

**LOCTITE**  
**BONDERITE**  
**TEROSON**

Adhesives, Sealants, Functional Coatings, Equipment and Services

# Agricultural & Construction Equipment Solutions





# Henkel.

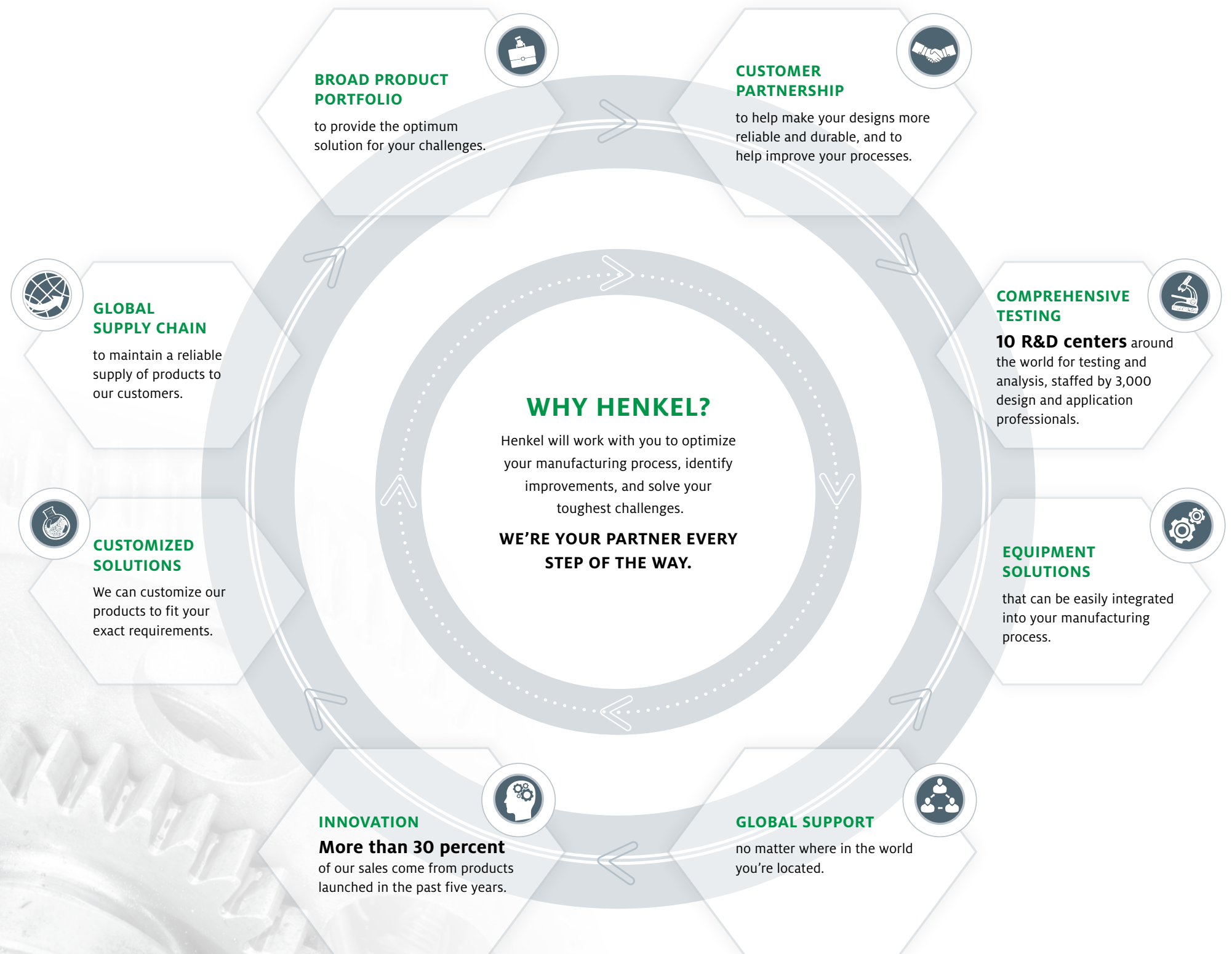
## Improving your designs, understanding your challenges

PROVEN SOLUTIONS FOR ALL YOUR NEEDS –  
TODAY AND TOMORROW

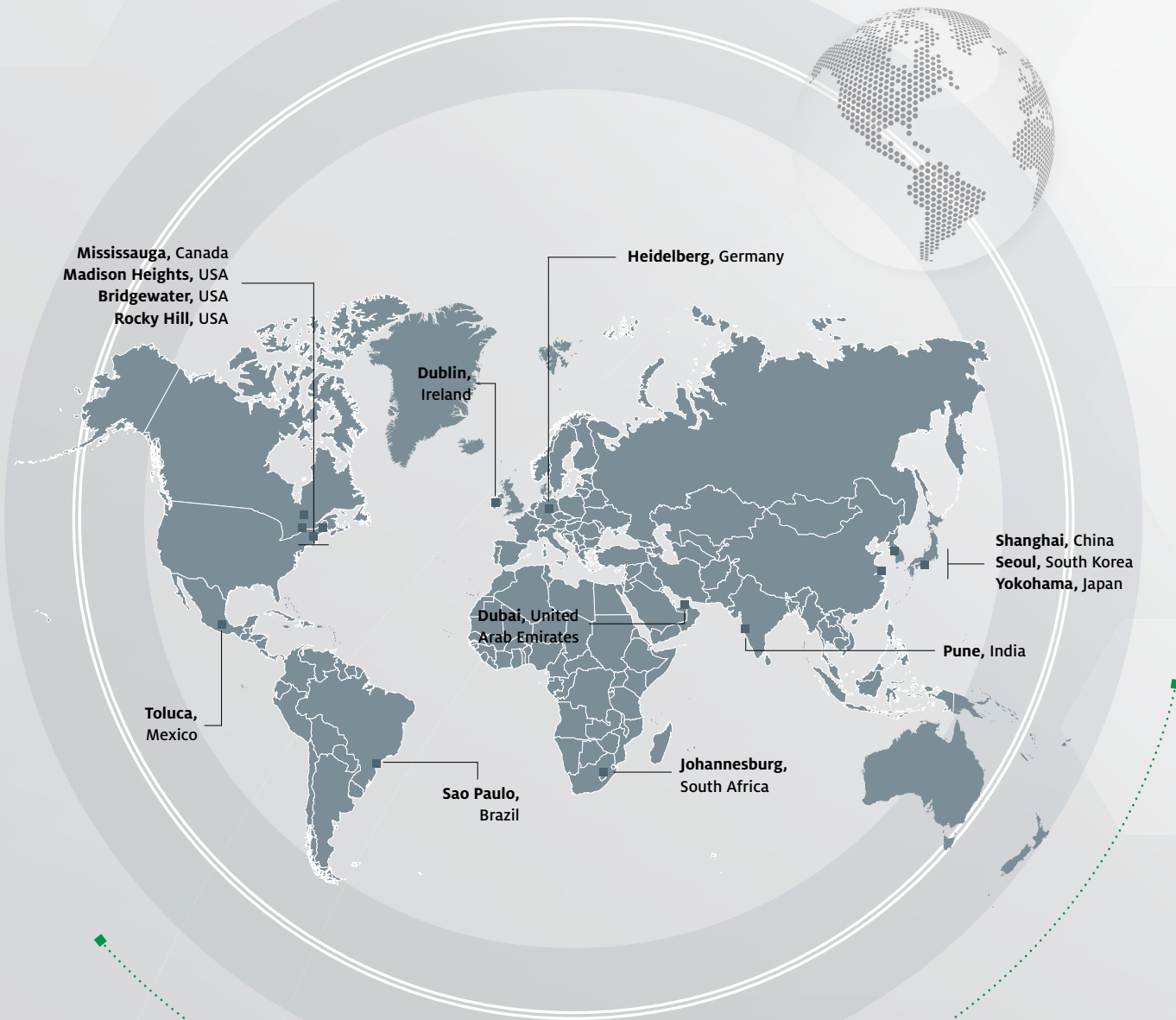
Manufacturers of agricultural and construction equipment face daily challenges – reducing costs, improving efficiency, and increasing innovation, to name just a few. While there are many adhesive suppliers to choose from, they're not all created equal. You need a supplier with a broad product portfolio, a global footprint, and the engineering and application know-how to solve your challenges. You also need a partner who can help you maintain your high quality while developing advanced new products.

**Henkel, the leading solutions provider for adhesives, sealants and functional coatings worldwide, offers much more than quality adhesives.** With our history and experience in the 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 and enhance the reliability of your equipment. And we're continually developing innovations to help you succeed in the future.

**Let us show you the value Henkel offers.**



# WORLDWIDE RESEARCH AND DEVELOPMENT



## 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.



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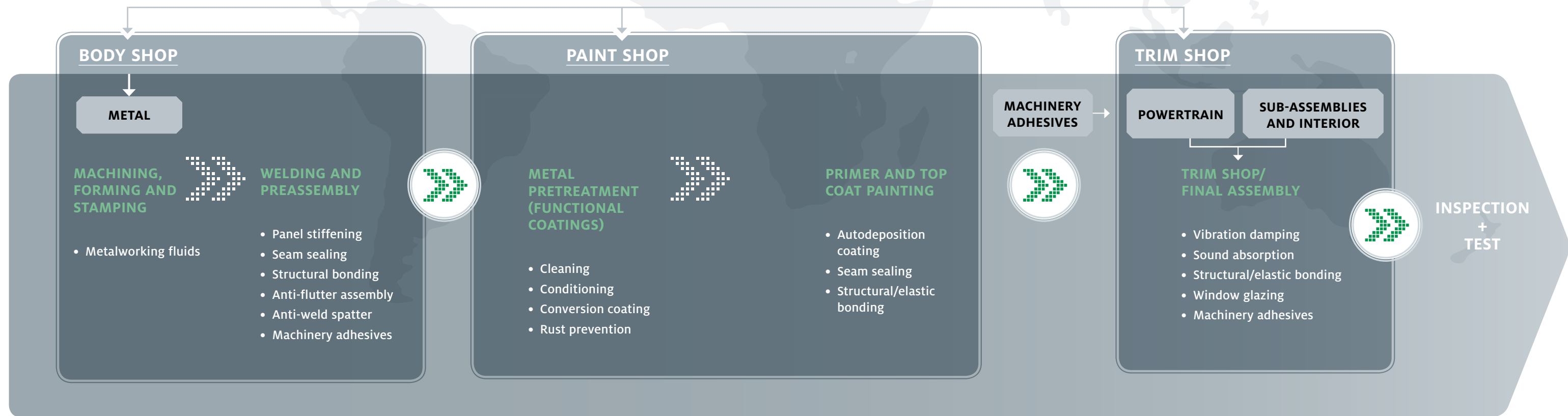
# HENKEL: YOUR TOTAL SOLUTIONS PROVIDER

## SOLUTIONS

for every step of your process

Henkel offers a **broad array** of adhesives, sealants and functional coatings for every step of your manufacturing process, from forming and stamping to final assembly. But Henkel is more than just a supplier – our **partnership** with customers sets us apart. We have the expertise and ability to work with you from the R&D stage through the entire manufacturing process.

In addition to the product solutions shown below, we can also support your needs with our **testing capabilities, acoustics labs, analytical services, technical seminars, value calculators**, and much more. Our **global capabilities** enable us to service your manufacturing and design centers in all regions with our dedicated Henkel technical and account experts. It's part of our mission to be your total solutions provider.

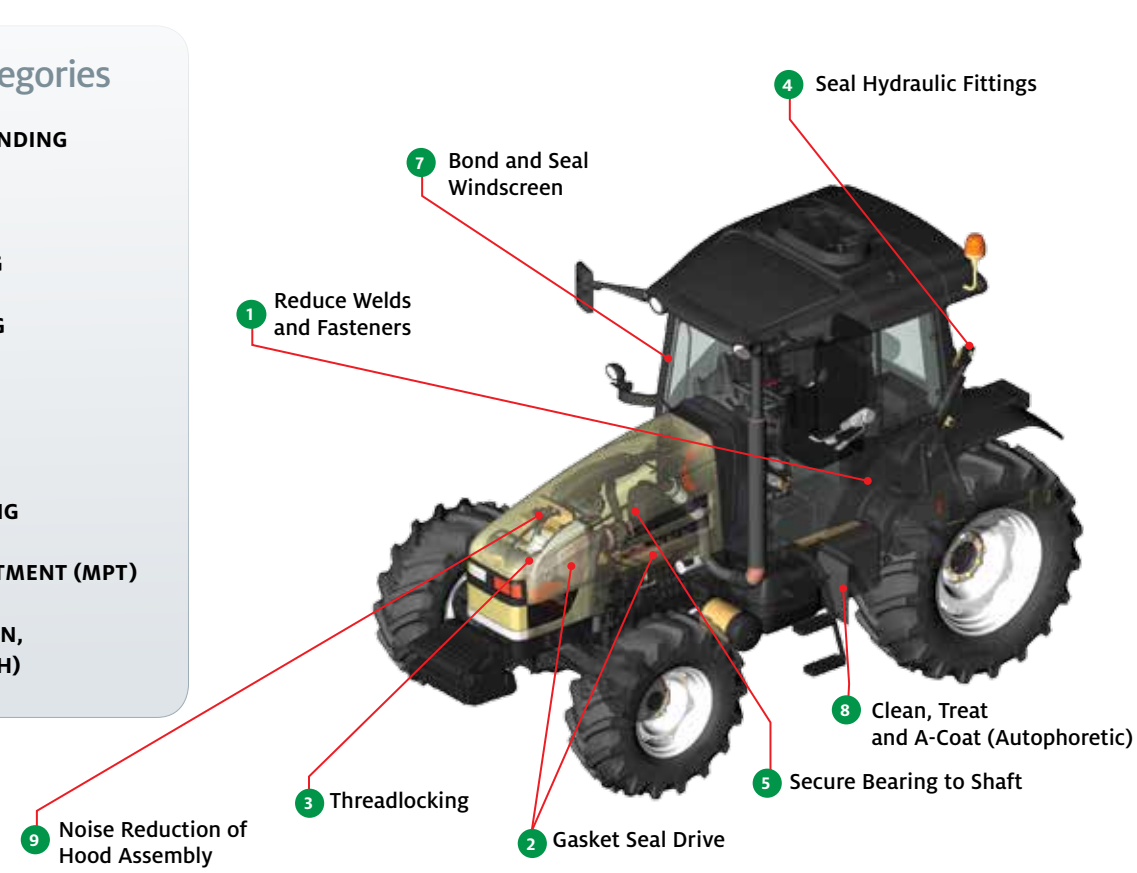




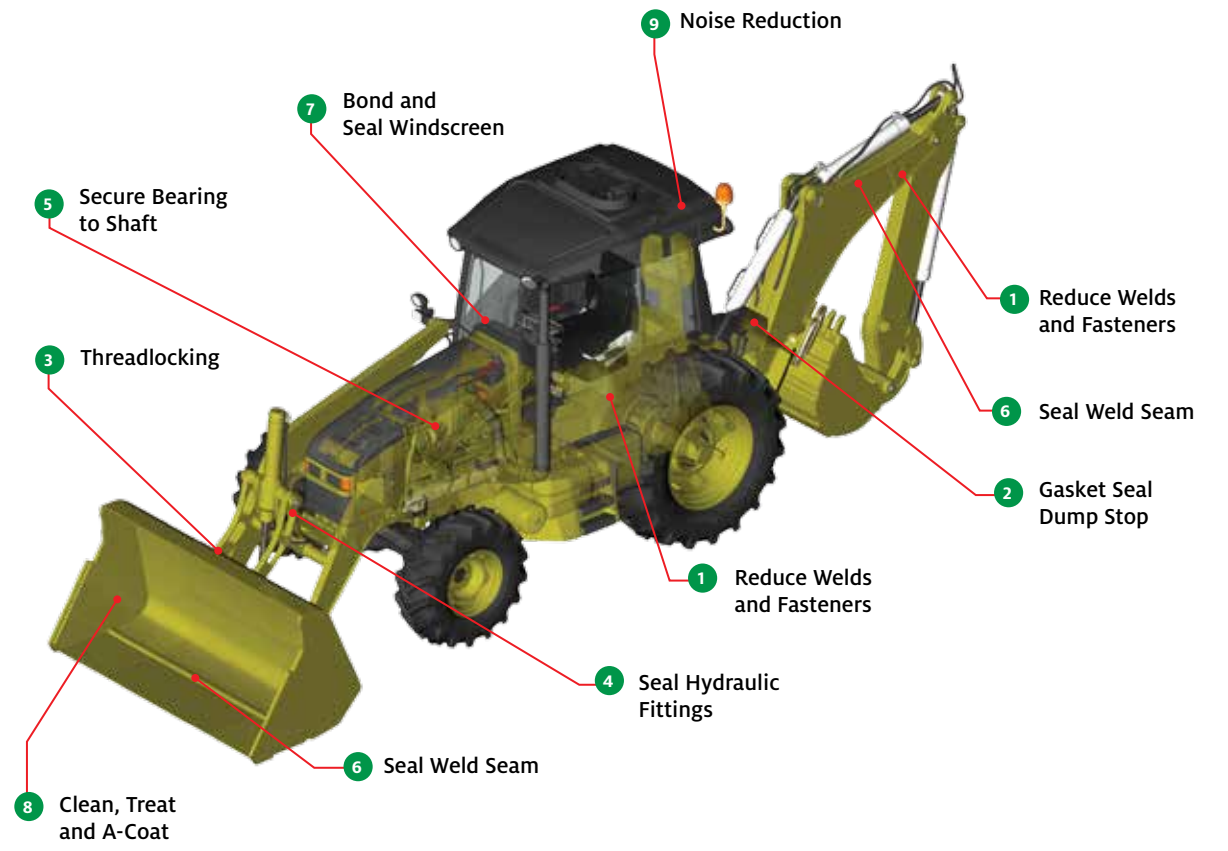
# VEHICLE APPLICATIONS

## Application Categories

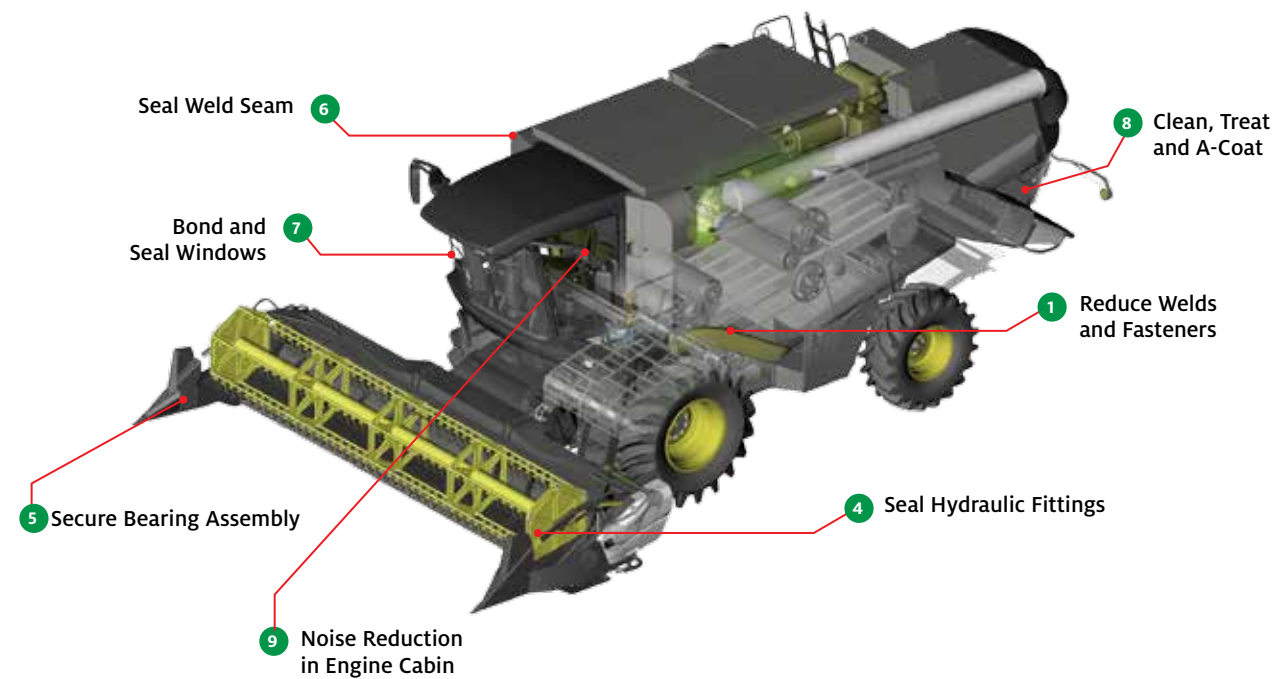
- 1 STRUCTURAL BONDING
- 2 GASKETING
- 3 THREADLOCKING
- 4 THREAD SEALING
- 5 RETAINING
- 6 SEAM SEALING
- 7 WINDOW GLAZING
- 8 METAL PRETREATMENT (MPT)
- 9 NOISE, VIBRATION, HARSHNESS (NVH)



