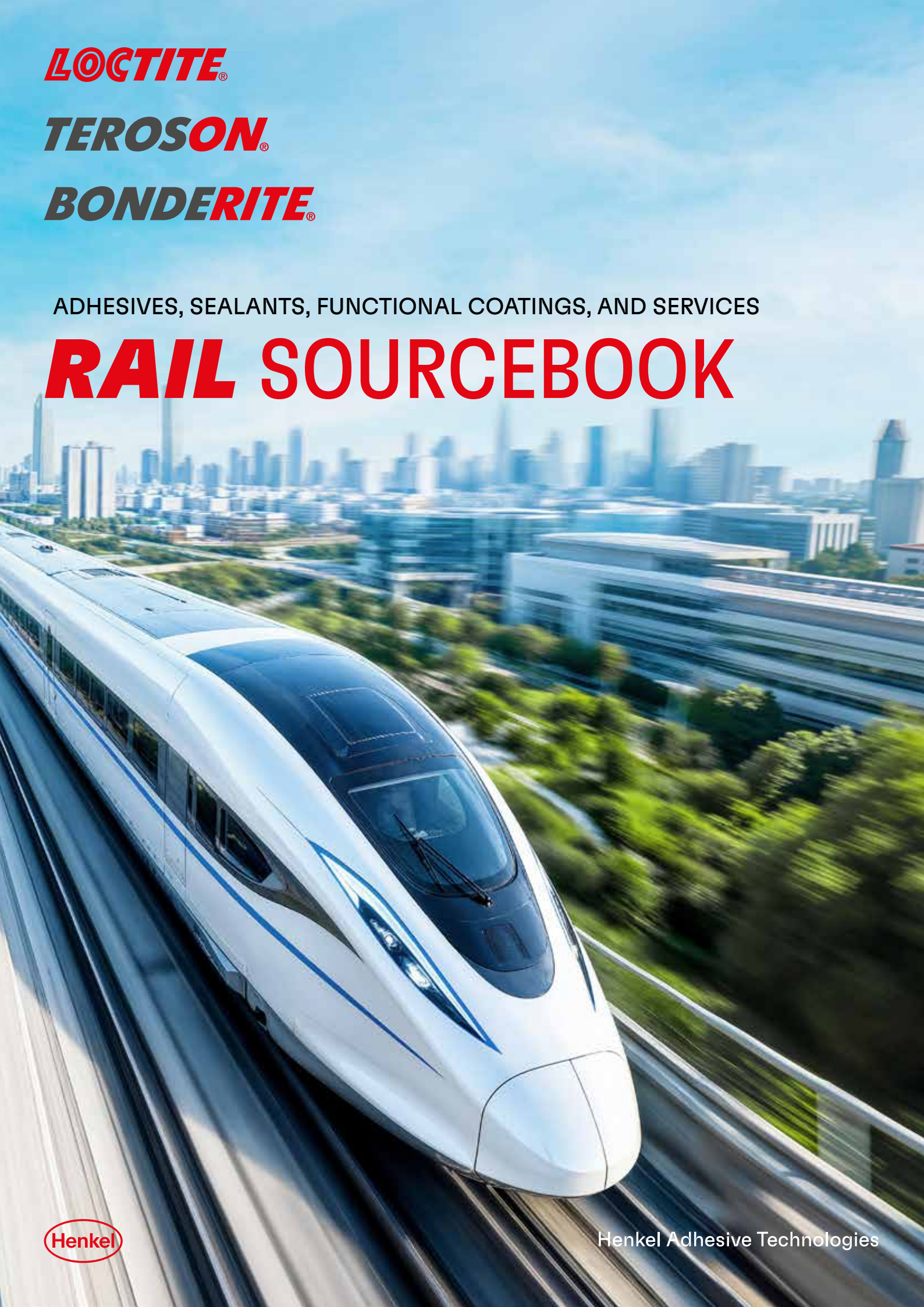
LOCTITE®

TEROSON®

BONDERITE®

ADHESIVES, SEALANTS, FUNCTIONAL COATINGS, AND SERVICES

RAIL SOURCEBOOK



Henkel

Henkel Adhesive Technologies

HENKEL: YOUR TOTAL SOLUTIONS PROVIDER FOR THE RAIL INDUSTRY

01 BODY SHOP

METAL
- Metalworking Fluids
- Cleaning
- Corrosion Protection

PAINTING
- Cleaning
- Pre-Treatment
- NVH Solutions
- Underbody Coatings

02 BODY ASSEMBLY

CAR BODY
- Structural Bonding
- Composite Bonding
- Panel Sealing
- Exterior Panel Bonding

COMPONENTS
- Axel Bonding
- Wheel Assembly

03 ASSEMBLY

EXTERIOR
- Window Bonding
- Window Sealing
- Anti-Slip Coatings
- Exterior Sealing
- Panel Sealing
- Panel Bonding

INTERIOR
- Floor Assembly
- Insulation Bonding
- Interior Sealing
- General Bonding
- Threadlocking
- Potting

04 INSPECTION + TEST

ENGINEERING SERVICES | TESTING

ACOUSTICS LABS | ANALYTICAL SERVICES

TECHNICAL SEMINARS

TRAINING | GLOBAL SUPPORT



WHY HENKEL?

Henkel will work with you to optimize your manufacturing process, identify improvements, and solve your toughest challenges.
WE'RE YOUR PARTNER EVERY STEP OF THE WAY.

CUSTOMER PARTNERSHIP
To help make your designs more reliable and durable, and to help improve your processes.

BROAD PRODUCT PORTFOLIO
To provide the optimum solution for your challenges.

EQUIPMENT SOLUTIONS
That can be easily integrated into your manufacturing process.

COMPREHENSIVE TESTING
10 R&D centers around the world for testing and analysis, staffed by 3,000 design and application professionals.

GLOBAL SUPPLY CHAIN
To maintain a reliable supply of products to our customers.

INNOVATION
More than 30 percent of our sales come from products launched in the past five years.

CUSTOMIZED SOLUTIONS
We can customize our products to fit your exact requirements.

GLOBAL SUPPORT
No matter where in the world you're located.





WORLDWIDE PRODUCTION SITES

ENGINEERING SOLUTIONS

Henkel's global network of engineering and R&D centers is staffed by 3,000 design and application professionals. We offer complete engineering services from application and design support to process optimization, as well as a full array of analytical and testing services.

CONTENTS

02 **HENKEL – SUPPORTING YOUR INNOVATIONS, UNDERSTANDING YOUR CHALLENGES**

04 Worldwide Production Sites
05 Contents
06 Henkel Innovation Solutions

08 **APPLICATIONS**

13 **ASSEMBLY SOLUTIONS**

14 Structural Bonding – Panels, Walls, Roofs, Floors
16 Window Bonding and Sealing
17 Elastomeric Structural Bonding
18 Rigid Structural Bonding and Small Part Bonding
20 Elastomeric Sealing

23 **NVH AND PROTECTIVE COATINGS**

24 NVH Solutions
26 Acoustic Coatings / Pads for Noise Control
28 Anti-Slip Floor Coatings and Underbody Protective Coatings / Clear Coats

31 **MACHINERY ADHESIVES AND MAINTENANCE**

32 Thread Sealing
33 Threadlocking
34 Retaining
35 Gasketing
36 Anti-Seize Lubricants
37 Gap Filling Solutions

39 **INDUSTRIAL CLEANING / METAL PRE-TREATMENT**

40 Industrial Cleaning and Metal Pre-Treatment
41 Operational Maintenance Cleaning
42 New Part Cleaning and Conversion Coatings
44 Remanufacturing Products

46 **REGULATORY OVERVIEW AND TOTAL SOLUTIONS FROM HENKEL**

HENKEL INNOVATION *SOLUTIONS*

YOUR PARTNER IN THE RAIL INDUSTRY

Innovations from Henkel deliver leading high-impact solutions worldwide through a broad technology portfolio – including engineered thermal and light cure acrylic, silicone, epoxy, and polyurethane adhesives, sealants and coatings. With our history and experience in the rail industry, our experts can help you find ways to optimize your manufacturing processes and drive down costs. We can help you reduce weight, increase durability, enhance reliability, and we're continually **developing innovations** to help you succeed in the future.

LATEST INNOVATIONS INCLUDE:

LOCTITE® HYBRID SOLUTIONS

LOCTITE® general-purpose structural adhesives, powered by hybrid adhesive technology, are a breakthrough in structural bonding. They're formulated to meet the rising demands in assembly design for:

- High performance structural bonding
- Multi-surface structural bonding
- Dissimilar substrate structural bonding
- Low hazard structural adhesives



