

# Thermal Management

	HTCX	HTCP	HTCPX	HTS	HTSP	TCOR	ER2220	ER2221	UR5633	SC2003
	Non-Silicone Heat Transfer Paste Xtra	Non-Silicone Heat Transfer Paste Plus	Non-Silicone Heat Transfer Compound Plus Xtra	Silicone Heat Transfer Compound	Silicone Heat Transfer Compound Plus	Thermally Conductive RTV	2 Part Epoxy Resin	2 Part Epoxy Resin	2 Part Polyurethane Resin	2 Part Silicone Resin
Thermal Conductivity (W/m.K)	1.35	2.50	3.40	0.90	3.00	1.80	1.54	1.20	1.24	0.80
Density (g/ml)	2.61	3.00	3.10	2.10	3.00	2.30	2.22	1.88	1.65	1.60
Viscosity/mPa s**	130,000	105,000	640,000	210,000	45,000	145,000	15,000	3,000	30,000	30,000
Cure Time (Hours @ 20°C / 60°C)	N/A	N/A	N/A	N/A	N/A	24*	24/4	24/2	24/4	24/1
Temperature Range (°C)	-50 to +180	-50 to +130	-50 to +130	-50 to +200	-50 to +200	-50 to +230	-40 to +130	-40 to +150	-50 to +125	-60 to +200
Evaporation Weight Loss (96hrs @ 100°C IP-183)	≤0.40%	≤1.00%	≤1.00%	≤0.80%	≤0.80%	N/A	N/A	N/A	N/A	N/A
Dielectric Strength (kV/mm)	42	42	42	18	18	>8	10	17.7	18	20
Volume Resistivity (Ω·cm)	1 x 10 <sup>14</sup>	1 x 10 <sup>14</sup>	1 x 10 <sup>14</sup>	1 x 10 <sup>15</sup>	1 x 10 <sup>15</sup>	1 x 10 <sup>14</sup>	1 x 10 <sup>15</sup>	1 x 10 <sup>10</sup>	1 x 10 <sup>14</sup>	1 x 10 <sup>15</sup>

\* Requires moisture to cure, elevated temperatures not recommended unless moisture is present. \*\*This information should be used as a guideline only.

# Conformal Coatings

	AFA	DCA	FSC	HPA	LTC	SC-102	URC	UVCL	WBP/WBPS	2K100	2K300	2K500	FPC
	Aromatic Free Acrylic	Silicone Conformal Coating (SCC3)	Flexible Modified Silicone Coating	High Performance Acrylic	Low Temperature Coating	Silicone Coating	High Performance Urethane Coating	UV Cure Conformal Coating	Aquacoat Plus/Sprayable	High-Performance Solvent Free Urethane	High-Performance Solvent Free Urethane	High-Performance Solvent Free Urethane	Ultra-Thin Coating
Colours Available	Transparent	Clear/Black/Red	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
Viscosity (mPa s @ 20°C) (Bulk)	175	200	550	300	150	500	240	150	200/80	2000	1500	1000	2
Flashpoint (°C) (Bulk)	-7	27	27	-7	-3	>90	27	>90	None	>100	>100	>100	>90
Solids (%) (Bulk)	35	37	50	35	23	100	43	100	35	100	100	100	2
Dielectric Strength (kV/mm)	45	90	80	45	80	17	80	27	50	90	90	90	90
Insulation Resistance (Ω)	1 x 10 <sup>15</sup>	1 x 10 <sup>15</sup>	1 x 10 <sup>20</sup>	1 x 10 <sup>15</sup>	1 x 10 <sup>15</sup>	1 x 10 <sup>15</sup>	1 x 10 <sup>16</sup>	7 x 10 <sup>12</sup>	5 x 10 <sup>11</sup>	2 x 10 <sup>16</sup>	2 x 10 <sup>16</sup>	5 x 10 <sup>12</sup>	1 x 10 <sup>15</sup>
Temp. Range (°C)	-65 to +125	-70 to +200	-50 to +125	-55 to +130	-65 to +130	-65 to +200	-40 to +130	-65 to +135	-60 to +125	-40 to +100	-40 to +130	-40 to +140	-40 to +200**
Touch Dry Time (Mins @ 20°C)	5-10	50-55	10-15	10-15	10-15	<10	15	-	25-35	240	240	240	1-5
Cure Time (Hours @ 20°C)	24	2 @ 20°C & 2 @ 90°C*	24	24	24	24	24	-	24	10 mins @ 80°C	10 mins @ 80°C	10 mins @ 80°C	24
Solvent Resistance	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Humidity Resistance	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Mould Resistance	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Thinners	FTH	DCT	DCT	UAT	LTCT	N/A	LOT	N/A	DI Water	N/A	N/A	N/A	HFS
UV Trace	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Approvals	IPC-CC-830, UL746, (Meets) BMW GS95011-5	UL746	IEC61086, UL746	MIL-I-46058C	(Meets) BMW GS95011-5, IPC-CC-830, IEC61086	Meets IPC-CC-830	Meets IPC-CC-830	(Meets) BMW GS95011-5, IPC-CC-830, UL746		(Meets) BMW GS95011-5, IPC-CC-830	Meets IPC-CC-830	IPC-CC-830, BMW GS95011-5	Meets UL746