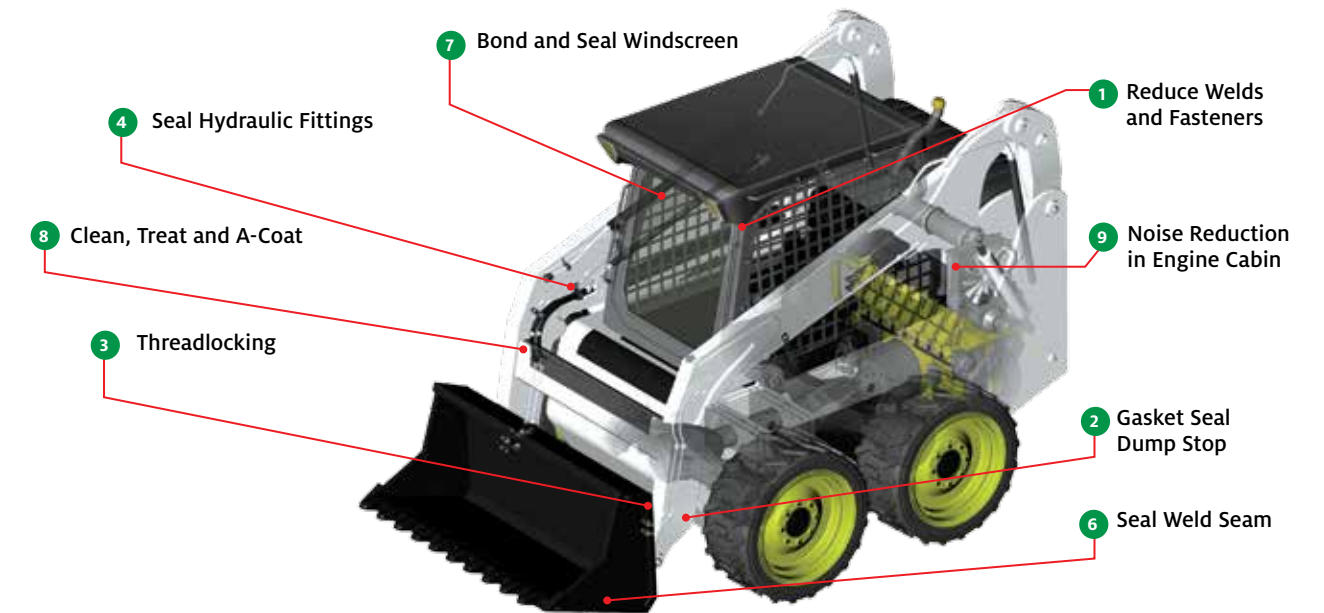
### Tractors



### Backhoes



### Combines

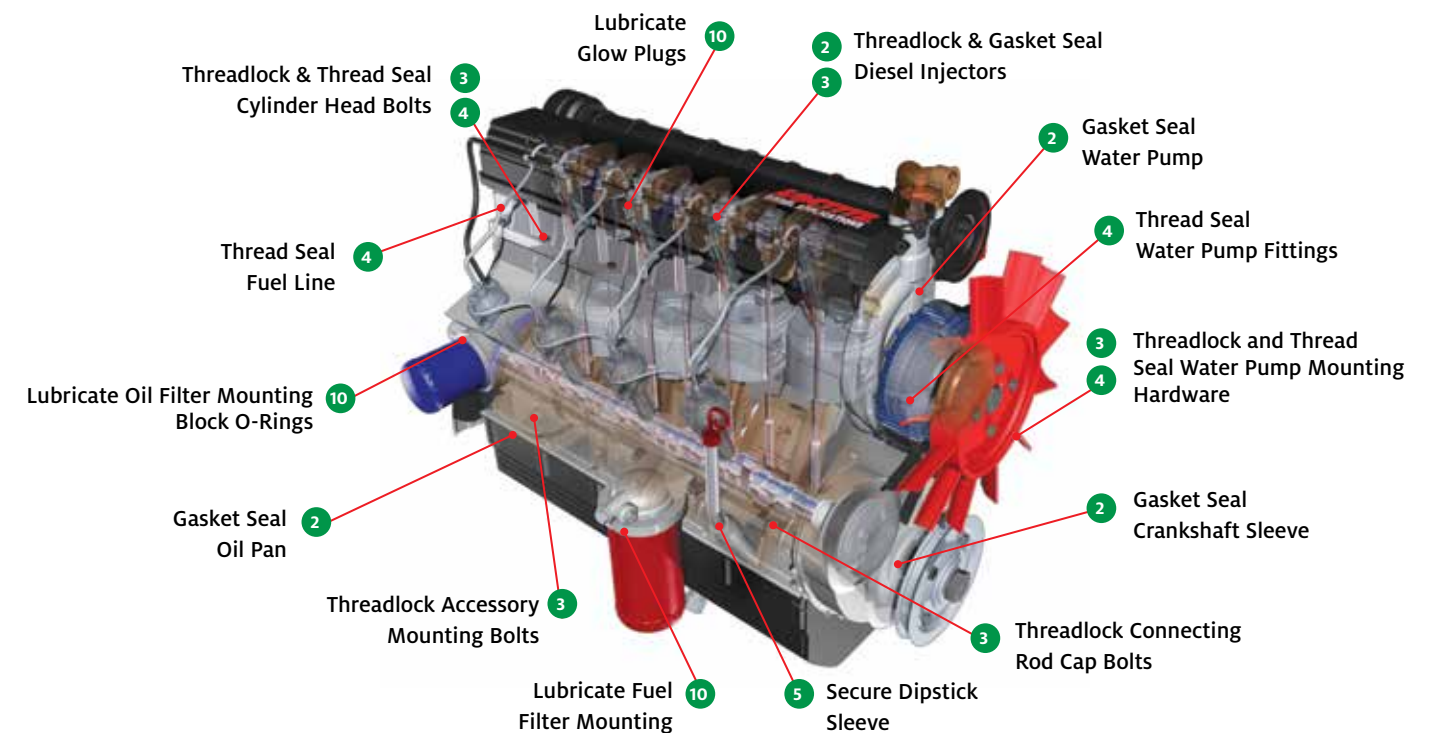
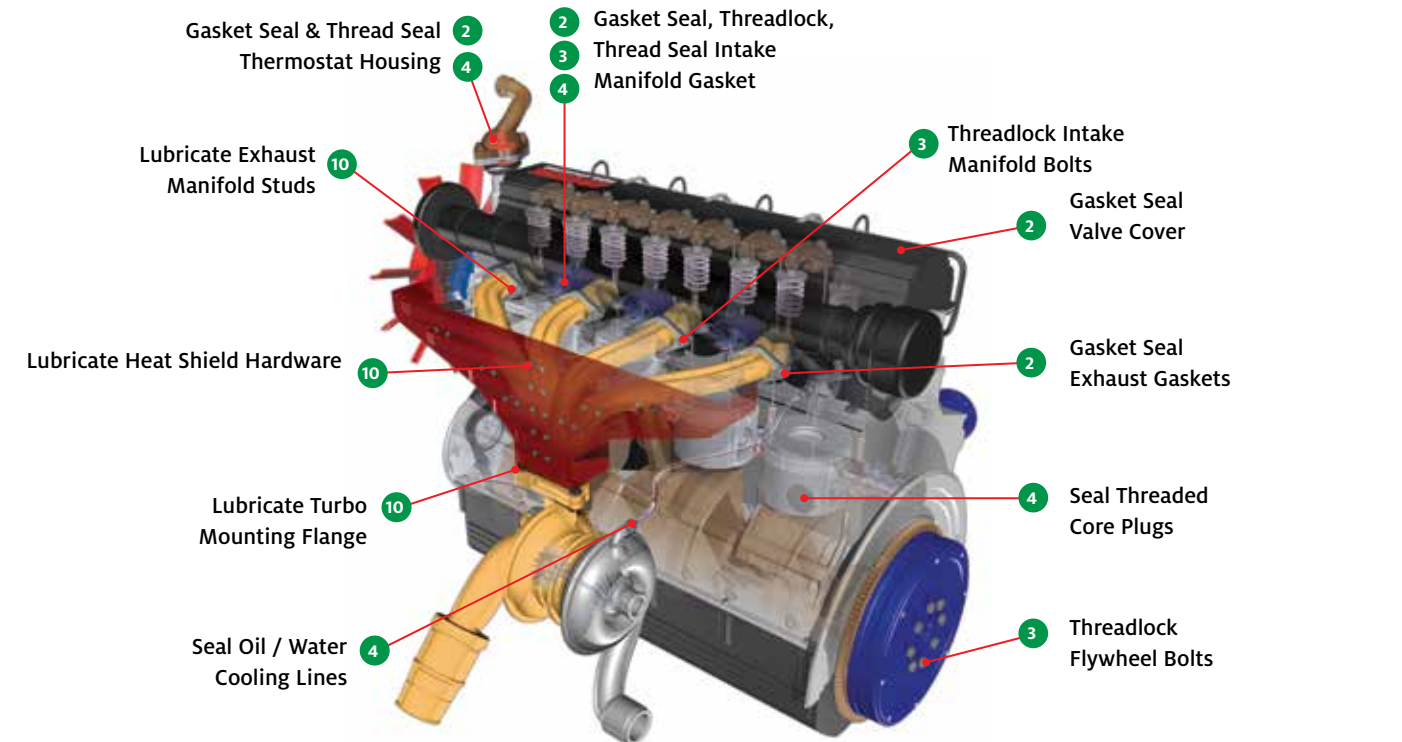
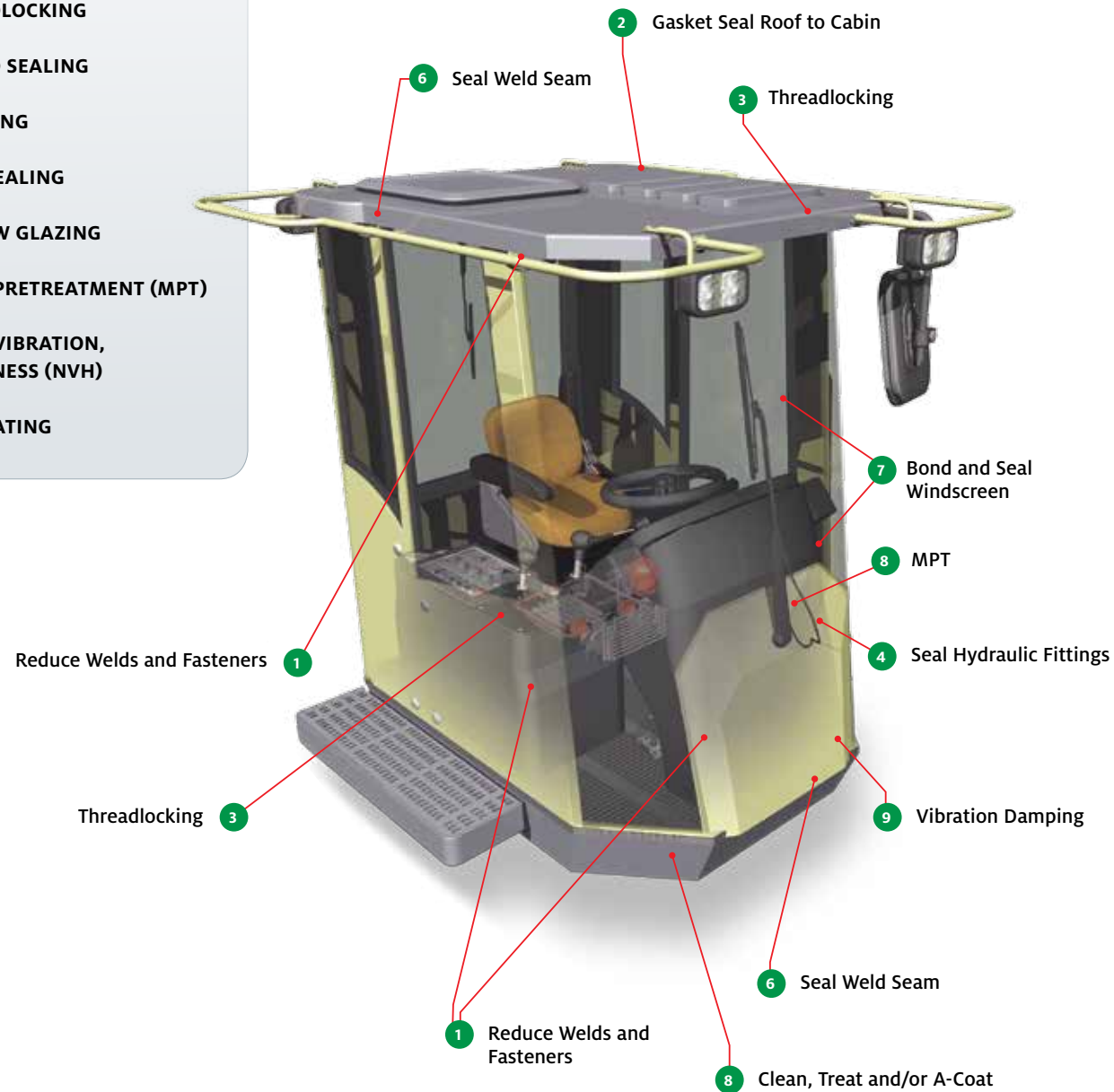


### Skid Steers

# CABIN AND ENGINE APPLICATIONS

## Application Categories

- 1 STRUCTURAL BONDING
- 2 GASKETING
- 3 THREADLOCKING
- 4 THREAD SEALING
- 5 RETAINING
- 6 SEAM SEALING
- 7 WINDOW GLAZING
- 8 METAL PRETREATMENT (MPT)
- 9 NOISE, VIBRATION, HARSHNESS (NVH)
- 10 LUBRICATING

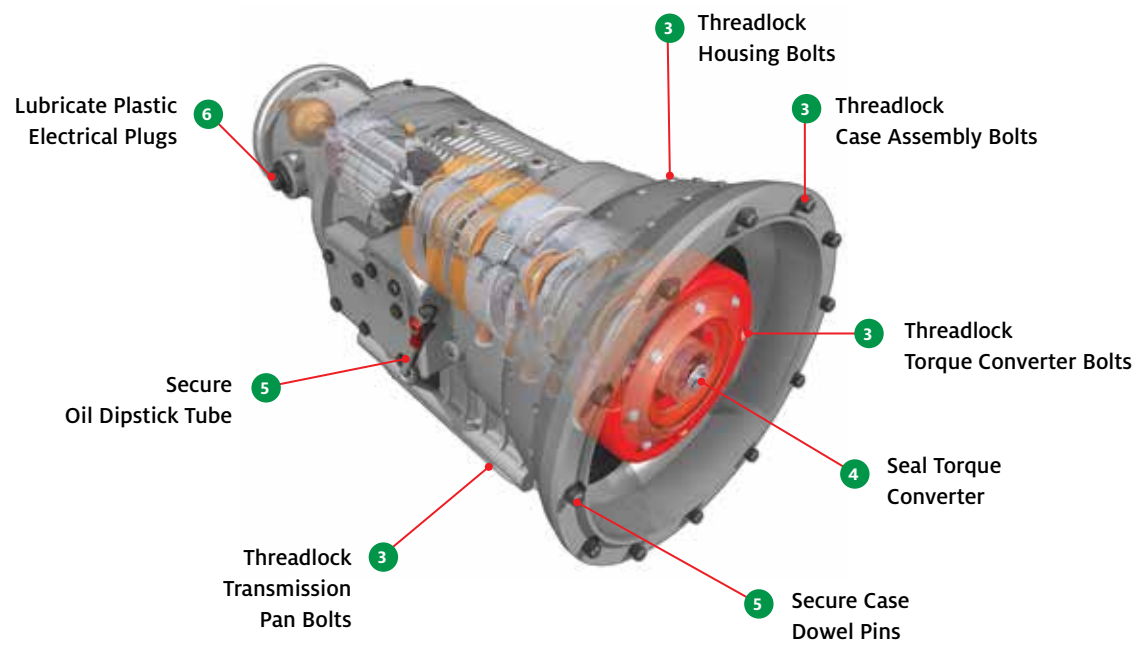
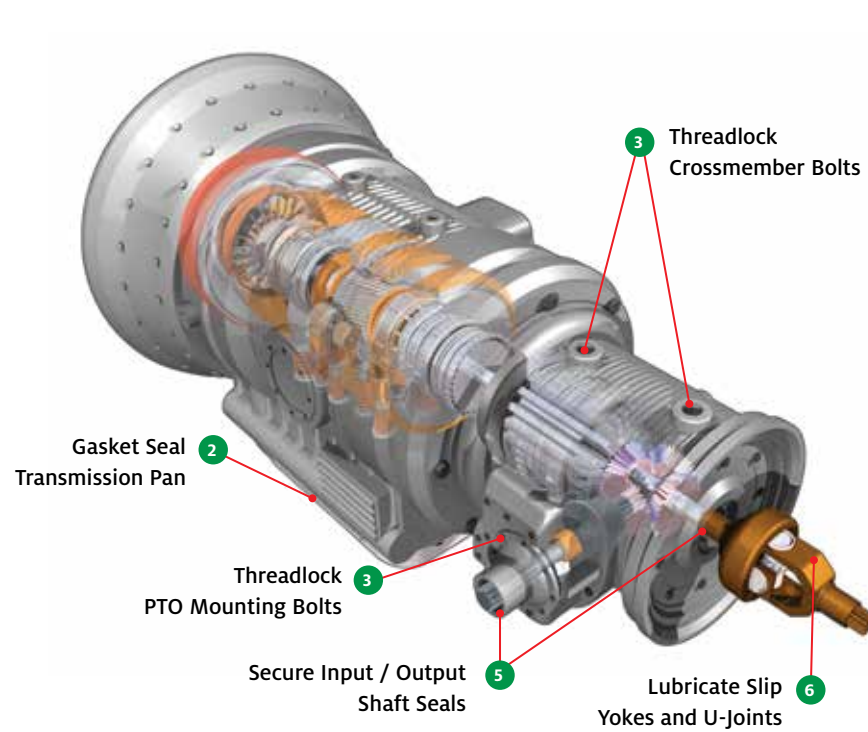




