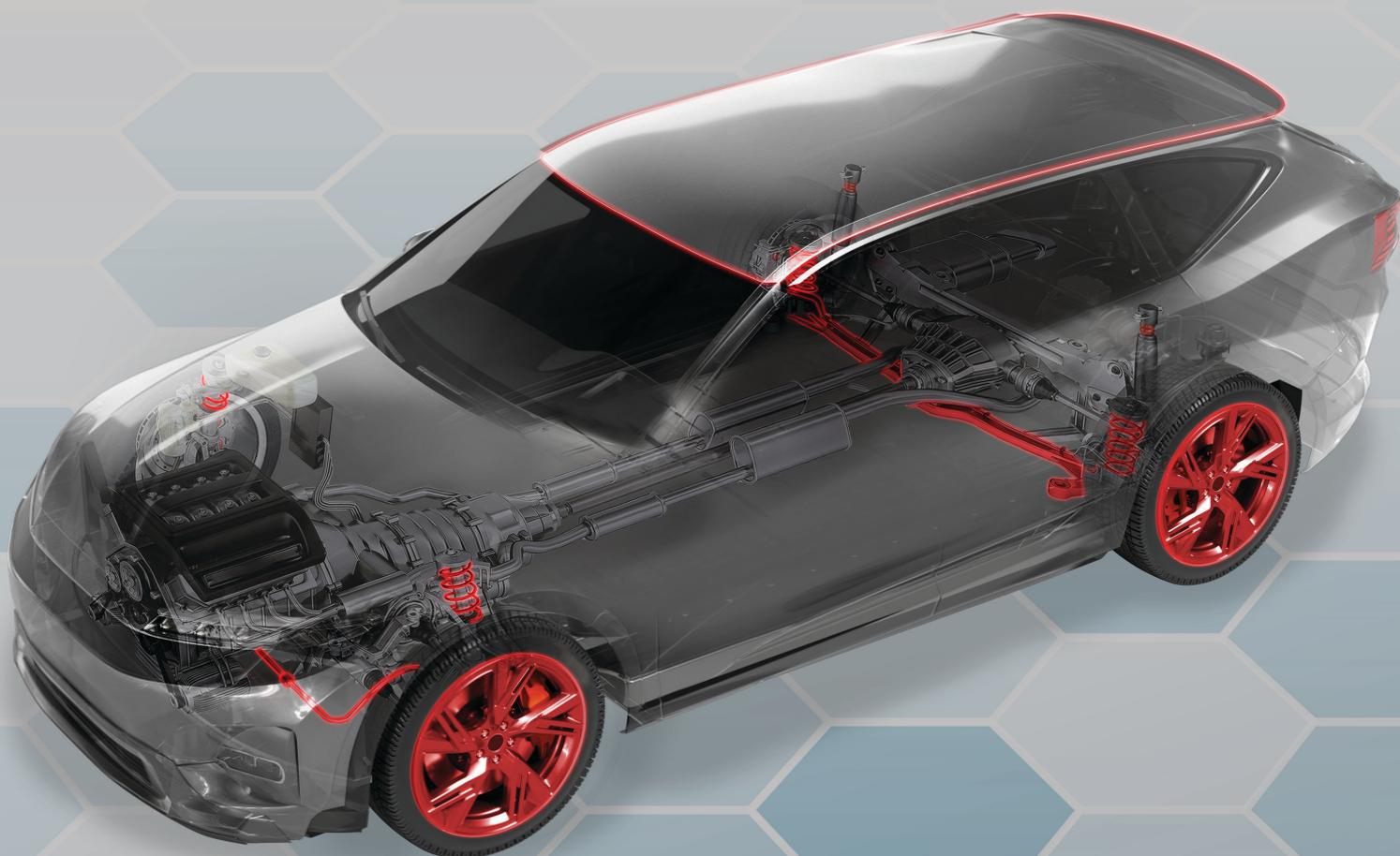


LOCTITE
TEROSON

FREKOTE

COMPOSITE SOLUTIONS

FOR AUTOMOTIVE COMPONENTS



Henkel

Henkel Adhesive Technologies

REDUCE WEIGHT. REDUCE COSTS. INCREASE QUALITY.

Partner with Henkel, your trusted partner for composites, resins and adhesive solutions along your entire value chain.



Lightweight

Our composites portfolio allows for weight reduction of components by structure optimization.



Tailor-made Solutions

Henkel is a full-solution partner with a broad technology portfolio, deep process and application know-how. We offer more than just products - we tailor our solutions to address customer needs.



Sustainability

Our composite contribute to the realization of future CO2 emission targets.





PROCESS

There are many different manufacturing processes in the production of composites, which are tailored to the individual requirements and basic conditions. The Resin Transfer Molding process (shown below) has become established for the production of complex parts with high Fiber Volume Fraction and enables reproducible and fully automated series production.