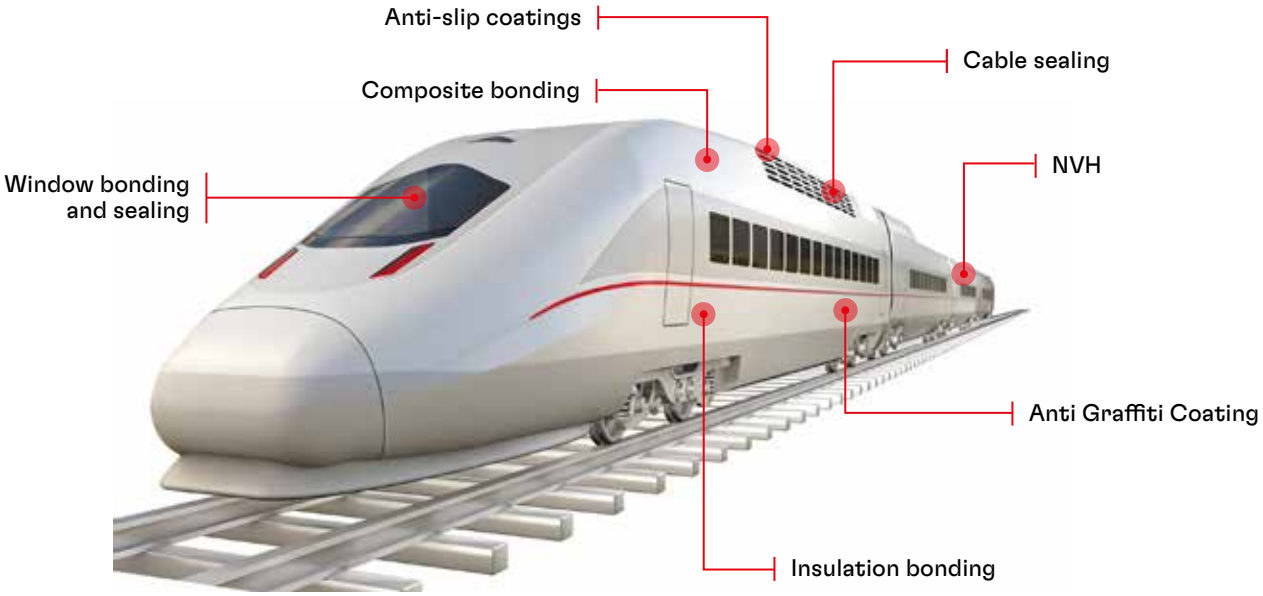




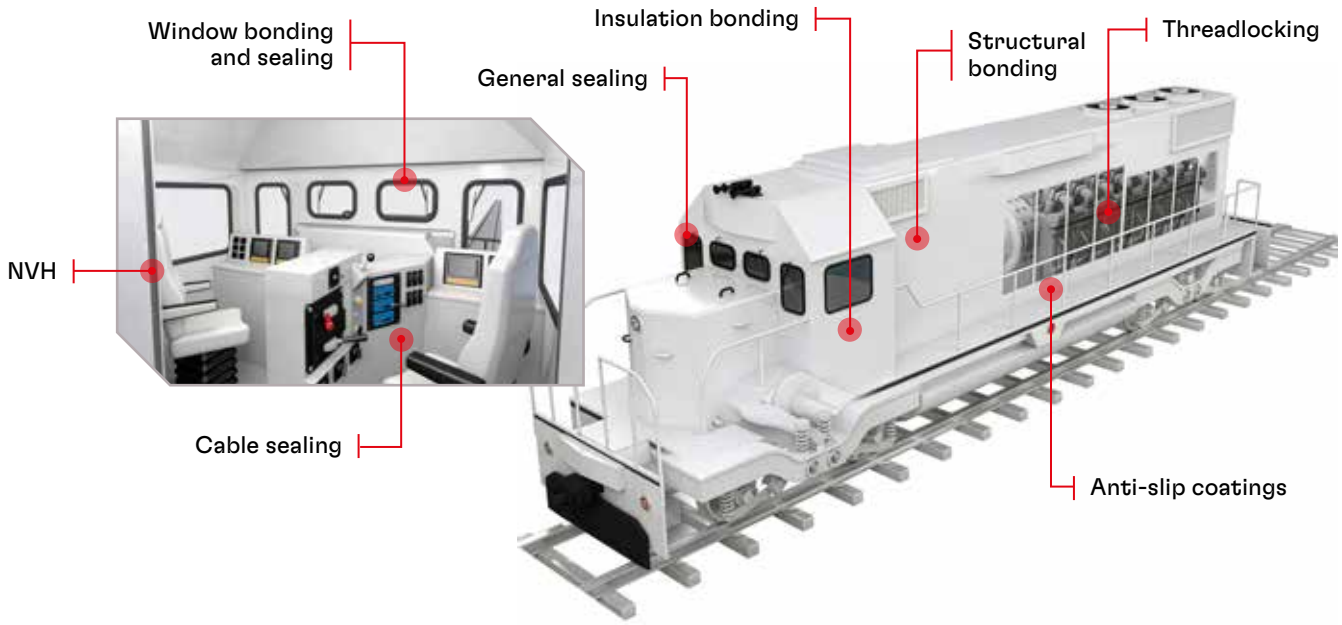


APPLICATIONS

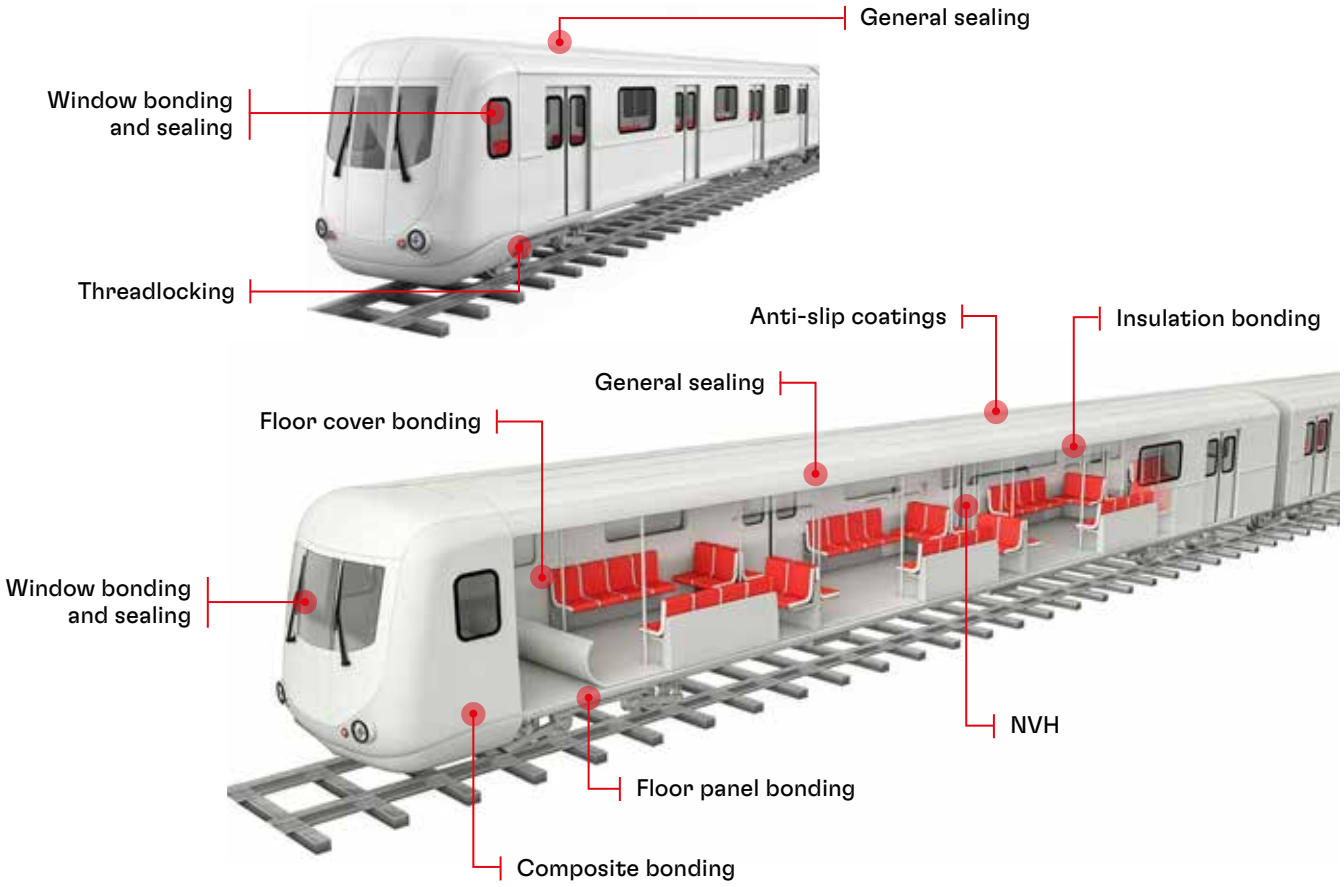
HIGH SPEED TRAIN



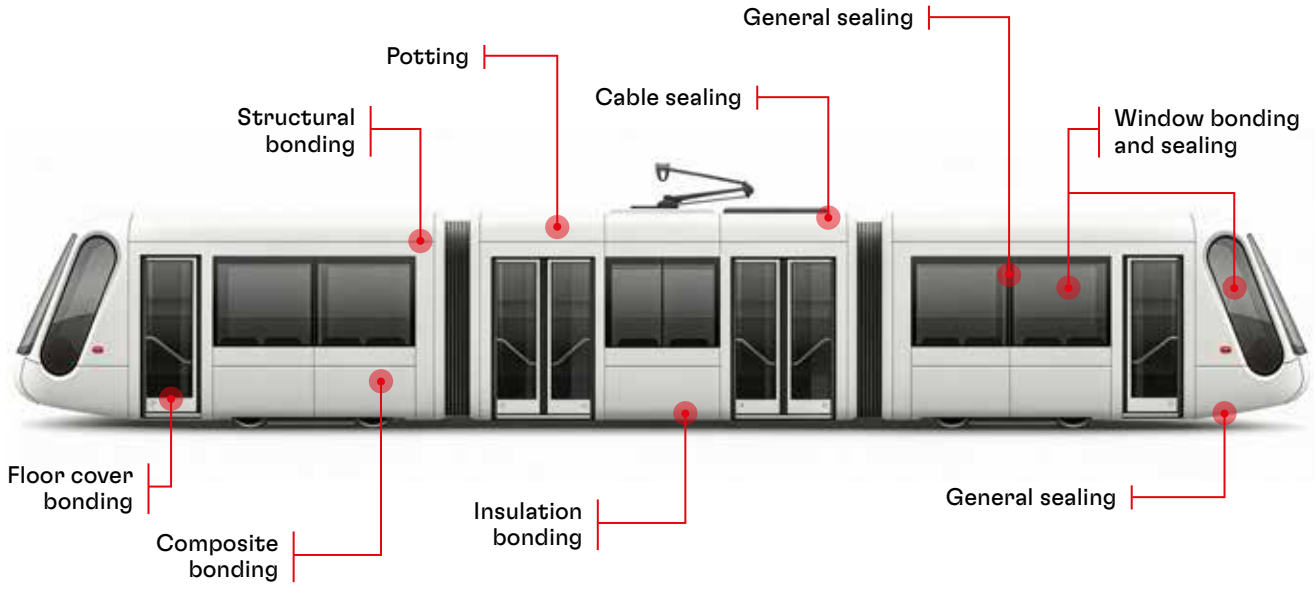
LOCOMOTIVE / LOCOMOTIVE CABIN



SUBWAY / UNDERGROUND



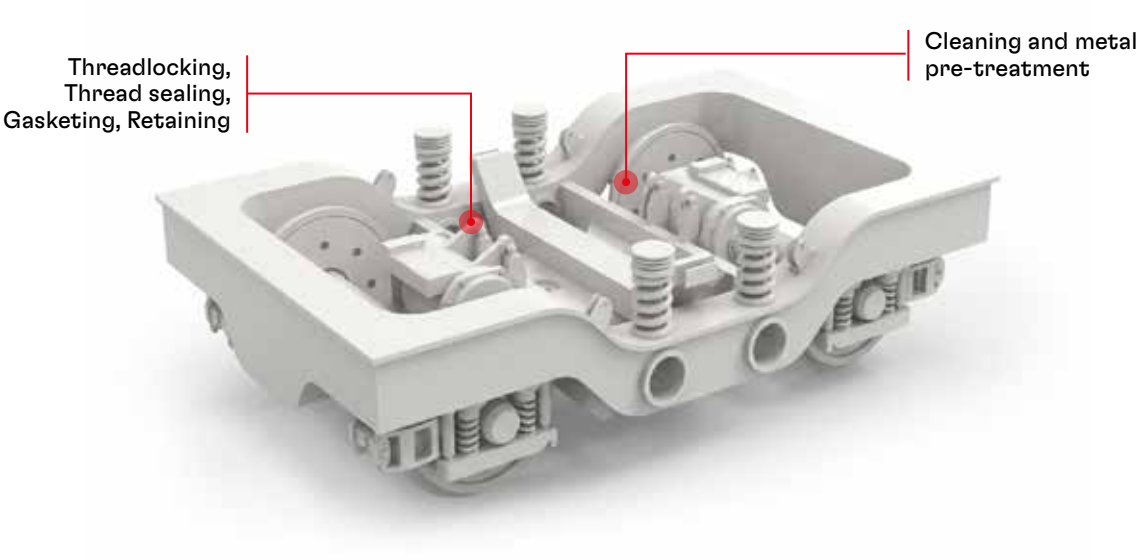
TRAMWAY / STREETCAR



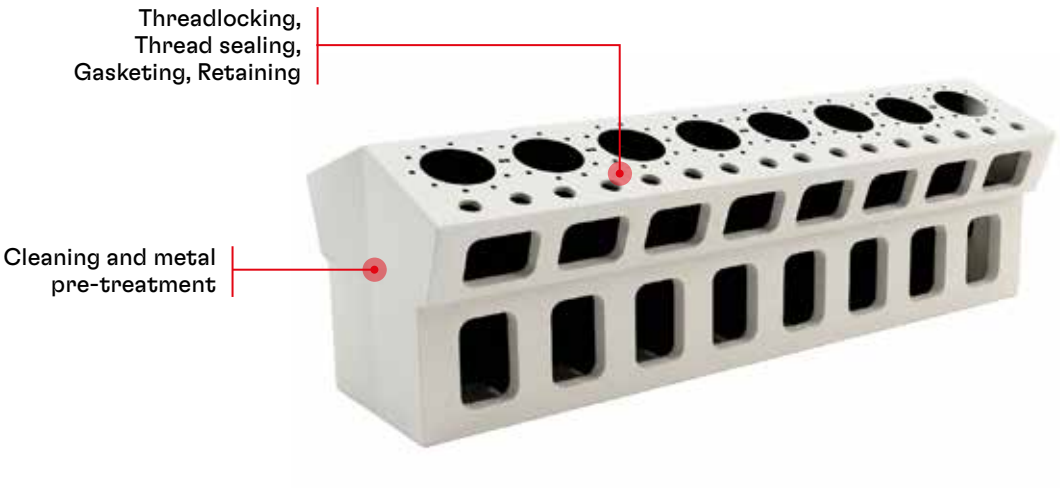


APPLICATIONS

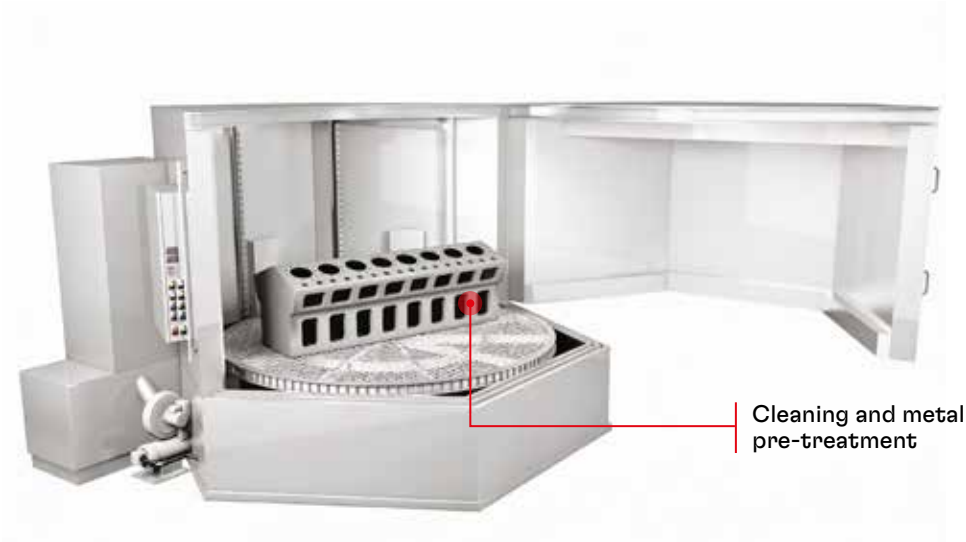
BOGIE



DIESEL ENGINE



REMANUFACTURING CLEANER



VEHICLE WASH SOLUTIONS



LOCTITE®
TEROSON®





ASSEMBLY *SOLUTIONS*

FASTER AND LOWER-COST ASSEMBLY WITH MORE DESIGN CHOICES

From structural bonding to seam sealing and window glazing, we provide a complete range of technologies that allow you to reduce or replace traditional mechanical fastening and sealing methods in a variety of assembly applications.

Bonded joints eliminate the cost of mechanical fasteners and welds, and allow dissimilar materials to be joined. These bonded joints distribute load more evenly allowing lighter gauge materials with tighter tolerances to be used. Replacing welds, rivets, and bolts also helps manufacturers eliminate leaks and reduce warranty claims. The end result is stronger, lighter, more economical vehicles with increased performance.



STRUCTURAL BONDING – PANELS, WALLS, ROOFS, FLOORS

FROM WELD AND FASTENER REDUCTION TO ASSEMBLY OF DISSIMILAR SUBSTRATES

FOR USE BETWEEN FLEXIBLE SHEET METALS, RIGID CASTINGS / EXTRUSIONS, AND / OR COMPOSITE / PLASTIC MATERIALS

Primarily designed to replace welds, rivets, and other mechanical fasteners in the body, paint or trim shops, our wide range of high strength structural adhesives enable the assembly of non-metallic substrates and open new perspectives of lightweight designs.

The distributed load an adhesive provides versus the stress concentrations of mechanical fastening allows thinner, lower weight panels to be implemented – ultimately reducing weight.

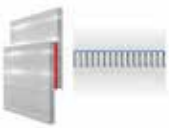
WHY USE A STRUCTURAL ADHESIVE?