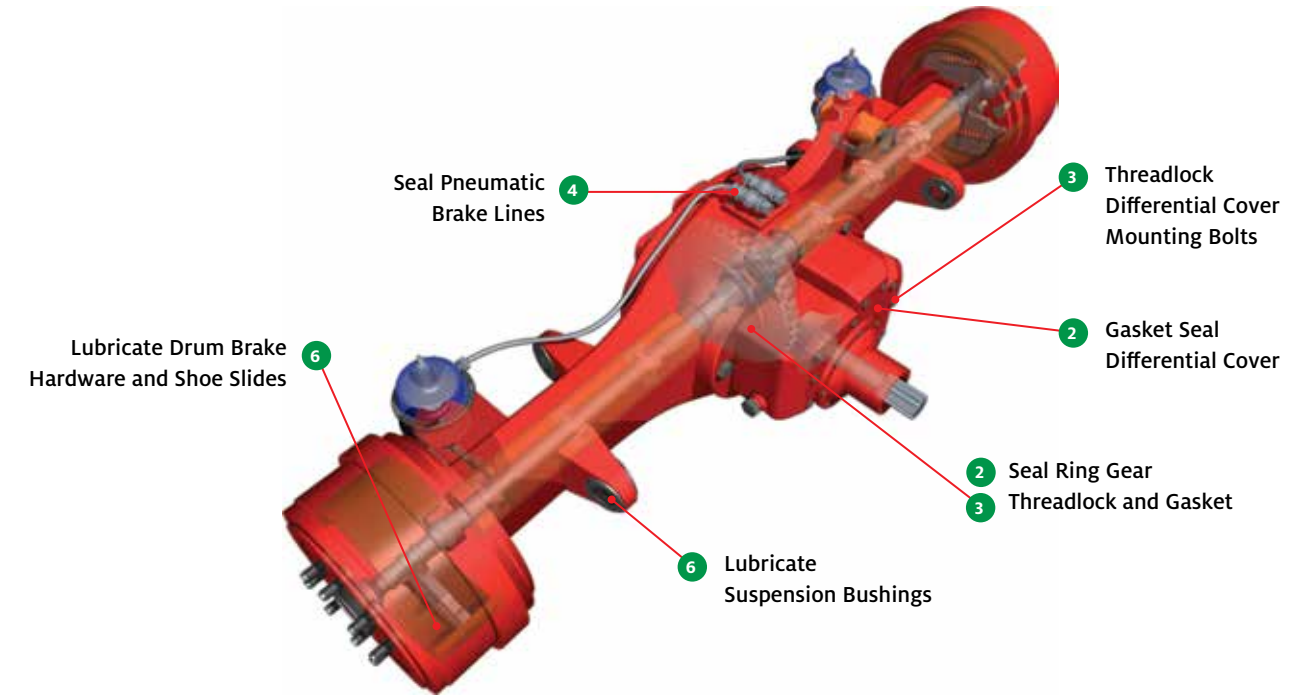
# SUBCOMPONENT APPLICATIONS

## Application Categories

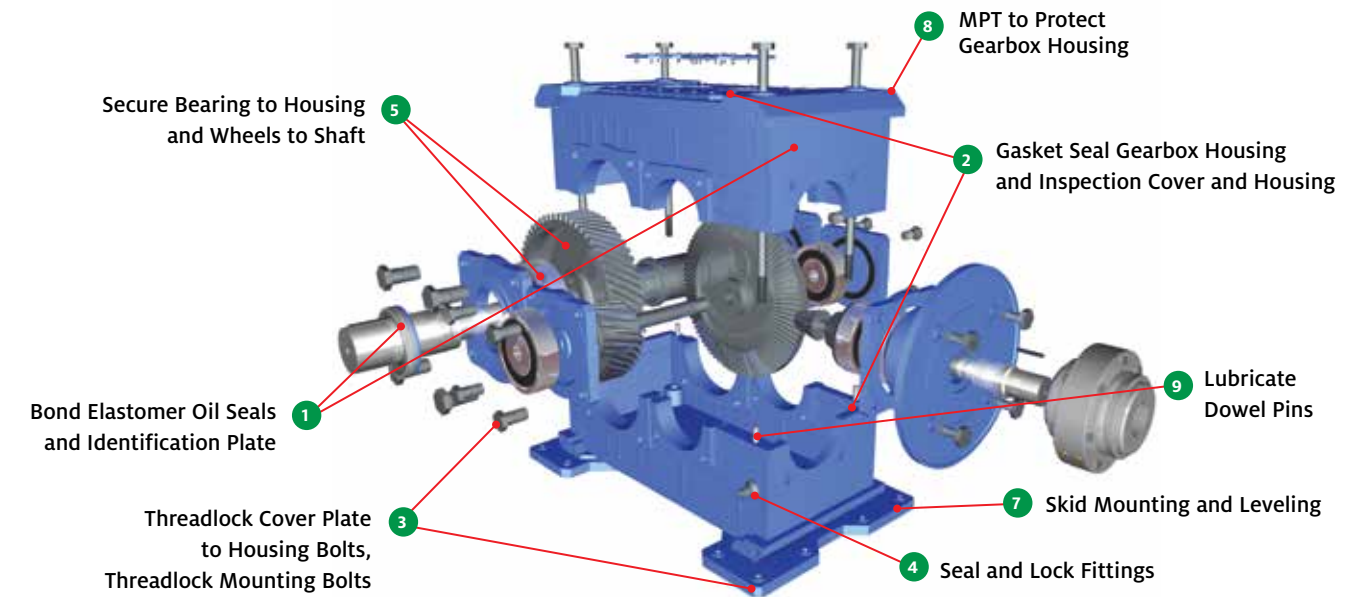
- 1 GENERAL BONDING
- 2 GASKETING
- 3 THREADLOCKING
- 4 THREAD SEALING
- 5 RETAINING
- 6 LUBRICATING
- 7 GROUTING
- 8 METAL PRETREATMENT (MPT)
- 9 ANTI-SEIZE



## Transmission Assemblies



## ▲ Axle/Differential Assemblies

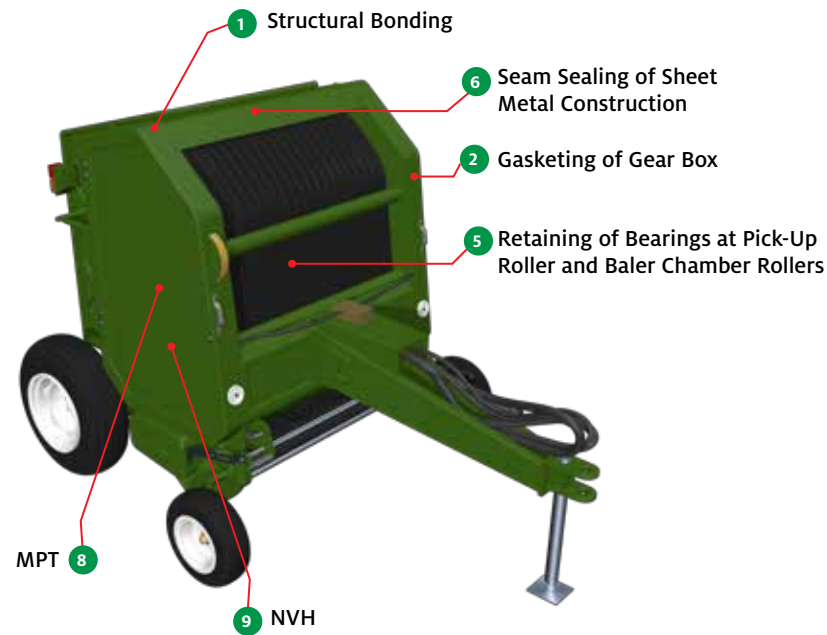


## ▲ Gearbox Assemblies

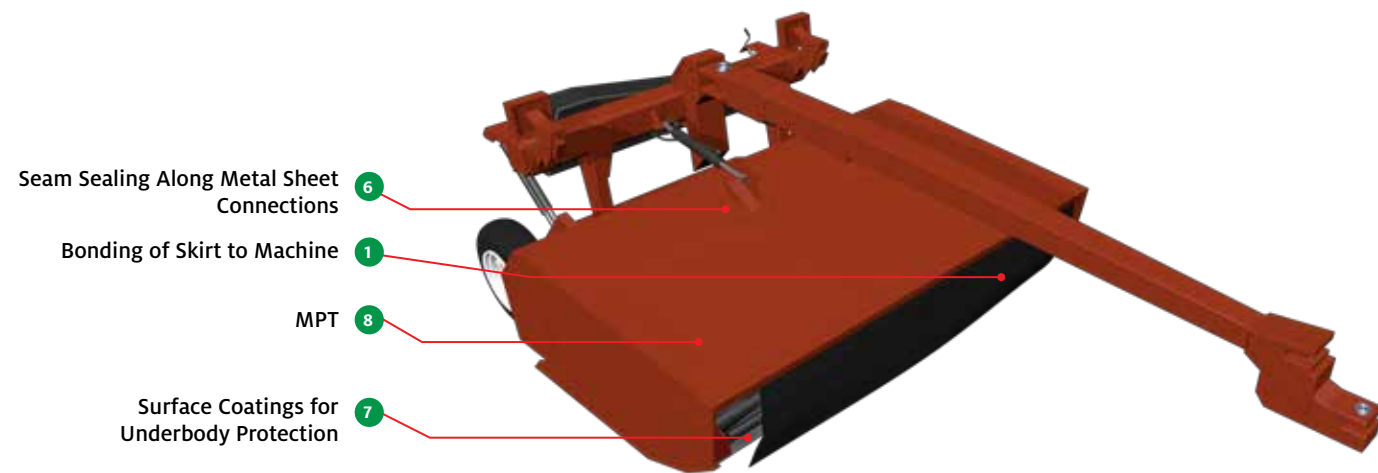
# ATTACHMENT APPLICATIONS

## Application Categories

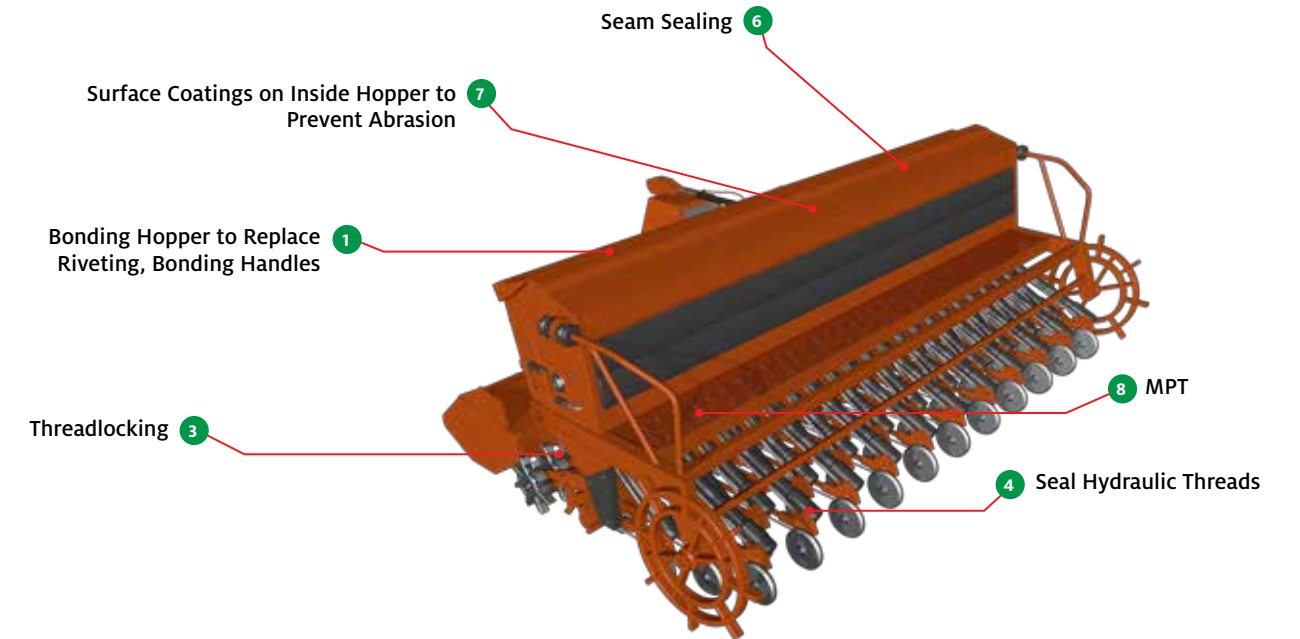
- 1 STRUCTURAL BONDING
- 2 GASKETING
- 3 THREADLOCKING
- 4 THREAD SEALING
- 5 RETAINING
- 6 SEAM SEALING
- 7 SURFACE COATINGS
- 8 METAL PRETREATMENT (MPT)
- 9 NOISE, VIBRATION, HARSHNESS (NVH)



### ▲ Balers



### ▲ Mowers



### ▲ Seed Drills



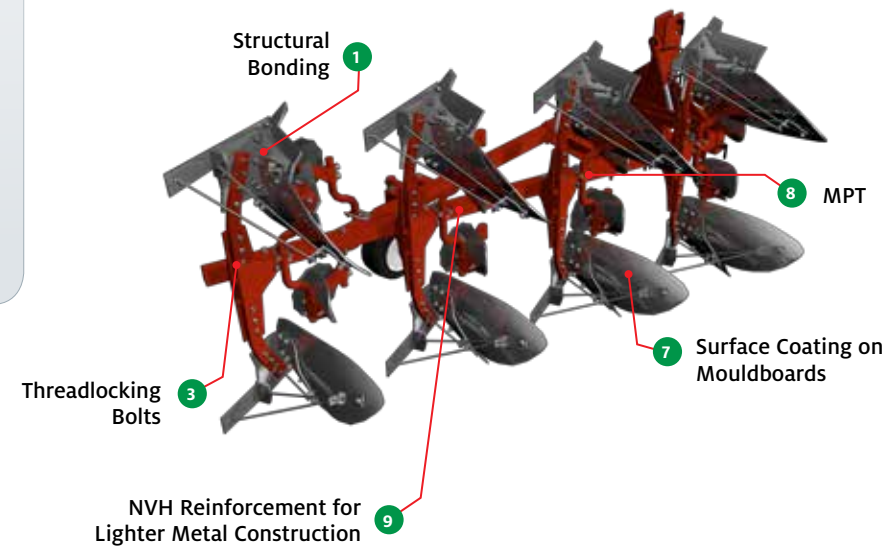
### ▲ Harrows



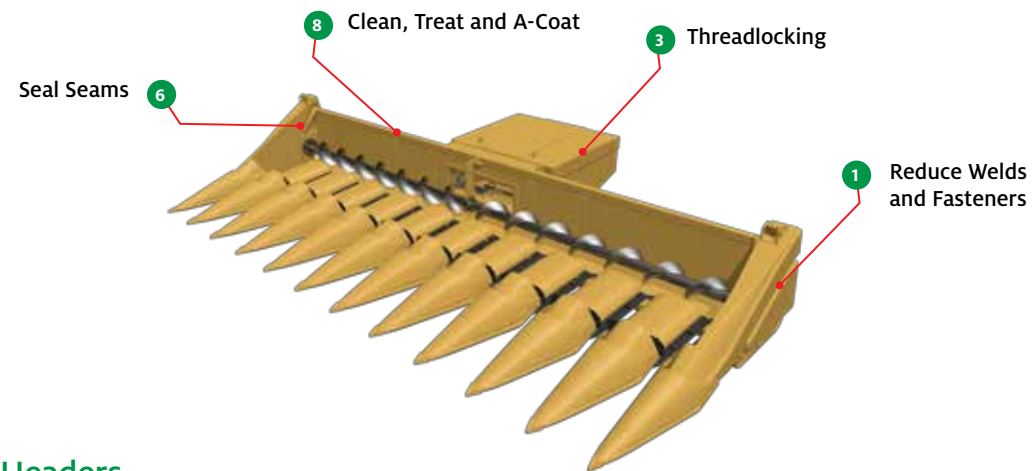
# ATTACHMENT APPLICATIONS

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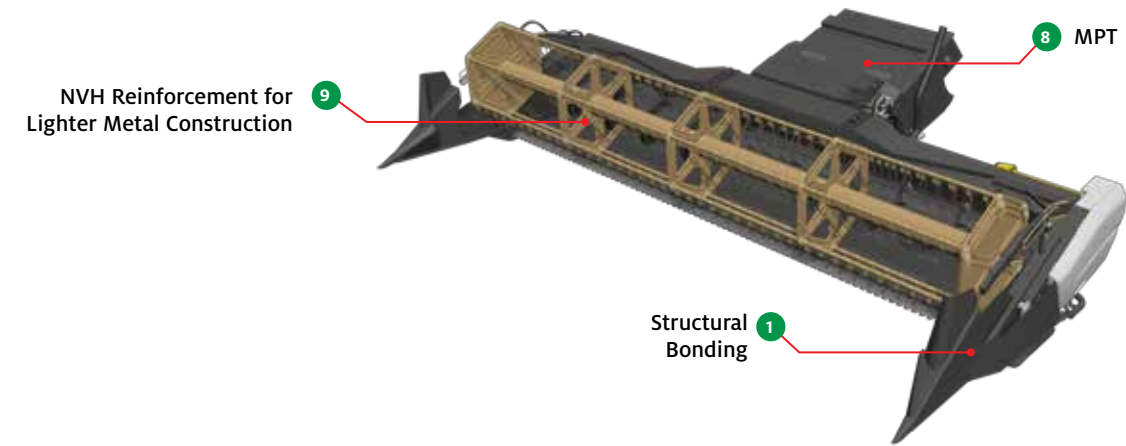
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- 7 SURFACE COATING
- 8 METAL PRETREATMENT (MPT)
- 9 NOISE, VIBRATION, HARSHNESS (NVH)



### ▲ Plows



### ▲ Corn Headers



### ▲ Grain Headers



### ▲ Sprayers



## NOISE, VIBRATION, HARSHNESS AND METAL REINFORCEMENT SOLUTIONS

### 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 agricultural and construction equipment manufacturing. Our TEROSON® brand NVH solutions and LOCTITE® brand adhesives and sealants help enhance material properties and minimize audible noises.


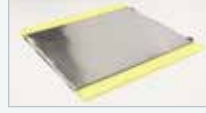





# NOISE, VIBRATION, HARSHNESS AND METAL REINFORCEMENT SOLUTIONS

**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 also helps agricultural and construction 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 0.1 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 leakage**.
- We help our customers achieve **high performance sealing and save on process cost** through automation.

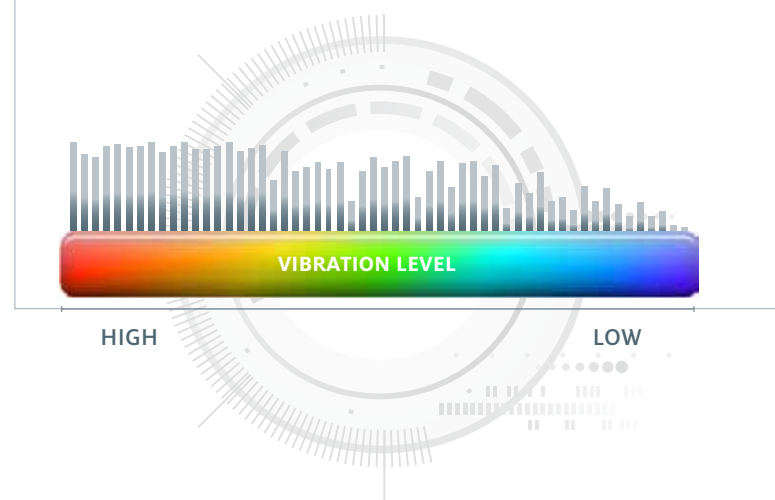
NOISE, VIBRATION AND HARSHNESS SOLUTIONS (FIGURE 1)					
APPLICATION	<b>REINFORCEMENT</b> 	<b>DAMPING</b> 	<b>SEALING</b> 	<b>ABSORPTION</b> 	<b>BARRIER</b> 
NEED	<b>Increase stiffness, shift resonant frequency</b>	<b>Attenuate vibration of panel structure</b>	<b>Isolate noise sources</b>	<b>Reduce reverberant noise</b>	<b>Block sound transmission</b>
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	
	<ul style="list-style-type: none"> <li>• Structural vibration reduction</li> <li>• Allows metal design with thinner panels</li> <li>• Reduction in mass</li> </ul>	<ul style="list-style-type: none"> <li>• High loss factor performance</li> <li>• Structural vibration reduction</li> <li>• Improves NVH performance</li> <li>• Converts vibration into thermal energy</li> <li>• Reduction in sound pressure levels</li> <li>• Easy to apply on various substrates</li> </ul>	<ul style="list-style-type: none"> <li>• Less welding</li> <li>• Less corrosion</li> <li>• Process cost savings through automation</li> </ul>	<ul style="list-style-type: none"> <li>• High Sound Transmission Loss (STL) performance</li> <li>• High absorption performance</li> <li>• Tunable performance</li> <li>• Complexity reduction</li> </ul>	

## Vibration Response Test (Figure 2)



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

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



## NVH Technology Overview

FREQUENCY	20kHz	AIRBORNE NOISE	BARRIER	<ul style="list-style-type: none"> <li>&gt; Multilayer with EVA Sound Insulation</li> <li>&gt; Fiber (Nonwoven) Absorber</li> <li>&gt; Open Cell Foam Absorber</li> <li>&gt; Preformed Mastic Parts (Non-Expanding)</li> <li>&gt; Preformed Parts: Expandable Soft Foams</li> </ul>
	1kHz		ABSORPTION	
100Hz	SEALING			
0.1kHz	STRUCTURAL NOISE	DAMPING	<ul style="list-style-type: none"> <li>&gt; Bitumen Sheets</li> <li>&gt; Constrained Layer Damping Pads (CLD)</li> <li>&gt; Aqueous Synthetic Damping - Large Surface (rail)</li> <li>&gt; Liquid Applied Sound Deadener (LASD)</li> <li>&gt; Pumpable Anti-flutter</li> <li>&gt; Bonding With Semi-Structural Adhesives</li> <li>&gt; Bonding With Structural Adhesives</li> <li>&gt; Injection of Structural Hard Foams - RT - RIM</li> <li>&gt; Preformed Parts: 3D Structural Foam - Thin Gauge Metal (auto)</li> <li>&gt; Preformed Parts: 2D Structural Tapes and Pads</li> </ul>	
		REINFORCEMENT		

# NOISE, VIBRATION, HARSHNESS AND METAL REINFORCEMENT SOLUTIONS

## TEROSON® Liquid Applied Sound Deadener (LASD)

TEROSON® Liquid Applied Sound Deadener (LASD) significantly reduces the structural noise generated by the vehicle's powertrain and wheels by absorbing and dissipating vibrational energy. LASD is applied directly to the vehicle body, reducing noise and vibration.