\* The SCC3 range may also be cured at ambient temperature however the solvent resistance will be reduced. Please refer to the technical data sheet for more information on UV Curing Parameters.

\*\*Application and Geometry Dependent.

2K100, 2K500, UVCL, AFA, LTC and DCA have passed qualification to BMW Group Standard GS95011-5

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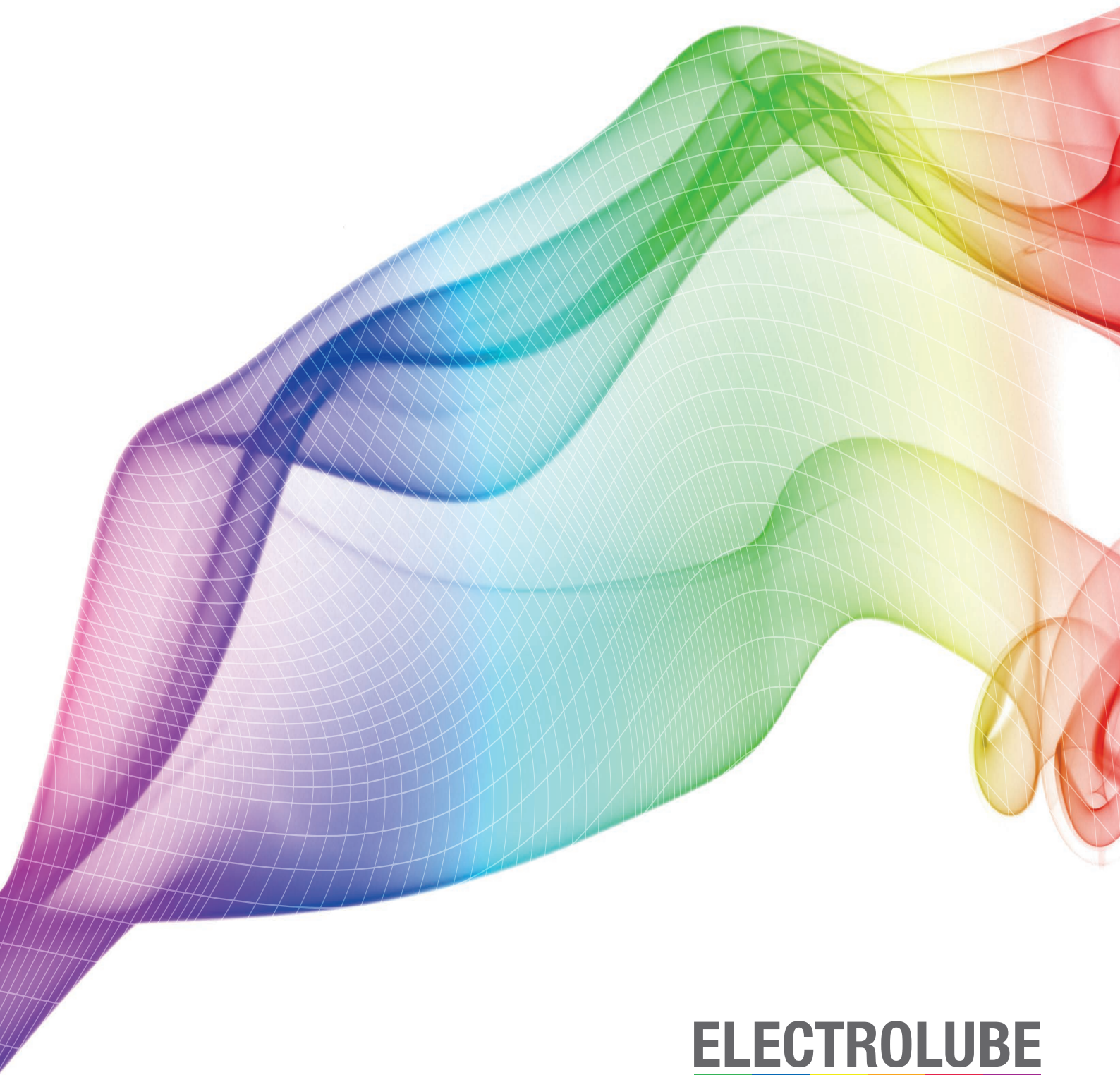
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# Product Selector