- Increase strength
- Seal, bond, and protect in one step
- Noise, vibration, harshness (NVH) damping
- Prevent corrosion
- Improve aesthetics
- Simplify designs
- Improve part performance
- Join dissimilar substrates
- Distribute stress evenly
- Reduce assembly time
- Reduce water leaks

WHERE TO USE A STRUCTURAL ADHESIVE:

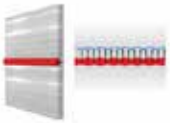
- Skin to frame assembly
- Door and panel stiffener attachment
- Bracket attachment
- Plastic and composite components
- Aluminum and stainless components

DIFFERENT JOINT METHODS LEAD TO DIFFERENT STRESS DISTRIBUTION:



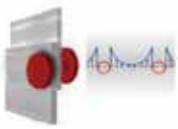
Bonding

- Even stress distribution
- Distribution over a large area



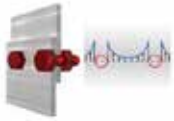
Welding

- Uneven stress distribution
- Concentration within small welding line
- Heat distorting of substrate



Spot Welding

- Produces read-through, (dimples on surface)
- Very irregular stress distribution
- Stress concentration at holes



Huck Bolts / Rivets / Bolting

- Very irregular stress distribution
- Stress concentration at holes
- Water ingress route

STRUCTURAL ADHESIVE SOLUTIONS

Technology	Primary Uses	Advantages	Considerations
SILANE MODIFIED POLYMERS (SMPS)	For plastic and treated / painted sheet metal where fatigue resistance, weather resistance, and elastic bonding are needed	▪ Primerless adhesion to most substrates ▪ Excellent anti-flutter material ▪ Great UV stability ▪ No solvent, isocyanates or silicone ▪ Good paintability after cure up to 3 days	▪ Poor adhesion on oily metal ▪ Maximum temperature resistance ▪ Low cohesive strength ▪ Slow fixture and cure speed ▪ Moisture-sensitive
POLYURETHANES (PU)	For plastic and treated / painted sheet metal parts where fatigue resistance and elastic bonding are needed	▪ Excellent flexibility ▪ Great for noise and vibration reduction ▪ Great adhesion on plastics and painted metal ▪ Great on dissimilar materials ▪ Excellent paintability after cure up to 7 days	▪ Limited temperature resistance (1 hr. at 140°C / 284°F) ▪ Poor adhesion to bare and oily metal ▪ Poor corrosion resistance ▪ Contains isocyanates ▪ Moisture-sensitive before cure ▪ Multi-step surface preparation
TWO-PART (2C) ACRYLICS	For a wide range of substrates including oily metal in body and trim shops where high cleavage and strength are required	▪ Excellent adhesion on plastic and metal ▪ High peel and impact resistance ▪ Excellent oily surface adhesion ▪ Good corrosion resistance ▪ High heat resistance (30 minutes at 200°C / 428°F)	▪ Requires mixing and / or fixturing ▪ Refrigerated storage ▪ Strong odor (MMA) Modified Methacrylate Acrylics ▪ Not weld-through capable (flammable) ▪ May create read-through on thin metals
TWO-PART (2C) EPOXIES	For metal in body shops where high cleavage and strength are required	▪ High shear and impact strength on metal ▪ Oily surface adhesion (heat cure) ▪ Excellent moisture resistance ▪ Excellent heat resistance ▪ (up to 1 hour at 220°C / 428°F) ▪ Weld-through compatible	▪ Slow fixture / cure times (2C) ▪ Requires mixing and / qor fixturing during cure ▪ Poor elongation and damping ▪ Below average oil tolerance ▪ Poor adhesion to plastics
TWO-STEP ACRYLICS	For a wide range of substrates in body and paint shops where rapid on-demand fixturing is needed	▪ No mixing, cure on-demand ▪ Good corrosion resistance ▪ High strength on wide range of substrates ▪ Light oily surface adhesion ▪ High heat resistance (30 minutes at 200°C / 428°F)	▪ Activator may contain solvents ▪ Resin has moderate odor ▪ Low cure-through depth, ~1 mm ▪ Fillets remain uncured ▪ Not weld-through capable
ONE-PART (1K) EPOXY	For sheet metal in body and paint shop applications as a flexible anti-flutter material as well as primary structure bonding to replace welds and other joining methods	▪ Wide range of expansions (0 to >1000%) ▪ Good adhesion on oily metal ▪ Weld-through capable ▪ Unlimited open time; weld-through capable ▪ High toughness and peel strength ▪ Excellent washout resistance	▪ Limited to hidden / non-visible joints ▪ Requires heat to cure ▪ Can be induction or thermal cured

WINDOWS BONDING AND SEALING

BONDING AND SEALING WINDOWS / ELASTOMERIC BONDING

FOR USE BETWEEN FLEXIBLE SHEET METALS, RIGID CASTINGS / EXTRUSIONS, AND / OR COMPOSITE / PLASTIC MATERIALS

Designed to bond windscreens and side windows to the train body, our wide range of window bonding adhesives simplifies and improves the assembly process while improving torsional stiffness and vehicle safety.

WHY USE AN ELASTOMERIC STRUCTURAL PRODUCT?

- Seal in / out heat, liquids, solids, and gases (e.g., moisture, dirt, and exhaust)
- Improve safety, aesthetics, and drag
- Airtight seal results in improved noise, vibration, and harshness (NVH) enhancements
- Higher strength for increased glass retention

WHERE TO USE AN ELASTOMERIC STRUCTURAL PRODUCT:

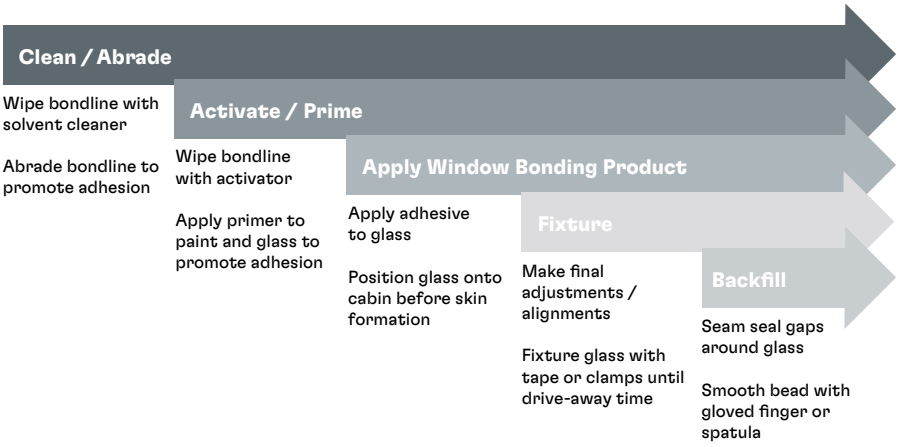
- Bonding and sealing windscreens
- Bonding of floor panels
- Sealing between panes of glass
- Stationary windows and sunroofs
- Backfilling large gaps and voids
- Bonding headliner and upholstery

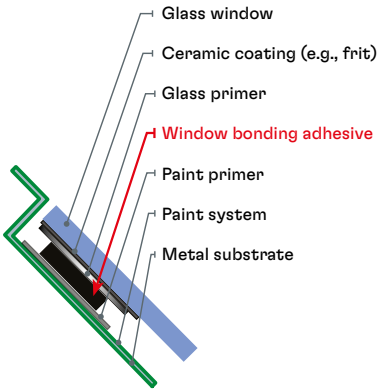
TYPES OF ELASTOMERIC STRUCTURAL PRODUCTS

- Single-component, moisture-cure or accelerated PU-and SMP-based adhesives
- Accelerated single-component, PU-and- SMP-based adhesives
- Two-part (2C), PU-and- SMP-based adhesives
- High modulus or low modulus adhesives
- Primers or activators

TYPICAL WINDSCREEN INSTALLATION PROCESS

HOW TO USE WINDOW BONDING PRODUCTS





CROSS SECTION OF TRADITIONAL WINDOW BONDING APPLICATION

ELASTOMERIC STRUCTURAL BONDING

ELASTOMERIC STRUCTURAL BONDING ADHESIVES

Elastomeric structural bonding adhesives are widely utilized to bond front windscreens and side glass to rail vehicles. These materials eliminate the need for rubber seals, leading to improved vehicle appearance. Elastomeric adhesives are also ideal for large panel bonding of specialty vehicle and rail structures. While increasing aesthetics, lightweighting the vehicle, and still maintaining structural strength, elastomeric adhesives also maintain elasticity for improvement of torsional stiffness and accomodation of differential thermal expansion.

ADHESIVE FEATURES

- Offer high elongation to accommodate movement due to thermal expansion and contraction
- Allow for high dispense rates for large parts
- One-and-two-part adhesives available
- When accelerated, will cure large gaps independent of atmospheric moisture

Product	Chemistry	APAC	EU	NA	Color	Mix Ratio	Tack Free Time (min)	Cure Time (hours)	Tensile Strength MPa	Shear Strength Steel - MPa	Elonga-tion %	Hard-ness Shore A	Description
TEROSON® MS 9320 SF	MS Polymer	✓	✓	✓	Gray, Black	1k	8~20	4.5 mm /24 h	N / A	N / A	N / A	30	Excellent for lamination and sealing
TEROSON® MS 937	MS Polymer	✓	✓		White, Black, Grey	1k	5~15	4 mm /24 h	3.0	N / A	220	50	General-purpose bonding, longer open time to allow part alignment faster setting than MS 939
TEROSON® MS 939	MS Polymer	✓	✓		White, Off-white, Grey, Black	1k	4~10	3 mm /24 h	3.0	N / A	250	55	General-purpose bonding adhesive with very good environmental resistance
TEROSON® MS 939 FR	MS Polymer	✓	✓	✓	Black, Grey	1k	6~20	3 mm /24 h	3.5	N / A	180	55	Flame-resistant, adhesive and sealant, DIN 6701 data available
TEROSON® MS 940*	MS Polymer				Black	1k	30	2.5 mm/ 24 h	6.1	N / A	590	52	Interior and exterior sealing. High Mechanical Performance
TEROSON® MS 949 FR	MS Polymer		✓	✓	Black, Grey	1k	30	3 mm /24 h	2.8	N / A	250	55	Flame-resistant, adhesive and sealant with improved adhesion, DIN 6701 data soon available
TEROSON® PU 8590 N/MT	Polyurethane	✓			Black	1k	30	4 mm /24 h	6.0	4~5	550	50	General-purpose adhesive; Exclusive to India
TEROSON® PU 8590 UHV BUS	Polyurethane		✓		Black	1k	25	4 mm /24 h	8.0	5	450	60	Good UV resistance, smooths well, requires primer, DIN 6701
TEROSON® SMOOTH AGENT V01 RAIL	Water-base	✓			Clear	1k	N / A	N / A	N / A	N / A	N / A	N / A	Smooth agent, no odor, no bleeding

Product	Chemistry	APAC	EU	NA	Color	Mix Ratio	Tack Free Time (min)	Tensile Strength MPa	Shear Strength Steel - MPa	Elonga-tion %	Hard-ness Shore A	Description
TEROSON® MS 939 FR 2C	MS Polymer	✓	✓		Black	Static Mix (10:1)	40~45	3.5	N / A	180	55	Greater depth of cure and cure independent of atmospheric moisture
TEROSON® MS 949 FR 2C	MS Polymer		✓	✓	Black, Grey	Static Mix (10:1)	30	2.3	N / A	315	55	Flame-resistant, adhesive and sealant with improved adhesion, DIN 6701 data soon available. 2C cartridges
TEROSON® MS 647 2C	MS Polymer		✓		Black, Grey, White	Static Mix (10:1)	15~20	2.8	N / A	300	45	Fast cure 2C SMP adhesive for general purpose bonding applications
TEROSON® MS 9322 SF 2C	MS Polymer		✓		Grey	Static Mix (10:1)	20	1.4	N / A	360	24	Fast cure low viscosity SMP adhesive for laminations. Can be spread or sprayed
TEROSON® MS 9399	MS Polymer	✓	✓		Black, Grey, White	Static Mix (1:1)	30	3.0	3	150	55	High cure-through depth, DIN 6701 data available

* For more information, please get in touch.

RIGID STRUCTURAL BONDING AND SMALL PART BONDING

RIGID STRUCTURAL BONDING ADHESIVES

Rigid bonders can be used for constant fixturing to hold primary structures together. They are used in place of mechanical fasteners and thereby reduce leaks, eliminate galvanic corrosion issues, improve vehicle aesthetics, and allow for lighter weight vehicles for better fuel efficiencies.

ADHESIVE FEATURES

- High strength bonds
- Can be used to bond dissimilar substrates

Product	Chemistry	APAC	EU	NA	US	Mix Ratio	Fixture Time (min)	Cure Time (hours)	Tensile Strength MPa	Shear Strength Steel - MPa	Elongation %	Hardness Shore D	Description
LOCTITE® AA H3000	Acrylic	✓	✓	✓		1:1	15	24	28.2	28.6	25	N / A	Easy to use, one- to-one mix ratio
LOCTITE® AA H8000	Acrylic	✓		✓		10:1	30	24	14.8	22.9	13	70	Robust, works on oily metal, excellent weather resistance
LOCTITE® EP 5089	Epoxy	✓	✓	✓		1k, heat cure	N / A	10 min. at 155°C	>30	31.1	9	68	Toughened heat cure epoxy, high shear, peel, impact, and thermal resistance
LOCTITE® AA 3560	Acrylic	✓				10:1	25	24	19	21	30	69	Halogen-free, for tough, impact-resistant applications
LOCTITE® AA 3300	Acrylic	✓				10:1	40	24	7-8	8	>100	N / A	Low shrinkage,high peel strength and impact strength
TEROSON® EP 5065	Epoxy	✓	✓		✓	2:1	600	48	36	23	3	N / A	2C epoxy for structural bonding applications low viscosity
LOCTITE® EA 9466	Epoxy	✓	✓			2:1	180		32	37	3	60	2C epoxy for structural bonding applications low viscosity
LOCTITE® UK 8326 B30	Polyurethane		✓			4:1	45~60	5~7 days	N / A	N / A	N / A	N / A	2C polyurethane for semi structural applications high viscosity
LOCTITE® UK 8155 B30	Polyurethane		✓			3.8:1	45~75	5~7 days	N / A	N / A	N / A	N / A	2C polyurethane for semi structural applications low viscosity
LOCTITE® UK 8103 B15 / UK 5400	Polyurethane	✓	✓			3.9:1 by volume	70~90	72	N / A	>6	N / A		Panel lamination adhesive
LOCTITE® UK 88 / UK 5400	Polyurethane	✓				5:1 By weight	60	120	N / A	>6	N / A	N / A	Panel lamination adhesive
CERESIT® R 710	Polyurethane	✓				5:1 By weight	30	120	N / A	>6	N / A	N / A	Panel lamination adhesive

ADHESIVES FOR SMALL PART BONDING

When dealing with smaller components, the strength requirements are often very different. With a small bond area, a much higher strength per contact area is required than with larger parts. Smaller parts can also have different requirements under influences such as thermal cycling.

