Polymer Systems Technology Limited

PST

HIGH CONSISTENCY SILICONES AND PROCESSING EQUIPMENT

NuSil

Milling & Calendering Equipment

The careful attention to detail combined with the knowledge of processing silicones, a bespoke turnkey service is offered by PST.

Customers are welcome and encouraged to visit our facility in High Wycombe to experiment with the equipment and try the different machines to see the best results with the silicone high consistency elastomers.

HAND OPERATED TWO ROLL MILL

With this small lightweight, hand operated two roll mill you are able to carry your tool to most alternative workspaces when needed. The gears on one side of each roll see to a smooth run, the gap between the rolls can be adjusted between 0.2 and 5 mm. This machine is perfect for mixing small amounts of HCR and rolling into thin layers.

TECHNICAL SPECIFICATIONS

Standard work height : workbench height + 32 cm
Length of rolls : 30 cm
Diameter of rolls : 10 cm
Distance between rolls / min-max : 0.2 - 5.0 mm
Weight of machine : 24 kg
Measurements : L x W x H (min / max) : 38 x 25 x 38 cm

ELECTRIC BENCH TOP ROLL MILL

It has forward and reverse speeds for hand use and it has a safety wire, plus a unique safety release bar to meet CE marking. The machine is set up for forward and reverse manually, forward and reverse jog and foot pedal activated forward and reverse.

TECHNICAL SPECIFICATIONS

Electrical connection : 230 Volt, 1 phase and ground.
Installed power rating : 0,5 [kW]
0 Volt safety
Standard Work height : workbench height + 30 cm
Roll width : 40 cm
Roll diameter : 10 cm
Gap minimum / maximum : 0.1 – 12 mm
Rotation speed : variable 2 to 10 RPM
Mass : 140 kg
Dimensions : L x W x H : 60 x 60 x 40 cm

FLOOR STANDING TWO ROLL MILL

The Floor Standing Two Roll Mill is developed to be used in a standing position. It's open on the front and back side so that feeding HCR's to the machine is quite easy. In front of the Gap between the two mixing rolls, a wire is situated that will cause the machine to stop when pressed, and starts the roller again when released.

For applications where personnel operate the machine, a Guard in front of the Gap between the mixing rolls fully guards the entrance. When this guard is part of the machine, compressed air operates the guard, an essential requirement.

TECHNICAL SPECIFICATIONS

Electrical connection : 230 Volt, 1 phase and ground.
Installed power rating : 1,6 [kW]
0 Volt safety
Standard Work height : 1 [M]
Roll width: 0,75 [M]
Roll diameter: 0,2 [M]
GAP minimum / maximum : 0 – 25 mm
Mass : 280 kg
Dimension : L x W x H : 0,6 x 1,1 x 1,1 [M]
Rotation speed : variable 5 to 30 RPM

HEIGHT ADJUSTABLE VERSION

TECHNICAL SPECIFICATIONS

Electrical connection: 230 Volt, 1 Ph and earth (50/60 Hz).
Power consumption: 1,8 [kW]
Zero volt safety
Electrical height adjustment system
Standard work height: variable from min. 1 to max. 1,35 [M]
Roll length: 0,6 [M]
Roll diameter: 0,2 [M]
GAP minimum - maximum: 0.1 – 25 mm
Rotation speed: variable 5 to 30 RPM

HORIZONTAL TWO ROLL MILL

TECHNICAL SPECIFICATIONS

Electrical connection : 400 Volt, 3 phase and ground.

Installed power rating : 2,2 [kW]
0 Volt safety
Standard Work height : 1,2 [M]
Roll width: 0,75 [M]
Roll diameter: 0,2 [M]
GAP minimum / maximum : 0.1 – 15 mm
Rotation speed : variable 1 to 30 RPM
Mass : 420 kg
Dimension : L x W x H : 1,2 x 0,85 x 1,45 [M]

HIGH CONSISTENCY RUBBERS (HCR)

PLATINUM CARE

PRODUCT NUMBER	DUROMETER TYPE A	TENSILE psi (MPa)	ELONGATION %	TEAR ppi (Kn/m)	WORK TIME @ 25°C	MIX RATIO	CERTIFIED CURE TIME / °C
MED-2045	40	1525 (10.5)	800	200 (35.3)	N/A	3 PART	10m / 171
MED-4014	15	675 (4.6)	1450	140 (24.7)	>72 h	1:1	10m / 116
MED-4020	25	1400 (9.7)	1200	180 (31.7)	>72 h	1:1	10m / 116
MED-4025	30	1500 (10.3)	900	140 (24.7)	1.5 h	1:1	10m / 171
MED-4027	30	2300 (15.9)	1050%	235 (41.2)	2.5 h	1:1	10m / 171
MED-4035	35	1500 (10.3)	1000	200 (35.3)	3.5 h	1:1	10m / 116
MED-4050	50	1450 (10.0)	1000	250 (44.1)	3.5 h	1:1	10m / 116
MED-4065	65	1150 (7.9)	950	250 (44.1)	6 h	1:1	10m / 116
MED-4080	80	1100 (7.6)	700	215 (37.9)	8 h	1:1	10m / 116

