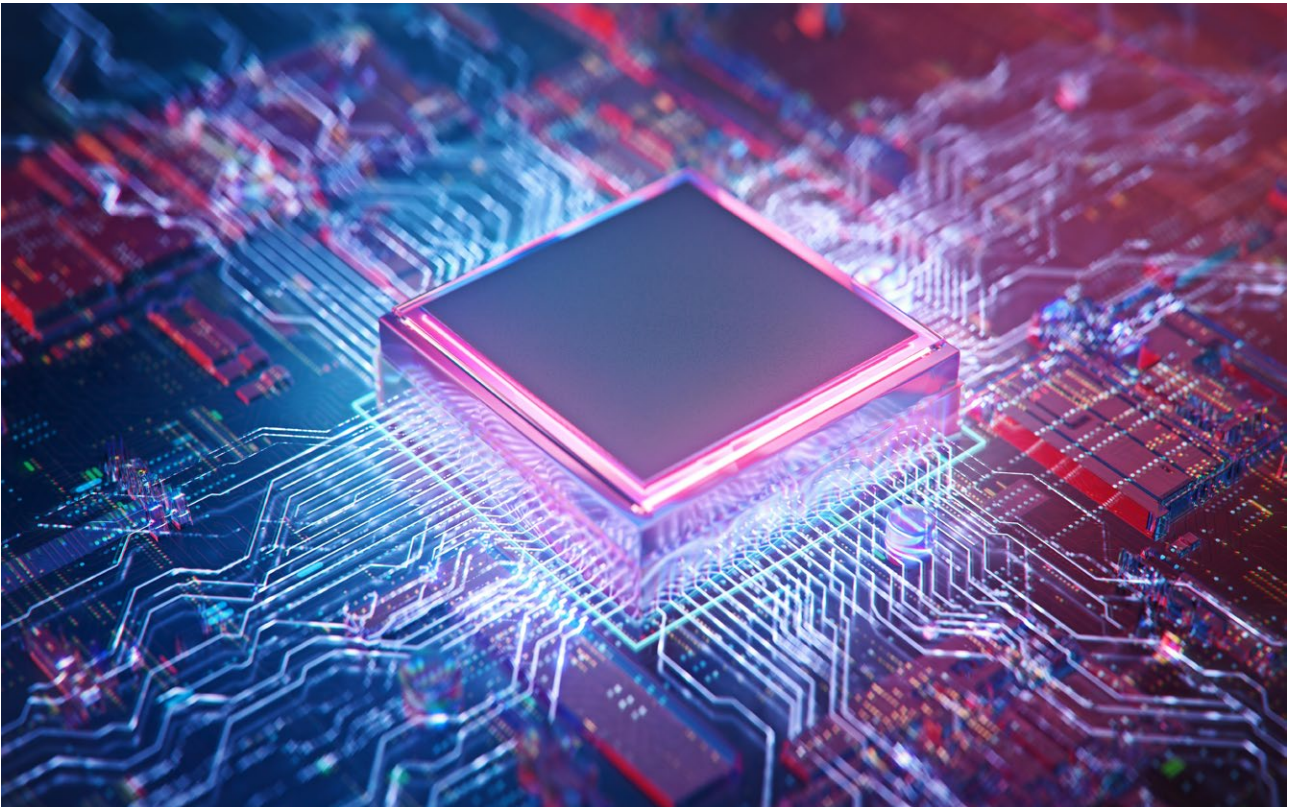


Product Overview

Electronics and Thermal Management



OUR PORTFOLIO FOR THE ELECTRONICS INDUSTRY

Are you looking for the right partner with expertise and specialty products in the highly dynamic electronics industry to help tackle your technical challenges?

Evonik's Polymer Specialties group offers an extensive product portfolio with a wide range of chemistries and functionalities designed specifically for electronics. We are here to support your formulation solutions with much higher flexibility and best-in-class performance.

