

**LOCTITE**<sup>®</sup>  
**BONDERITE**<sup>®</sup>  
**TEROSON**<sup>®</sup>

Adhesives, Sealants, Functional Coatings, Equipment and Services  
Agricultural & Construction Equipment Solutions



Henkel

# 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. 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.**



### GLOBAL SUPPLY CHAIN

to maintain a reliable supply of products to our customers.



### CUSTOMIZED SOLUTIONS

We can customize our products to fit your exact requirements.



### BROAD PRODUCT PORTFOLIO

to provide the optimum solution for your challenges.



### CUSTOMER PARTNERSHIP

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



### COMPREHENSIVE TESTING

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



### EQUIPMENT SOLUTIONS

that can be easily integrated into your manufacturing process.



## 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.**

### INNOVATION

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

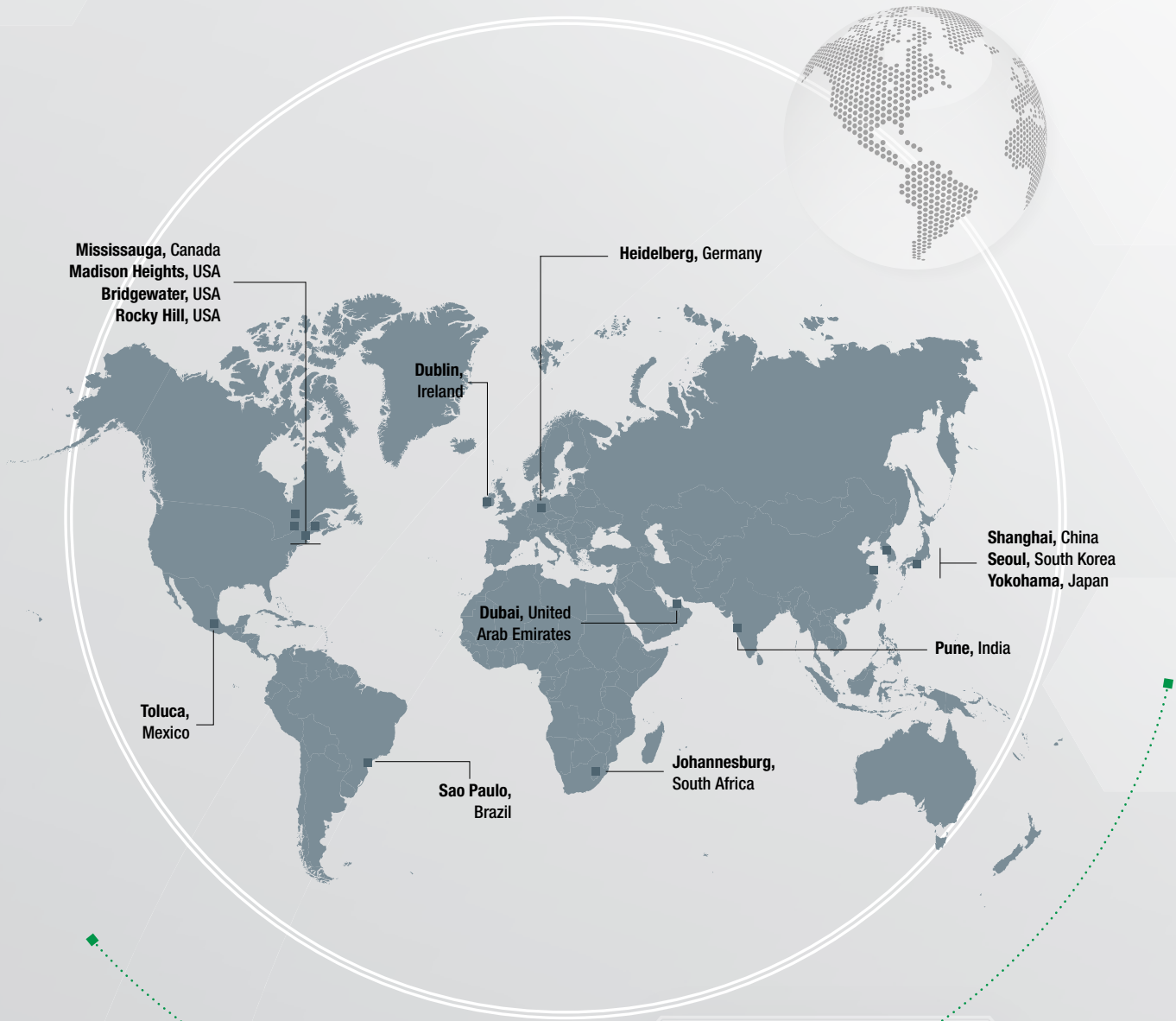


### GLOBAL SUPPORT

no matter where in the world you're located.