ADHESIVE FEATURES
- Rapid fixture
- Normally primerless

Product	Chemistry	APAC	EU	NA	Mix Ratio	Pot Life (min)	Cure Time (hours)	Tensile Strength MPa	Shear Strength Steel - MPa	Elongation %	Hardness Shore D	Description
LOCTITE® EA 9450	Epoxy		✓		1:1	13	24	17	23	40	70	Ultra tough, impact resistant
LOCTITE® EA E-20HP	Epoxy	✓		✓	2:1	20	24	39	23	8	80	High strength with exceptional toughness
LOCTITE® EA E-60HP	Epoxy	✓		✓	2:1	60	24	35	30	9	80	High strength with extended cure life and exceptional toughness
LOCTITE® EA E-120HP	Epoxy	✓		✓	2:1	120	24	40	29	10	N / A	Non-sag epoxy with extended open time to allow alignment
LOCTITE® EA 9460	Epoxy	✓			1:1	60	24	30.3	24	3.5	> 75	Non-sag slump resistance, Impact resistant , Fatigue resistant
LOCTITE® EA E-120FR	Epoxy	✓			1:1 by weight	120	48	15	10	10	80	casting system with excellent handling properties

Product	Chemistry	APAC	EU	NA	Mix Ratio	Fixture Time (min)	Cure Time (hours)	Tensile Strength MPa	Shear Strength Steel - MPa	Elongation %	Hardness Shore D	Description
LOCTITE® HY 4070	Hybrid	✓	✓		10:1	1	24	15	25	5	65	Rapid curing product for metal and plastic part bonding
LOCTITE® HY 4080GY	Hybrid	✓	✓	✓	1:1	10	24	11	26	80	72	Rapid fixturing hybrid adhesive
LOCTITE® 480	Cyanoacry-late	✓	✓	✓	1k	2	24	20	26	N / A	N / A	Toughened instant adhesive
LOCTITE® 406	Cyanoacry-late	✓	✓	✓	1k	0.3~0.8	24	13	15.5	N / A	N / A	Instant adhesive for rubbers
LOCTITE® 403	Cyanoacry-late	✓	✓	✓	1k	0.3~0.8	24	30	20.3	N / A	N / A	Instant adhesive for general purposes
LOCTITE® HY 4090GY	Hybrid	✓	✓	✓	1:1	3	168	7.1	17	N / A	67	Rapid fixturing hybrid adhesive with maximum chemical resistance

ELASTOMERIC SEALING

ELASTOMERIC SEALANTS

Henkel's elastomeric sealants are formulated to provide a long- term durable seal in both indoor and outdoor environments.Elastomeric sealants can provide the necessary elongation for movement between parts during expansion and contraction, can be used to seal gaps and areas where there may be leaks, and can keep foreign materials at bay. Henkel SMP materials are compatible with most paint systems to allow seamless blending with the exterior finish for enhanced vehicle aesthetics.

ADHESIVE FEATURES

- One component cure for easy application
- UV stability
- High elongation to accommodate thermal expansion of the panels being sealed
- High elongation to allow for increased joint movement

Product	Chemistry	APAC	EU	NA	Color	Cure Mechanism	Tack Free Time (min)	Cure Time (hours)	Tensile Strength MPa	Shear Strength Steel - MPa	Elongation %	Hardness Shore A	Description
TEROSON® MS 660	MS Polymer		✓		Clear	Moisture	4	2 mm/ 24 h	2.0	N / A	230	40	Transparent. Interior or exterior sealing
TEROSON® MS 930	MS Polymer	✓	✓	✓	Black, White, Grey	Moisture	10~40	4 mm/ 24 h	0.9	N / A	250	30	Low modulus, high elongation sealant for interior and exterior usage
TEROSON® MS 935	MS Polymer	✓	✓		Black, White, Grey	Moisture	5~20	3 mm/ 24 h	2.8	N / A	230	50	Interior and exterior sealing. High environmental resistance
TEROSON® MS 940*	MS Polymer				Black	Atmospheric Humidity	30	2.5 mm/ 24 h	6.1	N / A	590	52	Interior and exterior sealing. High Mechanical Performance
TEROSON® MS 949 FR	MS Polymer		✓	✓	Black, Grey	Moisture	30	3 mm /24 h	2.8	N / A	250	55	Flame-resistant, adhesive and sealant with improved adhesion, DIN 6701 data soon available
TEROSON® MS 9320 SF	MS Polymer	✓	✓	✓	Grey	Moisture	8~20	4.5 mm/ 24 h	N / A	N / A	N / A	30	sprayable, bead-application, brushable after application
TEROSON® RB 2759	Rubber		✓		Grey	Solvent Evaporation	N / A	N / A	N / A	N / A	N / A	N / A	Rubber sealant for mechanically mounted windows
TEROSON® RB 4006	Rubber	✓	✓		Grey	Solvent Evaporation	20~30	1~2 weeks	N / A	N / A	N / A	N / A	Rubber sealant for mechanically mounted windows

* For more information, please get in touch.

ELASTOMERIC BONDING PRIMERS / CLEANERS

Most elastomeric bonding systems can benefit from the use of a primer in order to promote adhesion. Some primers also contain a UV blocking agent that when used for glass bonding, protects the bond line from UV light, and eliminates UV degradation of bond strength over time. Henkel provides a range of cleaners that are ideal for ensuring a clean surface for bonding products to deliver maximum performance.

ADHESIVE FEATURES

- Improved adhesion to surfaces
- Rapid preparation time for bonding
- Faster curing
- Increased depth of cure
- Protection from UV

Product	Chemistry	APAC	EU	NA	Color	Cure Mechanism	Dry Time (min)	Active Time	Description
TEROSON® PU 8517H	Solvent	✓	✓		Black	Evaporation	> 5	3 months	Long open time black primer that protects bonds from UV and improves adhesion on glass and ceramic frit
TEROSON® PU 8519P	Solvent	✓	✓	✓	Black	Evaporation	1K > 2 2C > 15	60 min	Black primer that protects bond lines from UV and improves adhesion on glass and ceramic frit. Fast evaporation time
TEROSON® PU 8511	Solvent	✓	✓		Black	Evaporation	0.5~5	4 days	Black primer that protects bond lines from UV and improve adhesion on materials, especially glass and ceramic frit
TEROSON® PU 8550	Solvent	✓	✓		Clear	Evaporation	0.5	N / A	Isopropanol cleaner for paint and glass
TEROSON® PU 8560 AC-25	Solvent		✓	✓	Clear	Evaporation	> 30 sec	60 min	Activator / cleaner used to improve adhesion of PU materials
TEROSON® SB 450	Solvent	✓	✓	✓	Clear	Evaporation	0.5	60 min	Activator / cleaner used to improve adhesion on MS polymer and silicone materials. Has UV marker to inspect application under black light to verify application
TEROSON® VR 10	Solvent		✓		Clear	Evaporation	0.5	N / A	Cleaner designed to be used in window glazing to clean surface and remove silicone residue



LOCTITE®

TEROSON®





NOISE, VIBRATION, HARSHNESS METAL REINFORCMENT

NVH AND PROTECTIVE *COATINGS*

CREATE STRONGER AND QUIETER EQUIPMENT

Henkel's solutions to reduce noise, vibration, and harshness (NVH) were originally designed for automotive vehicle cabins and are now used in rail equipment manufacturing. Our TEROSON® brand NVH solutions and LOCTITE® brand adhesives and sealants help enhance material properties and minimize noise.



NVH SOLUTIONS

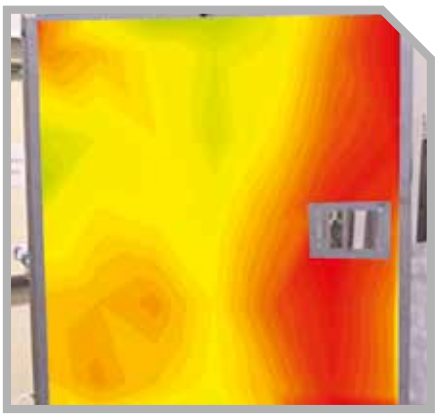
Henkel is a leading source worldwide for NVH (noise, vibration, and harshness) solutions. We provide advanced NVH technologies and comprehensive design and engineering support to our customers. Henkel has been an NVH partner with the top automotive manufacturers for more than 20 years, and our expertise helps rail equipment manufacturers create dimensionally stronger and quieter products. Our TEROSON® brand NVH solutions and LOCTITE® brand adhesives and sealants help enhance material properties and minimize audible noises.

NVH PRODUCT PORTFOLIO AND TECHNOLOGIES

- Henkel offers a full portfolio of NVH solutions in five categories – **reinforcement, damping, sealing, absorption, and barrier** – detailed in Figure 1.
- Our portfolio covers **15 core technologies** through the frequency range of 20 Hz up to 20 kHz. In addition, our capabilities allow us to provide solutions outside our core technologies.
- We provide effective solutions to **airborne noise and structure-borne noise**, as well as **vibration and sound leakage.**
- We help our customers achieve **high performance sealing and save on process cost** through automation.

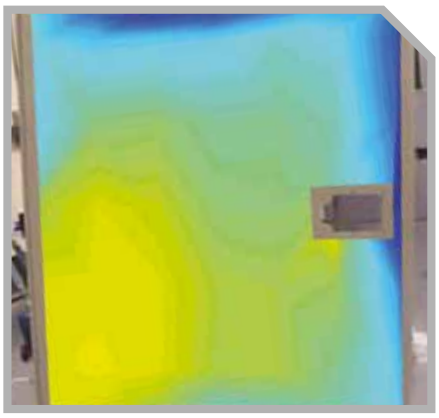
VIBRATION RESPONSE TEST (FIGURE 2)

> BEFORE



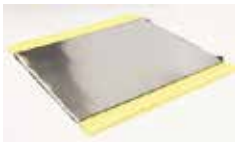
Vibration response test for side panel. Red / yellow indicates high levels of vibration.

> AFTER



Test results for side panel using Henkel expandable material. Blue / green indicates low levels of vibration.

NOISE, VIBRATION, AND HARSHNESS SOLUTIONS (FIGURE 1)

	REINFORCEMENT	DAMPING	SEALING	ABSORPTION	BARRIER
Application					
Need	Increase stiffness, shift resonant frequency	Attenuate vibration of panel structure	Isolate noise sources	Reduce reverberant noise	Block sound transmission
Solution	Reinforce with stiffening pads	▪ Liquid applied sound deadener ▪ Water-based damping ▪ High damping foam ▪ Constrained layer pads	Semi-Structural Adhesive / Sealant	Acoustic Barrier / Absorber	
	▪ Structural vibration reduction ▪ Allows metal design with thinner panels ▪ Reduction in mass	▪ High loss factor performance ▪ Structural vibration reduction ▪ Improves NVH performance ▪ Converts vibration into thermal energy ▪ Reduction in sound pressure levels ▪ Easy to apply on various substrates	▪ Less welding ▪ Less corrosion ▪ Process cost savings through automation	▪ High Sound Transmission Loss (STL) performance ▪ High absorption performance ▪ Tunable performance ▪ Complexity reduction	

NVH TECHNOLOGY OVERVIEW

FREQUENCY: 16 kHZ – 1 kHZ – 100 HZ – 20 HZ

AIRBORNE NOISE	BARRIER	> Multilayer with EVA Sound Insulation
	ABSORPTION	> Fiber (Nonwoven) Absorber > Open Cell Foam Absorber
	SEALING	> Preformed Mastic Parts (Non-Expanding) > Preformed Parts: Expandable Soft Foams
STRUCTURAL NOISE	DAMPING	> Bitumen Sheets > Constrained Layer Damping Pads (CLD) > Aqueous Synthetic Damping - Large Surface (rail) > Liquid Applied Sound Deadener (LASD) > Pumpable Anti-Flutter
	REINFORCEMENT	> Bonding With Semi-Structural Adhesives > Bonding With Structural Adhesives > Injection of Structural Hard Foams - RT - RIM > Preformed Parts: 3D Structural Foam - Thin Gauge Metal (auto) > Preformed Parts: 2D Structural Tapes and Pads

ACOUSTIC COATINGS / PADS FOR NOISE CONTROL

INTERIOR NVH COATINGS

Henkel is a leading provider of materials designed to be applied to the interior shell of rail coaches to reduce noise, vibration and harshness to ensure passenger comfort. These products are ideal for interior applications where there is a need to reduce sound from flat surfaces producing noise within a sealed structure.

ADHESIVE FEATURES

- Easy to apply
- Solvent-free
- Spray applied formula available
- Low VOC

Product	APAC	EU	NA	Service Temperature	Color	Drying Time (4 mm Wet Film) (Din En Iso 291) Hours	Loss Factor For 2 mm Dry Film Din En Iso 6721-3 (20°C, 200 Hz, Sheet Steel 1 mm)	Density, Wet / Dry G / cm^3	Solids Content %
TEROSON® WT 112 DB	✓	✓		-50°C to 120°C	Beige	24	≥0.22	1.40 / 1.20	67
TEROSON® WT 123 FRF	✓			-50°C to 120°C	Beige	24	≥0.22	1.40 / 1.20	66 - 72
TEROSON® WT 5111 LW RAIL	✓			-50°C to 120°C	Beige	24	≥0.15	1.0 / 0.9	68 - 75
TEROSON® WT 123 WF RAIL	✓			-50°C to 120°C	Beige	24	≥0.15	1.40 / 1.3	68 - 75
TEROSON® WT 123 WF	✓			-50°C to 120°C	Beige	24	≥0.19	1.40 / 1.3	73
TEROSON® WT 129	✓	✓	✓	-50°C to 120°C	Beige	24	≥0.19	1.34 / 1.2	70

INTERIOR DAMPING PAD

Henkel interior damping pads are designed to control noise and vibration in rail vehicle cabins by increasing the damping characteristics of metal structures. Based on butyl rubber technology, these solutions deliver effective NVH performance, improved passenger comfort, and long-term durability.

PRODUCT FEATURES

- Butyl Rubber
- High vibration damping performance
- Effective structure-borne noise reduction
- Easy installation

Product	APAC	EU	NA	Service Temperature	Color	Loss Factor For 2 mm Dry Film Din En Iso 6721-3 (20°C, 200 Hz, Sheet Steel 1 mm)	Density, Wet / Dry G / cm^3	Solids Content %
TEROSON® RB D203	✓			-10°C to 50°C	Black	≥0.2	1.35	99
TEROSON® RB 203H	✓			-10°C to 50°C	Black	≥0.2	2.0	99

UNDERBODY PROTECTIVE COATINGS

TEROSON® protective coatings are designed to be applied to the bottom of rail carriages. They protect the bottom of the vehicle from stone and other damage by forming a continuous coating that is impact-and- water-resistant. The coatings ultimately maintain the structural integrity of the floor system and reduce noise to produce a quieter environment for passengers.

ADHESIVE FEATURES
- Easy to apply
- Noise reduction
- Anti-stone / chip

Product	APAC	EU	NA	Color	Drying Time (4 mm Wet Film) (Din En Iso 291) Hours	Loss Factor For 2 mm Dry Film Din En Iso 6721-3 (20°C, 200 Hz, Sheet Steel 1 mm)	Density, Wet / Dry G / cm³	Solids Content %	Notes
TEROSON® WT 218	✓			Grey	22 - 48 depending on thickness applied	≥ 0.05	1.23	67	High Abrasion Resistance
TEROSON® WT 218 RAIL	✓			Grey	24 - 48 depending on thickness applied	≥ 0.05	1.23	70	
TEROSON® WT 218 FR 200	✓	✓	✓	Grey	21 - 48 depending on thickness applied	≥ 0.05	1.23	77	Good Fire Behavior

UNDERBODY FIRE RETARDANT DAMPING COATING

TEROSON® fire retardant damping coatings are designed to be applied to the bottom of rail carriages. It's a new-generation, water-based and environmentally friendly coating.