Chemistry	What we offer here	Our brand
Silicones	Addition-curing portfolio	Polymer VS, Modifier, VQM, Crosslinkers and etc
	Condensation-curing portfolio	Polymer OH, Modifier OH and etc
	Performance compounds for thermal management	TEGOSIL Heatban®, TEGOSIL® FR, TEGOSIL® HT
Reactive resins	Functional filler dispersants	TEGOPREN®, TEGOMER®
	Nanosilica in epoxies, acrylic monomers and solvents	NANOPOX®, NANOCRYL®, NANOPOL®
	Core-shell silicone rubber in epoxies and polyol	ALBIDUR® EP, ALBIDUR® PU
	Epoxy-silicone block copolymers	ALBIFLEX®
Thermoplastic resins	Silane modified polymers	Polymer ST, TEGOPAC®
	Functional filler dispersants	TEGOPREN®, TEGOMER®
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ADDITION-CURING SILICONES

POLYMERS						
	Chemical Characterization	Vinyl content [mmol/g]	Appearance	Viscosity at 25°C [mPas]		
Polymer VS 50	Vinyl-terminated polydimethyl siloxanes	0.60	clear, colorless	50		
Polymer VS 100		0.40		100		
Polymer VS 200		0.25		200		
Polymer VS 500		0.14		500		
Polymer VS 1,000		0.11		1,000		
Polymer VS 2,000		0.08		2,000		
Polymer VS 5,000		0.06		5,000		
Polymer VS 10,000		0.05		10,000		
Polymer VS 20,000		0.04		20,000		
Polymer VS 65,000		0.03		65,000		
Polymer VS 100,000		0.02		100,000		
Polymer VS 165,000		0.015		165,000		
Polymer RV 100		Terminal + lateral vinyl groups polydimethyl siloxanes		0.50	clear, colorless	100
Polymer RV 5,000				0.40		5,000
Polymer MV 2,000	Mono-vinyl-terminated polydimethyl siloxanes	0.06		2,000		

MODIFIERS

	Chemical Characterization	Appearance	SiH content [mmol/g]	Viscosity at 25°C [mPas]
Modifier 705	Polydimethyl siloxane + terminal SiH groups	clear, colorless	0.16	500
Modifier 715			3.40	3

VINYL-FUNCTIONAL TRANSPARENT QM RESIN COMPOUNDS

	Chemical Characterization	Vinyl content [mmol/g]	Resin content [wt.-%]	Viscosity at 25°C [mPas]
VQM 903	Vinyl-functional QM resin + vinyl-functional silicone polymers	0.18	20	10,000
VQM 906		0.19	25	50,000
VQM 907		0.20	20	5,000
VQM 909		0.23	20	1,000
VQM 973		0.34	45	30,000
VQM 985		0.45	45	4,000

CROSSLINKERS

	Chemical Characterization	Appearance	SiH content [mmol/g]	Viscosity at 25°C [mPas]
Crosslinker 100	Polydimethyl siloxane + SiH groups in the polymer chain	clear, colorless	7.8	45
Crosslinker 101			4.3	45
Crosslinker 110			3.8	100
Crosslinker 120			1.1	500
Crosslinker 122			1.8	200
Crosslinker 180			1.9	50
Crosslinker 190			16	20
Crosslinker 200			3.2	50
Crosslinker 210			4.2	40

CATALYSTS

	Chemical Characterization	Platinum content [wt.-%]	Appearance	Vinyl content [mmol/g]	Viscosity at 25°C [mPas]
Catalyst 510	Platinum + DVS complex in Polymer VS	0.5	yellowish, liquid	0.35	500
Catalyst 511		1.0		0.55	500
Catalyst 512		2.0		1.0	500
Catalyst 517	Platinum + DVS complex in DVS	2.0		10.8	5
Catalyst 540	Platinum + MVC complex in MVC	2.0		11.5	5

INHIBITORS

	Chemical Characterization	Volatility	Appearance	Vinyl content [mmol/g]	Viscosity at 25°C [mPas]
Inhibitor MVC	MVC pure	Low	clear, colorless	11.7	4
Inhibitor DVS	DVS pure	Medium	clear, colorless	10.7	4
Inhibitor 600	Alkinol	High	clear to slightly turbid, colorless	0.1	900