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## Aqueous Cleaning

		SWA	SWAJ	SWAS	SWAP	SWAT*	SWAX	SWMP
		Safewash original	Safewash Jigwash	Safewash Super	Safewash Pressure-wash	Safewash Total	Safewash Xtra	Safewash Mechanical - Plus
Equipment	Ultrasonic	Yes	Yes	★★★★★	Yes	Yes	Yes	Yes
	Pressure / Dishwasher / In-line	No	No	No	Yes	★★★★★	Yes	No
	Spray under Immersion	Yes	Yes	Yes	★★★★★	Yes	Yes	Yes
	Screen and Stencil Cleaner	No	No	No	Yes	Yes	★★★★★	No
Soil Removal	Heavy Grease (& Organics)	★★★☆☆	★★★☆☆	★★★★★	★★★☆☆	★★★☆☆	No	★★★★☆
	No Clean Fluxes	No	★★★☆☆	★★★★★	★★★☆☆	★★★☆☆	No	No
	Flux / Ionics	★★★☆☆	★★★★☆	★★★★★	★★★☆☆	★★★★☆	★★★☆☆	No
	Uncured Paste	★★★☆☆	★★★☆☆	★★★☆☆	★★★☆☆	★★★★☆	★★★★★	No
	Uncured Adhesive	No	No	No	No	★★★☆☆	★★★★★	No
Other	Sensitive Metals	No	Yes	Yes	Yes	Yes	Yes	No
	Rinsability	★★★☆☆	★★★★★	★★★★☆	★★★☆☆	★★★★☆	★★★☆☆	★★★☆☆
	Low Foam	No	No	No	Yes	Yes	Yes	No

\*Concentrate requires dilution, please refer to the Technical Data Sheet for more information.

## Solvent Cleaning

		HFFR	LFFR	FRC	ULS	DGC	IPA	ECSP	ULC	SSS
		Hexane-Free Flux Remover	Lead-Free Flux Residue Remover	Non-Flammable Flux Remover	Ultrasolve Cleaning Solvent	Non-Flammable Degreaser	Electronic Cleaning Solvent	Electronic Cleaning Solvent - Plus	Ultraclean Cleaning Solvent	Screen and Stencil Cleaner
Typical Properties	Density (g/ml)	0.78	0.78	1.33	0.79	1.33	0.79	0.79	0.79	1.03
	Flashpoint (°C)	7	0	None*	-20	None*	12	-48	>60*	>60*
	Boiling Point (°C)	>80	>80	36	>80	36	82	36	>173	>100
	Vapour Pressure (kPa)	6	11.5	66.1	11.5	66.1	4.4	53.3	0.5	1.45
	Evaporation Rate (ether = 1)	11	16	<1	16	<1	6	1.5	66	>50
	TLV (ppm)	300	300	242	300	242	400	500	300	300
Soil Removal	Heavy Grease (& Organics)									No
	No Clean Fluxes	★★★☆☆	★★★★☆	★★★★☆	No	No	No	No	No	No
	Flux / Ionics	★★★★☆	★★★★★	★★★★☆					No	No
	Uncured Paste	★★★★★	★★★★☆	★★★★☆	★★★☆☆	★★★☆☆	★★★☆☆	★★★☆☆		
	Uncured Adhesive	No	No	No	No	No	No	No	No	★★★★★

Evaporation Rate: The higher the number the slower the rate of evaporation. \*Classified as non-flammable.