PRODUCTION ACCESSORIES



RESINS



RELEASE AGENTS



ADHESIVES





PRODUCTION ACCESSORIES

At Henkel, we are not just a manufacturer of resin systems, but rather a comprehensive solution provider offering a range of products to support the end-to-end process. Our reactive binder LOCTITE® FRP 2000 ensures a handling-resistant preform that maintains its stability, even in the heated tool, and supports the infiltration. Our comprehensive portfolio for cleaning molds guarantees optimum surface quality, while suitable sealers support demolding.

	CLEANER		PRIMER		BINDER	CATALYST	
PRODUCT	LOCTITE® SF 7063	TEROSON® PU 8550	FREKOTE® 915 WB	FREKOTE® 913 WB	TEROSON® PU 8517H	LOCTITE® FRP 2000	LOCTITE® MAX 3-300
Description	Cleaner/ degreaser	Cleaner	Pre-cleaner	Post-cleaner primer	Liquid	Binder	Catalyst
Application Use	Removes most greases, oils, lubricants, metal shavings and fine particles	Cleaner for glass, painted- metal, and ceramic-coated surfaces	Usable on all surfaces	Usable on all surfaces	Adhesion promoter for bonding with PU-based adhesives & sealants	For consolidation all kind of fabrics for a heat-stable preform	For customizing curing time of PUs
Chemical Basis	Solvent-borne	Solvent-borne cleaner	Water	Water	Polyurethane	Polyester	Amine
Appearance	Clear, colorless	Clear, colorless	Beige	Clear, colorless	Black, thin liquid	White powder	Pale yellowish
Type of Polymer	Isoparaffin, dimethoxy- methane and ethanol	Isopropanol	Polyester, epoxy, steel, nickel	Polyester, epoxy, steel, nickel, aluminum	Polyurethane	Epoxy- polyester hybrid	Amine
Application Technique	Spray	Wipe-on	Wipe-on	Wipe-on	Wipe-on	Spray, masking	Amine
Comments	Ideal for surface preparation prior to the application of adhesives and sealants	Designed to remove fingerprints, dust, and other contaminants from substrates prior to bonding	Dissolves hardened release agents and other dirt	Anti-static mold cleaner, prevents renewed dust deposits, removes fingerprints	Suitable for bonding of PU- based adhesives & sealant on various plastics, glass, painted surfaces and metals	Compatible with PU and EP resins. Low material consumption due to high strength. Thermoplastic behavior	Catalyst for PU resins LOCTITE® Max 2 and LOCTITE® Max 3 to customize curing time without influence on part properties
Package Size	400 ml spray can, pump bottle, 10 L canister	1 L	1 L, 10 L	1 L	10 ML, 100 ML, 250 ML, 500 ML, 1 L	15 Kg	500 g

DYNAMIC LOADED PARTS**HIGH TEMPERATURE**

	Body in white	Structural and Dynamic	Clear and Colorless	Clear
PRODUCT	LOCTITE® MAX 2	LOCTITE® MAX 3	LOCTITE® MAX 5 LITE	LOCTITE® MAX 5
Technology	2 component mixing polyurethane	2 component mixing polyurethane	2 component mixing epoxy	2 component mixing epoxy
Glass Transition Temperature	> 115°C	> 135°C	> 195°C	> 215°C
Tensile Strength	80 Mpa	95 Mpa	60 Mpa	65 Mpa
Elongation	5 – 10%	6 – 9%	4%	5%
Critical Stress Intensity Factor K1C	1.2 Mpa*m ^{0.5}	1.3 Mpa*m ^{0.5}	1.1 Mpa*m ^{0.5}	1.2 Mpa*m ^{0.5}
Suitable Manufacturing Process	HP-RTM, wet pressing	HP-RTM, wet pressing	Broad spectrum, e. g. infusion, filament winding , (VA) RTM, HP-RTM	Broad spectrum, e. g. infusion, filament winding , (VA) RTM, HP-RTM
Comments	Customized reaction via snap-curing and catalyst	Customized reaction via snap-curing and catalyst	UV-stabilizers inhibitant	Unique combination of Tg and K1C, service temperature up to 200°C

RESINS

The resin system is the heart of the component and guarantees the fixing of the fibers, protection against external influences and optimum force transmission through good infiltration. Our PU-based resin systems are ideally suited for processing in the High Pressure-RTM process and, due to their broad application, are used for dynamic loaded components. Our epoxy resins can be processed with all common Liquid Composite Molding processes RTM, filament winding and wet pressing. They combine very high temperature resistance with outstanding toughness while maintaining an optical appearance.





RELEASE AGENTS

Our internal and external release agents ensure good separation of finished parts from a tool and enable a clean and automatable demolding process. Backed by over 50 years of experience and development, FREKOTE® release agents have become the global industry standard for performance, quality and value creation by ensuring minimal contamination and high demolding per application. Unlike wax or silicone layers, semi-permanent FREKOTE® release agents do not transfer to the molded part. Instead, they form a chemical bond with the mold surface.