CONDENSATION-CURING SILICONES

POLYMERS

	Chemical Characterization	Appearance	Viscosity at 25°C [mPas]
Polymer OH 0.1	Hydroxy-terminated polydimethyl siloxanes	clear, colorless	100
Polymer OH 1			1,000
Polymer OH 2			2,000
Polymer OH 3.5			3,500
Polymer OH 5			5,000
Polymer OH 20			20,000
Polymer OH 80			80,000
Polymer OH 300			400,000

MODIFIERS

	Chemical Characterization	Appearance	Viscosity at 25°C [mPas]
Modifier OH 650	Mono-hydroxy-terminated polydimethyl siloxanes	clear, colorless	50,000
Modifier OH 655			5,000

CROSSLINKERS

	Chemical Characterization	Appearance	Viscosity at 25°C [mPas]
Crosslinker OX 10	Oxime silane, MOS	clear, colorless to yellowish	100
Crosslinker OX 20	Oxime silane, VOS		1,000
Crosslinker OX 32	Oxime sil., VOS/TOS 65/35	yellowish to brownish*	2,000
Crosslinker OX 33	Oxime sil., VOS/TOS 82/18		3,500

* Crystallization of TOS is possible at temperature below 45°C

CATALYST

	Chemical Characterization	Appearance	Typical dosage
Catalyst TD 18	Diocetyl tin dicarboxylate	colorless to yellow	0.05-2%

TEGOSIL® SILICONE COMPOUNDS FOR THERMAL MANAGEMENT

	Function		Color	Dosage / First recommendation	
TEGOSIL Heatban® 100	Heat resistance in HCR, condensation cured silicones and LSR*	up to 250°C	white	0.5-5.0%	1.5%
TEGOSIL Heatban® 110		up to 275°C	yellow	0.5-5.0%	1.5%
TEGOSIL Heatban® 200		up to 300°C	brown	3.0-5.0%	2.0%
TEGOSIL Heatban® 400	Heat resistance in LSR* or Pt cured HCR	up to 275°C	yellow	2.0-5.0%	3.0%
TEGOSIL Heatban® 400 CONC				1.0-3.0%	2.0%
TEGOSIL® FR 1000	Flame resistance, tracking and erosion in HCR and LSR*		slight grey	20-70%	20-70%
TEGOSIL® HT 2000	Heat transfer in HCR and LSR*		slight grey	20-70%	20-70%
TEGOSIL® HT 2100		20-70%		20-70%	

*LSR = addition cured silicones using Pt catalyst

PERFORMANCE ENHANCING DISPERSIONS AND RESINS

NANOPOX® 20nm nanosilica in epoxies

Type	Nano SiO ₂ [wt.%]	Base resin	EEW	Viscosity at 25°C [Pas]	Characterization
NANOPOX® E 430	40	DGEBA/F	290	30	No crystallization
NANOPOX® E 470	40	DGEBA	295	45	General purpose
NANOPOX® E 500	40	DGEBAF	275	20	Low viscous and additional flexibility
NANOPOX® E 601	40	EEC	225	2	Cycloaliphatic formulations, cationic curing
NANOPOX® E 770	40	Epoxidized novolac	310	20*	High Tg application

* at 50°C

NANOCRYL®
20nm nanosilica in acrylics

Type	Nano SiO ₂ [wt.%]	Acrylate monomer / Oligomer	Viscosity at 25°C [mPas]
NANOCRYL® A 370	50	HEMA: hydroxyethylmethacrylate	60
NANOCRYL® A 210	50	HDDA: hexanedioldiacrylate	175
NANOCRYL® A 215	50	TPGDA: tripropyleneglycoldiacrylate	200
NANOCRYL® A 220	50	TMPTA: trimethylolpropanetriacrylate	3,300
NANOCRYL® A 223	50	TMPEOTA: ethoxylated trimethylolpropanetriacrylate	1,000



NANOPOL®
20nm nanosilica in solvents

Type	Nano SiO ₂ [wt.%]	Solvent	Viscosity at 25°C [mPas]	Characterization
NANOPOL® A 710	50	MPA	20	For copper clad laminates (CCL)
NANOPOL® A 720	50	BuAc	20	