LASD offers a sustainable and cost-effective solution by providing mass reduction, improved Noise, Vibration, Harshness (NVH) performance, reduced operational complexity, and compliance with expected environmental regulation.

### ► BENEFITS

- Robotically applied LASD assures consistent application, providing reliable NVH performance.
- Renewable raw materials reduce the use of chemicals of concern and improve automotive interior air quality.

### Service and Support

Henkel supports its LASD technology with experienced acoustics/ materials engineering, laboratory and field service personnel. LASD application systems can be easily added into existing body or paint shop manufacturing processes.



## TEROSON® Foam Absorbers

TEROSON® foam absorbers are an effective solution to reduce exterior noise and cabin noise. The foam absorbers can be used inside the engine cover and cabin. They absorb noise inside the engine room or cabin and reduce reverberant noise in the cavity.

### ► BENEFITS

- Absorbs engine noise
- Attenuates reverberant noise in cavities
- Good adhesion to panels
- Flame retardant

## Acoustics Labs and Engineering Services

Henkel's technical support team offers engineering, design, prototyping, application evaluation and testing services to help customers solve NVH problems and improve machine design.

- **Acoustics labs** with state-of-the-art instrumentation and validation equipment to test and analyze noise and vibration reduction variables.
- **Lab locations** in each of our major regional hubs – Germany, United States, China and India.
- **NVH Engineering:** Our comprehensive services include analysis, application solution design and application solution validation.
- **NVH Testing:** Our world-class testing resources include acoustic material testing and machine/component testing.
- **NVH Simulation:** We use a broad range of modeling tools for structural, acoustic, thermal and aerodynamic simulation.



### Our services include:

NVH Analysis	Acoustic Material Testing	Other NVH Testing	
<ul style="list-style-type: none"> <li>• Noise source</li> <li>• Transmission path</li> <li>• Contribution</li> <li>• Frequency response</li> </ul>	<ul style="list-style-type: none"> <li>• Damping test (Oberst, impedance, free method)</li> <li>• Sound absorption</li> <li>• Transmission loss</li> </ul>	<ul style="list-style-type: none"> <li>• Semi anechoic room test</li> <li>• Reverberant room test</li> <li>• Vibration test by laser meter</li> <li>• Acoustic camera (holography)</li> </ul>	<ul style="list-style-type: none"> <li>• Sound pressure level</li> <li>• Sound intensity / power</li> <li>• Field test</li> <li>• Modal test</li> </ul>

### NVH Simulation Capabilities

Simulation types	FEA	BEM	SEA
Strength	✓	×	×
Stiffness	✓	×	×
Modal	✓	×	×
Vibration	✓	×	×
Noise	✓	✓	✓
Thermal	✓	×	×

- **FEA** Finite element analysis for structural and low frequency
- **BEM** Boundary element analysis for mid and high frequency
- **SEA** Statistical energy analysis for mid and high frequency





## FUNCTIONAL COATINGS

### Solutions for Metal Pretreatment

Henkel offers a full range of metal pretreatment solutions to reduce process steps, improve efficiency, and increase cost savings. Our solutions will help you achieve enhanced paint adhesion and corrosion protection with less energy and water consumption, less wastewater, and more environmentally conscious formulas.



# FUNCTIONAL COATINGS AND METAL PRETREATMENT SOLUTIONS

## THE HENKEL PORTFOLIO

### CLEANERS

- ▶ Maintenance
- ▶ Process
- ▶ Industrial
- ▶ Specialty
- ▶ Pickles
- ▶ Strippers
- ▶ Alkaline
- ▶ Neutral
- ▶ Conditioners

BONDERITE® cleaners help to increase efficiency, lower operating costs, and simplify your daily business processes.



### METAL PRETREATMENT AND CONVERSION COATINGS

- ▶ Iron phosphate, zinc phosphate, manganese phosphate
- ▶ New generation coatings (nanoceramics)
- ▶ Light metal finishing (chrome, non-chrome technologies, anodizing)

BONDERITE® metal pretreatments and conversion coatings set a high standard for corrosion protection and paint adhesion. These high-performance, sustainable products can help improve your process reliability and are available in multiple options for dip or spray applications.



### COATINGS

- ▶ Electro-ceramic coating
- ▶ Autophoretic coating (A-Coat)
- ▶ Rust prevention
- ▶ Break-in lubricant coating

BONDERITE® coating processes deliver anti-corrosion, friction reduction, and improved heat resistance benefits while offering a number of environmental benefits.

### Key Henkel Processes

Henkel's focus on innovation has led to the development of new, more efficient surface treatment processes that offer environmental benefits and reduced energy and CO<sub>2</sub>.

- **Henkel Nanoceramic Process:**  
Our **BONDERITE® M-NT 1™** conversion coating provides a phosphate-free alternative to traditional iron phosphate.
- **Henkel Autodeposition Process:**  
Our **BONDERITE® M-PP** autodeposition process combines metal pretreatment and finishing in one process, increasing efficiency along with energy and cost savings.

*Read more about these innovative processes on the following page.*



### Equipment

All our product solutions are supported by a full range of dispensing equipment that can be easily integrated into your existing manufacturing processes.

*See page 33 for more information.*

### Henkel Process Services

#### Process selection

Henkel's experts consult with customers to match their individual requirements to the right Henkel process.

#### Analytic and process validation

Henkel analyzes the complete production process for customers, reducing production cycle times and rejection rates.

#### Start-up of application and lab testing

Henkel tests applications of your process in our labs and ensures that Henkel products can be smoothly integrated into your plant.

#### Process optimization

Henkel works with customers to design simpler and more efficient production processes, with a focus on meeting environmental and safety criteria.

#### Customer training

Henkel offers comprehensive training to help our customers understand our products in detail and learn correct application methods.



# FUNCTIONAL COATINGS AND METAL PRETREATMENT SOLUTIONS

## Henkel Nanotechnology Solutions

MORE SAVINGS, FEWER STEPS

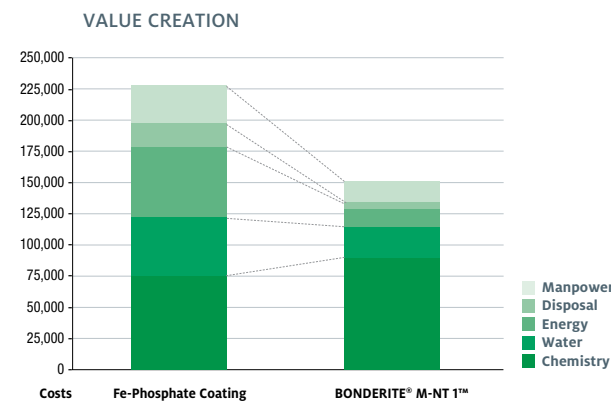
### BONDERITE® M-NT 1™

The BONDERITE® M-NT 1™ conversion coating is single-part zirconium-based nanotechnology, which provides a phosphate-free alternative to traditional iron phosphate. It runs at low temperatures and is completely phosphate- and regulated heavy metal-free, to reduce energy consumption and waste removal. BONDERITE® M-NT 1™ is suitable for dip and spray applications.

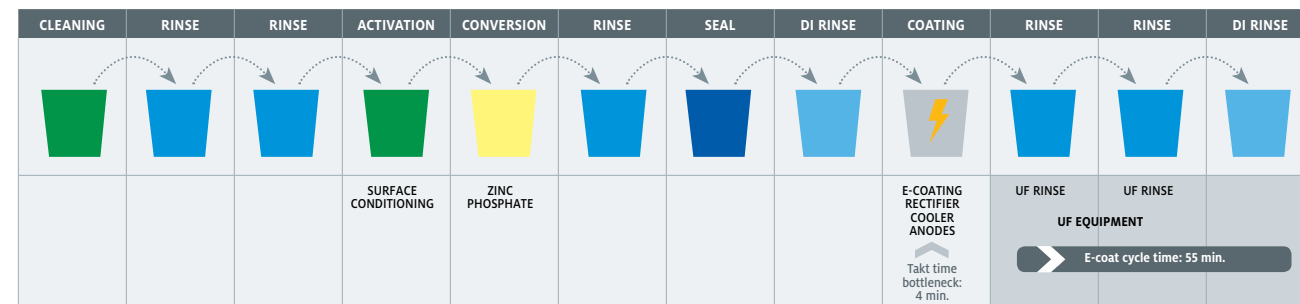
#### ► BENEFITS

The Henkel Nanoceramic process offers significant savings in manpower, disposal, energy, and water costs compared to traditional processes:

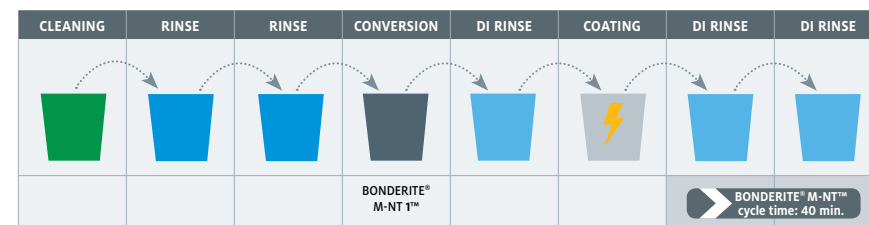
- **Lower energy and water use:** BONDERITE® M-NT 1™ operates at ambient temperatures, reducing energy use and associated CO<sub>2</sub>
- **Reduced hazardous waste:** Free of nickel, phosphates, Volatile Organic Compounds (VOCs) and regulated chemicals
- **Marginal sludge formation:** Significant savings in hazardous waste generation
- **Fewer process steps:** Activation and passivation are no longer required; contact times are simultaneously reduced



#### ► TRADITIONAL MULTI-STEP PROCESS



#### ► HENKEL NANOCERAMIC PROCESS



## Henkel Autodeposition Solutions

ENHANCED CORROSION PROTECTION FOR DEMANDING APPLICATIONS

### BONDERITE® M-PP

The BONDERITE® Autodeposition process delivers a highly corrosion-resistant, thin, organic coating while increasing process efficiency over traditional finishing methods. It combines metal pretreatment and finishing in one process, providing a lasting finish – both inside and outside of parts.

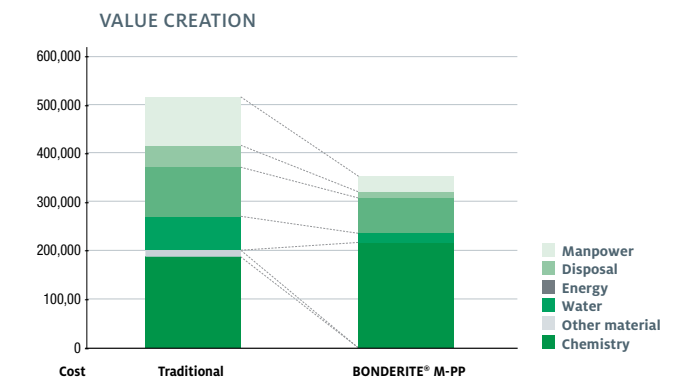
#### ► BENEFITS

Henkel's Autodeposition process provides substantial savings compared to traditional e-coating methods:

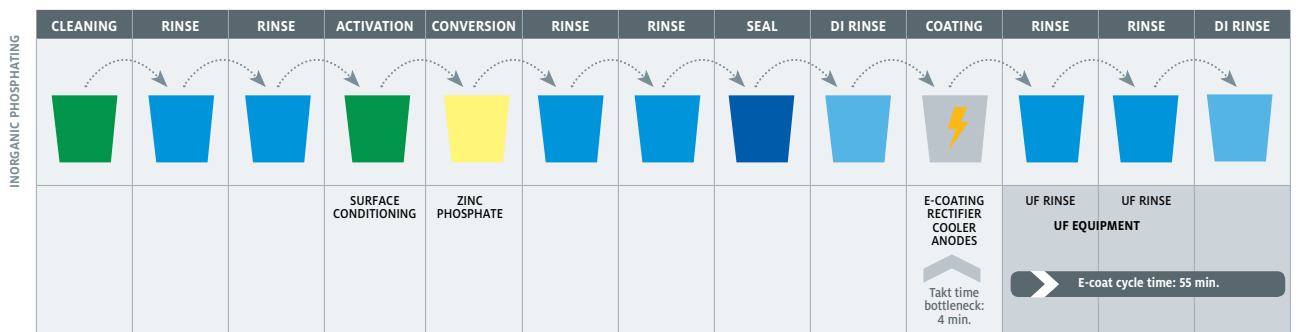
- **Requires significantly less** manpower and equipment, less cycle time, energy, part rework and handling
- **Reduced energy:** BONDERITE® M-PP and powder coating topcoats are "co-cured" in a single oven, significantly reducing energy requirements and the production footprint
- **Environmental benefits:** No toxic heavy metals, very low VOCs

#### ► PROCESS ADVANTAGES

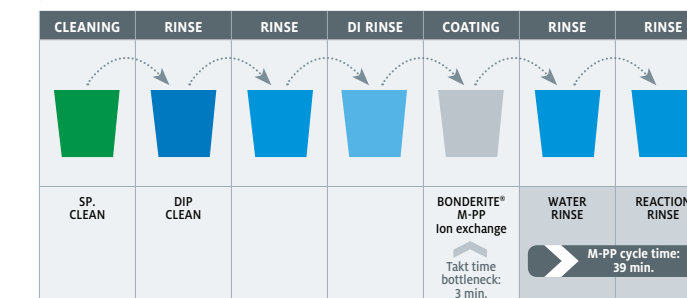
- Unlimited throwing (wetting) power with uniform coverage
- Coats fully assembled parts
- Inside and outside part protection
- No electrical contacts required



#### ► TRADITIONAL MULTI-STEP PROCESS



#### ► HENKEL AUTODEPOSITION PROCESS



#### PRODUCT LINE SUPPORT

Henkel's BONDERITE® team is made up of chemists, engineers, application specialists and pilot plant facilities that can assist you in the evaluation, design and installation of autodeposition coating processes. For more information, please contact your Henkel representative for assistance.

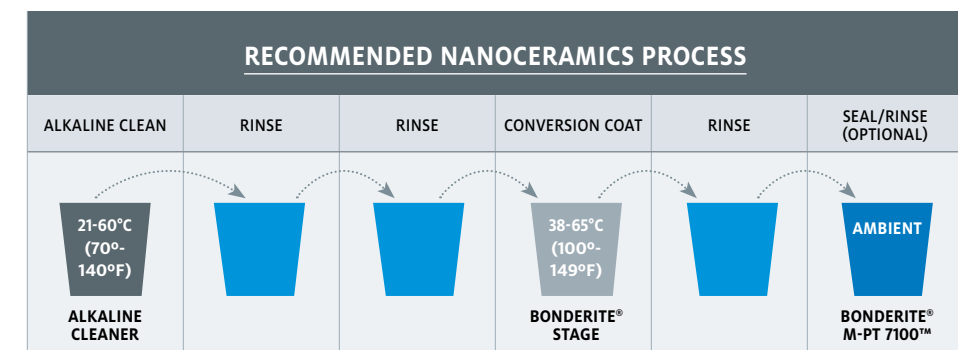
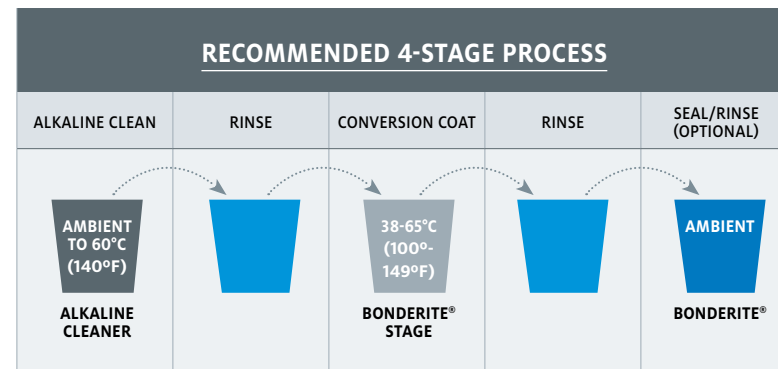
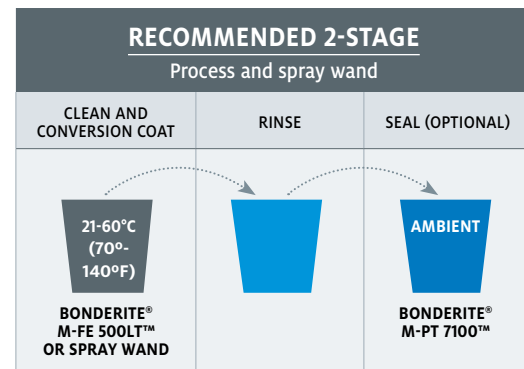
# FUNCTIONAL COATINGS AND METAL PRETREATMENT SOLUTIONS

**LEARN MORE:**

This catalog lists the most common products used in each application. Many additional products are available. Not all products are available in all countries. Contact your Henkel representative for assistance.

YOUR APPLICATION	METAL AND PAINT PRETREATMENT				
	Cleaning				
STEP 1 ▶ Pick a cleaner	Phosphate-free	Steel	Aluminum	Pickle	Multi-Metal
STEP 2 ▶ Pick a conversion coating					
STEP 3 ▶ Seal it					
SOLUTION	BONDERITE® C-AK 305N™	BONDERITE® C-AK 305™	BONDERITE® C-AK 412™	BONDERITE® C-IC 182B™	BONDERITE® C-AK 1520™
Application Temperature	37°C-60°C (99°F-140°F)	37°C-60°C (99°F-140°F)	54°C-82°C (129°F-180°F)	82°C (180°F)	43°C-60°C (109°F-140°F)
Concentration by Volume	1-3%	2-4%	1-5%	5-30%	1-3%
Contact Time	5-25 sec.	5-25 sec.	1-15 min.	1-15 min.	30-80 sec.
Application	Spray	Spray	Spray, Immersion	Spray, Immersion	Spray, Immersion
Acid/Alkaline	Alkaline	Alkaline	Alkaline	Acid	Alkaline

METAL AND PAINT PRETREATMENT									
Conversion Coating									
1-STAGE	2-STAGE		4-STAGE		5-STAGE	SEAL / POST RINSE (CHROME-FREE)			
Spray Wand	Spray Wand	Cleaner/Coater		Iron Phosphate		Nanoceramic	Dry-in-Place	Organic	Inorganic
BONDERITE® M-FE 101™	BONDERITE® M-FE 200™	BONDERITE® M-FE 500LT™	BONDERITE® M-FE 700™	BONDERITE® M-FE 1030™	BONDERITE® M-FE 1090™	BONDERITE® M-NT 1™	BONDERITE® M-PT 7100™	BONDERITE® M-PT 99X™	BONDERITE® M-PT 50NC™
49°C-88°C (120°F-190°F)	54°C-88°C (129°F-190°F)	21°C-60°C (70°F-140°F)	43°C-65°C (109°F-149°F)	38°C-49°C (100°F-120°F)	43°C-46°C (109°F-115°F)	Ambient	Ambient	Ambient	21°C-38°C (70°F-100°F)
1-3%	1-6%	2-4%	4-8%	3-4%	2-6%	3-5%	5-10%	3%	10%
30-180 sec.	30-180 sec.	1-2 min.	1-5 min.	45-90 sec.	30 sec.-5 min.	20-120 sec.	5-15 sec.	20-120 sec.	15-60 sec.
Spray	Spray	Spray	Spray, Immersion	Spray	Spray, Immersion	Spray, Immersion	Spray	Spray, Immersion	Spray, Immersion
Acid	Acid	Acid	Acid	Acid	Acid	Acid	Acid	Acid	Acid





## FUNCTIONAL COATINGS AND METAL PRETREATMENT SOLUTIONS

### Additional Coating Solutions

#### Rust Preventatives

Henkel offers a comprehensive line of BONDERITE® neutral cleaners and rust preventatives to protect metal surfaces. Neutral cleaners are typically used after machining to remove machining fluids and metal fines while providing short-term rust protection.

#### ► ADVANTAGES

- Use in single stage washers
- Use with automatic gauging equipment
- Good separation of removed oils
- No scale buildup in washer
- Good before heat treating

Our BONDERITE® rust preventatives provide protection on ferrous and non-ferrous alloys and can be applied by spraying or dipping. The product range includes a variety of staying power:

- **In process:** Applied inline and lasts a few days to a few weeks.
- **Short term:** Applied toward the end of the operation and lasts up to two months with ideal storage conditions
- **Extended:** Applied at or near the end of the process and lasts six months or longer.