ULTRA HIGH PERFORMANCE

MED-4055	55	1575 (10.9)	900	300 (52.5)	2.5 h	1:1	10m / 138
MED-4070	70	1325 (9.11)	700	285 (50.3)	2 h	1:1	10m / 138

PEROXIDE CURE

MED4-4115	50	1500 (10.3)	450	100 (17.6	N/A	1 PART	5m / 116
MED4-4116	70	1350 (9.3)	400	125 (22.0)	N/A	1 PART	5m / 116
MED-4120	25	1300 (9.0)	925	130 (22.9)	N/A	1 PART	5m / 116
MED-4128	25	1035 (7.1)	800	70 (12.3)	N/A	1 PART	10m / 116
MED-4135	35	1250 (8.6)	800	110 (19.4)	N/A	1 PART	5m / 116
MED-4150	50	1450 (10.0)	700	180 (31.7)	N/A	1 PART	5m / 116
MED-4165	65	1200 (8.3)	500	200 (35.3)	N/A	1 PART	5m / 116
MED-4174	50	1200 (8.3)	775	225 (39.7)	N/A	1 PART	5m / 116

USP CLASS VI HCRs

- For a wide variety of fabrication techniques for the healthcare industry including: moulding, calendering and extruding.
- Two-part, high consistency elastomers design for optimal performance in a wide range of applications.
- Produces a tough, durable, translucent elastomer when thermally cured.
- Has a non-tacky surface and no volatile by-products or peroxide residues.
- Advantages include lot-to-lot consistency and cost effectiveness.
- Can be used with NuSil's Healthcare colour masterbatches for applications requiring coloured silicones.

PRODUCT NUMBER	DUROMETER TYPE A	TENSILE psi (MPa)	ELONGATION %	TEAR ppi (Kn/m)	WORK TIME @ 25°C	MIX RATIO	CERTIFIED CURE TIME / °C
SIL2-5020	21	1620 (11.2)	1185	195 (34.3)	8h	1:1	15m / 165
SIL2-5030	31	1690 (11.7)	1140	215 (37.8)	5h	1:1	15m / 165
SIL2-5040	39	1510 (10.4)	1115	220 (38.7)	4h	1:1	15m / 165
SIL2-5050	50	1350 (9.3)	940	245 (43.1)	4h	1:1	15m / 165
SIL2-5060	60	1295 (8.9)	920	255 (44.9)	11h	1:1	15m / 165
SIL2-5070	68	1330 (9.2)	855	260 (45.8)	2h	1:1	15m / 165
SIL2-5080	80	1140 (7.9)	615	210 (37.0)	>24h	1:1	15m / 165

High Consistency Rubbers, or HCRs, can be used for extrusion of tubing and profiles (rod or ribbon), in calendared sheeting for die-cutting, or in compression or transfer moulded parts such as balloons, gaskets or O-rings. HCRs are clay-like in the uncured state and primarily formulated in a one or two part system (peroxide and platinum catalysts respectively).

POST CURE	STRESS @ STRAIN	CURE RATE	CURE RATE SCORCH	MASTER	COMMENTS
2h / 148	200 (1.4) @ 200	2.35	0.70	YES	Designed for dissolving in solvents
-	35 (0.2) @ 200	2.50	1.25	YES	Low durometer, low modulus
-	80 (0.6) @ 200	2.30	0.95	YES	High tear, low modulus
-	110 (0.9) @ 200	2.80	0.75	YES	Low tension set
-	100 (0.69) @ 200	-	-	YES	High tensile strength, low modulus
-	200 (1.4) @ 200	2.70	1.00	YES	High tear strength
-	300 (2.1) @ 200	2.60	1.10	YES	High tear strength
-	300 (2.4) @ 200	2.65	0.85	YES	High tear strength
-	475 (3.3) @ 200	2.75	0.80	YES	High tear strength
4h / 177	490 (3.4) @ 200	2.85	1.00	YES	Ultra-high tear strength
4h / 177	605 (4.2) @ 200	2.70	0.90	YES	Abrasion / Fatigue Resistant
2h / 249	450 (3.1) @ 200	2.20	0.65	YES	Non-vinyl specific peroxide precatalyzed
2h / 249	600 (4.1) @ 200	2.05	0.50	YES	Non-vinyl specific peroxide precatalyzed
2h / 177	100 (0.7) @ 200	2.10	0.55	YES	Uncatalyzed
2h / 200	90 (0.6) @ 200	1.65	0.55	YES	Low-tension set, Uncatalyzed
2h / 177	185 (1.3) @ 200	2.10	0.55	YES	Uncatalyzed
2h / 177	300 (2.1) @ 200	1.90	0.50	YES	Uncatalyzed
2h / 177	450 (3.1) @ 200	1.70	0.50	YES	Uncatalyzed
4h / 205	325 (2.2) @ 200	1.70	0.55	YES	Uncatalyzed