★★★★★

## Contact Lubricants

	SGA	SGB	CG53A	CG60	CG70	CG80	EGF	SPG	CTG
Specialist Property	Low mV Drop	General Purpose	High Voltage	Plastics Compatibility	Low Temperature Performance	High Temperature Performance	High Temperature	Plastic Mechanical Lubrication	Moisture Resistance
Pour Point (base oil, °C IP-15)	-54	-37	-37	-54	-70	-35	-25	-57	-62
% Evaporation Weight Loss (IP-183 100°C)	0.90	0.93	0.21	0.30	0.30	0.20	<0.10	0.20	0.30
Drop Point (°C IP-31)	>250	250	200	200	200	200	>250	>250	>200
Penetration (Worked, Cone, 20°C IP-50)	320	320	320	320	320	320	280	320	330
Temperature Range (°C)	-40 to +125	-35 to +130	-35 to +130	-45 to +130	-55 to +130	-30 to +160	-25 to +300	-40 to +125	-50 to +160
Mechanical Lubrication	★★★☆☆	★★★☆☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★☆☆	★★★★☆	★★★☆☆
Electrical Performance	★★★★☆	★★★☆☆	★★★☆☆	★★★★☆	★★★★☆	★★★★☆	★★★☆☆	★★★☆☆	★★★★☆
Humidity Resistance*	★☆☆☆☆	★★★☆☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★☆☆☆☆	★★★☆☆	★★★★☆
Plastics Compatibility**	No	★☆☆☆☆	★☆☆☆☆	★★★★☆	★★★★☆	★☆☆☆☆	★★★★☆	★★★★☆	★★★★☆
UV Trace	No	No	No	Yes	Yes	Yes	No	No	No
Oil Version Available	SOA	SOB/ EML	No	No	CO70	No	EOF/ DOF	No	No

\*Based on accelerated testing. \*\*Compatibility may differ from quoted results – Testing should always take place prior to production.

## Polyurethane Resins

	UR5044	UR5048	UR5118	UR5528	UR5547	UR5604	UR5633	UR5634
Specialist Property	Soft, Re-enterable	Soft, low stress	Water Resistance	Tough, High Adhesion	General Purpose	General Purpose / UL Approved	Thermally Conductive	Optically Clear
Colour (Mixed System)	Dark Blue	Clear Amber	Black	Black	Black	Black	Black	Water White
Cured Density (g/ml)	1.58	0.95	0.99	1.07	1.60	1.54	1.65	1.11
Mixed System Viscosity (mPa s @ 23°C)	3400	980	2300	2000	4000	2000	30000	1050
Mix Ratio by Weight (by Volume)	13.4:1 (11.7:1)	14:1 (19:1)	2.8:1 (2.7:1)	2.4:1 (2.9:1)	5.5:1 (4:1)	5.2:1 (3.9:1)	12.2:1 (8.8:1)	0.9:1 (1:1)
Usable Life (Minutes @ 23°C)	25	20	25	20	20	40	15	15
Gel Time (Minutes @ 23°C)	40	40	40	35	50	90	40	20
Cure Time (Hours @ 23°C/60°C)	24/3	24/4	36	24/5	24/3	24/3	24/4	24/4
Shore Hardness	A40	A12	A80	D57	A85	A75	A90	A80
Thermal Conductivity (W/m.K)	0.60	0.20	0.20	0.25	0.65	0.45	1.24	0.20
Temperature Range (°C)	-70 to +120	-60 to +100	-60 to +125	-50 to +125	-50 to +120	-40 to +130	-50 to +125	-40 to +120
Maximum Temperature – Short Term (°C)	+130	+100	+130	+130	+125	+155	+130	+130
Dielectric Strength (kV/mm)	17.7	18	18	25	14	18	18	11
Volume Resistivity (Ω•cm)	10 <sup>10</sup>	10 <sup>14</sup>	10 <sup>15</sup>	10 <sup>14</sup>	10 <sup>14</sup>	10 <sup>14</sup>	10 <sup>14</sup>	10 <sup>14</sup>
Flame Retardency Level	V-0	-	-	-	V-0	V-0	V-0	-
UL94 Approval	Yes	No	No	No	No	Yes	No	No
RoHS Compliant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

For exact calculated ratios please see the technical data sheet.