# 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.

### BODY SHOP

#### METAL

#### MACHINING, FORMING AND STAMPING

- Metalworking fluids



#### WELDING AND PREASSEMBLY

- Panel stiffening
- Seam sealing
- Structural bonding
- Anti-flutter assembly
- Anti-weld spatter
- Machinery adhesives



### PAINT SHOP

#### METAL PRETREATMENT (FUNCTIONAL COATINGS)

- Cleaning
- Conditioning
- Conversion coating
- Rust prevention





### PRIMER AND TOP COAT PAINTING

- Autodeposition coating
- Seam sealing
- Structural/elastic bonding

### MACHINERY ADHESIVES



### TRIM SHOP

#### POWERTRAIN

#### SUB-ASSEMBLIES AND INTERIOR

### TRIM SHOP/ FINAL ASSEMBLY

- Vibration damping
- Sound absorption
- Structural/elastic bonding
- Window glazing
- Machinery adhesives

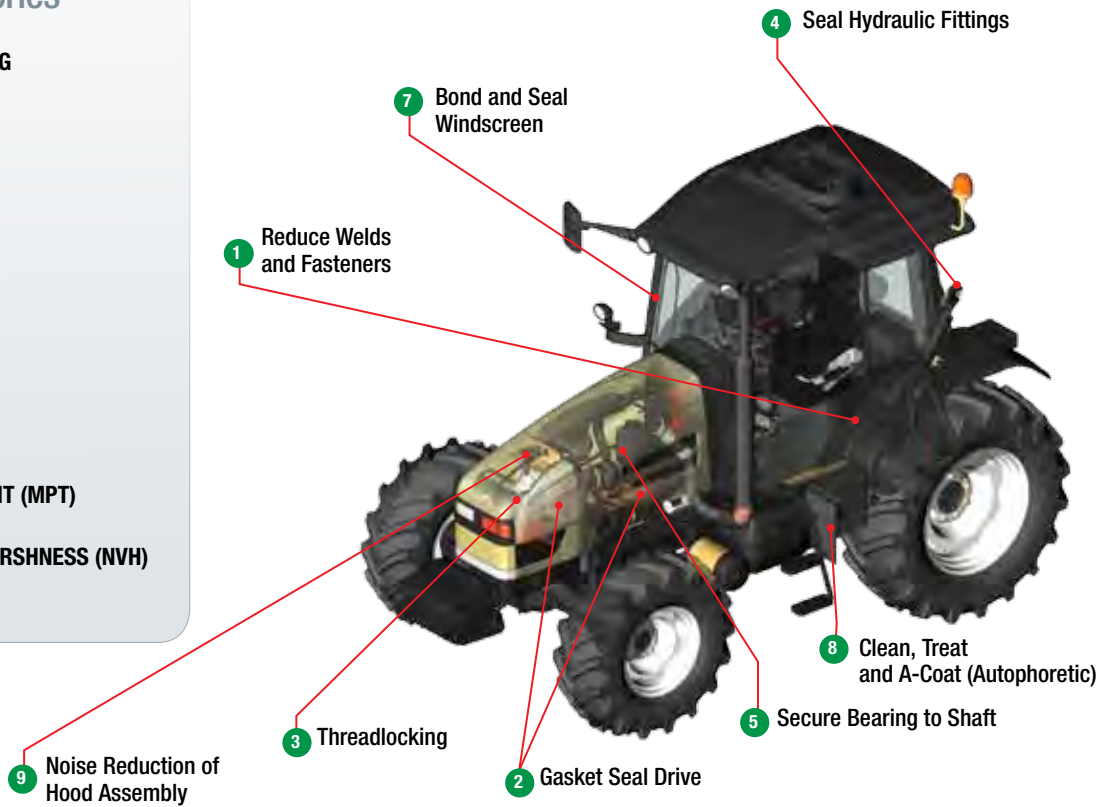


### INSPECTION + TEST

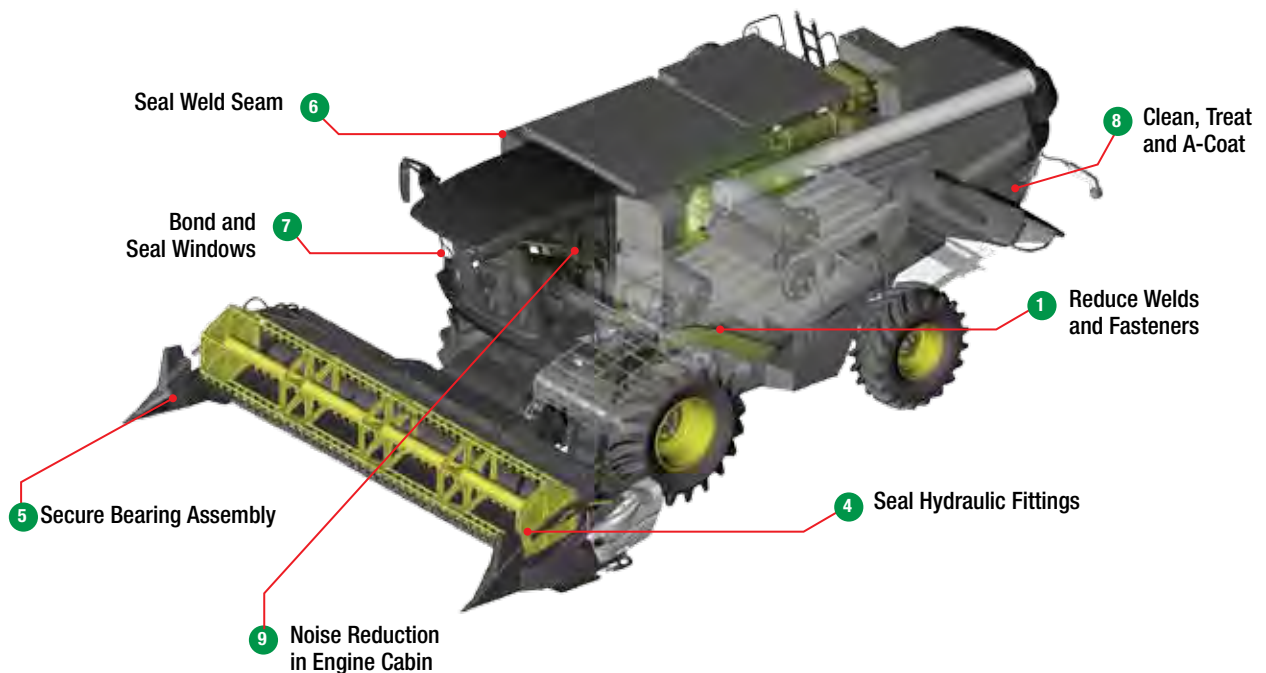
# VEHICLE APPLICATIONS

## 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)

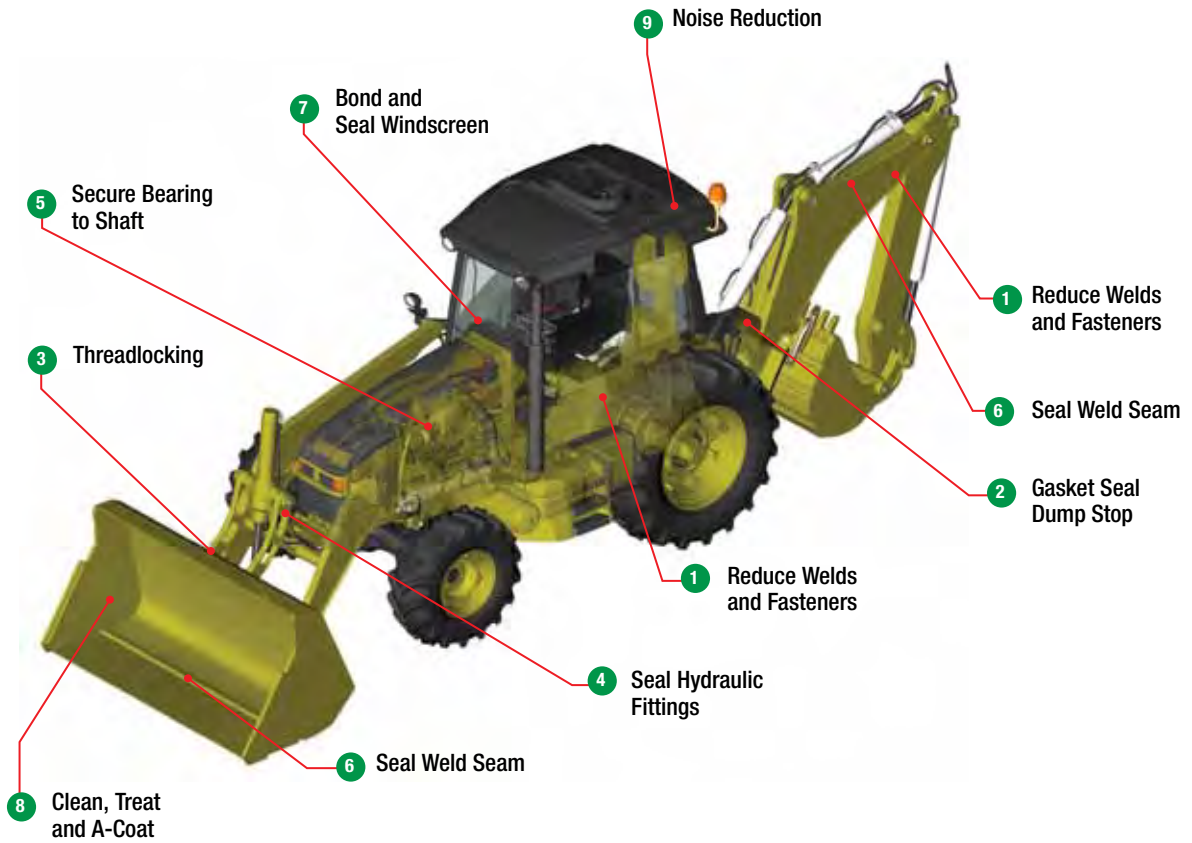