- NuSil Technology's Class VI (C6) products meet the requirements defined in ISO-10993 for Surface Devices with "limited" (<24 hours) or "prolonged" (1 to 30 days) contact duration.
- After post-cure, material meets or exceed the extraction requirements for FDA regulation 21 CFR 177.2600 "Rubber Articles Intended for Repeated Use (Food Contact)" NuSil Technology's SIL2-5030 shall not be considered for use in human implantation for a period of greater than 29 days.

POST CURE TIME / °C	STRESS @ STRAIN psi (MPa) @ %	CURE RATE T10 (m) @ 165°C	CURE RATE T90 (m) @ 165°C	MASTER ACCESS FILE	COMMENTS
-	65 (0.5) @ 200	0.15	0.29	NO	Designed for high-volume extrusion or moulding
-	120 (0.8) @ 200	0.15	0.26	NO	Designed for high-volume extrusion or moulding
-	140 (1.0) @ 200	0.15	0.29	NO	Designed for high-volume extrusion or moulding
-	320 (2.2) @ 200	0.15	0.34	NO	Designed for high-volume extrusion or moulding
-	380 (2.6) @ 200	0.15	0.20	NO	Designed for high-volume extrusion or moulding
2h / 150	360 (2.5) @ 200	0.15	2.80	NO	Designed for high-volume extrusion or moulding
2h / 150	460 (3.2) @ 200	0.15	1.55	NO	Designed for high-volume extrusion or moulding

VERSASIL^3

HIGH CONSISTENCY SILICONE ELASTOMERS

DESCRIPTION

- A unique three-part system, VersaSil$_3$ offers the flexibility of adjustable cure rate and table life for various fabrication requirements.
- High tear strength, wide processing parameters, and translucent, non-tacky surfaces.
- Developed to be compounded with the inhibitor CAT-40 and the platinum catalyst CAT-55. Advantages include: no volatile by-products, lower cure temperature, and optional post-cure.
- 100: 1.0: 1.0 Mix Ratio.

APPLICATION

- For mass production with maximum flexibility.
- For a wide variety of fabrication techniques for the healthcare industry including: moulding, calendaring and extruding.

NuSil Technology's VersaSil$_3$ Series shall not be considered for use in human implantation for a period of greater than 29 days.

PLATINUM CURE

VersaSil^3 30, 40, 50, 60, 70, and 80 are a family of versatile high-consistency elastomers developed for volume-users who demand maximum flexibility. VersaSil3 can be used for silicone extrusion, moulding, and calendaring. This unique 3-part system allows flexibility to adjust the cure rate and the table life to various fabricating requirements. The VersaSil3 series produces tough, durable elastomers with nominal Type A durometers of 30, 40, 50, 60, 70, and 80. Additionally, the base stocks may be blended to produce elastomers of intermediate durometer and other physical properties. This brochure can be used as a guide for anticipated physical and chemical properties from the vulcanized VersaSil3 elastomer system.

MILLING INSTRUCTIONS

Always soften the components before mixing together. If it is a 1:1 mix ratio silicone product, always soften part A and then soften part B separately, if heat is generated, allow to cool to ambient conditions, before combining the 2 components.

Versasil is unique as there is only one component to soften and always do this before adding the Inhibitors Cat-40 and Catalyst, Cat-55.

Add entire calculated quantity of CAT-40 and mill until homogenous. While the base/CAT-40 mixture is turning on the mill, add the CAT-55 in small increments until the entire calculated amount is added. Finally, mill in the remaining base stock. Take caution to avoid overmilling. Note: CAT-40 and CAT-55 are supplied in highly concentrated masterbatches. These masterbatches are provided at a consistency that can be easily cut with a spatula or knife. Be certain that the instrument used is thoroughly cleaned between contact with CAT-40 and CAT-55.

The following table displays typical properties of the unvulcanised VersaSil3 base stocks and typical properties after vulcanization using CAT-40 and CAT-55 platinum catalyst masterbatches.