Under ambient temperature conditions (in the absence of a fire), it provides damping performance equivalent to that of conventional damping compound products, effectively reducing vibration and noise.

When exposed to high temperatures or fire conditions, the fire-retardant damping coating exhibits an initial expansion temperature of 150°C and an expansion ratio of approximately 50–100 times, delivering fire protection performance equivalent to that of standard water-based fire-retardant coatings.

ADHESIVE FEATURES
- Easy to apply
- Noise reduction
- Structure fire retardant
- Anti-stone / chip

Product	APAC	EU	NA	Color	Drying Time (4 mm Wet Film) (Din En Iso 291) Hours	Loss Factor For 2 mm Dry Film Din En Iso 6721 - 3 (20°C, 200 Hz, Sheet Steel 1 mm)	Density, Wet / Dry G / cm³	Solids Content %	Notes
TEROSON® WT 4111 FR RAIL	✓			Grey, Black	22 - 48 depending on thickness applied	≥ 0.05	1.26	70	High structure FR performance
TEROSON® WT 4111 FRS RAIL	✓			Grey, Black	24 - 48 depending on thickness applied	≥ 0.05	1.26	70	Fast cure

ANTI-SLIP FLOOR COATINGS AND UNDERBODY PROTECTIVE COATINGS / CLEAR COATS

ANTI-SLIP FLOOR COATINGS

Rail service workers often need to work on the roof or access areas using narrow passages. Coating these low-traffic, but potentially higher risk areas with our anti-slip floor coatings reduces job-related slips and falls and increases workplace safety. These coatings are also recommended for ramps, stairs, walkways, and other pedestrian service areas.

ADHESIVE FEATURES

- Roller, spray, and trowel applications available
- Can be used on multiple surfaces
- Good flexibility
- Work in wet environment
- Good chemical, moisture, and UV resistance
- Indoor and outdoor suitable

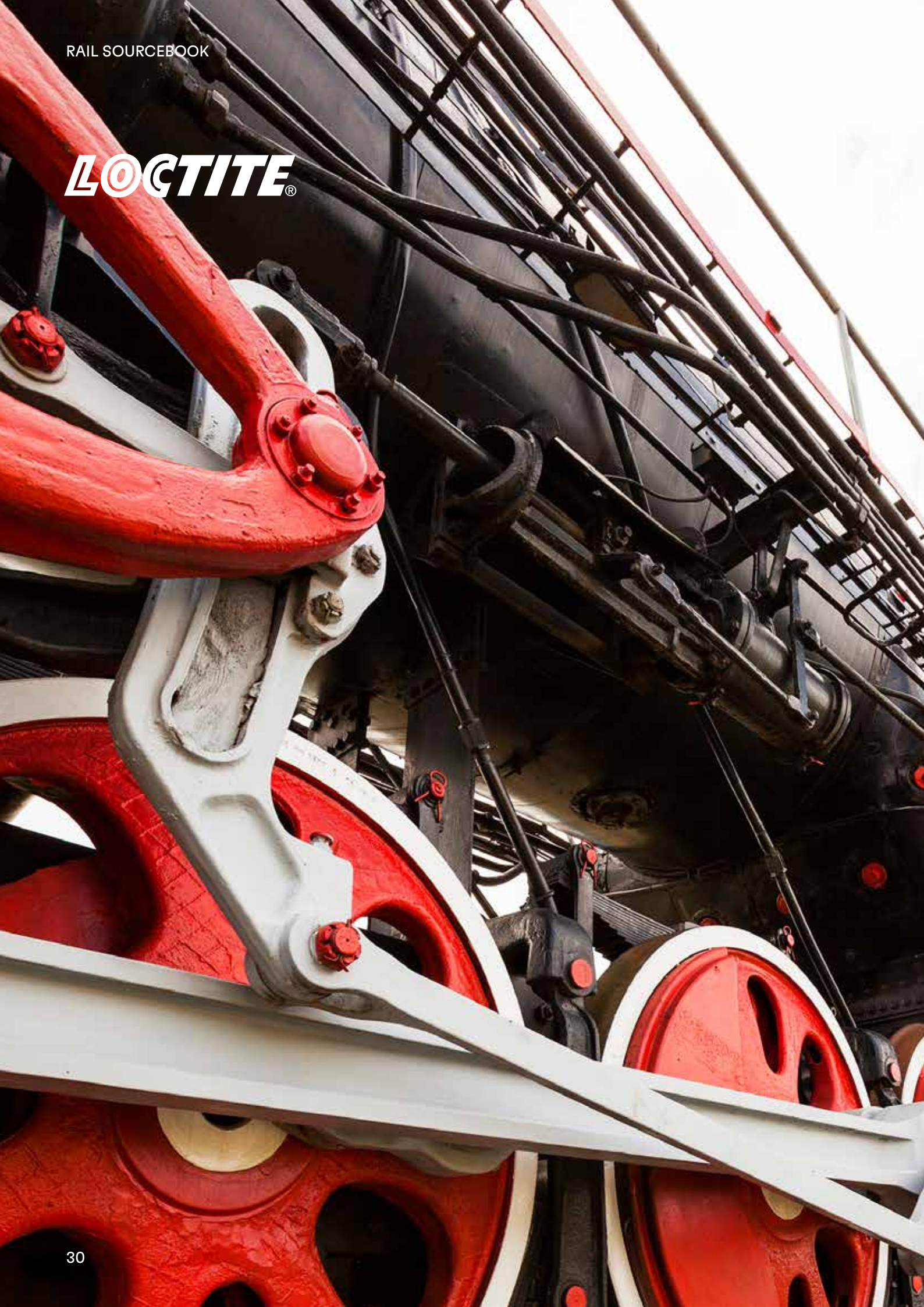
Product	APAC	EU	NA	Chemical Base	Color	Uv Resistant	Wet Exposure	Recommended Primer Metal Surfaces	Recommended Primer Wood, Tile, and Porous Surfaces	Use For	Also Known As
LOCTITE® PC 2760 RAIL	✓			Epoxy	Black	Some	Intermitten	LOCTITE® PC 7643 Metal Primer	LOCTITE® PC 6241 Water-Based Primer	Wood, concrete, and metal surfaces to increase traction to minimize falls. Not for continuously wet environments.	Heavy Duty Pedestrian Grade
LOCTITE® PC 2760 RAIL CN	✓			PE	Grey	Yes	Yes	LOCTITE® PC 7643 Metal Primer	LOCTITE® PC 6241 Water-Based Primer	Wood, concrete, and metal surfaces to increase traction to minimize falls. Not for continuously wet environments	N / A
LOCTITE® PC 6255			✓	Acrylic	Grey or Black	Yes	Yes	LOCTITE® PC 7643 Metal Primer	LOCTITE® PC 6253 Acrylic Primer	Best for metal surfaces subject to thermal cycling due to good flexibility.	Acrylic Pedestrian Grade
LOCTITE® PC 6261			✓	Epoxy	Grey or Black	Some	Intermitten	LOCTITE® PC 7643 Metal Primer	LOCTITE® PC 6241 Water-Based Primer	Wood, concrete, and metal surfaces to increase traction to minimize falls. Not for continuously wet environments.	Heavy Duty Pedestrian Grade
LOCTITE® PC 4400		✓	✓	Hybrid	Clear	Yes	Yes			Railway tank cars, chemical tanks, heavy duty equipment, anodized aluminum	Protective coating for paints (clear coat)

For metal surfaces we recommend a primer to ensure optimal adhesion and service life.

Anti-slip floor coatings can be applied by the OEM manufacturer or the end transit or rail operator.



LOCTITE®



MACHINERY ADHESIVES AND *MAINTENANCE*



THREADLOCKING, THREADSEALING, RETAINING, GASKETING, LUBRICATING, AND REPAIRING WITH LOCTITE® PRODUCTS

Henkel's wide range of LOCTITE® threadlocking, thread sealing, gasketing, and retaining products help manufacturers increase reliability and reduce downtime. Our innovative and reliably engineered adhesives replace mechanical locking and sealing methods, prevent loosening from vibration, strengthen the assembly, and protect against leaks and corrosion.

THREAD SEALING

LOCTITE® anaerobic thread sealants prevent leakage of gases and liquids. Designed for low pressure and high pressure applications, they fill the space between threaded parts and provide an instant, low pressure seal. When fully cured, they seal to the burst strength of most pipe systems. Thread Sealants prevent loosening from shock and vibration, as well as fill air voids to prevent leakage of fluid / gas being sealed.

ADVANTAGES VERSUS TRADITIONAL SEALANT TYPES

- Single component – clean and easy to apply or automate
- Allows for precision alignment, versus PTFE tapes which do not allow adjustment
- Can be used on any size of pipe fitting
- Resists vibration and shock loads
- Protect mated threaded areas against corrosion and galling

	Product	APAC	EU	NA	Typical use	Color and Appearance	Viscosity (cP)	Temperature Range	Pressure Resistance (psi)	Recommended Primer	Agency Approvals
Hydraulic and Pneumatic	LOCTITE® 542 PIPE SEALANT	✓	✓		Hydraulic lines, smaller pneumatic fittings	Brown	2,000	-65°F to 300°F (-54°C to 149°C)	10,000	SF 7088, SF 7649, or SF 7471	DVGW WRAS
	LOCTITE® 5452 THREAD SEALANT			✓	Pneumatic hydraulic sealant, no fillers	Purple	29,000 / 200,000 thixotropic	-65°F to 300°F (-54°C to 149°C)	10,000	SF 7088, SF 7649 or SF 7471	
	LOCTITE® 545 PIPE SEALANT	✓	✓	✓	Hydraulic lines, smaller pneumatic fittings	Purple	14,000	-65°F to 300°F (-54°C to 149°C)	10,000	SF 7088, SF 7649, or SF 7471	ABS, CFIA
General-Purpose	LOCTITE® 561 PIPE SEALANT	✓	✓	✓	General-purpose, portable, overhead	White Paste	Semisolid	-65°F to 300°F (-54°C to 149°C)	10,000	SF 7088, SF 7649 or SF 7471	UL Classified for U.S., CFIA Listed, NSF / ANSI 61
High Temperature	LOCTITE® 567 THREAD SEALANT	✓	✓	✓	For stainless steel and all other metal fittings; designed for Taper / Taper NPT Fittings	White	540,000	-65°F to 400°F (-54°C to 204°C)	10,000	SF 7088, SF 7649 or SF 7471	UL Classified for U.S., ABS, CFIA Listed, NSF / ANSI 61, ULC Classified for Canada
	LOCTITE® 577 THREAD SEALANT	✓	✓	✓	For European taper to straight piping standard	Yellow	24,000 / 80,000 Thixotropic	-65°F to 260°F (-54°C to 180°C)	10,000	SF 7088, SF 7649 or SF 7471	DGVW, NSF P1
	LOCTITE® 5400	✓	✓		Locking and sealing of metal threaded pipes and fittings	Yellow to dark orange	5,000~ 20,000	-65°F to 300°F (-55 °C to 150°C)		SF 7091, SF 7649 or SF 7471	DVGW WRAS, SVGW, NSF, KTW

LOCTITE® ACTIVATORS

Product	APAC	EU	NA	Color	Viscosity (cP)	Base	On-Part Life	Dry Time	Application	Agency Approvals
LOCTITE® SF 7088	✓		✓	Teal	Semisolid	No solvent	30 days	None	Anaerobics	MIL-S-22473E for existing designs, ASTM D-5363 for new designs
LOCTITE® SF 7471	✓	✓	✓	Amber	2	Acetone / Isopropanol	7 days	30 to 70 seconds	Anaerobics	MIL-S-22473E for existing designs, ASTM D-5363 for new designs
LOCTITE® SF 7649	✓	✓	✓	Clear / Green	2	Acetone	30 days	30 to 70 seconds	Anaerobics	MIL-S-22473E for existing designs, ASTM D-5363 for new designs, NSF / ANSI 61, NSF P1, CFIA Listed

THREADLOCKING

LOCTITE® threadlockers dramatically increase the reliability of threaded assemblies. Available as liquid and semisolid adhesives, LOCTITE® threadlockers are applied to the threads of a fastener and cure to a hard thermoset plastic when situated between metal surfaces. They cure in the absence of air and completely fill the gaps between mating threads to lock and seal threads and joints. Threadlockers bond metal fasteners to prevent loosening from shock and vibration, as well as fill voids to seal and protect threads from rust and corrosion.

ADVANTAGES VERSUS TRADITIONAL SEALANT TYPES

- Fill air void to seal and protect threads from rust and corrosion
- Single component – clean and easy to apply or automate
- Can be used on various sizes of fasteners – reduced inventory costs
- Prevents unwanted movement, loosening, leaks, and corrosion
- Resist vibration