#### Remanufacturing

Henkel offers products and engineering services that can make you more competitive in the demanding business of engine and transmission remanufacturing. Our R&D scientists and engineers have developed a wide range of products for every step of the remanufacturing cycle, including market-leading solutions for cleaning, remachining and reassembly.

Henkel products are designed to improve finished goods reliability, reduce operating costs, and return engines and transmissions back into service faster than ever before. Whether you need a consultation regarding our products' performance or a complete turnkey process design, Henkel can provide cost-effective solutions that will meet or exceed your requirements.



#### Anti-Weld Spatter

Henkel's innovative Anti-Weld Spatter coatings protect welding equipment and parts by preventing metal spatter from adhering to the contact tip, nozzle and surrounding parts. Products can be applied manually or robotically and are suitable for MIG and MAG welding.

#### ► BENEFITS

##### Increased Productivity

- Easy to apply and/or automate
- Minimizes downtime
- Reliable continuous production

##### Lower Costs

- Extends torch nozzle and tip life
- Decreases cleaning time and frequency

##### Higher Quality

- Silicone-free, no paint issues
- Improves quality of weld seams
- High temperature resistance (1100°C/2012°F)

### Functional Coating Equipment Solutions

Over the past 30 years, Henkel has designed, built and integrated advanced equipment solutions to optimize the application of metal pretreatment products, providing trusted, high quality services to our customers. We offer a complete line of application equipment, process controls, pretreatment support equipment and other specialty systems that can be easily integrated into your existing manufacturing processes.

- **Process Control Systems:** Our LINEGUARD® control systems streamline process steps, increase efficiencies, and improve overall quality. We can demonstrate washer chemical savings of 10-25%, water usage savings of 5-30%, and quality improvements (reduced paint line rejections) of up to 10% after LINEGUARD® system installations.
  - Solid state
  - Programmable logic controller (PLC)
  - PC-based logic controller
- **Pretreatment Support Equipment:** The right support equipment can maximize process efficiencies, recycle processing solutions for longer bath life, reduce fresh water requirements, and minimize waste loading.
  - Chemical metering pumps
  - Air diaphragm pumps
  - Level controls
  - Spray nozzles
  - Coalescing oil separators
  - Ion exchange
- **Test Equipment and Data Management Systems:** Essential for good manufacturing quality control, our test equipment and data management systems are developed in close collaboration with our customers and fully supported by our team of equipment engineers.
- **Equipment field service support**
- **Customized equipment solutions and systems**



#### BONDERITE® equipment package

BONDERITE® equipment supports the complete bath management process. Baths can be analyzed precisely, and adjusted efficiently or even automatically. Remote access and monitoring is also available.

#### ► BENEFITS

- Linear and constant bath management
- Improved coating quality
- Increased safety
- Process cost reduction
- Documented and recorded process parameters
- Monitoring of process costs and chemicals





## ASSEMBLY SOLUTIONS

### Faster and Lower-Cost Assembly

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.



# ASSEMBLY SOLUTIONS – SEAM SEALING

## Fill Gaps and Leak Paths

SEAL IN/OUT HEAT, LIQUIDS, SOLIDS AND GASES; IMPROVE AESTHETICS

Designed to prevent leakage, our robust seam sealants work effectively on metals, plastics and composites, and can be applied during any phase of vehicle or component assembly. Our current seam sealant technologies include products that are paintable and resistant to the high heat of paint cure processes.

- Products engineered to adhere to bare oily metals in the body shop
- Painted components in the paint and trim shop
- Products designed to endure high temperature e-coat/powder coat lines
- Room temperature cure applications exposed to direct sun, elements and weather

### Why use a seam sealant?

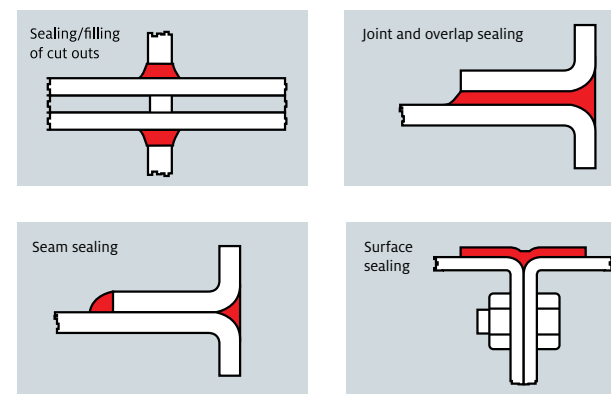
- Seal in/out heat, liquids, solids and gases (moisture, dirt and exhaust)
- Prevent corrosion between metal joints
- Improve aesthetics by eliminating rust bleed and creating a seamless appearance
- Reduce airborne and structural-borne noise
- Simplify designs and assembly process
- Enhance paint quality
- Reduce the need for welding

### Where to use a seam sealant:

- Over and between welded/fastened joints:
  - Cabin assemblies
  - Door and panel assemblies
  - Engine and radiator covers
  - Lower and upper frame assemblies
  - Boom and shovel assemblies



No matter what your needs are, we have a seam sealant that will adapt to your assembly and paint process.



### Room temperature curing seam sealants include:

- Rigid epoxy and acrylic-based weld sealants
- Flexible silyl modified polymers (SMP) and polyurethane (PU) based elastomeric adhesives

### Heat curing seam sealants include:

- Paintable weld-through compatible formulations
- Low and high temperature curing formulations

## ASSEMBLY PROCESS

**BODY SHOP**

**PAINT SHOP**  
Post Metal Pretreatment  
Pre E-Coat/Primer

**PAINT SHOP**  
Post E-Coat/Primer  
Pre Powder/Top Coat

**TRIM SHOP**

## CONSIDERATIONS

- Adhesion to bare "oily" metal
- Resistant to washout from MPT
- Thermal compatibility with paint bake (up to 220°C/428°F)
- Paint adhesion and no read-through

- Adhesion to treated metal
- Thermal compatibility with paint bake (up to 220°C/428°F)
- Paint adhesion and no read-through
- Minimal to no outgassing (paint)

- Adhesion to e-coated/primed metal
- Thermal compatibility with paint bake (up to 220°C/428°F)
- Paint adhesion and no read-through
- Minimal to no outgassing (paint)

- Adhesion to painted metal or composite
- UV and environmental resistance
- Ambient cure mechanism
- Excellent smoothability and appearance

## SOLUTIONS

- Reactive PVC and rubber based adhesives
- Epoxies
- Acrylics
- Some Silyl Modified Polymers\*

- Reactive PVC and rubber based adhesives
- Epoxies
- Acrylics
- Silyl Modified Polymers\*

- Reactive PVC and rubber based adhesives
- Epoxies
- Acrylics
- Silyl Modified Polymers\*
- Polyurethanes\*

- Silyl Modified Polymers
- Silicones

\*liquid paint process only

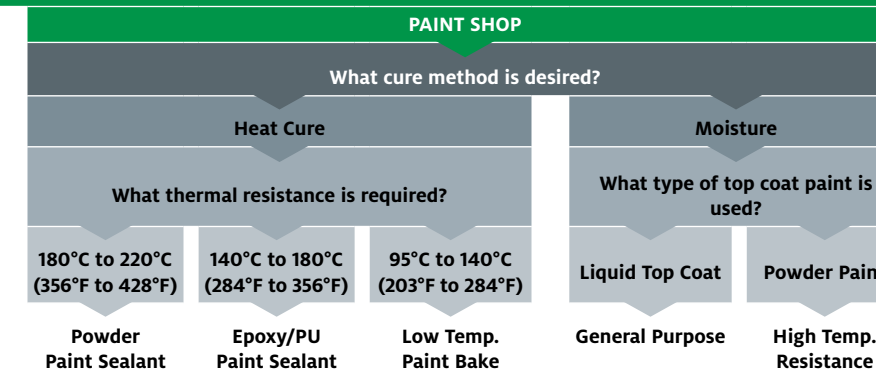
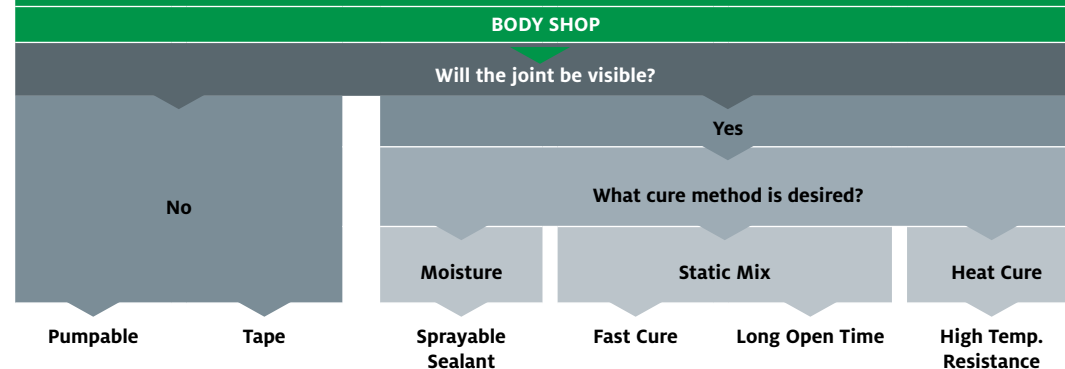
# ASSEMBLY SOLUTIONS – SEAM SEALING

**LEARN MORE:**

This catalog lists the most common products used in each application. Many additional products are available. Not all products are available in all countries. Contact your Henkel representative for assistance.

**YOUR APPLICATION CRITERIA**

**WHERE WILL THE SEAM SEALANT BE APPLIED?**



**SOLUTION**

	TEROSON® PV 1297™	TEROSON® RB 10102™	TEROSON® MS 9320SF™	LOCTITE® EA E-04SS™	LOCTITE® EA 9460™	LOCTITE® 5016™
<b>Chemistry</b>	PVC plastisol	Rubber	SMP	Epoxy	Epoxy	Epoxy/Acrylic
<b>Cure Type</b>	Heat Cure	Heat Cure	Moisture	Static Mix	Static Mix	Heat Cure
<b>Color</b>	Black	Black	Black, Grey, Ocher	Grey	Grey	White
<b>Expansion</b>	50-100%	60-120%	N/A	N/A	N/A	N/A
<b>Visible Joints</b>	No	No	Yes	Yes	Yes	Yes
<b>Oil Tolerance</b>	Highly Recommended	Highly Recommended	Recommended	Recommended	Recommended	Recommended
<b>Cure Schedule</b>	Min.: 25 min. @ 160°C (320°F) Max: 60 min. @ 200°C (392°F)	Min.: 10 min. @ 165°C (329°F) Max: 60 min. @ 205°C (401°F)	Skin Over Time: 15 min. Cure rate: 4.5 mm/day	Fixture Time: 6 min. 90% cured after 24 hrs.	Fixture Time: 3 hrs. 90% cured after 24 hrs.	Min.: 30 min. @ 140°C (284°F) Max: 30 min. @ 220°C (428°F)
<b>Application Temperature</b>	Ambient	Ambient	Ambient	Ambient	Ambient	Ambient
<b>Shore Hardness</b>	51A	N/A	30A	70D	75D	65A
<b>Peak Metal Temp. Resistance</b>	200°C (392°F)	205°C (401°F)	150°C (302°F)	220°C (428°F)	210°C (410°F)	230°C (446°F)

**Description**

- TEROSON® PV 1297™:** High expansion, PVC plastisol sealant for use on large non-visible gaps.
- TEROSON® RB 10102™:** Expandable heat curing, rubber based, weldable sealer tape for use on oily, non-visible joints.
- TEROSON® MS 9320SF™:** Sprayable or brushable modified silane sealant with excellent smoothability and paintability. Good adhesion to lightly oiled metal.
- LOCTITE® EA E-04SS™:** Fast 5-minute epoxy with excellent sag and washout resistance. Primarily used on thick substrates with large gaps.
- LOCTITE® EA 9460™:** Robust extended open-time epoxy with excellent sag and washout resistance. Primarily used on thick substrates with large gaps.
- LOCTITE® 5016™:** Smoothable epoxy/acrylic hybrid sealant with exceptional heat resistance for high temp. e-coat and powder bake processes.

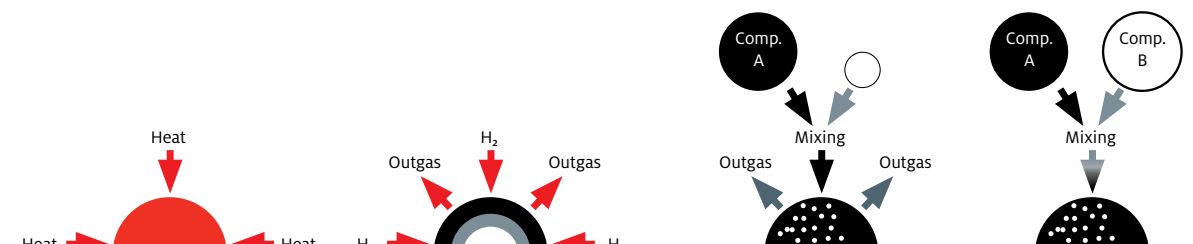
	TEROSON® AL 6302R™	TEROSON® PV 3046™	TEROSON® PU 1104 AA25™
<b>Chemistry</b>	PVC/Polyacrylate	PVC plastisol	PU
<b>Cure Type</b>	Heat Cure	Heat Cure	Heat Cure
<b>Color</b>	White	Ivory	Grey
<b>Expansion</b>	N/A	N/A	N/A
<b>Visible Joints</b>	Yes	Yes	Yes
<b>Oil Tolerance</b>	Not	Not	Not
<b>Cure Schedule</b>	Recommended Min.: 10 min. @ 150°C (302°F) Max: 60 min. @ 220°C (428°F)	Recommended Min.: 10 min. @ 140°C (284°F) Max: 20 min. @ 200°C (392°F)	Recommended Min.: 10 min. @ 85°C (185°F) Max: 60 min. @ 140°C (284°F)
<b>Application Temperature</b>	Ambient	Ambient	Ambient
<b>Shore Hardness</b>	55A	70A	58A
<b>Peak Metal Temp. Resistance</b>	220°C (428°F)	180°C (356°F)	140°C (284°F)

	LOCTITE® UR 3370™	TEROSON® MS 9380HT™
<b>Chemistry</b>	PU	SMP
<b>Cure Type</b>	Moisture	Moisture
<b>Color</b>	Black, White, Grey	Grey
<b>Expansion</b>	N/A	N/A
<b>Visible Joints</b>	Yes	Yes
<b>Oil Tolerance</b>	Not	Not
<b>Cure Schedule</b>	Recommended Skin Over Time: 30 min. 80% cure after 24 hrs.	Recommended Skin Over Time: 7 min. Cure rate: 3mm/day
<b>Application Temperature</b>	Ambient	Ambient
<b>Shore Hardness</b>	55A	65A
<b>Peak Metal Temp. Resistance</b>	170°C (338°F)	200°C (392°F)

	TEROSON® MS 930™	TEROSON® MS 5510™
<b>Chemistry</b>	SMP	SMP
<b>Cure Type</b>	Moisture	Moisture
<b>Color</b>	White, Grey, Black	Clear
<b>Expansion</b>	N/A	N/A
<b>Visible Joints</b>	Yes	Yes
<b>Oil Tolerance</b>	Not	Not
<b>Cure Schedule</b>	Recommended Skin Over Time: 25 min. Cure rate: 4 mm/day	Recommended Skin Over Time: 20 min. Cure rate: 2 mm/day
<b>Application Temperature</b>	Ambient	Ambient
<b>Shore Hardness</b>	30A	44A
<b>Peak Metal Temp. Resistance</b>	150°C (302°F)	150°C (302°F)

**Description**

- TEROSON® MS 930™:** Moisture cure modified silane with primerless adhesion to most substrates and excellent UV and moisture resistance.
- TEROSON® MS 5510™:** Ultra clear silyl modified polymer with excellent primerless adhesion to most substrates and UV resistance. Ideal for applications where paint color matching is important.



TYPE	HEAT CURE	MOISTURE CURE	1K BOOSTED	2K REACTION
Comp.	1K	1K	1,2	2k
Method	Cure on-demand	Humidity	Controlled Cure	Controlled Cure
Cure Cond.	Heat (oven)	Ambient	Ambient	Ambient
Cure Dir.	Outside in	Outside in	Homogenous	Homogenous
Mixing	No mixing	No mixing	Mixing	Mixing
Cure Time	<1 hr.	3-4 mm/day	<1 hr.	<24 hrs.
Fixture Time	N/A	<1 hr.	<20 min.	<1 hr.



# ASSEMBLY SOLUTIONS – WINDOW GLAZING

## Bonding and Sealing Windows

PUMPABLE HIGH STRENGTH ELASTOMERS FOR BONDING AND SEALING VEHICLE WINDSCREENS

Primarily designed to bond windscreens to vehicle cabins, our wide range of window glazing adhesives simplify and improve the assembly process while improving torsional stiffness and vehicle safety.

Based on the substrates and desired drive-away time, Henkel offers a variety of engineered products and primers that provide exceptional performance. These include products formulated to provide primerless adhesion and instant fixturing to products, with controlled and uniform curing.

### Why use a window glazing 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
- More automated assembly process reduces labor costs

### Where to use a window glazing product:

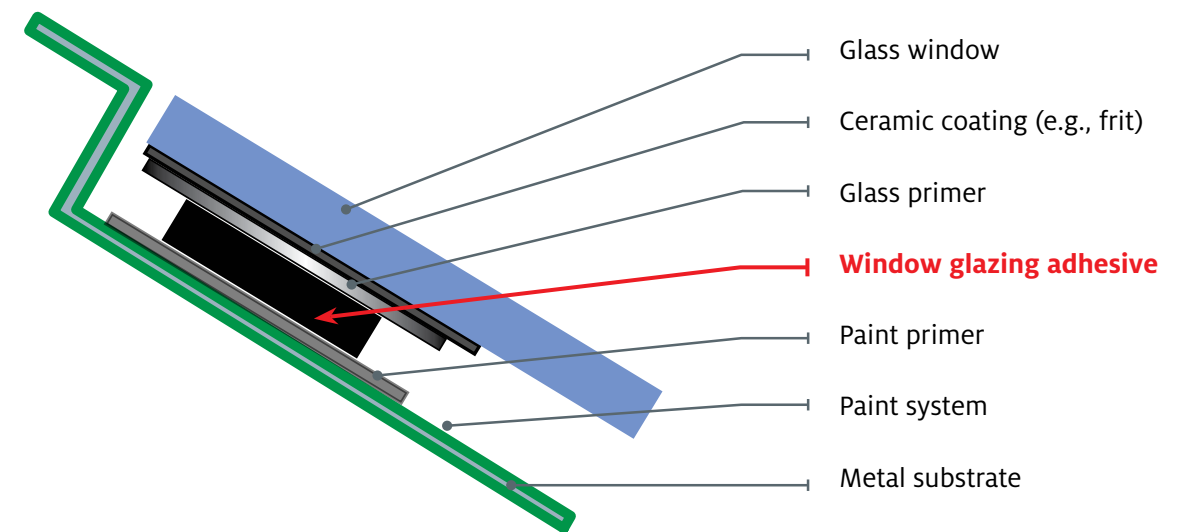
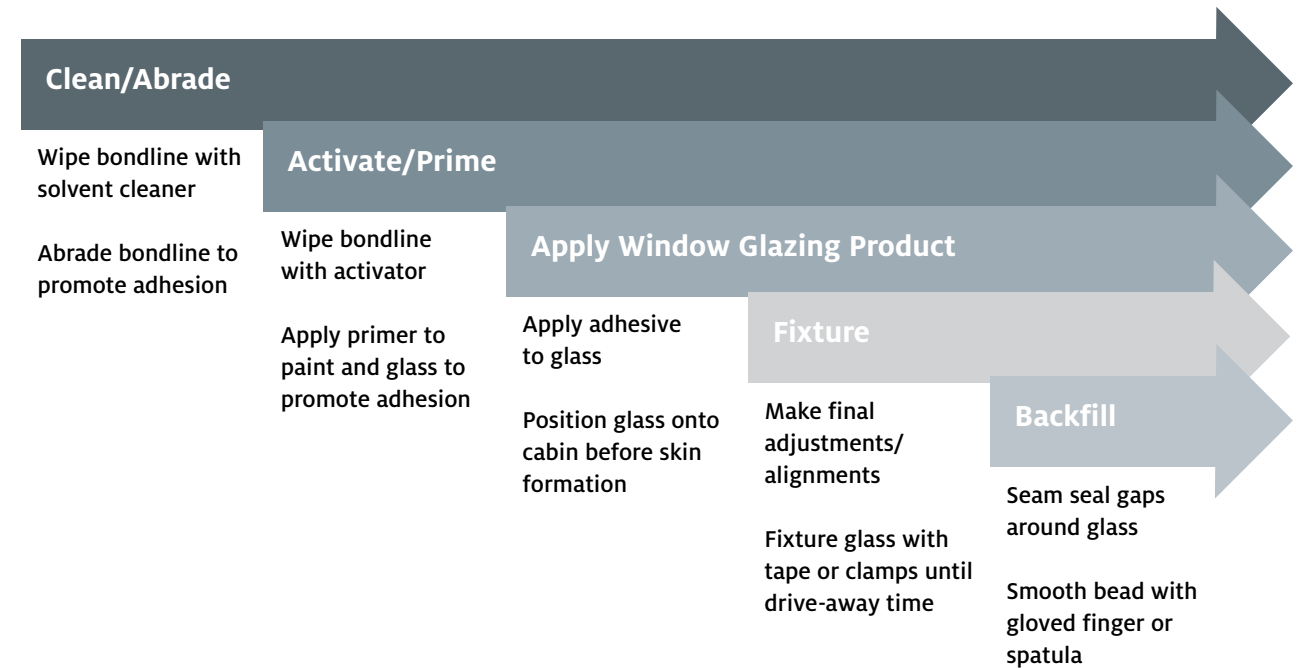
- In the Trim Shop on cabin assemblies
  - Bonding and sealing windscreens
  - Sealing between panes of glass
  - Stationary windows and sunroofs
  - Backfilling large gaps and voids
  - Bonding headliner and upholstery