NUSIL PRODUCT NUMBER	UNCURED PHYSICAL PROPERTIES			CURED PHYSICAL PROPERTIES				
	PLASTICITY	APPEARANCE	WORK TIME (HOURS)	SPECIFIC GRAVITY	DUROMETER (TYPE A)	TENSILE STRENGTH psi (MP0)	ELONGATION %	TEAR STRENGTH ppi (Km/N)
Platinum Cure—Press Cured with 100 : 1.0—(Base Stock : CAT-40 : CAT-55)								
MED-4032	60	Translucent	7.7	1.1	30	1200 (8.3)	1100	165 (29.1)
MED-4042	63	Translucent	1.8	1.11	40	1475 (10.2)	950	180 (31.7)
MED-4052	80	Translucent	9.0	1.16	50	1325 (9.1)	1100	230 (40.6)
MED-4062	85	Translucent	10.7	1.16	60	1300 (9.0)	875	250 (44.1)
MED-4072	85	Translucent	4.0	1.22	70	1100 (7.6)	875	240 (42.3)
MED-4082	115	Translucent	16.0	1.22	80	1050 (7.2)	800	240 (42.3)

BIOLOGICAL DATA:

Each lot of material is tested for cytotoxicity and emission spectroscopy, as per ISO-10993 and ASTM E 305 respectively. Master Files for the VersaSil$_3$ series have been filed with the U.S. Food and Drug Administration.

Customers interested in authorization to reference the Master Files must contact NuSil Technology LLC.

After being cured with CAT-40 and CAT-55, these elastomers are compliant with USP Class VI (Systemic Toxicity, Intracutaneous Toxicity, and 7-Day Muscle Implant Study) requirements and applicable ISO 10993 requirements. The following table summarizes the biological testing conducted on the formulation components of the VersaSil$_3$ series of elastomers.

Standard FDA Class	Test	Tested Per USP	Tested Per ISO 10993	Test Results
Cytotoxicity	Cytotoxicity Test Using The ISO Elution Method In The L-929 Mouse Fibroblast Cell Line	Yes	Yes	A-Noncytotoxic B-Noncytotoxic C-Noncytotoxic
Hemolysis	In Vitro Hemolysis Study (Extraction Method)	Yes	No	Nonhemolytic
Systemic Extracts	USP Systemic Toxicity Study In The Mouse (Extracts)	Yes	Yes	Nontoxic
Intracutaneous Extracts	Acute Intracutaneous Reactivity Study In The Rabbit (Extracts)	Exceed	Yes	Nontoxic
Implantation One Week	USP Muscle Implantation Study In The Rabbit With Histopathology (One W eek)	Yes	No	Nonirritant
Salmonella Mutagen	Ames Salmonella / Mammalian Microsome Mutagenicity Assay	Yes	Yes	Nonmutagenic
Rabbit Pyrogen	Rabbit Pyrogen Study - Material Mediated	Yes	Yes	Nonpyrogenic
Sensitization	Delayed Contact Sensitization Study (A Maximization Method) In The Guinea Pig (Saline Standard Cure)	Yes	No	No Sensitization

RHEOMETRY:

Rheometry is an extremely useful tool for determining the flow properties and cure profiles of silicones. Rheometry is determined by comparing the relationship between stress, strain, temperature and time. By minimizing the amount of CAT-40 masterbatch, a faster cure rate and quicker scorch time can be achieved. If a longer work time is desired, the CAT-40 ratio can be increased in order to yield the optimal table life for custom applications. (Temperatures of the work environment should be taken into account when determining table life values. Work times will be cut in half with every 10°C temperature increase. Work time values are measured at ambient conditions, which are defined at 25°C and 30%-70% relative humidity as per NTTM-008). Typical rheometry properties can be expected by varying CAT-40 concentrations.

CURED PHYSICAL PROPERTIES							RHEOMETRY DATA			
STRESS AT STRAIN 100% (psi)	STRESS AT STRAIN 200% (psi)	STRESS AT STRAIN 300% (psi)	% SHRINK	TENSILE SET @ 300% ELONGATION	COMPRESSION SET @ 25% (Method B)	POROSITY	CURE TIME T90 (min.)	SCORCH TIME (min.)	MIN TORQUE (In. lbs)	MAX TORQUE (in. lbs)
Platinum Cure—Press Cured with 100 : 1.0—(Base Stock : CAT-40 : CAT-55)										
85	150	230	2.6	9	7	0	4.0	1.0	6.0	35
145	226	270	1.3	9	5	0	5.0	0.4	6.0	47
190	275	360	2.6	14	9	0	4.0	0.8	9.0	48
282	450	360	2.6	16	6	0	2.0	0.7	8.0	33
370	450	420	2.5	31	12	0	4.0	0.6	12.0	90
380	450	460	1.5	13	7	0	2.0	0.6	10.0	87

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.

Certified System SAI GLOBAL ISO 14001 Environmental

Certified System SAI GLOBAL ISO 9001 Quality

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