	Key Features	Product	APAC	EU	NA	Typical use	Package Type and Size	Color	Viscosity** (cP)	Torque*** In.-Lbs. (Break / Prevail)	Tempe-rature Range	Cure Speed (Steel At 25°C)	Agency Approvals
Low Strength	Small Fasteners	LOCTITE® 222 THREADLOCKER	✓	✓	✓	Small screws under 1/4 in	10 ml bottle 50 ml bottle	Purple	1,200 / 5,000 Thixotropic	53 / 30	-65°F to 300°F	Fixture – 20 min Full – 24 hrs	N / A
Medium Strength	General-Purpose	LOCTITE® 243 THREADLOCKER	✓	✓	✓	1/4 in to 3/4 in bolts with light oil contamination	50 ml bottle 250 ml bottle 1 liter bottle	Blue	1,300 / 3,000 Thixotropic	230 / 40	-65°F to 360°F	Fixture – 10 min Full – 24 hrs	NSF / ANSI 61, CFIA Listed
	Semisolid Stick	LOCTITE® 248 THREADLOCKER	✓	✓	✓	1/4 in to 3/4 in bolts, overhead, pre-dispensed, hard-to-reach areas	9 g stick 19 g stick	Blue	Semisolid	110* / 43	-65°F to 300°F	Fixture – 5 min Full – 24 hrs	CFIA Listed
	Tape	LOCTITE® 249 THREADLOCKER TAPE			✓	1/4 in to 3/4 in bolts, overhead, pre-dispensed, hard-to-reach areas	260 in roll	Blue	Tape	74 / 47	-65°F to 300°F	Fixture – 30 min Full – 24 hrs	CFIA Listed
High Strength	General-Purpose	LOCTITE® 263 HIGH STRENGTH THREADLOCKER	✓		✓	High strength	50 ml bottle 250 ml bottle 1 liter bottle	Red	400 / 600	290 / 290*	-65°F to 360°F	Fixture – 10 min Full – 24 hrs	NSF / ANSI 61, CFIA Listed
	Semisolid Stick	LOCTITE® 268 THREADLOCKER – HIGH STRENGTH	✓	✓		Up to 3/4 in bolts, overhead, pre-dispensed, hard-to-reach areas	9 g stick 19 g stick	Red	Semisolid	220* / 34	-65°F to 300°F	Fixture – 5 min Full – 24 hrs	CFIA Listed
Wicking Grade	General-Purpose	LOCTITE® 270 THREADLOCKER	✓		✓	High strength	50 ml bottle 250 ml bottle 1 liter bottle	Red	400 / 600	290 / 290*	-65°F to 360°F	Fixture – 10 min Full – 24 hrs	NSF / ANSI 61
	General-Purpose	LOCTITE® 277 THREADLOCKER	✓			High strength, locking and sealing of large bolts and nuts (M25+)	50 ml bottle 250 ml bottle	Red	6,000 / 8,000	280 / 280	-65°F to 360°F	Fixture – 30 min Full – 24 hrs	Mil-S-46163A
	General-Purpose	LOCTITE® 290 THREADLOCKER	✓	✓	✓	Medium / high strength, wicking grade for preassembled parts and weld sealing	50 ml bottle 250 ml bottle 1 liter bottle	Green	25 / 55	90 / 260	-65°F to 300°F	Fixture – 20 min Full – 24 hrs	MIL-S-46163A for existing designs, ASTM D-5363†, NSF / ANSI 61, NSF P1, CFIA Listed
	Label free	LOCTITE® 2700	✓	✓		High strength, threadlocking for zinc-flake coated surfaces		Green	450	327 / 398	-55°C to +150°C	Fixture – 5 min Full – 24 hrs	WRAS BS 6920/ NSF S6
	Label free	LOCTITE® 2400	✓	✓		Medium strength, threadlocking for stainless stee		Blue	3,100	220 / 27	-55°C to +150°C	Fixture – 10 min Full – 24 hrs	WRAS BS 6920/ NSF S6
	Label free	LOCTITE® 2405		✓		Medium strength, threadlocking for stainless steel		White-Cream	3,100	220 / 27	-55°C to +150°C	Fixture – 10 min Full – 24 hrs	NSF/ANSI Standard 61 / NSF Category P1

* Break loose value.
† For new designs.

RETAINING

LOCTITE® anaerobic retaining compounds secure bearings, bushings, and cylindrical parts into housings or onto shafts. They achieve maximum load transmission capability and uniform stress distribution, and eliminate fretting corrosion. Applied as a liquid, they form a 100% contact between mating metal surfaces, eliminating the need for expensive replacement parts, time-consuming machining or the use of mechanical methods.

ADVANTAGES VERSUS CONVENTIONAL ASSEMBLY METHODS

- High shear strength – augments or replaces press fits
- 100% contact – evens distribution of load and stress
- Eliminates fretting and backlash in keys and splines
- Fills air voids to seal and protect from corrosion and fretting
- Relaxes part tolerances

LOCTITE RETAINING COMPOUNDS

Product	APAC	EU	NA	Typical use	Color	Maximum Gap Fill (Diameter-Inches)	Viscosity (cP)	Shear Strength Steel / Steel* (psi)	Temperature Range	Cure Speed*	Recommended Primer
LOCTITE® 540 RETAINING COMPOUND	✓		✓	Cup / core plug adhesive sealant	Blue	N / A	7,000 to 12,000	2,030	-65°F to 300°F (-54°C to 149°C)	N / A	SF 7649 or SF 7471
LOCTITE® 603 RETAINING COMPOUND	✓	✓	✓	For close-fitting parts with light contamination	Green	0.005 in	125	3,770	-65°F to 300°F (-54°C to 149°C)	Fixture – 10 min Full – 24 hrs	SF 7088, SF 7649 or SF 7471
LOCTITE® 620 RETAINING COMPOUND	✓	✓	✓	For high temperature applications	Green	0.005 in	8,500	3,800	-65°F to 450°F (-54°C to 232°C)	Fixture – 1 hr Full – 24 hrs	SF 7088, SF 7649 or SF 7471
LOCTITE® 638	✓	✓	✓	High strength, primerless, oil tolerant, for slip-fitted products	Green	0.010 in (0.25 mm)	2,500~ 4,500		-65°F to 355°F (-54°C to 180°C)	Fixture – 4 min Full – 24 hrs	Not Required
LOCTITE® 648 RETAINING COMPOUND		✓	✓	Fast fixturing for close-fitting parts, high strength for stainless steel	Green	0.006 in	500	3,900	-65°F to 355°F (-54°C to 180°C)	Fixture – 5 min Full – 24 hrs	SF 7088, SF 7649 or SF 7471
LOCTITE® 660 RETAINING COMPOUND	✓	✓	✓	For repair of worn machinery parts	Silve	0.020 in	250,000 / 1,500,000 Thixotropic	3,335	-65°F to 300°F (-54°C to 149°C)	Fixture – 20 min Full – 24 hrs	SF 7088, SF 7649 or SF 7471
LOCTITE® 668 RETAINING COMPOUND	✓		✓	Bonding of cylindrical fitting parts	Green	0.05 in	Semisolid	2,610	-65°F to 400°F (-54°C to 204°C)	Fixture – 30 min Full – 72 hrs	SF 7649 or SF 7471
LOCTITE® 6300	✓	✓		Bonding of cylindrical fitting parts	Green	0.15 – 0.25 mm	350	2,180	-55°C to +180°C	Fixture – 10 min Full – 24 hrs	SF 7649 or SF 7471

* Varies with substrates.

GASKETING

LOCTITE® gasketing products are self-forming gaskets that provide a perfect seal between components, with maximum face-to-face contact, eliminating flange face corrosion. They form a low-pressure seal immediately on assembly and fully cure in 24 hours, providing a joint that will not shrink, crack, or relax. They are available as anaerobic products for rigid flanges and silicone products for flexible flanges.

ADVANTAGES VERSUS CONVENTIONAL PRECUT COMPRESSION GASKETS

- Fill all voids – relaxes the tolerances and preparation of flange surfaces
- Can be used on various flange configurations – reduce inventory costs
- Eliminate shimming and compression setting – no need for re-torquing
- Seal liquids and gases, and protect flanges from corrosion
- Unitize flange assemblies for added reliability and high resistance to solvents

LOCTITE ANAEROBIC GASKETING PRODUCTS

Product	APAC	EU	NA	Color	Typical use	Gap fill (Inches)	Cured state	Viscosity (cP)*	Tempera-ture Range	Cure Speed	Recom-mended Primer	Specific Gravity	Agency Approvals
LOCTITE® 510 FLANGE SEALANT	✓	✓	✓	Red	High temp. applications, excellent solvent resistance	Unprimed – 0.010 Primed – 0.020	Rigid	90,000 / 500,000 Thixotropic	-65°F to 400°F (-54°C to 204°C)	Unprimed – 4 to 24 hrs Primed – 30 min to 4 hrs	SF 7088, SF 7471 or SF 7649	1.16	N/A
LOCTITE® 518 FLANGE SEALANT	✓	✓		Red	For all metals, including aluminum flanges	Unprimed – 0.010 Primed – 0.050	Flexible	800,000 / 3,750,000 Thixotropic	-65°F to 300°F (-54°C to 149°C)	Unprimed – 4 to 24 hrs Primed – 30 min to 4 hrs	SF 7088, SF 7471 or SF 7649	1.13	NSF / ANSI 61, CFIA Listed
LOCTITE® 5128 FLANGE SEALANT		✓		Red	For all metals, including aluminum flanges	Unprimed – 0.010 Primed – 0.020	Highly Flexible	10,000 / 50,000 Thixotropic	-65°F to 300°F (-54°C to 149°C)	Unprimed – 4 to 24 hrs Primed – 30 min to 4 hrs	SF 7088, SF 7471 or SF 7649	1.10	N/A
LOCTITE® 5188 FLANGE SEALANT	✓	✓	✓	Red	Flexible form-in-place gasket, aluminum flanges	0.25 mm	Highly Flexible	11,000~ 32,000	-65°F to 300°F (-55 °C to 150°C)	25 min		1.10	N/A

* NOTE: Different test methods were used. Please see SDS, or consult with Henkel Engineering for test specifications.

LOCTITE SILICONE GASKETING PRODUCTSS

Product	APAC	EU	NA	Color	Consistency	Oil resistance	Temperature range (intermittent)	Sealing time	Agency Approvals
LOCTITE® SI 587 BLUE, HIGH PERFORMANCE RTV SILICONE GASKET MAKER	✓		✓	Blue	Paste	Increased oil resistance	-75°F to 500°F (-59°C to 260°C)	Tack-free – 30 min Full strength – 24 hrs	NSF P1, CFIA Listed, ABS
LOCTITE® SI 5900	✓	✓	✓	Black	Paste	Oil / water resistant	-65°F to 500°F (-54°C to 260°C)	Tack-free – 30 min Full strength – 24 hrs	NSF P1, CFIA Listed
LOCTITE® SI 5699 GREY, HIGH PERFORMANCE RTV SILICONE GASKET MAKER	✓	✓	✓	Grey	Paste	Increased oil resistance	-75°F to 625°F (-59°C to 329°C)	Tack-free – 30 min Full strength – 24 hrs	CFIA Listed
LOCTITE® SI 5970	✓			Black	Paste	Oil / water resistant	-65°F to 446°F (-54°C to 230°C)	Tack-free – 25 min Full strength – 24 hrs	NA

ANTI-SEIZE LUBRICANTS

LOCTITE® anti-seize products provide lubrication as well as protection against rust, corrosion, seizing and galling. Anti- seizes are typically the products of choice for high temperature applications because of their unique ability to provide protection in extreme temperature conditions. Each product contains a combination of solid lubricating agents resulting in different high temperature limits and lubricities.

ADVANTAGES VERSUS CONVENTIONAL ASSEMBLY METHODS

- Allows for disassembly following high temperature service
- Protects from galling and seizure under high stress environment

Product	Also Known As	APAC	EU	NA	Color	Solid Lubricating Agent	Torque Coefficient	Temperature Range Celsius	Metal Free (Y / N)	Description
LOCTITE® LB 771	Nickel Anti-Seize	✓		✓	Silver	Nickel / Graphite	0.13	-30°C to 1,315°C	N	Best for very high temperature applications
LOCTITE® LB 8007	C5-A Copper-Based Anti-Seize		✓		Copper	Copper / Graphite	0.16	-30°C to 980°C	N	Copper based formula Aerosol Version spray can
LOCTITE® LB 8008	C5-A Copper-Based Anti-Seize	✓	✓	✓	Copper	Copper / Graphite	0.16	-30°C to 980°C	N	Copper based formula
LOCTITE® LB 8009	Heavy Duty Anti-Seize	✓	✓	✓	Grey	Calcium Carbonate / Graphite	0.16	-30°C to 1,315°C	Y	Metal Free, all metals but especially Stainless Steel and Aluminum
LOCTITE® LB 8023	Marine Grade Anti-Seize	✓	✓	✓	Black	Calcium Sulfonate	0.18	-30°C to 1,315°C	Y	Works well for high humidity, fresh and salt water exposure. Very high wash out resistance
LOCTITE® LB 8044	Zinc Anti-Seize			✓	Grey	Zinc	0.15	-30°C to 400°C	N	Best for salt metals. Protects aluminum and ferrous surfaces from seizure
LOCTITE® LB 8065	C5-A Copper-Based Anti-Seize			✓	Copper	Copper / Graphite	0.16	-30°C to 980°C	N	Copper based formula semi-solid stick
LOCTITE® LB 8070	Heavy Duty Anti-Seize			✓	Grey	Calcium Carbonate / Graphite	0.16	-30°C to 1,315°C	Y	Metal Free, all metals but especially Stainless Steel and Aluminum semi-solid stick
LOCTITE® LB 8150	Silver Grade Anti-Seize	✓	✓	✓	Silver	Graphite / Aluminum	0.18	-30°C to 870°C	N	Standard Anti-Seize for most applications. Very robust
LOCTITE® LB 8151	Silver Grade Anti-Seize		✓		Silver	Graphite / Aluminum	0.18	-30°C to 870°C	N	Standard Anti-Seize for most applications. Very robust Aerosol version of LB 8150
LOCTITE® LB 8507	Nickel Anti-Seize		✓		Silver	Nickel / Graphite	0.13	-30 °C to 1,315°C	N	Best for very high temperature applications Aerosol version of Product 771

GAP FILLING SOLUTIONS

FILLERS

During production there is always a requirement to produce a smooth seamless design. Due to material constraints and tolerances, products are required to build up surfaces in order to get a flush finish. This is especially noticeable where FRP parts are bonded to metal parts like end caps. FRP is dimensionally less stable than metal so body fillers are employed in the finishing operation prior to painting.

Henkel offer a wide range of such products, but due to regional chemical regulations each area has a unique offering. Please contact your Henkel representative for the local offering.

POTTING

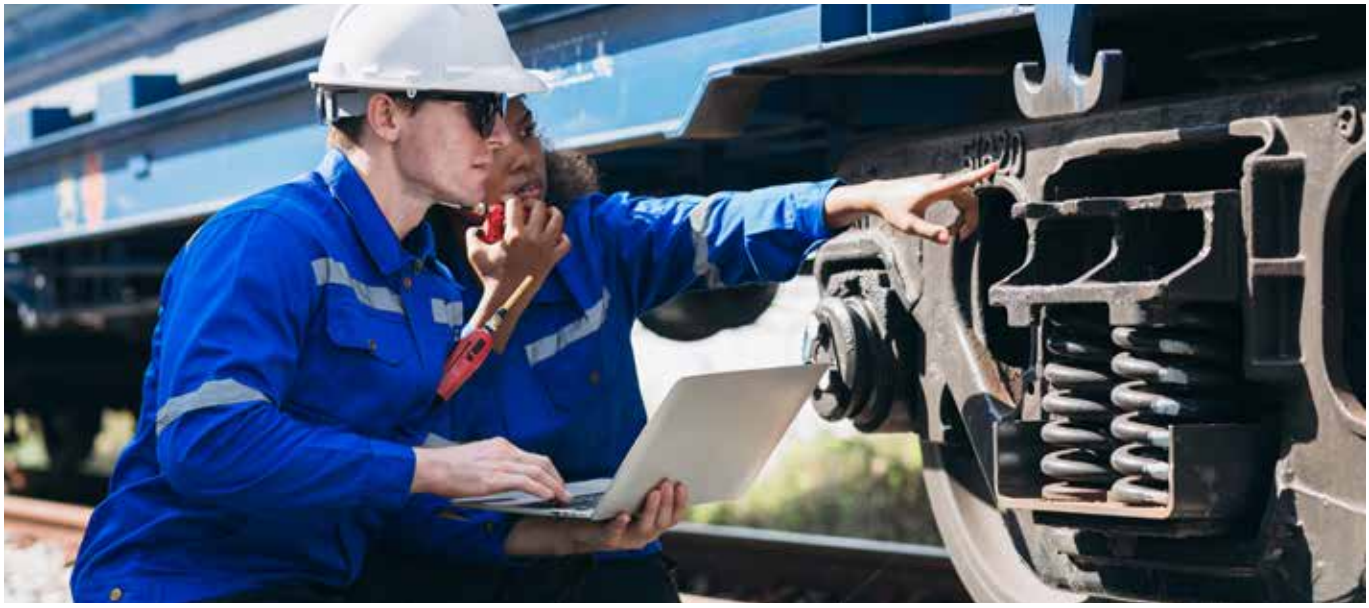
Many devices require sealing for environmental protection or tamper resistance. In the case of electrical parts, one of the most common requirements is making sure that they are sealed from exposure to water. A common solution is to use a low viscosity material called a potting compound. The low viscosity characteristic of the resin allows it to flow around and encapsulate electronic components within a structure in order to protect them from moisture.