### Types of window glazing products:

Moisture curing window glazing products include:	Controlled curing window glazing products include:	Primerless window glazing products include:
<ul style="list-style-type: none"> <li>• High modulus single-component PU based adhesives</li> <li>• Low modulus single-component SMP based adhesives</li> </ul>	<ul style="list-style-type: none"> <li>• Boosted single-component PU and SMP based adhesives</li> <li>• Dual-component SMP based elastomeric adhesives</li> </ul>	<ul style="list-style-type: none"> <li>• Single-component moisture cure or boosted PU and SMP based adhesives</li> <li>• Dual-component SMP based elastomeric adhesives</li> <li>• Dual-component SMP based adhesives</li> </ul>

## Typical Windscreen Installation Process

HOW TO USE WINDOW GLAZING PRODUCTS



CROSS SECTION OF TRADITIONAL WINDOW GLAZING APPLICATION

# ASSEMBLY SOLUTIONS – WINDOW GLAZING

**LEARN MORE:**

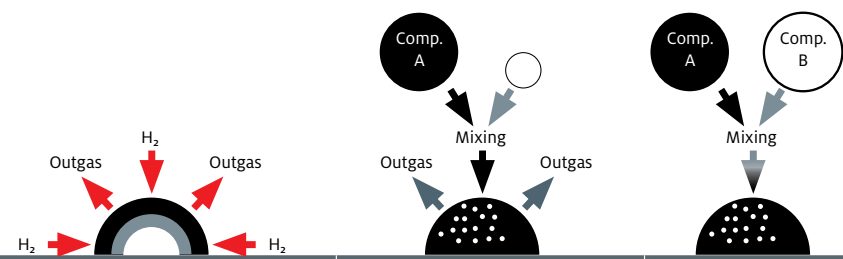
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**YOUR APPLICATION CRITERIA**



**SELECT YOUR STEP IN THE GLAZING PROCESS**

YOUR APPLICATION CRITERIA	SELECT YOUR STEP IN THE GLAZING PROCESS														
	CLEAN/ACTIVATE				PRIME		GLAZE					GLASS BONDING/SEALING			
	Do you need an active cleaner?				What substrate are you trying to prime?		What type of glazing compound is preferred?					Is your process paint sensitive?			
	No		Yes		Glass/Frit	Paint/Metal	Standard Primer System		Primerless System		Controlled Cure		No	Yes	
General Purpose	Silicone Removal	PU Activator	SMP Activator	Glass/Frit Primer	All-In-One Primer	Cold Applied	High Sag Resistance	Cold Applied	High Position Tack	Low Modulus	Static Mix	PU Booster	Clear RTV	Paintable	
SOLUTION	TEROSON® PU 8550™	TEROSON® VR20™	TEROSON® PU 8560™	TEROSON® SB 450™	TEROSON® PU 8517H™	TEROSON® PU 8519P™	TEROSON® PU 8597™	TEROSON® PU 8599™	TEROSON® PU 9095™	TEROSON® PU 9095HV™	TEROSON® MS 939™	TEROSON® MS 9399™	TEROSON® PU 8590 BB-15™	LOCTITE® SI 595™	TEROSON® MS 5510™
<b>Chemistry</b>	Isopropanol	Benzene	Silane/Benzene	Silane/Isopropanol	PU	PU	PU	PU	PU	SMP	SMP	Glycerol Booster	Silicone	SMP	
<b>Cure Type/Ratio</b>	Solvent	Solvent	Solvent	Solvent	Solvent	Solvent	Moisture	Moisture	Moisture	Moisture	Static Mix (1:1)	Static Mix (1-5%)	Moisture	Moisture	
<b>Color</b>	Clear	Clear	Clear	Clear	Black	Black	Black	Black	Black	Black	Black	Beige	Clear	Clear	
<b>Dry/Skin Time</b>	2 min.	2 min.	30 sec.	10 sec.	15 min.	2 min.	25 min.	20 min.	30 min.	10 min.	30 min.	5-20 min.	45 min.	20 min.	
<b>Elongation</b>	N/A	N/A	N/A	N/A	N/A	N/A	350%	250%	400%	400%	250%	150%	N/A	275%	140%
<b>Tensile Strength (MPa)</b>	N/A	N/A	N/A	N/A	N/A	N/A	9.0	8.0	8.0	8.0	3.0	2.0	N/A	0.9	1.7
<b>Application Temperature</b>	Ambient	Ambient	Ambient	Ambient	15°C to 25°C (59°F to 77°F)	0°C to 30°C (32°F to 86°F)	5°C to 35°C (41°F to 95°F)	60°C to 70°C (140°F to 158°F)	5°C to 50°C (41°F to 122°F)	60°C to 70°C (140°F to 158°F)	5°C to 40°C (41°F to 104°F)	15°C to 40°C (59°F to 104°F)	5°C to 70°C (41°F to 158°F)	Ambient	Ambient
<b>Shore Hardness</b>	N/A	N/A	N/A	N/A	N/A	N/A	70A	70A	60A	60A	55A	60A	N/A	14A	44A
<b>Description</b>	General purpose glass, ceramic frit and painted metal cleaner based on isopropanol.	Universal window glazing cleaner based on white spirits specially formulated to remove silicone residue from windscreens.	Solvent based activated cleaner containing silanes for added adhesion promotion.	Isopropanol based activated cleaner formulated specially for use with silyl modified polymers.	Black primer formulated specially for enhancing UV resistance and promoting adhesion on glass and ceramic frit.	Fast black primer formulated for promoting adhesion on all glazing surfaces including paint, glass and ceramic frit.	Robust black primer glazing compound for general use in room-temperature-applied applications.	Ultra high viscosity black primer glazing compound with excellent sag resistance. Requires preheating to dispense.	Pumpable glazing compound for bonding windows without the use of black primer. Primarily used in handheld manual applications.	High position tack warm melt glazing compound for bonding windows without the use of black primer or fixturing. Requires preheating to dispense.	Flexible modified silane adhesive used in applications with large differences in thermal expansion and plastic windows.	Primerless two-component modified silane adhesive used primarily on small glass or plastic windows where fast, consistent cure speed is required.	Urethane glazing booster added to glazing compounds to enhance cure speed and promote uniform controlled curing.	Clear, robust acetoxysilicone for sealing between glass windows for better operator visibility.	Clear, silicone-free glass silyl modified polymer for sealing between glass windows.



TYPE	MOISTURE CURE	1K BOOSTED	2K REACTION
Comp.	1K	1,2	2k
Method	Humidity	Controlled Cure	Controlled Cure
Cure Cond.	Ambient	Ambient	Ambient
Cure Dir.	Outside in	Homogenous	Homogenous
Mixing	No mixing	Mixing	Mixing
Cure Time	3-4 mm/day	<1 hr.	<24 hrs.
Skin Over Time	<1 hr.	<20 min.	<1 hr.





# ASSEMBLY SOLUTIONS – STRUCTURAL BONDING

## Weld and Fastener Reduction

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

Structural and elastic bonding adhesives have been used in the automotive and aerospace industry for decades. The benefits of design versatility, even stress distribution, and robust long-term performance compared to traditional assembly methods are now being applied to the agricultural and construction equipment industries.

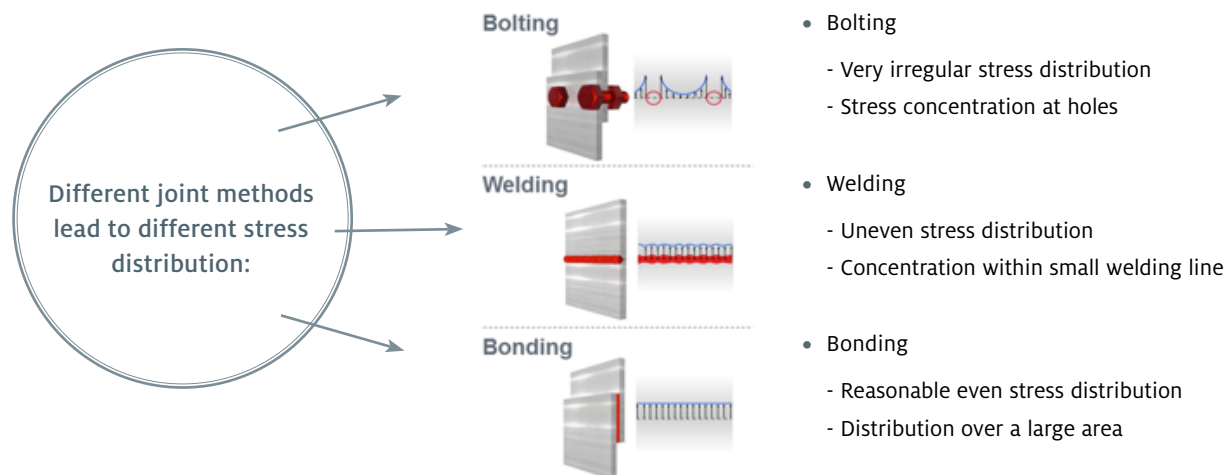
Primarily designed to replace welds, rivets and other mechanical fasteners in the body, paint or trim shops, our wide range of high strength structural and elastic bonders simplify and improve the design and assembly processes while improving aesthetics, performance and processing costs.

### Why use a structural adhesive?

- High strength
- Seal, bond and protect in one step
- Reduce NVH (anti-flutter)
- Prevent corrosion
- Improve aesthetics
- Simplify designs
- Improve part performance
- Join dissimilar substrates
- Use lower-cost materials
- Distribute stress evenly
- Reduce assembly time
- Reduce need for skilled labor/welders

### 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
- Lower and upper frame assembly
- Boom and shovel assembly



## Structural Adhesive Solutions

TECHNOLOGY	PRIMARY USES	ADVANTAGES	CONSIDERATIONS
Epoxies	For metal in body shops where high cohesive, cleavage and adhesive strength is required.	<ul style="list-style-type: none"> <li>• High shear &amp; impact strength on metal</li> <li>• Oily surface adhesion (heat cure)</li> <li>• Excellent moisture resistance</li> <li>• Excellent heat resistance (up to 1 hr. @ 220°C/428°F)</li> <li>• Weld-through compatible</li> </ul>	<ul style="list-style-type: none"> <li>• Slow fixture/cure times (2k)</li> <li>• Requires mixing and/or fixturing during cure</li> <li>• Poor elongation and damping</li> <li>• Below average oil tolerance as 2k</li> <li>• Poor adhesion to plastics</li> </ul>
Two-Part (2k) Acrylics	For a wide range of substrates including oily metal in body and trim shops where high cohesive, cleavage and adhesive strength is required.	<ul style="list-style-type: none"> <li>• Excellent adhesion on plastic &amp; metal</li> <li>• High peel &amp; impact resistance</li> <li>• Excellent oily surface adhesion</li> <li>• Good corrosion resistance</li> <li>• High heat resistance (30 min. @ 200°C/428°F)</li> </ul>	<ul style="list-style-type: none"> <li>• Requires mixing and/or fixturing</li> <li>• Refrigerated storage</li> <li>• Strong odor (MMA) Modified Methacrylate Acrylics</li> <li>• Not weld-through capable (flammable)</li> <li>• May create read-through on thin metals</li> </ul>
Two-Step Acrylics	For a wide range of substrates in body and paint shops where rapid on-demand fixturing is needed.	<ul style="list-style-type: none"> <li>• No mixing, cure on-demand</li> <li>• Good corrosion resistance</li> <li>• High strength on wide range of substrates</li> <li>• Light oily surface adhesion</li> <li>• High heat resistance (30 min. @ 200°C/428°F)</li> </ul>	<ul style="list-style-type: none"> <li>• Activator may contain solvents</li> <li>• Resin has moderate odor</li> <li>• Low cure through depth, ~1mm</li> <li>• Fillets remain uncured</li> <li>• Not weld-through capable</li> </ul>
Polyurethanes (PU)	For plastic and treated/painted sheet metal parts where fatigue resistance and elastic bonding is needed.	<ul style="list-style-type: none"> <li>• Excellent flexibility</li> <li>• Great for noise &amp; vibration reduction</li> <li>• Great adhesion on plastics &amp; painted metal</li> <li>• Great on dissimilar materials</li> <li>• Excellent paintability after cure up to 7 days</li> </ul>	<ul style="list-style-type: none"> <li>• Limited temp. resistance (1 hr. @ 140°C/284°F)</li> <li>• Poor adhesion to bare and oily metal</li> <li>• Poor corrosion resistance</li> <li>• Contains isocyanates</li> <li>• Moisture sensitive before cure</li> </ul>
Silyl Modified Polymers (SMPs)	For plastic and treated/painted sheet metal where fatigue resistance, weather resistance and elastic bonding is needed	<ul style="list-style-type: none"> <li>• Primerless adhesion to most substrates</li> <li>• Excellent anti-flutter material</li> <li>• Great UV stability</li> <li>• No solvent, isocyanates or silicone</li> <li>• Good paintability after cure up to 3 days</li> </ul>	<ul style="list-style-type: none"> <li>• Poor adhesion on oily metal</li> <li>• Max temp. resistance (1 hr. @ 177°C/351°F)</li> <li>• Low cohesive strength</li> <li>• Slow fixture and cure speed</li> <li>• Moisture sensitive</li> </ul>
Reactive Rubbers	For sheet metal in body and paint shop applications as a flexible anti-flutter material.	<ul style="list-style-type: none"> <li>• Wide range of expansions (0 to &gt;1000%)</li> <li>• Good adhesion on oily metal</li> <li>• Weld-through capable</li> <li>• Excellent washout resistance</li> <li>• Good heat resistance (up to 1 hr. @ 200°C/428°F)</li> </ul>	<ul style="list-style-type: none"> <li>• Limited to hidden/non-visible joints</li> <li>• Limited shelf life (3 to 6 months)</li> <li>• Limited availability</li> <li>• Pumpables require preheating to dispense</li> </ul>

# ASSEMBLY SOLUTIONS – STRUCTURAL BONDING

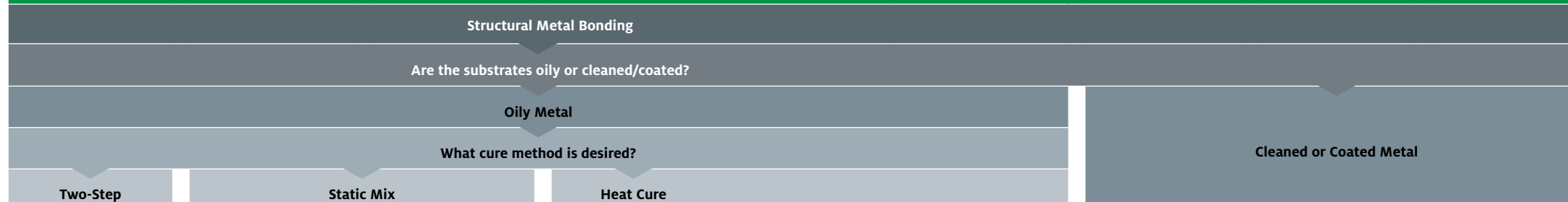
**LEARN MORE:**

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**YOUR APPLICATION CRITERIA**



**WHAT TYPE OF BONDING IS REQUIRED?**



**SOLUTION**

<b>Chemistry</b>
<b>Cure Mechanism</b>
<b>Color</b>
<b>Viscosity (Pa-S)</b>
<b>Fixture/Cure Time</b>
<b>Tensile Strength (MPa)</b>
<b>Elongation</b>
<b>Hardness</b>
<b>Shear Strength (Steel) (MPa)</b>
<b>Description</b>

	Oily Metal			Cleaned or Coated Metal				
	Two-Step	Static Mix		Heat Cure				
	Fast Cure	High Strength	High Impact Resistance	High Performance	High Position Tack	Fast Cure	High Impact Strength	General Purpose
	<b>LOCTITE® AA 334™/SF 7387™</b>	<b>LOCTITE® AA H8000™</b>	<b>LOCTITE® AA H8510™</b>	<b>TEROSON® EP 5089™</b>	<b>TEROSON® RB 5197™</b>	<b>LOCTITE® EA E-05MR™</b>	<b>LOCTITE® EA E-30UT™</b>	<b>LOCTITE® EA E-60HP™</b>
Chemistry	Acrylic	MMA	MMA	Epoxy	Rubber Based	Epoxy	Epoxy	Epoxy
Cure Mechanism	Two-Step	Two-Part	Two-Part	Heat	Heat	Two-Part	Two-Part	Two-Part
Color	Yellow	Green	Grey	Purple	Black	Clear	Purple	Off-White
Viscosity (Pa-S)	85,000	190,000	45,000	100,000	180,000	25,000	65,000	45,000
Fixture/Cure Time	2 min./ 24 hrs.	30 min./ 24 hrs.	30 min./ 24 hrs.	10 min. @ 155°C (311°F)	15 min. @ 175°C (347°F)	15 min./ 24 hrs.	3 hrs./ 24 hrs.	4 hrs./ 24 hrs.
Tensile Strength (MPa)	N/A	14.8	16.2	> 30.0	12.0	49.9	36.8	35.2
Elongation	N/A	13%	41%	9%	10%	5%	3%	9%
Hardness	70D	70D	70D	68D	N/A	78D	80D	80D
Shear Strength (Steel) (MPa)	17.8	22.9	19.9	31.1	15.0	23.3	29.0	29.8
Description	General purpose, high temp. two-step acrylic for use in lightly oiled metal bonding applications that require fast cure on-demand fixturing and tough, durable strength.	Robust, static mix acrylic designed for structurally bonding oily metal in weld and rivet reduction applications. Excellent weather resistance.	Oily metal bonder for high impact and peel stress applications. Contains 30 mil spacer beads to prevent excessive squeeze-out of adhesive due to over-clamping.	Toughened heat cure epoxy offering high shear strength, thermal resistance and extremely good peel and impact resistance. Weld-through capable.	High strength, rubber-based oily metal bonder formulated with high position tack and excellent wash-off resistance. Ideal for panel stiffener bonding applications. Weld-through capable.	Ultra clear, fast fixturing epoxy that provides excellent moisture resistance and exceptional toughness.	Ultra tough, high impact resistant epoxy designed for structurally bonding a variety of substrates in high impact applications.	High strength epoxy with an extended 60-minute work life for large assemblies.





# ASSEMBLY SOLUTIONS – STRUCTURAL BONDING

**LEARN MORE:**

This catalog lists the most common products used in each application. Many additional products are available. Not all products are available in all countries. Contact your Henkel representative for assistance.