## Tractors

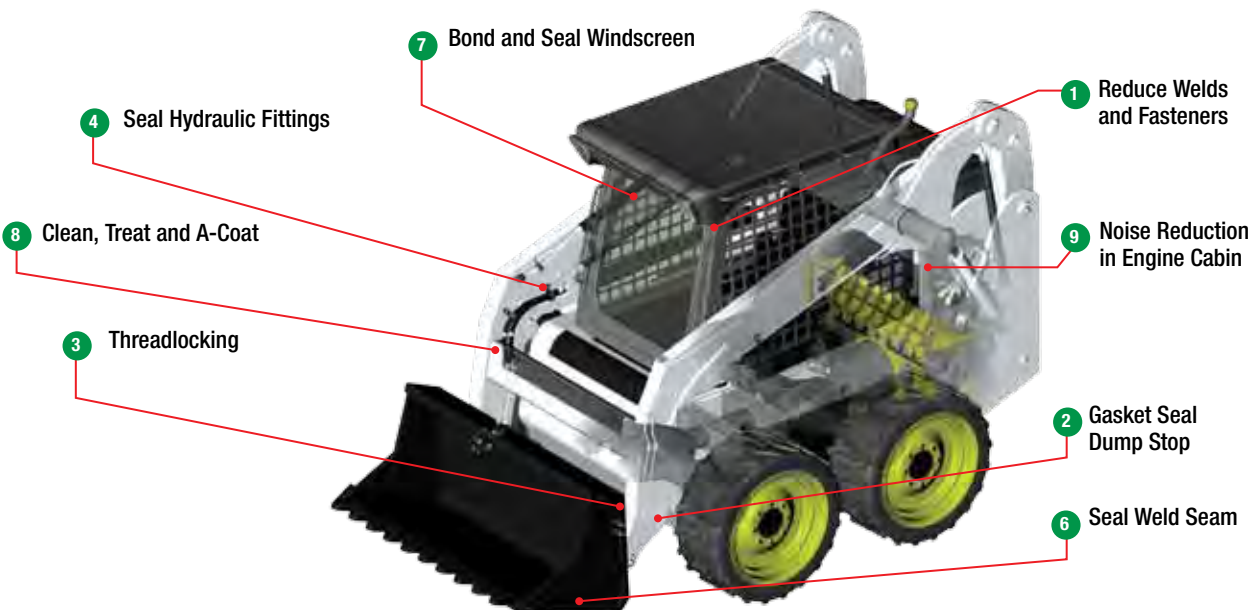


## Combines





## ▲ Backhoes

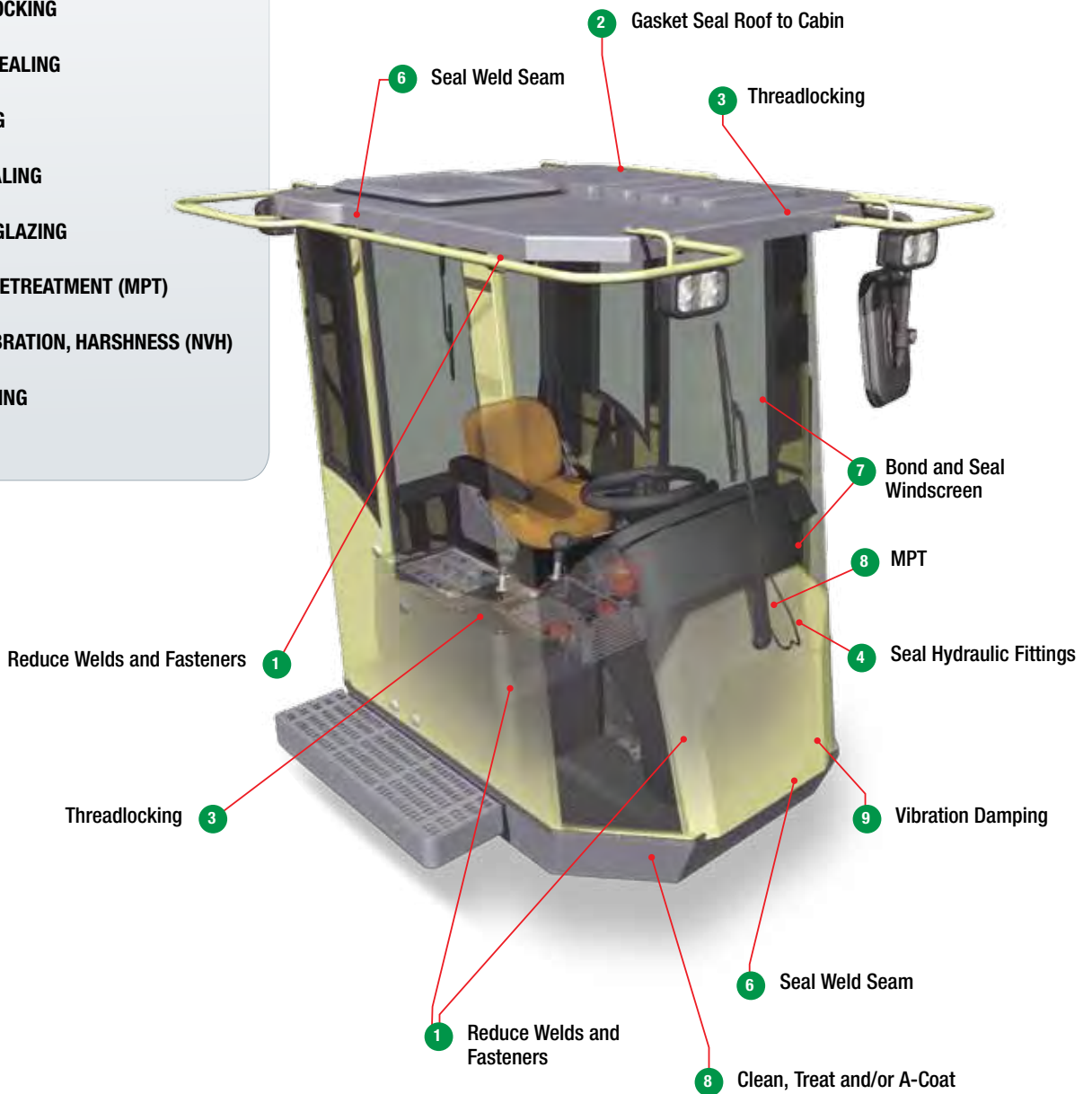


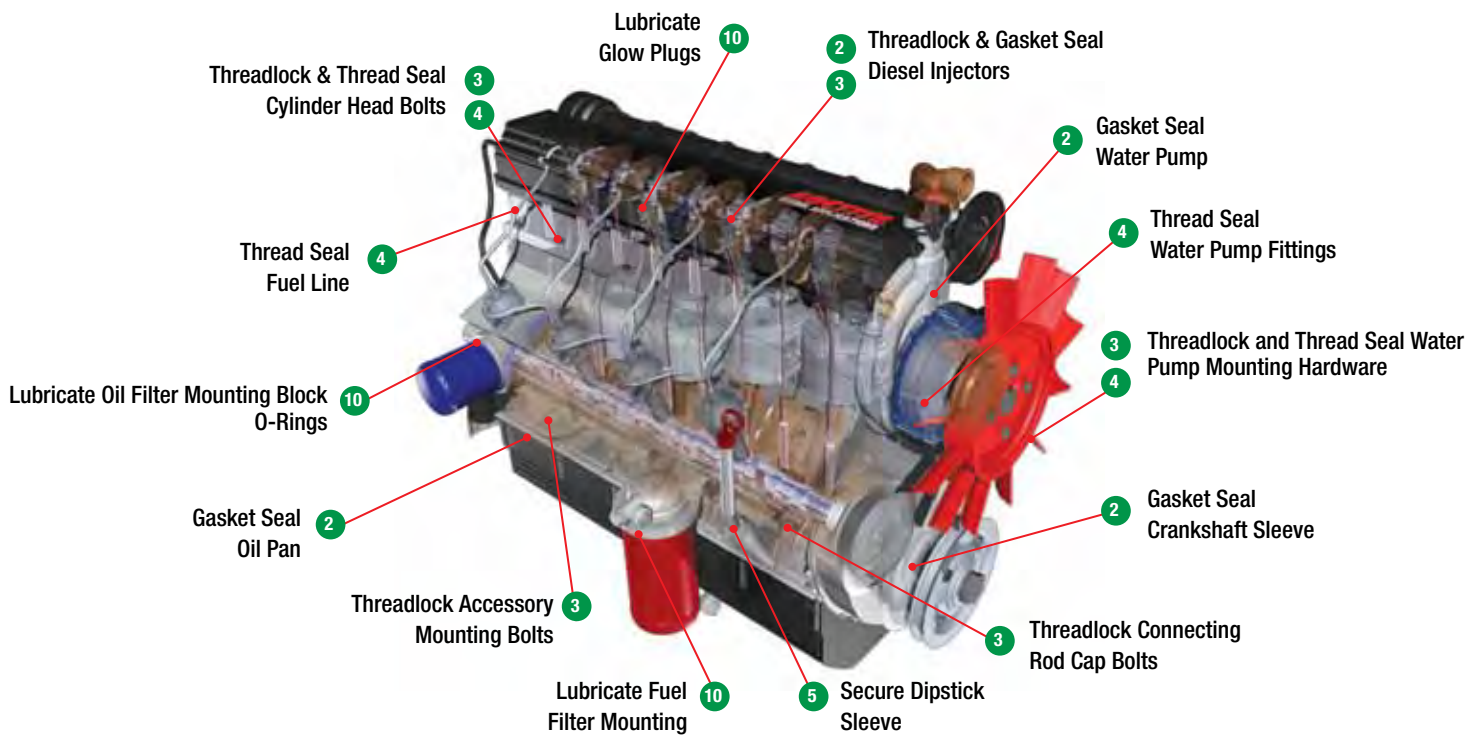
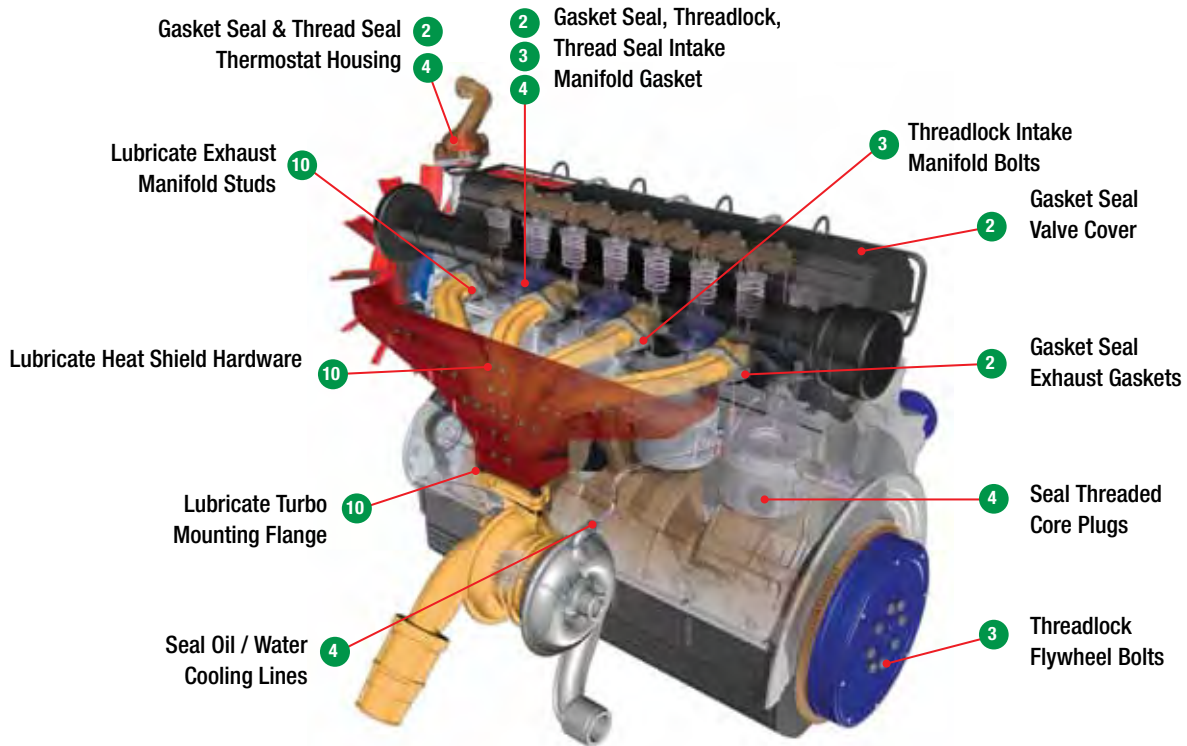
## ▲ Skid Steers