Product selection is based on many requirements such as chemical resistance, process time, accuracy, health and safety, cure time, fixture time, cost, color, etc. Henkel is unique in the market in that we offer options in virtually every major adhesive chemistry which allows us to recommend the best solution for the customer based on specific needs.

OTHER GAP FILLING SOLUTIONS

Henkel is willing to go beyond standard application issues and work with you to solve design challenges that you have never seen before. With our extensive portfolio and experience, it is a core part of our culture to develop innovative solutions.

For more information, please contact your local representative.



BONDERITE®





FUNCTIONAL COATINGS

INDUSTRIAL CLEANING / METAL PRE-TREATMENT

THE RIGHT SOLUTION FOR EVERY SURFACE CLEANING PROCESS REQUIREMENT

Henkel supplies a broad portfolio of BONDERITE® cleaners that help metal processors increase efficiency and lower operating costs. BONDERITE cleaners are simple and efficient to use while significantly improving users' environmental sustainability. A complete range of alkaline, neutral, and acidic cleaners ensures that there is a BONDERITE product for every cleaning requirement in four main categories: industrial and specialty, operational maintenance, new part cleaning and conversion, as well as remanufacturing.



INDUSTRIAL CLEANING AND METAL PRE-TREATMENT

BONDERITE® - INDUSTRIAL AND MAINTENANCE CLEANERS

BONDERITE® industrial and maintenance cleaners represent the highest efficiency and sustainability in industrial cleaning. Thanks to a wide range of alkaline, neutral, and acid cleaners, plus our field and laboratory services around the globe, you can be sure of the perfect solution for your cleaning needs.

WHY HENKEL BONDERITE

- Wide portfolio of alkaline, neutral, and acidic cleaning products that meet all application requirements
- 90 years of Henkel experience helping customers optimize their process and select the most appropriate products
- Ongoing research and product development efforts allow Henkel to be an industry leader in new technology
- Rigorous product testing in Henkel's own R&D centers
- High level product and process analysis ensuring that customers are always following best practices
- Henkel service values shared throughout the organization with customer service at their core

THE RIGHT SOLUTION FOR EVERY CLEANING

PARTS CLEANING AND METAL PRE-TREATMENT CLEANING:
Neutral, acidic, and alkaline cleaners for spray and immersion for cleaning as a pre-treatment prior to subsequent surface treatments,as well as interoperational cleaners after cutting, grinding, drilling, and honing

MAINTENANCE CLEANERS:
Degreasers, vehicle cleaners, descalers, graffiti removers, paint strippers, hand cleaners, floor cleaners, parts cleaners, high pressurecleaners, ultrasonic cleaners, defoamers

SERVICES:
Field tech service, laboratory analytical services, customer-specific product development

OPERATIONAL MAINTENANCE CLEANING

MAINTENANCE CLEANERS

One of the most important aspects of keeping rail vehicles rolling is keeping them clean. Henkel offers solutions that meet the day-to-day cleaning demands of the rail industry.

EXTERIOR CLEANERS

Product	APAC	Eu	Na	How to apply	Ph	Features	Uses
BONDERITE® C-MC 3000	✓	✓	✓	Spray, Brush	Alkaline	Excellent general-purpose cleaner; foamsto stay on vertical surfaces. Applied at room temperature up to 80°C	Heavy oil, grease, dust, carbon, flash rust
BONDERITE® C-MC 12300	✓	✓		Spray, Brush	Neutral	Universal liquid cleaner for interior surfaces. Good for soil removal, and has small foaming effect. Ambient temperature application	Dust and greasy indoor dirt
BONDERITE® C-MC 30112		✓		Spray	Alkaline	Lower pH than competition allows for longer exposure without affecting paint job. Sticks to surfaces to better dissolve soils	Insect removal from paint and windscreens
BONDERITE® C-MC ACD-1166		✓		Spray, Brush	Acid	Acidic cleaner for automatic applications. Free of oxalic acid; works with hard water	Iron and copper oxides, brake dust, mineral soiled, light organic dirt
BONDERITE® C-MC GEL-7		✓		Brush, Wipe	Alkaline	Heavy-duty cleaner. Applicable on vertical and upside down surfaces	Bogie cleaning
BONDERITE® C-MC N DB		✓		Spray, Brush	Neutral	Safe and easy-to-use neutral cleaner. Suitable for automatic cleaning lines. Appliedat room temperature (up to 50°C)	Oil, brake dust, carbon, environmental dirt
BONDERITE® C-NE 5948 RAIL	✓			Spray, Brush	Neutral	Safe and easy-to-use neutral cleaner. Suitable for automatic cleaning lines. No corrison on SS, Al and copper	Oil, dust, environmental dirt
BONDERITE® C-MC 1204	✓			Spray, Brush, Wipe	Alkaline	Heavy-duty cleaner. Alternatives to organic solvent cleaners	Oil, dust, environmental dirt, carbon

GRAFFITI REMOVERS

Product	APAC	Eu	Na	How to apply	Ph	Features
BONDERITE® C-MC 245		✓		Brush, Wipe	Alkaline	Designed to completely remove graffiti ink shadow after cleaning processes
BONDERITE® C-MC 400	✓	✓		Brush	Acid	Removal of external graffiti, available in 3 different viscosities, designed for manualcleaning, should be applied above 5°C
BONDERITE® S-ST 1302		✓		Spray, Brush	Alkaline	For removal of interior graffiti, great EH&S ratings, requires room temperatureapplication

PAINT GUN CLEANERS

Product	APAC	Eu	Na	How to apply	Ph	Features
BONDERITE® C-MC 21130	✓	✓		Spray, Immersion	N / A	Paint gun cleaner for solvent-based and water-based paints
BONDERITE® C-SO-283			✓	Spray, Immersion	N / A	Organic solvent paint gun cleaner for cleaning solvent-borne paint applicationequipment and metal surfaces

PART CLEANERS

Product	APAC	Eu	Na	How to apply	Ph	Features
BONDERITE® C-MC 90014	✓	✓		Manual	Alkaline	Parts cleaner to replace solvents
LOCTITE® 778 RAIL	✓			Manual	N / A	Fast dry time, no residue, no CFC, and requires no rinsing
LOCTITE® SF 777 RAIL	✓			Manual	N / A	No residue, no CFC, and requires no rinsing
LOCTITE® SF 7063	✓	✓		Manual, Immersion	N / A	No CFC, and requires no rinsing, General cleaner
LOCTITE® SF 7070	✓	✓		Manual, Immersion	N / A	No CFC, and requires no rinsing, Suit for heavy oil
BONDERITE® C-SO RC680	✓			Manual, Ultrasonic	N / A	No CFC, and requires no rinsing, High flash point

NEW PART CLEANING AND CONVERSION COATINGS

PRODUCTS FOR METAL PRE-TREATMENT – CONVERSION COATING CLEANERS AND CONVERSION COATINGS

BONDERITE® offers conversion coating cleaners and conversion coatings that can increase corrosion protection, adhesion, and performance of a substrate.

METAL PRE-TREATMENT: CONVERSION COATING CLEANERS

Product	APAC	Eu	Na	How to Apply	Ph	Features
BONDERITE® C-AD 0470	✓	✓		Immersion	N / A	Cleaning booster for immersion processes
BONDERITE® C-AD 5003	✓	✓		Spray	N / A	Cleaning booster for spray processes
BONDERITE® C-AK 1574	✓	✓	✓	Spray, Immersion	N / A	Multi-metal cleaner, low foam
BONDERITE® C-S0 263			✓	Pre-Saturated Wipes	N / A	Manual Application

METAL PRE-TREATMENT: CONVERSION COATINGS

							META			PAINT		
Product	APAC	Eu	Na	How to Apply	Ph	Features	Steel	Galvanized Steel	Aluminum	Powder Coating	Wet Coat	E-Coating
BONDERITE® M-CR 65000		✓	✓	Spray, Immersion	Acid	Steel, galvanized steel, aluminum, based on trivalent chromium with mil spec approval	✓	✓	✓	✓	✓	✓
BONDERITE® M-FE 700			✓	Spray, Immersion	Acid	Iron phosphate cleaner and coating for steel, low temperature cure 30°C, heavy-duty	✓	✓	✓			
BONDERITE® M-FE-500LT			✓	Spray, Immersion	Acid	Iron phosphate cleaner and coating for steel, low temperature cure 30°C, light-to-medium-duty	✓					
BONDERITE® M-NT 1200	✓	✓	✓	Spray	Acid	Phosphate-free substitute for zinc phospating for steel, galvanized steel, or aluminum 2-component	✓	✓	✓	✓	✓	✓
BONDERITE® M-NT 1455-W	✓	✓	✓	Pre-Saturated Wipes	Acid	Manual application for multi-metals, chrome-free	✓	✓	✓			
BONDERITE® M-NT 1800	✓	✓	✓	Immersion	Acid	Phosphate-free substitute for zinc phospating for steel, galvanized steel, or aluminum 2-component	✓	✓	✓	✓	✓	✓
BONDERITE® M-NT 2			✓	Spray, Immersion	Acid	Offers improved corrosion resistance and can be used for steel, galvanized steel, and aluminum 1-component	✓	✓	✓	✓	✓	✓
BONDERITE® M-NT 30002		✓		Spray, Immersion	Acid	Used on steel, galvanized steel, and aluminum based on trivalent chromium	✓	✓	✓	✓	✓	✓
BONDERITE® M-NT 40043		✓		Spray, Immersion	Acid	Cleaner-coater, zirconium-based chemical conversion for steel, galvanized steel, and aluminum	✓	✓	✓	✓	✓	
BONDERITE® M-NT 5700-W	✓		✓	Pre-Saturated Wipes	Acid	Manual application for aluminum only, passes AAMA specs, chrome-free			✓			
BONDERITE® M-NT 701 / M-NT 41042		✓	✓	Spray, Immersion	Acid	Cleaner-coater	✓	✓	✓	✓	✓	
BONDERITE® M-PP 866	✓	✓	✓	Immersion	Acid	Flexible PVDC-coating, light-to-medium-duty interior applications, cure before top coating	✓			✓	✓	
BONDERITE® M-PP 930	✓	✓	✓	Immersion	Acid	Hard epoxy-acrylic coating, ideal for harsh environments and tubular structures, can be co-cured with paint	✓				✓	
BONDERITE® M-ZN 3410			✓	Spray, Immersion	Acid	Robust, easy-to-use, recommended GO TO product	✓	✓	✓	✓	✓	✓
BONDERITE® M-ZN 952 / 958	✓	✓	✓	Spray, Immersion	Acid	For creating tricationic zinc phosphate coating; compatible with most metals	✓	✓	✓	✓	✓	✓

PRODUCTS FOR DERUSTING AND DESCALING

Incoming materials in rail often have mill scale and require removal of flash rust. Henkel offers derusting and descaling products that will remove soil, rust, and scale prior to conversion coatings – ultimately optimizing cost and labor.

DERUSTING AND DESCALING PRODUCTS

Product	APAC	Eu	Na	How to Apply	Ph	Features
BONDERITE® C-AK 359	✓	✓		Spray	Alkaline	Multi-metal degreaser; mild foaming
BONDERITE® C-AK 5800	✓	✓	✓	Spray	Alkaline	Cleaner for steel and plastic
BONDERITE® C-AK LNS	✓		✓	Spraying or High Pressure	Alkaline	Cleaner for aluminum
BONDERITE® C-IC 172	✓	✓	✓	Derusting and Descaling (Prior to Conversion Coatings)	Acid	Phosphoric acid pickling product for steel
BONDERITE® C-IC 182 C			✓	Spray, Immersion	Acid	Inhibited phosphoric acid pickling product for steel
BONDERITE® C-IC NP 7300			✓	Spray, Immersion	Acid	Sulphuric acid pickling product for steel
BONDERITE® C-MC 80	✓	✓		Spraying or High Pressure	Alkaline	Cleaner for steel and non-ferrous metals (light metals should be tested for compatibility)
BONDERITE® C-NE 20	✓	✓	✓	Immersion	Neutral	Universal neutral degreaser
BONDERITE® C-NE 5088	✓	✓	✓	Spray	Neutral	Heavy-duty neutral degreaser; very robust chemistry; solvent-free

TEMPORARY CORROSION PROTECTION

Rust preventatives should be used in any area with more than 40% humidity in order to prevent metals from flash rusting.

TEMPORARY CORROSION PROTECTION PRODUCTS

Product	APAC	Eu	Na	How to Apply	Ph	Features
BONDERITE® S-FN 7400	✓	✓		Spray, Immersion	Alkaline	Steel and cast iron, can be painted over; 1 day of protection
BONDERITE® C-NE 3300	✓	✓	✓	Spray, Immersion	Neutral	Multi-metal, protection and cleaner, 1-3 days of protection
BONDERITE® S-PR 6776		✓		Spray, Immersion	Neutral	Multi-metal 1-6 weeks of protection
BBONDERITE® S-PR 3	✓	✓		Spray, Immersion	N / A	Steel and cast iron, oil-based product, 3-6 months of protection
BONDERITE® L-GP 5800	✓		✓	Spray, Immersion	Alkaline	All metals, water-based emulsion, 1-6 weeks of protection
BONDERITE® L-GP 4141			✓	Spray, Immersion	N / A	Steel and cast iron protection, oil-based, 3-6 months of protection
BONDERITE® S-FN 503			✓	Spray, Immersion	Alkaline	Steel and cast iron protection, can be painted over; 1 day of protection
BONDERITE® O-PC 100	✓	✓		Spray, Immersion	N / A	Water-based PVDC-coating
BONDERITE® O-PC 700	✓	✓		Spray, Immersion	N / A	Water-based Alkyd-coating
BONDERITE® O-PC 528 RFU		✓		Spray, Immersion	N / A	Solvent-based PVB-epoxy phenolic primer
BONDERITE® C-NE 750	✓			Spray, Immersion	Neutral	Multi-metal 3-7 days of protection

REMANUFACTURING PRODUCTS

PRODUCTS FOR REMANUFACTURING

Henkel offers degreasers, derusting / descaling products, deoxidizing and decarbonizing products, cleaners and paint strippers – all formulated for remanufacturing. Henkel's chemistries are formulated to be robust, strong, and aggressive enough to cut through heavy grease, oils, and paint coatings.