RELEASE AGENT

PRODUCT	FREKOTE® 700 NC	FREKOTE® 770 NC	FREKOTE® 44 NC	FREKOTE® C-200	FRP 3000
Chemical Base	Solvent	Solvent	Solvent	Water	Polyester
Appearance	Clear, liquid	Clear, liquid	Not applicable	Milky emulsion	Yellowish
Mold Temperature	+15 to +135°C	+15 to +60°C	+20 to +60°C	+60 to +205°C	Not applicable
Drying Time	20°C, 20 Min. 60°C, 8 Min. 100°C, 5 Min.	20°C, 10 Min. 60°C, 5 Min.	20°C, 3 Hr. 60°C, 30 Min. 100°C, 15 Min.	60°C, 30 Min. 100°C, 10 Min. 150°C, 4 Min.	Not applicable
Surface Obtained	Glossy	High gloss finish	Matte	Matte	Opaque
Suitable for Type of Polymer	Epoxy	Epoxy, polyester resin, PE	Epoxy, PA	Epoxy, PA, PP, PE	All types
Application Technique	Wipe-on, spray-on	Wipe-on, spray-on	Wipe-on, spray-on	Spray-on	Added to resin as additional mixing component
Comments	Excellent sliding properties, suitable for most composites, also for polyester resins	Excellent sliding properties, high gloss finish, fast curing, suitable for most composites	No build up of mold coating, no contamination by carryover, minimal cleaning effort before gluing and painting	Low build-up of mold coating, no contamination through carryover	Internal mold release agent to optimize demolding performance; used in combination with PU resins LOCTITE® Max 2 and LOCTITE® Max 3
Package Size	1 L, 5 L, 25 L, 208 L	1 L, 5 L, 25 L, 208 L	1 L, 5 L	5 L	5 Kg

ADHESIVES

Due to their nature, composite components pose particular challenges for bonding. With our portfolio of Henkel products, the right adhesive can be selected to meet the individual requirements of the application.

MECHANICAL PERFORMANCE REQUIREMENTS

	STRUCTURAL		STRUCTURAL-ELASTIC		ELASTIC		
PRODUCT	TEROSON® EP 5065	LOCTITE® EA 9497	LOCTITE® UK 2015	LOCTITE® UK 2032	TEROSON® PU 860 ME	TEROSON® MS 9320 SF	LOCTITE® SI 5970
Curing Mechanism	2 component room temperature curing	2 component mixing epoxy/RT	2 component mixing PU/RT	2 component mixing PU/RT	2 component mixing PU/RT	1K MS / humidity	1K MS / humidity
Application	Structural bonding	Structural bonding	Structural-elastic bonding	Elastic-semistructural bonding	Elastic-semistructural bonding	Elastic bonding	Sealing
Viscosity	16 Pas	6 - 20 Pas	300 - 700 Pas	300 - 700 Pas	70 - 110 Pas	Pasty	Pasty
Pot Life	60 Min. at RT	165 - 255 Min. at RT	6 - 10 Min. at RT	5 - 10 Min. at RT	40 Min. at RT	20 Min. at RT	25 Min. at RT
Curing Time	8 Hr. at RT up to 30 Min. at 80°C	8 Hr. at RT up to 15 Min. at 80°C	Pot life at RT: 6-10 Min.	Pot life at RT: 5-10 Min.	90 Min.	4.5 mm/24 Hr.	2.5 mm/24 Hr.
Tensile Shear Strength	25 MPa	20 MPa	> 20 MPa	> 8 MPa	10 - 13 MPa	Not applicable	> 1.5 MPa
Young's Modulus	> 1,300 MPa	2,420 MPa	> 300 MPa	30 MPa	Not applicable	Elastic	Elastic
Tensile Elongation	< 5%	3%	> 90%	150%	> 200%	Not applicable	> 200%
Temperature Stability	-40°C to +80°C	-60°C to 180°C	-40°C to +80°C	Up to 110°C	-40°C to +80°C	-30°C to +90°C	-50°C to +200°C
Special Features	Crash-resistant adhesive with good adhesion to body steel with and without KTL coating, galvanized steel and aluminum; with low elongation at break	Ideal for thermally conductive bonding applications and encapsulation of electronic components; high resistance to heat aging, high media resistance	Especially suited for CFK/GFK, KTL and e-coat	Class-A usable; multi substrate bonding	Semi-structural adhesive for bonding of non-metallic surfaces; free from substances, either a hazardous to health and volatile components	Sprayable; paintable; also available as a "slower" variant	Excellent resistance to engine oils; typical applications include flange sealing of sheet metal parts, housing covers and oil pans
Package Size	Cartridge 198 ml, Pail 15 Kg	Cartridge 50 ml, 400 ml, Bottle 1 Kg	Cartridge 1050 ml, Pail 25 Kg	Pail 25 Kg	Cartridge 400 ml	Cartridge 300 ml, Pail 25 Kg	Cartridge 300 ml, Pail 25 Kg

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