YOUR APPLICATION CRITERIA	WHAT TYPE OF BONDING IS REQUIRED?										
	General Purpose Elastic Bonding					Composite/Plastic Bonding			Instant Bonding		
	What cure method is desired?										
SOLUTION	Moisture Cure		Static Mix		Heat Cure	Flexible Substrates		Rigid Substrates	Fast Cure	Large Gaps	Toughened
	General Purpose	High Position Tack	Fast Cure	General Purpose	Cure on-demand	Flexible Substrates	Rigid Substrates	Fast Cure	Large Gaps	Toughened	
<b>Chemistry</b>	TEROSON® MS 939™ MS Polymer	TEROSON® PU 9095™ HV Polyurethane	TEROSON® MS 9399™ MS Polymer	LOCTITE® UK U-05FL™ Polyurethane	TEROSON® PU 1103 AA25™ Polyurethane	LOCTITE® UK 1366 B10™ Polyurethane	LOCTITE® UK 1351 B25™ Polyurethane	LOCTITE® AA H3300™ MMA	LOCTITE® 4090™ Cyanoacrylate	LOCTITE® 411™ Cyanoacrylate	
<b>Cure Mechanism</b>	Moisture	Moisture	Two-Part	Two-Part	Heat	Two-Part	Two-Part	Two-Part	Two-Part	Moisture	
<b>Color</b>	Black	Black	Black	Off-White	Crème	Green	Green	Yellow	Off-White	Clear	
<b>Viscosity (Pa-S)</b>	Paste	Paste	Paste	100,000	95,000	34,000	29,000	110,000	17,000	6,000	
<b>Fixture/Cure Time</b>	10 min./ 72 hrs.	30 min./ 72 hrs.	2 hrs./ 72 hrs.	2.5 hrs./ 24 hrs.	10 min. @ 85°C (185°F)	35 min./ 72 hrs.	75 min./ 72 hrs.	5 min./ 24 hrs.	3 min./ 24 hrs.	35 sec./ 24 hrs.	
<b>Tensile Strength (MPa)</b>	3.0	8.0	3.0	9.0	5.0	10.0	26.0	29.0	7.0	7.0	
<b>Elongation</b>	250%	400%	150%	74%	200%	58%	1%	30%	4%	N/A	
<b>Hardness</b>	55A	55A	60A	45D	74A	55D	84D	80D	67D	N/A	
<b>Shear Strength (Steel) (MPa)</b>	1.5	2.3	3.0	7.0	4.0	10.3 (PVC)	8.8 (PVC)	14.6 (PVC)	17.0	29.0	
<b>Description</b>	A robust, isocyanate-free, heavy bodied modified silane adhesive that exhibits primerless adhesion to most substrates.	High tensile strength, high position tack urethane adhesive that is free of PVC and solvents. Ideal for panel and floor bonding applications.	Non-sag, two-component modified silane adhesive. Mixed adhesive provides primerless adhesion to a wide variety of substrates.	High performance static mix urethane adhesive for general-purpose metal bonding. Highly flexible, impact and moisture resistant with high peel and shear strength on many substrates.	Solvent-free elastic adhesive based on an encapsulated polyisocyanate. Cures at low paint bake temperatures. Ideal for cure on-demand applications with low temp. paint bake processes.	Highly flexible structural bonder with good adhesion to plastics and composites. Excellent environmental resistance and impact strength.	Highly toughened GL approved two-part urethane for composites bonding. Non-sag with excellent fatigue and environmental resistance.	Non-sag, fast fixturing structural adhesive for bonding a variety of plastics and composites.	Two-component epoxy/cyanoacrylate hybrid with ultra fast fixturing, great gap filling and thermal resistance. Ideal for high strength general-purpose bonding applications including rubbers, metals and plastics.	High viscosity, high strength, surface insensitive rubber-toughened cyanoacrylate that bonds instantly to most substrates including rubbers, metals and plastics.	





## MACHINERY ADHESIVES

### Seal, Bond and Protect Flanged, Threaded and Cylindrical Assemblies

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



# MACHINERY ADHESIVES – THREADLOCKING

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## Threadlocking

LOCTITE® threadlockers dramatically increase the reliability of threaded assemblies. Available as liquid and semi-solid adhesives, LOCTITE® threadlockers are applied to the threads of a fastener and cure to a hard thermoset plastic when applied 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.

## Benefits

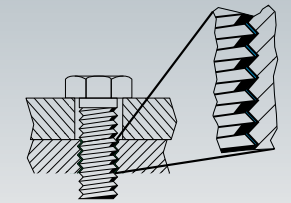
- Bonds metal fasteners to prevent loosening from shock and vibration
- Fills air void to seal and protects threads from rust and corrosion
- Single component – clean and easy to apply or automate
- Can be used on various sizes of fasteners – reduced inventory costs
- Long open time – cures in absence of oxygen and presence of active metal

### INACTIVE METALS

Plated Parts	Galvanized Steel
Anodized Aluminum	Zinc
Titanium	Aluminum
Stainless Steel	Black Oxide

### Helpful Hints:

- Use LOCTITE® SF 7649™ Primer for faster fixture times and on inactive metals
- Typical bolt assemblies only have 15% contact with 85% air void



### YOUR APPLICATION CRITERIA



### ARE THE PARTS ALREADY ASSEMBLED?

Yes

Yes

No

Are your bolts larger than 7/8"?

No

What temperature resistance do you need?

182°C/360°F

232°C/450°F

343°C/650°F

Wicking Grade

High Lubricity

Medium Strength/  
Primerless

Medium Strength  
Health and Safety Grade

High Strength/  
Primerless

High Strength Health  
and Safety Grade

Medium Strength

Medium Strength

### SOLUTION

LOCTITE® 290™

LOCTITE® 2047™

LOCTITE® 243™

LOCTITE® 2400NA™

LOCTITE® 263™

LOCTITE® 2700NA™

LOCTITE® 246™

LOCTITE® 2422™

<b>Color</b>	Green	Black	Blue	Blue	Red	Green	Blue	Blue
<b>Viscosity (Pa-s)</b>	25/55	2,000/12,000	1,300/3,000	3,070	400/600	350/550	2,600	Paste
<b>Fixture/Cure Time</b>	20 min./24 hrs.	90 min./24 hrs.	10 min./24 hrs.	10 min./24 hrs.	10 min./24 hrs.	5 min./3 hrs.	5 min./24 hrs.	30 min./24 hrs.
<b>Breakaway/Prevail Torque (N-m)</b>	10/29	42/9	26/5	20/2	33/33	20/19	19/5	12/1
<b>Temperature Resistance</b>	-54° to 149°C (-65° to 300°F)	-54° to 149°C (-65° to 300°F)	-54° to 182°C (-65° to 360°F)	-54° to 182°C (-65° to 360°F)	-54° to 182°C (-65° to 360°F)	-54° to 182°C (-65° to 360°F)	-54° to 232°C (-65° to 450°F)	-54° to 343°C (-65° to 650°F)
<b>Oil Resistance (1,000h @ 121°C/250°F)</b>	Recommended	Highly Recommended	Highly Recommended	Highly Recommended	Highly Recommended	Highly Recommended	Highly Recommended	Highly Recommended
<b>Water/glycol resistance (1,000h @ 87°C/189°F)</b>	Highly Recommended	Highly Recommended	Highly Recommended	Highly Recommended	Highly Recommended	Highly Recommended	Highly Recommended	Highly Recommended
<b>Gasoline Resistance (1,000h @ 22°C/72°F)</b>	Highly Recommended	Highly Recommended	Highly Recommended	Highly Recommended	Highly Recommended	Highly Recommended	Highly Recommended	Highly Recommended

<p>Recommended for locking pre-assembled fasteners. Mil Spec (S-46163A) Type III, Grade R. NSF/ANSI 61 Certified.</p>	<p>This product is specially formulated with lubricant additives to aid in the assembly of large nuts and bolts.</p>	<p>General purpose removable strength liquid threadlocker. Reliably seals, locks and protects metal fasteners up to 3/4". NSF/ANSI 61 Certified. CFIA Approved.</p>
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<p>Removable strength threadlocker formulated to have a 'white' health and safety label. Tested and deemed a non-skin allergen/irritant.</p>	<p>General purpose permanent strength liquid threadlocker. Reliably seals, locks and protects metal fasteners up to 1". CFIA Approved.</p>	<p>Permanent strength threadlocker formulated to have a 'white' health and safety label. Tested and deemed a non-skin allergen/irritant.</p>	<p>Removable strength liquid threadlocker for high temp. applications. (Note: Also available in High Strength Red, LOCTITE® 272™)</p>	<p>Removable strength liquid threadlocker for ultra high temp. applications (e.g. 343°C/650°F). (Note: Also available in High Strength Red, LOCTITE® 2620™)</p>
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# MACHINERY ADHESIVES – THREAD SEALING

**LEARN MORE:**

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## Thread Sealing

LOCTITE® anaerobic thread sealants prevent leakage of gases and liquids and are available in liquid form or as sealing cord. 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.

## Benefits

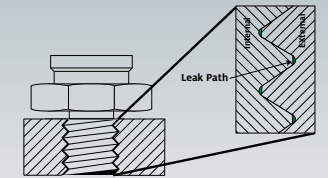
- Bonds metal fasteners to prevent loosening from shock and vibration
- Fills air void to seal and protect threads from rust and corrosion
- Single component – clean and easy to apply or automate
- Can be used on various sizes of fasteners – reduces inventory costs
- Long open time – cures in absence of oxygen and presence of active metal

### INACTIVE METALS

Plated Parts	Galvanized Steel
Anodized Aluminum	Zinc
Titanium	Aluminum
Stainless Steel	Black Oxide

### Helpful Hints:

- Use LOCTITE® SF 7649™ Primer for faster fixture times and/or on inactive metals.
- Even highly machined pneumatic fittings have leak paths.



### YOUR APPLICATION CRITERIA



### ARE THE PARTS METAL OR PLASTIC?

#### METAL

Are you working with hydraulic fittings?

No

What is your preferred application technique?

Liquid Paste

Semi-Solid Stick

Yes (non-fouling)

What size are your fittings?

1/2" or greater

3/8" or less

#### PLASTIC

Coated Multi-Filament Thread

### SOLUTION

<b>Color</b>	White	White	Yellow	White	Purple	Purple	White
<b>Viscosity (Pa-s)</b>	14,000	540,000	55,000	Semi-Solid	30,000	14,000	Solid Thread
<b>Fixture/Cure Time</b>	30 min./ 72 hrs.	6 hrs./ 72 hrs.	30 min./ 24 hrs.	5 min. / 24 hrs.	5 min. / 24 hrs.	4 hrs. / 24 hrs.	Non-reactive
<b>Pressure Resistance (MPa) (hydraulic)</b>	69.0	69.0	69.0	69.0	69.0	69.0	69.0
<b>Temperature Resistance</b>	-54° to 149°C (-65° to 300°F)	-54° to 149°C (-65° to 300°F)	-54° to 149°C (-65° to 300°F)	-54° to 149°C (-65° to 300°F)	-54° to 149°C (-65° to 300°F)	-54° to 149°C (-65° to 300°F)	-54° to 149°C (-65° to 300°F)
<b>Oil Resistance (1,000h @ 125°C/257°F)</b>	Highly Recommended	Highly Recommended	Highly Recommended	Highly Recommended	Highly Recommended	Highly Recommended	Highly Recommended
<b>Gasoline Resistance (1,000h @ 22°C/72°F)</b>	Highly Recommended	Highly Recommended	Highly Recommended	Highly Recommended	Highly Recommended	Highly Recommended	Highly Recommended
<b>Water/Glycol Resistance (1,000h @ 87°C/189°F)</b>	Highly Recommended	Highly Recommended	Highly Recommended	Highly Recommended	Highly Recommended	Highly Recommended	Highly Recommended
<b>Description</b>	Thread sealant formulated to have a 'white' health and safety label. Tested and deemed a non-skin allergen/irritant.	General purpose thread sealant specially formulated with anti-galling properties for stainless steel substrates. ABS Approved.	Primerless thread sealant formulated to have higher strength for coarse threads and anti-galling properties for use on stainless steel substrates.	Semi-solid thread sealant stick convenient for overhead applications and on-the-go usage. NSF/ANSI 61 Certified.	Non-fouling thread sealant formulated for use on larger fine-threaded fittings as used in hydraulic and pneumatic installations.	Non-fouling thread sealant formulated for use on smaller fine-threaded fittings as used in hydraulic and pneumatic installations. ABS Approved. CFIA Listed.	General purpose, non-reactive thread sealant that is wound from the dispensing package onto the threads of a pipe.

#### Health and Safety Grade

LOCTITE® 5400™

#### General Purpose

LOCTITE® 567™

#### Coarse Threads

LOCTITE® 577™

#### General Purpose

LOCTITE® 561™

#### High Viscosity

LOCTITE® 5452™

#### Low Viscosity

LOCTITE® 545™

#### Universal Sealant

LOCTITE® 55™ Pipe Cord





# MACHINERY ADHESIVES – GASKETING

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## Gasketing

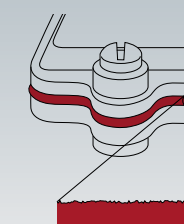
LOCTITE® gasketing products are self-forming gaskets that provide a perfect seal between components, with maximum face-to-face contact, eliminating flange face corrosion. They form a low-pressure seal immediately on assembly and fully cure in 24 hours, providing a joint that will not shrink, crack or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

## Benefits

- Fills all voids – relaxes the tolerances and preparation of flange surfaces
- Can be used on various flange configurations – reduces inventory costs
- Eliminates shimming and compression setting – no need for re-torquing
- Seals liquids and gases, and protects flanges from corrosion
- Unitizes flange assemblies for added reliability and durability

## Helpful Hints:

- For frequently serviced parts, consider using a cure-in-place light cure silicone gasketing product such as LOCTITE® SI 5039™.
- Even machined flanges have surface irregularities that can create leak paths.



### YOUR APPLICATION CRITERIA



### ARE YOUR SUBSTRATES RIGID METAL (CASTED OR MACHINED) OR FLEXIBLE (PLASTIC OR STAMPED)?

Casted or Machined Metal (< 0.25 mm gap)				
What temperature resistance do you need?				
204°C/400°F	149°C/300°F			

Plastic or Stamped Metal (> 0.25 mm gap)			
Are the flanges intended to be serviceable regularly?			
No – Form in Place			Yes – Cure in Place
What temperature resistance do you need?			
232°C/450°F	260°C/500°F	371°C/700°F	

### SOLUTION

	High Temp.	Health and Safety Grade	Flexible	Oil Tolerant	Fast Cure
<b>Color</b>	Red	Red	Red	Red	Red
<b>Viscosity (Pa·s)</b>	350,000	21,000	20,000	50,000	2,275,000
<b>Shear Strength (MPa)</b>	5.0	21.0	2.0	10.0	7.0
<b>Temperature Resistance</b>	-54° to 204°C (-65° to 400°F)	-54° to 149°C (-65° to 300°F)	-54° to 149°C (-65° to 300°F)	-54° to 149°C (-65° to 300°F)	-54° to 149°C (-65° to 300°F)
<b>Functional Cure Time</b>	4 hrs.	2 hrs.	24 hrs.	4 hrs.	4 hrs.
<b>Oil Resistance (1,000h @ 125°C/257°F)</b>	Highly Recommended	Highly Recommended	Highly Recommended	Highly Recommended	Highly Recommended
<b>Gasoline Resistance (1,000h @ 22°C/72°F)</b>	Recommended	Highly Recommended	Recommended	Recommended	Recommended
<b>Water/Glycol Resistance (1,000h @ 87°C/189°F)</b>	Highly Recommended	Recommended	Recommended	Highly Recommended	Highly Recommended
<b>Description</b>	Rigid, general purpose, form-in-place anaerobic flange sealant formulated for use in high temp. rigid metal gasketing applications.	Rigid anaerobic, form-in-place gasketing compound formulated to have a 'white' health and safety label. Tested and deemed a non-skin allergen/irritant.	Flexible, general purpose, form-in-place anaerobic flange sealant designed for use on metal substrates (especially aluminum).	High strength, flexible, general purpose, form-in-place anaerobic flange sealant for use on metal substrates with slight oil contamination that are subjected to high stress at 80°C/176°F continuously.	Rigid, general purpose, form-in-place anaerobic flange sealant for use on rigid metal flanges where fast cure time is needed. NSF/ANSI 61 Certified. CFIA Approved.

Rapid Cure	Oil Tolerant	High Temp.	Light Curable
<b>LOCTITE® SI 5600™</b>	<b>LOCTITE® SI 5900™</b>	<b>LOCTITE® SI 5920™</b>	<b>LOCTITE® SI 5033™</b>
Black	Black	Copper	Translucent White
65,000	35 g/min.	275 g/min.	135 g/min.
2.0	1.0	0.65	1.0
-54° to 232°C (-65° to 450°F)	-54° to 260°C (-65° to 500°F)	-54° to 371°C (-65° to 700°F)	-54° to 176°C (-65° to 349°F)
5 min.	20 min.	1 hr.	30 sec. (light cure)
Highly Recommended	Highly Recommended	Highly Recommended	Recommended
Not Recommended	Not Recommended	Not Recommended	Not Recommended
Highly Recommended	Highly Recommended	Not Recommended	Recommended
Flexible, fast cure, form-in-place 2k silicone for use in gasketing applications with flexible parts or large gap tolerance. (Also available in slower cure times.)	Flexible, general purpose, form-in-place, moisture cure, oxime silicone for use in gasketing applications with flexible parts or large gap tolerance. CFIA Approved.	Flexible, form-in-place, moisture cure, oxime silicone for use in high temp. gasketing applications.	Flexible, cure-in-place moisture/light cure, acetoxysilicone gasket for use in high line speed applications for flanges that may require frequent servicing.



# MACHINERY ADHESIVES – RETAINING

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## 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.

## Benefits

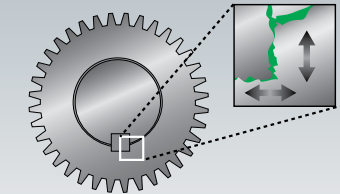
- High shear strength – augments or replaces press fits
- 100% contact – evens distribution of load and stress
- Eliminates fretting and backlash in keys and splines
- Fills air voids to seal and protect from corrosion
- Relaxes part tolerances

### INACTIVE METALS

Plated Parts	Galvanized Steel
Anodized Aluminum	Zinc
Titanium	Aluminum
Stainless Steel	Black Oxide

### Helpful Hints:

- Use LOCTITE® SF 7649™ Primer for faster fixture times and on inactive metals.
- Even machined surfaces have only 20% to 40% contact.



## YOUR APPLICATION CRITERIA



## DO YOU HAVE LARGE PARTS THAT REQUIRE EXTRA ASSEMBLY TIME?

No

What temperature resistance is required?

180°C/356°F

Health and Safety Grade

General Purpose/  
Stainless Steel

Slip Fit/High Strength

LOCTITE® 6300™

LOCTITE® 648™

LOCTITE® 638™

## SOLUTION

<b>Color</b>	Green	Green	Green
<b>Viscosity (Pa-s)</b>	350	500	2,500
<b>Shear Strength (Steel) (MPa)</b>	15.0	27.0	31.0
<b>Clearance</b>	Up to 0.25mm	Up to 0.15mm	Up to 0.25mm
<b>Temperature Resistance</b>	-54° to 180°C (-65° to 356°F)	-54° to 180°C (-65° to 356°F)	-54° to 180°C (-65° to 356°F)
<b>Fixture/Cure Time</b>	60 min. / 24 hrs.	3 min. / 24 hrs.	4 min. / 24 hrs.
<b>Oil Resistance (1,000 hrs. @ 250°C/482°F)</b>	Highly Recommended	Highly Recommended	Highly Recommended
<b>Gasoline Resistance (1,000 hrs. @ 22°C/72°F)</b>	Highly Recommended	Highly Recommended	Highly Recommended
<b>Water/Glycol Resistance (1,000 hrs. @ 87°C/189°F)</b>	Highly Recommended	Highly Recommended	Highly Recommended

High strength retaining compound formulated to have a 'white' health and safety label. Tested and deemed a non-skin allergen/irritant.

General purpose, high strength, retaining compound for bonding cylindrical metal parts (especially stainless steel) with a clearance or interference fit. NSF/ANSI 61 Certified.

General purpose, high strength, retaining compound for bonding cylindrical metal parts with slip fits or larger gaps. NSF/ANSI 61 Certified.

Yes

What temperature resistance is required?

149°C/300°F

204°C/400°F

Slip Fit/High Temp.

