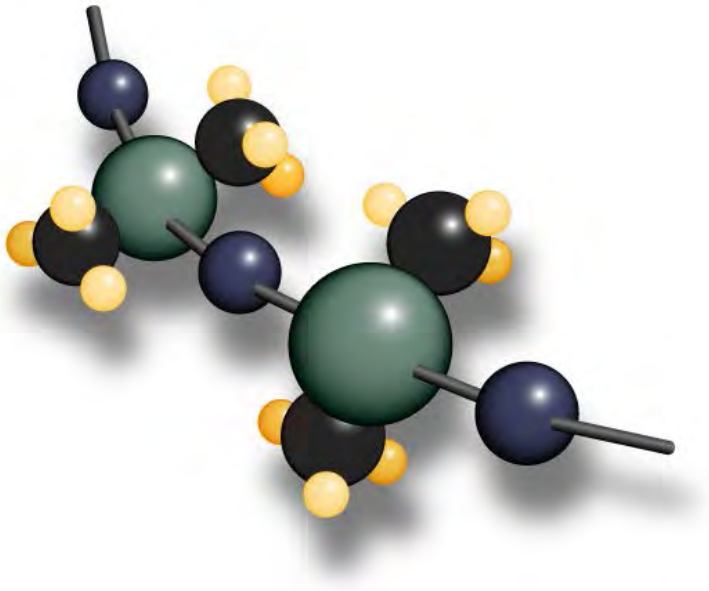

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