DEGREASING PRODUCTS

							USES			
Product	**APAC**	**Eu**	**Na**	**How to Apply**	**Ph**	**Features**	**Steel**	**Aluminum**	**Galvanized**	**Plastics**
BONDERITE® C-AK 1574 MRO		✓	✓	Immersion	Alkaline	One-step degreasing, derusting, and paint stripping of steel	✓			
BONDERITE® C-AK 5520	✓	✓		Spray	Alkaline	One-step degreasing, derusting, and paint stripping of steel	✓	✓	✓	
BONDERITE® C-AK RM-21	✓		✓	Immersion	Alkaline	One-step degreasing, derusting, and paint stripping of steel	✓			
BONDERITE® C-MC 3000		✓		Spray and foam, Manual	Alkaline	Steel and plastic degreasing	✓			✓
BONDERITE® C-MC 35050			✓	Spray wand cleaner	Alkaline	For large applications such as vessels, machines, and tanks	✓			
BONDERITE® C-NE 175		✓		Immersion, Spray	Neutral	Multi-metal and plastic degreasing	✓	✓	✓	✓
BONDERITE® C-NE 5175			✓	Immersion, Spray	Neutral	Contains some rust preventative	✓	✓	✓	✓
BONDERITE® C-NE 5220-1		✓	✓	Spray (low pressure)	Neutral	Multi-metal degreasing	✓	✓	✓	✓
BONDERITE® C-SO 283			✓	Hand (wipe)	Neutral	Fast drying, blended solvent. Verify plastic compatibility before use	✓	✓	✓	✓

STEEL DERUSTING / DESCALING PRODUCTS

Product	**APAC**	**Eu**	**Na**	**How to Apply**	**Ph**	**Features**
BONDERITE® C-AK 1574 MRO		✓	✓	Immersion	Alkaline	One-step degreasing, derusting, and paint stripping
BONDERITE® C-AK 338	✓		✓	Immersion	Alkaline	Powdered, use on steel, galvanized steel, and aluminum
BONDERITE® C-AK RM-21	✓		✓	Immersion	Alkaline	One-step degreasing, derusting, and paint stripping
BONDERITE® C-IC 182C			✓	Spray, Immersion	Acid	Phosphoric acid pickling for steel
BONDERITE® C-IC 3502		✓		Immersion	Acid	Pickling and derusting of iron and steel
BONDERITE® C-IC NP 7300			✓	Immersion	Acid	Sulphuric acid, phosphate-free pickling for steel
BONDERITE® C-MC LAVOXYD			✓	Spray, Immersion, Manual	Acid	Exterior train and tanker wash
BONDERITE® C-NE 90200	✓		✓	Immersion, spray	Neutral	Neutral and phosphate-free derusting

ALUMINUM CLEANING AND DEOXIDIZING PRODUCTS

Product	**APAC**	**Eu**	**Na**	**How to Apply**	**Ph**	**Features**
BONDERITE® C-IC 172I			✓	Spray, immersion	Acid	Aluminum only
BONDERITE® C-IC 3012			✓	Immersion	Acid	Cleaner and paint stripper in one (Use with S-ST 3012MM)
BONDERITE® C-IC 457			✓	Spray, immersion	Acid	Aluminum only
BONDERITE® C-MC 11110		✓		Immersion	Acid	Multi-metal including aluminum
BONDERITE® S-ST 3012MM			✓	Immersion	Acid	Cleaner and paint stripper in one (Use with C-IC 3012)
BONDERITE® S-ST 6776 LO AERO	✓	✓	✓	Immersion	N / A	Multi-metal cleaner (includes aluminum) with paint stripping ability

DECARBONIZING PRODUCTS

Product	APAC	Eu	Na	How to Apply	Ph	Features	USES Steel	USES Aluminum	USES Galvanized
BONDERITE® C-AK 1574 MRO		✓		Immersion	Alkaline	Strong alkaline degreasing, derusting and decarbonizing of steel	✓		
BONDERITE® C-AK 5948 DPM THICK		✓	✓	Brush or spray	Alkaline	Clings to surfaces to degrease aluminum without harming paints		✓	
BONDERITE® C-AK 9045-6 AERO		✓	✓	Immersion	Alkaline	Water-based carbon remover		✓	
BONDERITE® C-AK RM-21	✓		✓	Immersion	Alkaline	Degreasing, derusting and paint strip	✓		
BONDERITE® C-MC GEL-7		✓		Brush or spray	Alkaline	Decarbonizing of aluminum		✓	

PAINT STRIPPING PRODUCTS

Product	APAC	Eu	Na	How to Apply	Ph	Features	USES Steel	USES Aluminum	USES Galvanized
BONDERITE® C-AK RM21	✓		✓	Immersion	Alkaline	Heavy-duty degreaser and rust remover for reman	✓		
BONDERITE® S-AD 201		✓		Immersion	N / A	Strips paints (including e-coats) from all substrates, product combined with BONDERITE S-ST 99 A		✓	✓
BONDERITE® S-AD-18			✓	Spray	N / A	Additive to boost performance of paint strippers, multi- metal compatibility	✓	✓	✓
BONDERITE® S-AD-21			✓	Immersion	N / A	Additive to boost performance of paint strippers, multi- metal compatibility	✓	✓	✓
BONDERITE® S-ST 3000			✓	Spray, immersion	Alkaline	Removes all types of paints, provides etch resistance, low odor		✓	
BONDERITE® S-ST 301			✓	Immersion	Alkaline	Paint stripper safe for aluminum wheels	✓	✓	✓
BONDERITE® S-ST 3012MM			✓	Immersion	Acid	Heavy-duty paint stripper for reman, used with C-IC 3012		✓	
BONDERITE® S-ST 65		✓		Spray, immersion	Alkaline	Strips paints (including e-coats) and powder coatings	✓		
BONDERITE® S-ST 6776 THIN		✓	✓	Immersion	Acid	Highly chemically resistant polyurethane, removes polyurethane paint	✓	✓	✓
BONDERITE® S-ST 6776 LO AERO	✓	✓	✓	Hand brushing	Acid	Highly chemically resistant polyurethane, removes polyurethane paint	✓	✓	✓
BONDERITE® S-ST 9210		✓		Spray, immersion	Alkaline	Highly alkaline paint stripper with hot working temperature	✓		
BONDERITE® S-ST 99 A		✓		Immersion	N / A	Strips paints (including e-coats) from all substrates, product combined with BONDERITE S-AD 201		✓	✓
BONDERITE® S-ST HOT 50			✓	Immersion	Alkaline	Removes all types of paints	✓		
BONDERITE® S-ST 6930	✓	✓	✓	Spray, immersion	N / A	Removes all types of paints, low odor	✓	✓	✓



REGULATORY OVERVIEW AND **TOTAL SOLUTIONS FROM HENKEL**

Regulatory testing requirements and approvals are in place in order to ensure passenger safety in case of an emergency. Collectively, the testing is known as FST: Fire, Smoke, and Toxicity testing, working towards keeping passengers safe in case on an emergency.

EN 45545

This Fire, Smoke, and Toxicity approval applies to the European Union (EU) countries and is one of the most widely used employed standards. It details level of protection, HL1 to HL3. It also covers specific application ranges, referred to as R1 to R26. Qualification is completed to specific application ranges, as no blanket qualification exists. Henkel products meet a number of application ranges within this standard.

NFPA 130

This approval is part of the National Fire Protection Association (NFPA) standard 130 which covers passenger rail. It is mandatory in the USA, but adopted in most countries of the Americas, as well as many other parts of the world. Henkel has a range of products that meet this standard as it has a single test for all adhesives.

BSS 7239

This Boeing standard is employed for toxicity of gas produced in a fire. No pass / fail criteria exists; testing only requires that a quantitative reading be measured. Henkel can provide the results for a range of products.

SMP-800C

This aerospace toxicity of gas produced in a fire test is similar to BSS 7239, but contains a pass / fail criterion. Henkel has data on a range of products.

ASTM E-1354

This test is widely used to calculate the heat generated during a fire within a rail vehicle by its manufacturer. Its goal is to determine if a vehicle fire would produce enough energy to damage infrastructure such as a tunnel or bridge, which could cripple a rail line.

TB / T3139

This test applies to China only and is a analysis of chemical content. Henkel has data on a range of products.

Other Regulatory Requirements

Beyond these tests additional country specific test exist for many other countries such as India, Japan, Russia and others.

RAIL – as part of public infrastructure requires many local and regional approvals. Contact your local Henkel to learn more about regulations in your area.



In addition to offering the broadest product portfolio in the adhesives industry, Henkel provides an array of services to help our rail equipment customers optimize their manufacturing process, improve efficiency and reduce overall costs.

THE FOLLOWING SERVICES ARE AVAILABLE WORLDWIDE:

- **MANUFACTURING EXCELLENCE**
  Henkel has decades of success optimizing manufacturing processes. We can analyze your complete manufacturing process and provide tailor-made recommendations on how to reduce production cycle times and rejection rates, thereby lowering your overall costs and increasing your productivity.

- **LAB TESTING**
  Henkel's testing capabilities can provide complete data on our product recommendations. Whether you want to analyze a single component of your production process or review the complete system, our labs can provide all the data you need.

- **CUSTOMER TRAINING**
  Henkel offers a wide selection of customized training programs to help customers learn the details of our product technologies and how to apply them effectively. We can also train you to use our custom-designed equipment efficiently. Our Technology Days provide additional training and demonstrations of our newest innovations.

- **VALUE CALCULATORS**
  Using our Value Calculators, our adhesives specialists can accurately analyze the total cost of your adhesive processes and determine your savings potential. Simply arrange an appointment with our specialists, and they will visit your production facilities to conduct an in-depth analysis.

- **ANALYTICAL SERVICES**
  Henkel provides comprehensive analyses of all steps in your manufacturing process using our own industry experts. We will identify problem points on the production line and recommend improvements to the manufacturing process. These services can also include equipment teardowns, surface analysis, and testing.

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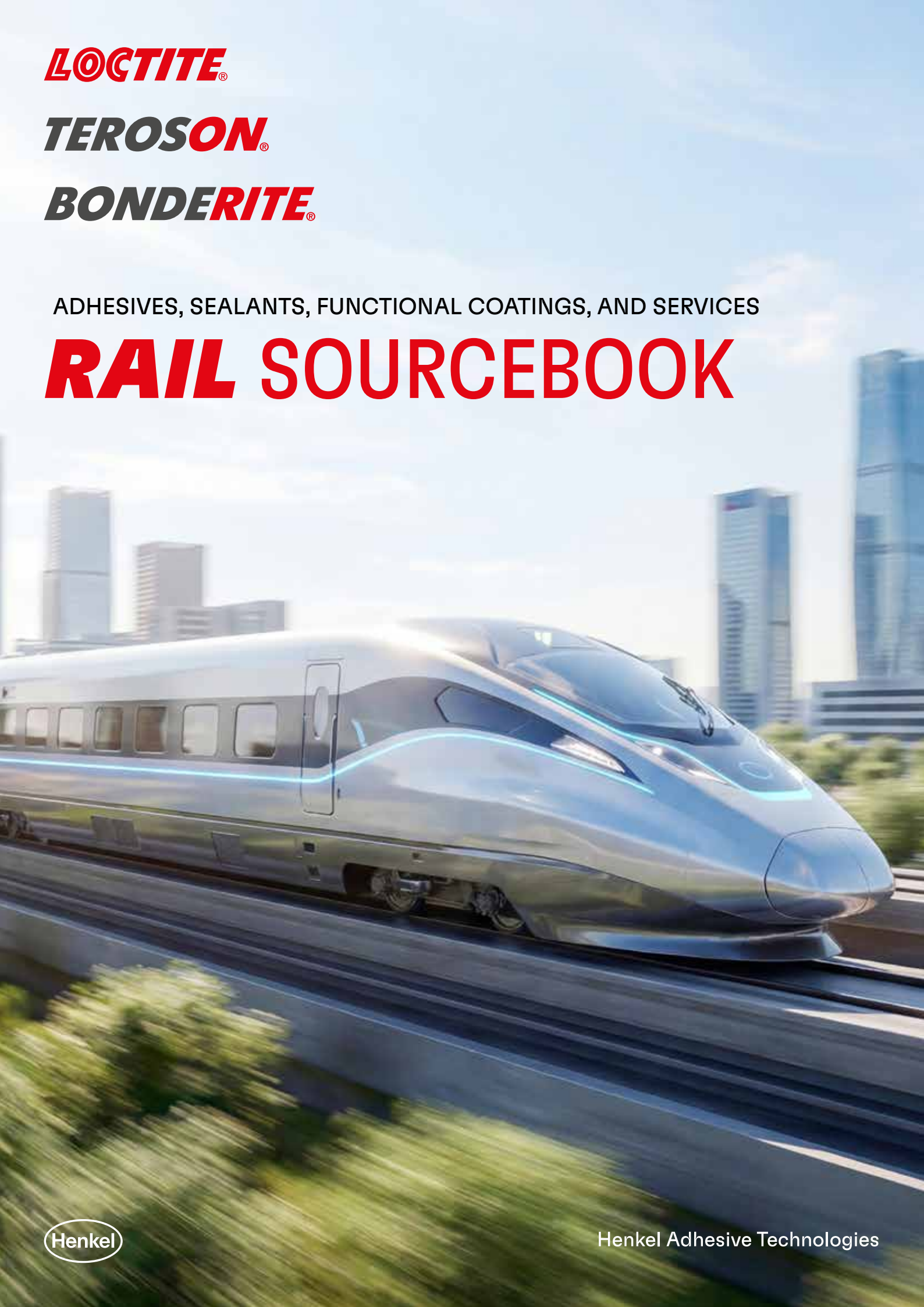
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