Heavy Press Fits

Slow Cure for Large Parts and Active Metals

LOCTITE® 620™

LOCTITE® 232™

LOCTITE® 640™

<b>Color</b>	Green
<b>Viscosity (Pa-s)</b>	8,500
<b>Shear Strength (Steel) (MPa)</b>	26.0
<b>Clearance</b>	Up to 0.2mm
<b>Temperature Resistance</b>	-54° to 232°C (-65° to 450°F)
<b>Fixture/Cure Time</b>	60 min. / 24 hrs.
<b>Oil Resistance (1,000 hrs. @ 250°C/482°F)</b>	Highly Recommended
<b>Gasoline Resistance (1,000 hrs. @ 22°C/72°F)</b>	Highly Recommended
<b>Water/Glycol Resistance (1,000 hrs. @ 87°C/189°F)</b>	Highly Recommended

High strength, retaining compound for bonding cylindrical metal parts in high temp. applications. ABS Approved.

<b>Color</b>	Brown
<b>Viscosity (Pa-s)</b>	5,000
<b>Shear Strength (Steel) (MPa)</b>	9.0
<b>Clearance</b>	Up to 0.38mm
<b>Temperature Resistance</b>	-54° to 149°C (-65° to 300°F)
<b>Fixture/Cure Time</b>	60 min. / 24 hrs.
<b>Oil Resistance (1,000 hrs. @ 250°C/482°F)</b>	Highly Recommended
<b>Gasoline Resistance (1,000 hrs. @ 22°C/72°F)</b>	Highly Recommended
<b>Water/Glycol Resistance (1,000 hrs. @ 87°C/189°F)</b>	Highly Recommended

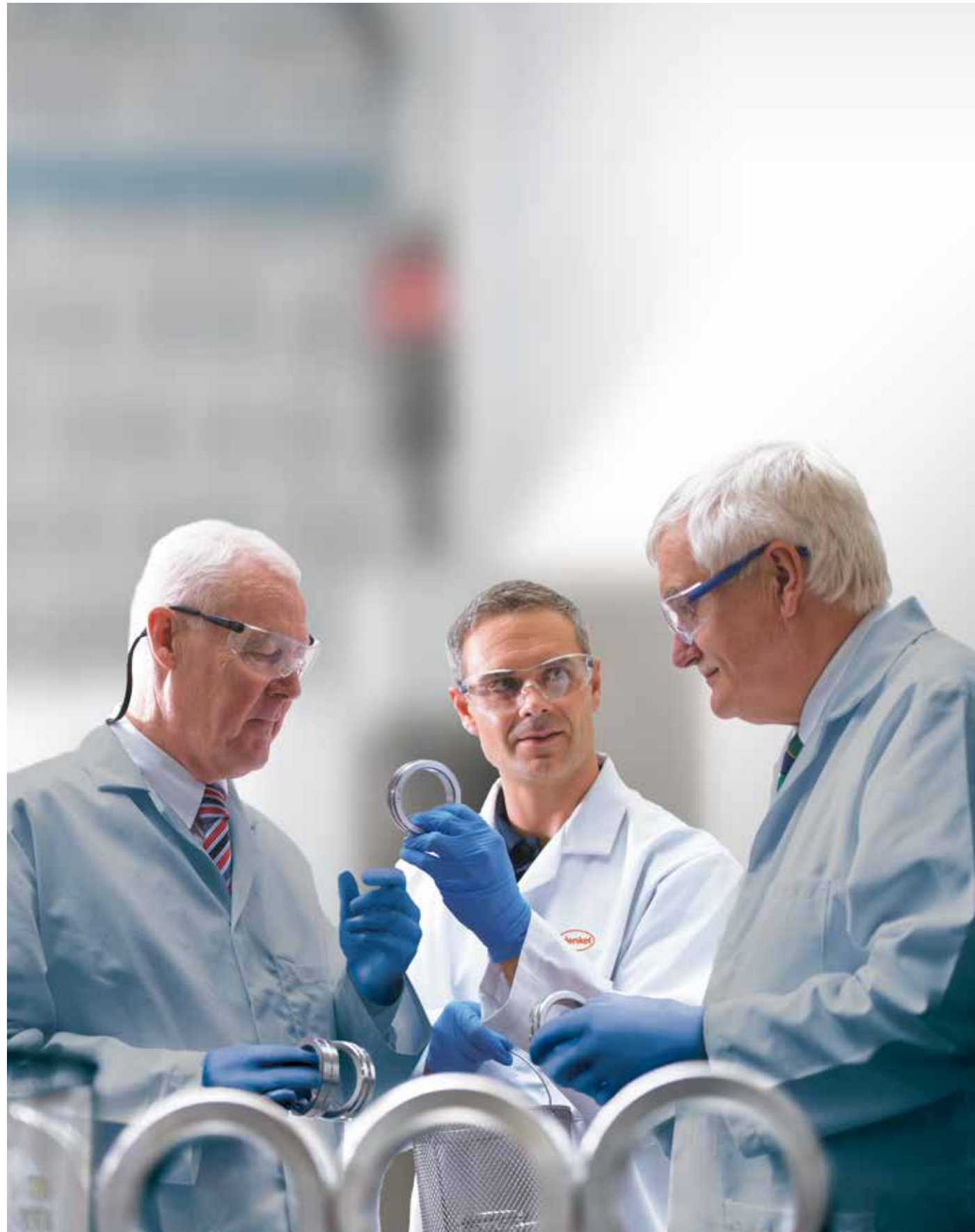
Slow curing, low strength retaining compound for bonding very large and/or heavy interference fitting metal parts.

<b>Color</b>	Green
<b>Viscosity (Pa-s)</b>	600
<b>Shear Strength (Steel) (MPa)</b>	22.0
<b>Clearance</b>	Up to 0.1mm
<b>Temperature Resistance</b>	-54° to 204°C (-65° to 400°F)
<b>Fixture/Cure Time</b>	60 min. / 24 hrs.
<b>Oil Resistance (1,000 hrs. @ 250°C/482°F)</b>	Highly Recommended
<b>Gasoline Resistance (1,000 hrs. @ 22°C/72°F)</b>	Highly Recommended
<b>Water/Glycol Resistance (1,000 hrs. @ 87°C/189°F)</b>	Highly Recommended

Slow cure, high strength retaining compound for bonding very large and/or heavy interference fitting metal parts (especially brass) in high temp. applications.







## EQUIPMENT AND ENGINEERING SOLUTIONS



### Dependable Equipment, High-Quality Services




Henkel provides a complete line of rugged and dependable application and cure equipment for all of our products as well as supporting services. Our engineering services range from design and product development to simulated testing of the manufacturing process and dispensing trials. In a design-through-assembly partnership, no one adds value like Henkel.






# ADHESIVE AND SEALANT EQUIPMENT SOLUTIONS





## LOCTITE® and TEROSON® Standard Equipment








From simple handheld devices to fully automated systems and a broad range of accessories, Henkel offers a complete line of off-the-shelf and custom-built dispensing equipment that can be integrated easily into your manufacturing process.

LOCTITE® PRODUCT		IDH NUMBER	USED TO DISPENSE	PACKAGE TYPES & SIZES	VISCOSITY RANGE	APPLICATION	CONSUMABLES – DISPENSE ACCESSORIES
VOLUMETRIC DISPENSING	<b>BOTTLE DISPENSING</b>						
		50 ML HAND PUMP 250 ML HAND PUMP	608966 88631	Retaining Compounds, Threadlockers	50 ml bottle 250 ml bottle	Low to Medium	Manual
VOLUMETRIC DISPENSING	<b>TUBE DISPENSING</b>						
		50 ML-F TUBE SQUEEZE DISPENSER	1083845	Thread Sealants, Gasketing Compounds	50 ml tubes	Low to High	Manual

LOCTITE® PRODUCT		IDH NUMBER	PRESSURE REGULATION	USED TO DISPENSE	PACKAGE TYPES & SIZES	VISCOSITY RANGE	LOW LEVEL SENSING	CONSUMABLES – DISPENSE ACCESSORIES	
PRESSURE TIME DISPENSING	<b>BOTTLE DISPENSING</b>								
		INTEGRATED SEMI-AUTOMATIC DISPENSER	1390322	0 to 15 psi Viscosity >3,000 cP	Gel Adhesives, Instant Adhesives, Light Cure/Acrylics, Retaining Compounds, Threadlockers	250 ml bottle 1 lb. bottle 1 liter bottle 2 kg bottle	Low to Medium	Yes	Dispense Tips and Accessories
			1390321	0 to 100 psi Viscosity 0 to 3,000 cP		200 g squeeze tube	Medium to High	Yes	
		LOCTITE® BOND-A-MATIC® 3000 DISPENSER	209685	0 to 15 psi	Gel Adhesives, Instant Adhesives, Light Cure Acrylics, Retaining Compounds, Threadlockers	250 ml bottle 1 lb. bottle 1 liter bottle 2 kg bottle	Low	No	
LOCTITE® BOND-A-MATIC® 3000 DISPENSER		218323	0 to 100 psi	200 g squeeze tube		Medium to High	No		
	LOCTITE® ROTOSPRAY™ 9000 APPLICATOR	The LOCTITE® Rotospray™ 9000 Applicator is a pneumatically powered applicator used for applying 360-degree beads of fluid on the inside diameter of any surface or threaded hole. Common materials applied are retaining compounds, threadlockers, activators/primers and oils. Common applications are engine cup plug sealing, bearing retaining and motor magnet bonding.							

LOCTITE® PRODUCT		IDH NUMBER	PRESSURE REGULATION	USED TO DISPENSE	PACKAGE TYPE & SIZES	VISCOSITY RANGE	LOW LEVEL SENSING	CONSUMABLES – DISPENSE ACCESSORIES	
SAUSAGE/CARTRIDGE DISPENSING	<b>ONE-PART DISPENSING – PNEUMATIC</b>								
		HD10 300 ML PNEUMATIC CARTRIDGE DISPENSER	1714379	0 to 60 psi	Gel Cyanoacrylates, Anaerobic Gasketing, Light Cure/ Acrylics, Silicones	300 ml cartridges 250 ml tubes	Medium to High	No	
		SOFT PRESS HANDHELD PNEUMATIC APPLICATOR	250052	0 to 125 psi	Adhesive Packaged in Soft Packs	Soft Pack	Low to High	N/A	582416 – Soft Press Pneumatic Applicator Nozzle (1)
		TEROSON® MULTIPRESS TELESCOPIC DISPENSER	142241	0 to 145 psi	Sprayable SMP Adhesives	300 ml cartridges	Low to High	N/A	547882 –Pneumatic Spray Applicator Nozzle Kit (12)
		TEROSON® POWERLINE II 300 ML DISPENSER	960304	0 to 100 psi	MS Polymer Polyurethane	300/310 ml cartridges	Medium to Very High	N/A	Cartridge Accessories
	LOCTITE® PUMP-A-BEAD™ II DISPENSER	209687	60 to 100 psi	LOCTITE® brand Flange Sealants	850 ml cartridges	Medium to High			

LOCTITE® PRODUCT		IDH NUMBER	USED TO DISPENSE	PACKAGE TYPE & SIZES	MIX RATIOS	VISCOSITY RANGE	TYPE	
DUAL CARTRIDGE DISPENSING	<b>TWO-PART DISPENSING</b>							
		50 ML DUAL CARTRIDGE MANUAL APPLICATORS	720228	Two-Component Epoxies, Urethanes, Methacrylates	50 ml dual cartridge	1:1, 2:1, 4:1	Low to High	Manual
			1034026		5-50 dual cartridge	10:1		
		200 ML/400 ML DUAL CARTRIDGE MANUAL APPLICATORS	218483	Two-Component Epoxies, Urethanes, Methacrylates	200 ml dual cartridge	1:1, 2:1	High to Paste	Manual
			218312		400 ml dual cartridge	1:1, 2:1		
			478600		490 ml dual cartridge	10:1		
		200 ML/400 ML DUAL CARTRIDGE PNEUMATIC APPLICATORS	218315	Two-Component Epoxies, Urethanes, Methacrylates	200 ml dual cartridge	1:1, 2:1	High to Paste	Pneumatic
			218311		400 ml dual cartridge	1:1, 2:1		
			470572		490 ml dual cartridge	10:1		
		LOCTITE® DURAPUMP™ PROGRAMMABLE METER MIX SYSTEM	1041635	Two-Part Epoxies, Two-Part Polyurethanes, Two-Part Acrylics, Two-Part Silicones	Any, excluding dual cartridges	Custom	SHOT SIZE RANGE 0.2 ml up to 26 ml depending on ratio selected	

ADDITIONAL EQUIPMENT OFFERINGS		
ROBOTIC SYSTEMS		Henkel offers a full line of bench top Gantry and Scara robots for all of your automation needs. These systems integrate directly with all of our LOCTITE® brand dispensing and curing equipment and allow manufacturers to reliably dispense difficult patterns onto complex surfaces with ease and efficiency.
DISPENSE VALVES, RESERVOIRS AND CONTROLLERS		Henkel features a robust line of precision dispense systems, valves, reservoirs and controllers specifically designed to meet various manufacturing needs for any handheld, bench top, stationary work cell or fully automated production process.
MIX NOZZLES		Henkel offers a comprehensive line of LOCTITE® precision mix nozzles, gasket rollers, dispense tips and syringe barrel components for all of your single-component or two-part adhesive dispensing needs.
DISPENSE TIPS, ROLLERS AND NEEDLES		
CUSTOM EQUIPMENT		Henkel specializes in high-quality customized equipment solutions for difficult applications. Our custom high-flow meter mix systems provide simple, accurate and reliable metering equipment. These systems are easy to use and ruggedly designed to keep maintenance to a minimum.
		Our customized high viscosity paste pump systems are specifically designed to dispense paste products packaged in 5-gallon open-top pails up to 55-gallon drums. Pump ratios can be tailored for pumping medium to high viscosity paste products.
		The LOCTITE® UV curing conveyor is a benchtop, ultraviolet curing conveyor that produces high-intensity ultraviolet energy in the UVA, UVB and UVC spectral region. This system can be integrated into an automatic or semiautomatic production line for cure-on-demand assembly.

For specific information on the equipment offered in the categories above or to see the full LOCTITE® equipment product line, please contact your local Henkel representative.



## ADHESIVE AND SEALANT ENGINEERING SERVICES

### Engineered for your applications

Henkel offers complete engineering services for projects demanding expertise and support beyond the limits of our standard technical services. Our engineers and scientists can provide the following value-added services:

- On-site engineering assistance
- Joint product development programs
- Prototype testing, fixture preparation and consultation
- Contract lab services and testing
- Custom formulations

#### Services

**Custom test fixtures and protocols:** Henkel can perform an array of rigorous strength tests to determine whether the customer's application and the adhesive criteria can hold up. Custom test fixtures and protocols can be developed to meet specific end-use requirements.

**Prototyping capability:** Our prototyping capability can provide valuable data regarding the feasibility of full-scale manufacturing.

**Durability and longevity testing:** Our engineers can create environmental conditions that simulate and even exceed the most severe conditions. With heat aging, salt fog, humidity, and thermal cycling chambers, our engineers can provide manufacturers with confidence in the durability and longevity of an assembly in the field.

#### Additional Capabilities:

- Process consultations
- Customer teardowns
- Custom equipment
- Customer line surveys
- Material properties testing
- Surface analysis
- Process optimization
- Equipment support



#### Laboratory Evaluations

- Adhesive bond strengths
- Threadlocking and thread sealing
- Gasketing and sealing
- Porosity sealing
- Bulk material properties
- Fluid immersion
- Accelerated aging
- Environmental exposure testing
- Robotic programming/dispensing

#### Robotics Lab

The robotics lab dispensing capabilities enable Henkel to utilize production-intent equipment for evaluation purposes. Various functions include:

- Full engine assembly (formed-in-place, cured-in-place, and injection gasketing)
- Electrical/electronic potting and gasketing
- Headlamp/lighting assembly
- Conducting dispense studies for process optimization

#### ► BENEFITS

- Simulates full manufacturing capabilities using production-intent equipment
- Full-scale UV and heat-cure equipment for small to large parts
- Dispense stations are able to be customized for small-scale testing to larger developmental validation test requirements
- Opportunity to dispense and test Henkel product on actual parts

#### Physical Testing Lab

Capabilities include:

- Evaluating bulk material properties of adhesives

#### ► BENEFITS

- Ability to conduct mechanical testing according to standard test methods and OEM specifications
- Capable of low load to high capacity forces
- Variety of fixtures available for testing various substrates and conditions



For complete product testing and engineering support, partner with Henkel to identify and validate the best adhesive solutions for your application.

## TOTAL SOLUTIONS AND SUPPORT



### PROCESS OPTIMIZATION

In addition to offering the **broadest product portfolio** in the adhesives industry, Henkel provides an array of services to help our agricultural and construction equipment customers **optimize** their manufacturing process, **improve** efficiency and **reduce** overall costs. The following services are available worldwide:



### 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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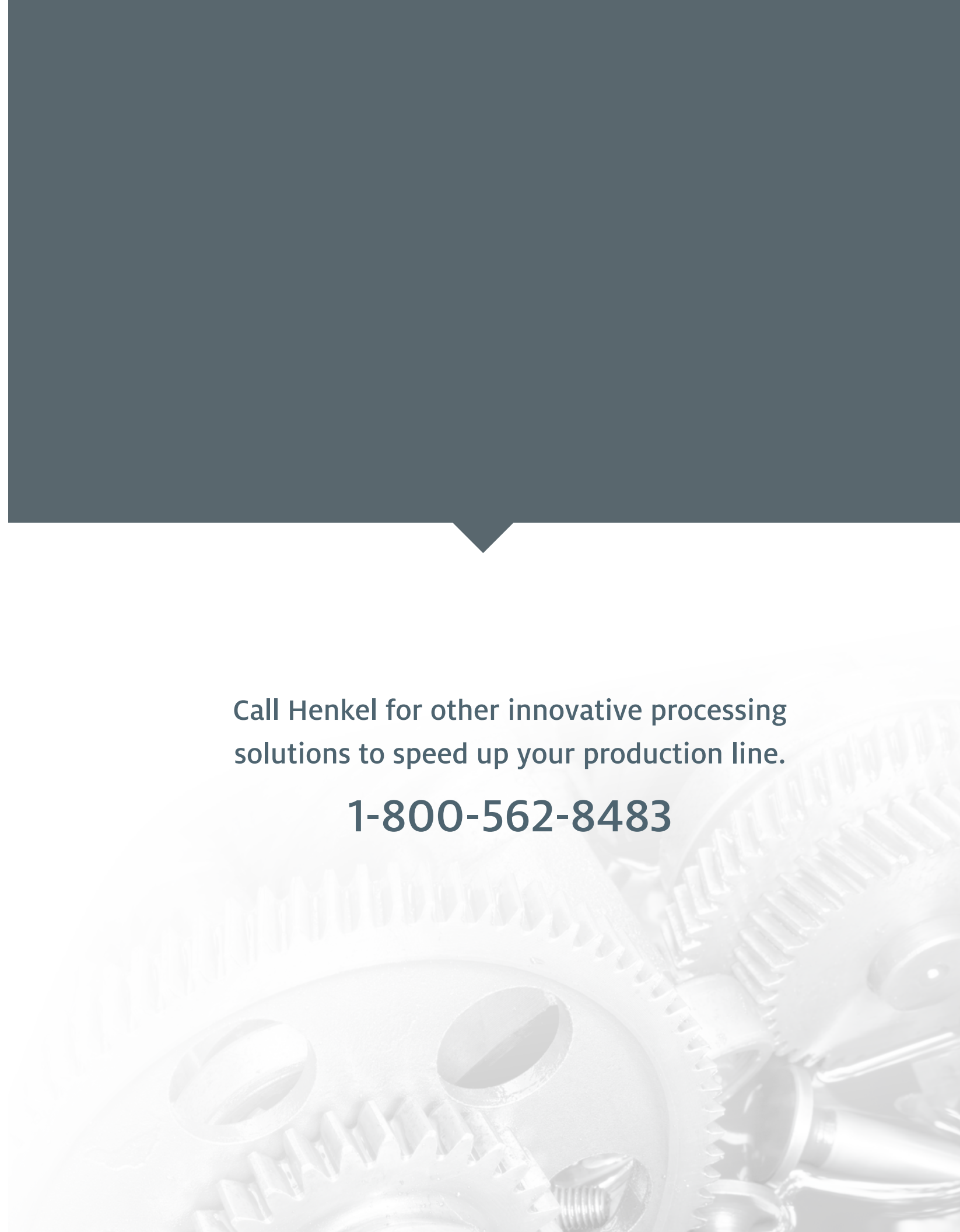
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## NOTES

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Call Henkel for other innovative processing solutions to speed up your production line.

**1-800-562-8483**





**LOCTITE®**  
**BONDERITE®**  
**TECHNOMELT®**  
**TEROSON®**  
**AQUENCE®**

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