# 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



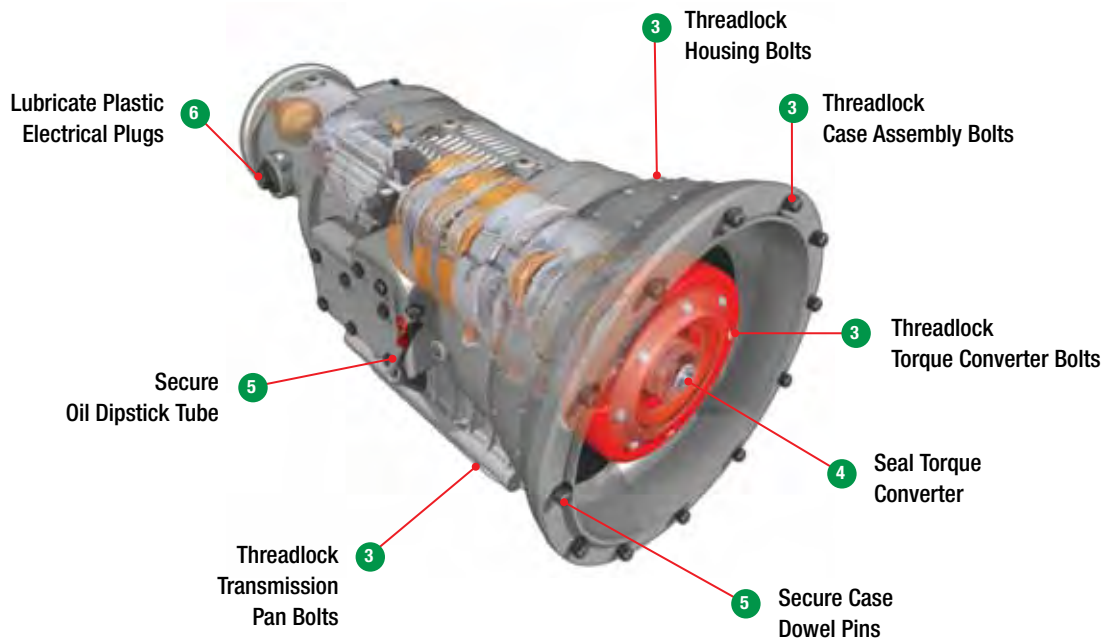
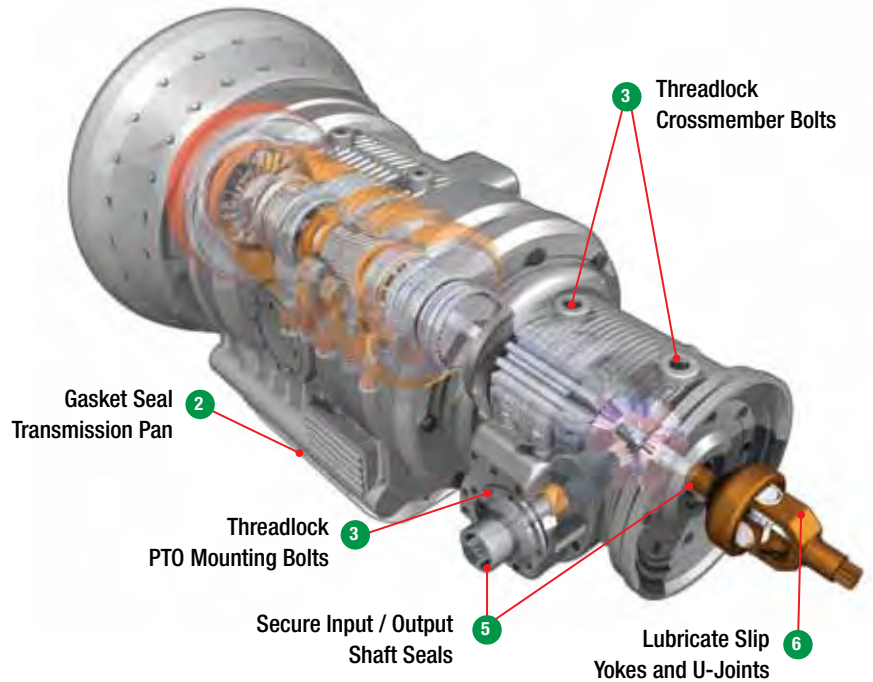