## Epoxy Resin

	ER1122	ER1426	ER1450	ER2188	ER2218	ER2220	ER2221	ER2223
Specialist Property	Excellent Adhesion	Optically Clear	Very Low Viscosity	General Purpose	High Temperature Stability	High Thermal Conductivity	Low Viscosity, Thermally Conductive	Chemically Resistant and High Temperature Stability
Colour (Mixed System)	Clear Amber	Water white	White	Black	Black	Grey	Black	Black
Cured Density (g/ml)	1.05	1.05	1.10	1.69	1.16	2.22	1.88	1.10
Mixed System Viscosity (mPa s @ 23°C)	12000	100	250	9000	500	15000	3000	150-250
Mix Ratio by Weight (by Volume)	1:1 (0.8:1)	4:1 (3.4:1)	2.5:1 (2.2:1)	11:1 (5.5:1)	3.6:1 (2.8:1)	20.8:1 (8.2:1)	13.9:1 (7:1)	3.5:1 (2.9:1)
Usable Life (Minutes @ 23°C)	90	120	20	60	40	120	60	30
Gel Time (@ 23°C)	4.0 hours	4.0 hours	30 mins	2.5 hours	50 mins	3.0 hours	6.0 hours	90 mins
Cure Time (Hours @ 23°C/60°C)	48/4	36/8	12/2	24/2	24/4	24/4	24/2	24/4
Thermal Conductivity (W/m.K)	0.20	0.20	0.20	0.91	0.28	1.54	1.20	0.20
Temperature Range (°C)	-40 to +120	-40 to +120	-50 to +130	-40 to +120	-50 to +150	-40 to +130	-40 to +150	-40 to +180
Maximum Temperature – Short Term (°C)	+140	+140	+150	+140	+245	+150	+170	+210
Dielectric Strength (kV/mm)	12	11	12	10	10	10	17	12
Volume Resistivity (Ω•cm)	10 <sup>14</sup>	10 <sup>14</sup>	10 <sup>14</sup>	10 <sup>14</sup>	10 <sup>14</sup>	10 <sup>15</sup>	10 <sup>10</sup>	10 <sup>15</sup>
Shore Hardness	D80	D85	D50	D85	D55	D90	D90	D80
Flame Retardency Level	-	-	-	V-0	V-0	V-0	V-0	-
UL94 Approval	No	No	No	Yes	No	No	No	No
RoHS Compliant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

For exact calculated ratios please see the technical data sheet.

## Silicone Compounds

	SC2001	SC2001FD	SC2003	SC2006	SC3001
Specialist Property	High Temperature Resistance	Fast Cure	Thixotropic	Soft, Low Stress	Optically Clear
Colour (Mixed System)	Dark Grey	Dark Grey	Dark Grey	Grey	Optically Clear
Cured Density (g/ml)	1.40	1.15	1.60	2.23	1.04
Mixed System Viscosity (mPa s @ 23°C)	3500	1800	30000	15000	1800
Mix Ratio by Weight (by Volume)	1:1 (1:1)	1:1 (1:1)	1:1 (1:1)	1:1 (1:1)	13:1 (12:1)
Usable Life (Minutes @ 23°C)	30	4	40	40	30*
Gel Time (Minutes @ 23°C)	60	8	80	240	180*
Cure Time (Hours @ 23°C)	24	4	24	0.5 @ 70°C	24*
Shore Hardness	A50	A40	A50	A10 / OO60	A20
Thermal Conductivity (W/m.K)	0.60	0.40	0.80	1.00	0.20
Temperature Range (°C)	-50 to +200	-45 to +200	-60 to +200	-60 to +200	-60 to +200
Maximum Temperature – Short Term (°C)	225	225	225	225	250
Dielectric Strength (kV/mm)	20	21	20	16	-
Volume Resistivity (Ω•cm)	10 <sup>15</sup>	10 <sup>15</sup>	10 <sup>15</sup>	10 <sup>14</sup>	10 <sup>14</sup>
Flame Retardency Level	V-0	V-0	V-0	V-0	HB
UL94 Approval	No	No	No	No	No
RoHS Compliant	Yes	Yes	Yes	Yes	Yes

\*Cure times will be dependent on ambient humidity.

For exact calculated ratios please see the technical data sheet.