ALBIDUR®
Core-shell structure silicone rubber particles in epoxies & polyol

Type	Silicone content [wt.%]	Base resin	EEW	Viscosity at 25°C [Pas]	Characterization
ALBIDUR® EP 2240 A	40	DGEBA	330	35	Toughening of 2-pack epoxy resin systems
ALBIDUR® EP 5340 A	40	EEC	250	6	For heat-cure and cationic UV-curing applications
ALBIDUR® PU 5640	40	Polyol		2.5	Polypropylene glycol (triol) for modification of PU resins

ALBIFLEX®
Epoxy-silicone block copolymers

Type	Silicone content [wt.%]	Base resin	EEW	Viscosity at 25°C [Pas]	Characterization
ALBIFLEX® 296	40	DGEBA	850	45	Flexibilizer and general purpose
ALBIFLEX® 297	40	DGEBA	850	20	Highly improved resistance against hydrolysis Enhanced compatibility with epoxy resins
ALBIFLEX® 348	60	DGEBA	1,150	30	For highly flexible system, preferred used as base resin

HYDROPHOBIC SURFACE TREATMENT OF FILLERS, PIGMENTS AND FLAME RETARDANTS

Product	Chemistry	Characterization	Viscosity at 25°C [mPas]	Dosage
TEGOPREN® 6879	Organo-modified siloxane	Super hydrophobicity	<500	0.5-2% for inorganic fillers, pigments and FR
TEGOPREN® 6875	Alkyl modified siloxane	General purpose	<1000	
TEGOPREN® 5885	Polyether modified siloxane	Especially for very fine or nano scaled fillers, e.g. organo clays or hydroxides	<200	
TEGOPREN® 5895	Polyether modified siloxane	Hydrophobic treatment in polyols	<2,000	
TEGOMER® E-Si 2330	Bi-functional epoxy siloxane	For inorganic fillers	<100	
TEGO® XP 21002	Multi-functional epoxy siloxane	For inorganic fillers	<500	1.0-3% for organic pigments and FR
TEGOMER® M-Si 2650	Organo-modified siloxane containing non-reactive aromatic groups	Very high hydrophobicity	<100	1.0-10% for nano materials
TEGO® XP 21010	Amino functional siloxane	Best choice for polyamide related applications	<100	
TEGOMER® DA 646	Polyether technology	Balanced hydrophobicity and dispersibility in polyethers and polyols	<500	
TEGOMER® V-Si 2250	Acrylic modified siloxane	Inorganic fillers in acrylics, vinyls	<200	

Recommendation Table

	EVA	PP	PA	PBT	PC	Epoxy	UPES	Silicone	PU	Acrylics	SMP
Al ₂ O ₃			TP 6879			E-Si 2330 XP 21002	TP 6879 M-Si 2650	TP 6879	DA 646 TP 5895	TP 6879 V-Si 2250	DA 646 TP 6879
SiO ₂		TP 6875	TP 6875 TP 6879		TP 6879	TP 6879 XP 21002	TP 6879 M-Si 2650	TP 6879 M-Si 2650	DA 646 TP 6879	TP 6879 V-Si 2250	DA 646 TP 6879
ATH*	TP 6875 TP 6879						TP 6875 M-Si 2650	M-Si 2650 TP 6879	TP 6879 TP 5895		DA 646 TP 6879
MDH*	TP 6875 TP 6879	TP 6875 TP 6879	TP 6875 TP 6879				TP 6875				DA 646 TP 6879
MC*			E-Si 2330 TP 6875	TP 6875 TP 6879							
MPP*			XP 21010 TP 6879								
APP*		TP 6875 TP 6879							DA 646 TP 5895		
TiO ₂		TP 6875	TP 6879								
CaCO ₃	TP 6879	TP 6879				E-Si 2330 XP 21002	TP 6879 M-Si 2650			TP 6879 V-Si 2250	DA 646 TP 6879
Clay	TP 5885 TP 6875	TP 5885 TP 6875	TP 6879								DA 646 TP 6879
Talc	TP 6875	TP 6875			TP 6875						

* ATH: alumina trihydrate
MDH: magnesium dihydroxides
MC: melamine cyanurate
MPP: melamine polyphosphate
APP: ammonium polyphosphate

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