▲ Engine Assemblies

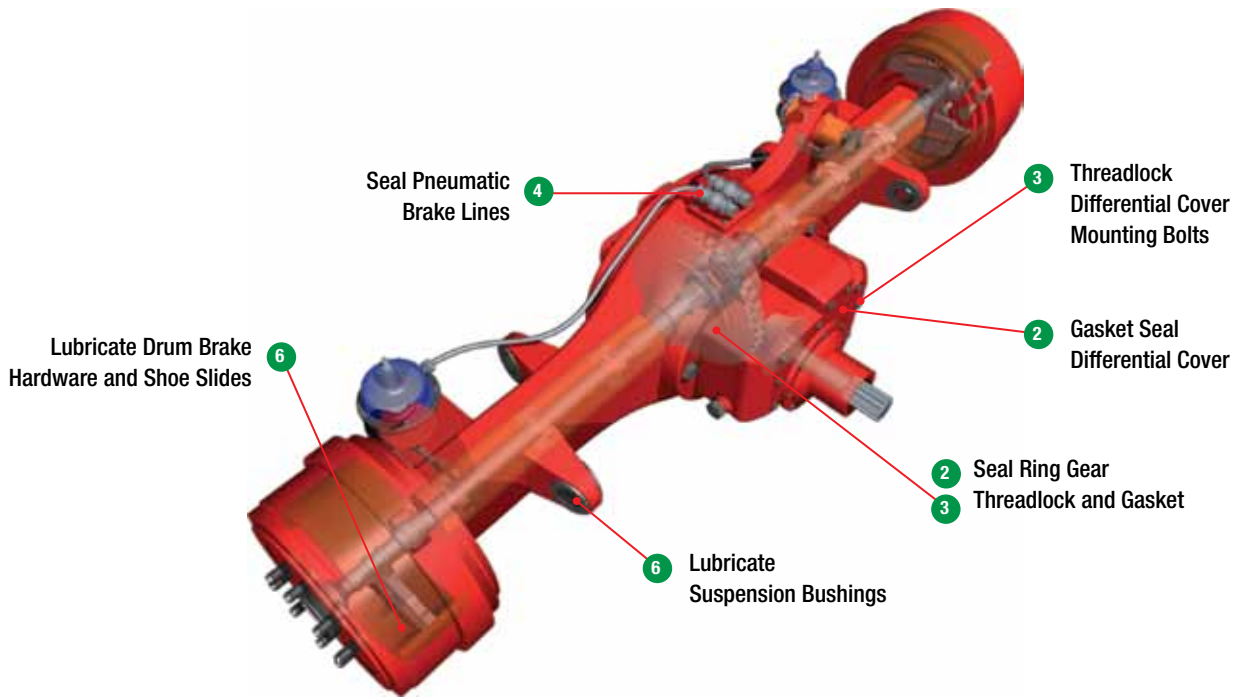
# SUBCOMPONENT APPLICATIONS

## Application Categories

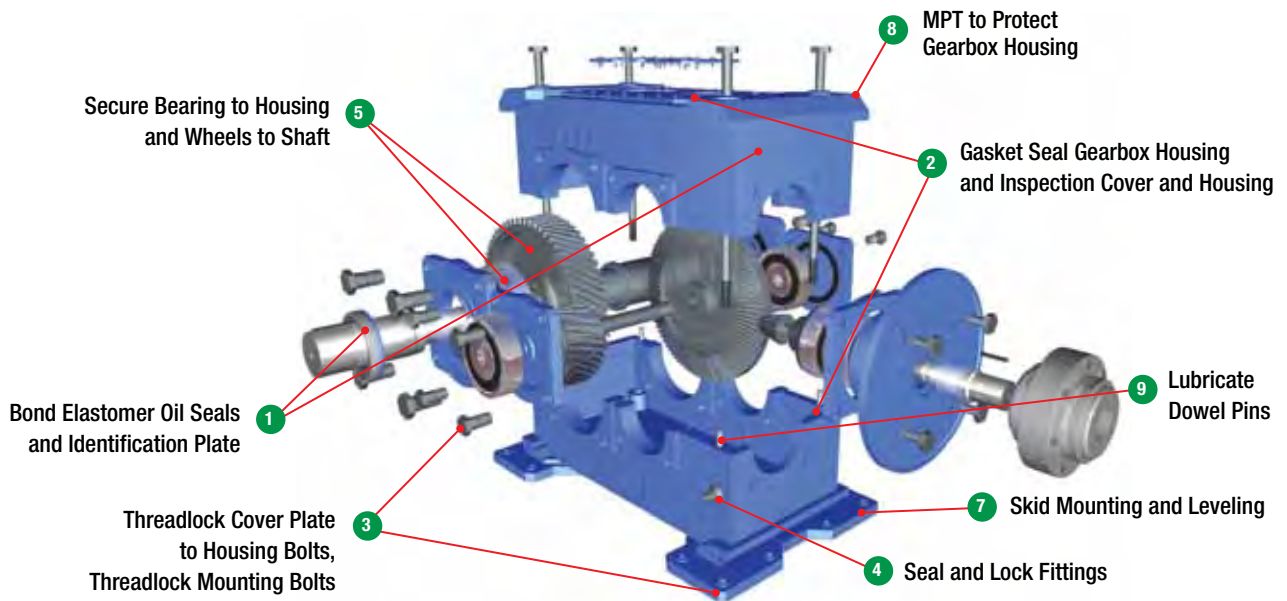
- 1 GENERAL BONDING
- 2 GASKETING
- 3 THREADLOCKING
- 4 THREAD SEALING
- 5 RETAINING
- 6 LUBRICATING
- 7 GROUTING
- 8 METAL PRETREATMENT (MPT)
- 9 ANTI-SEIZE







▲ Axle/Differential Assemblies

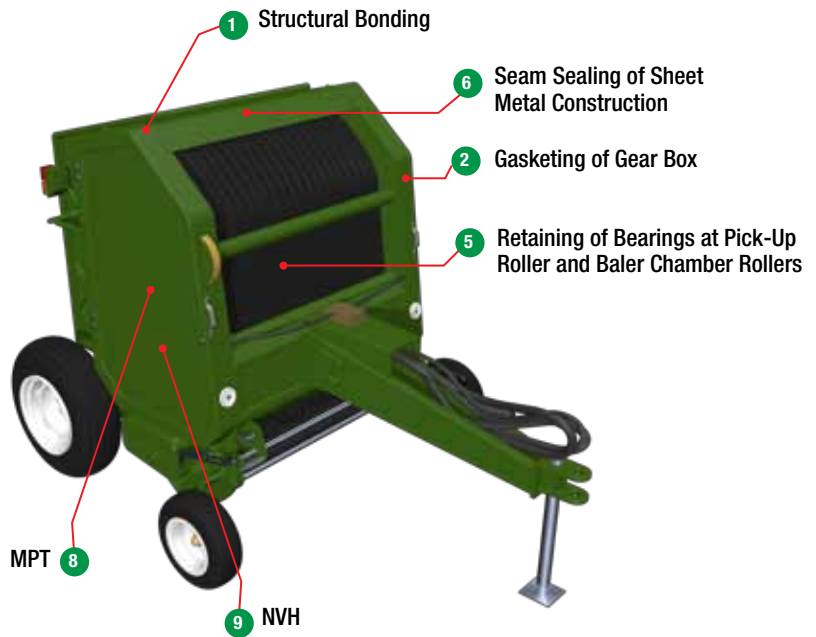


▲ Gearbox Assemblies

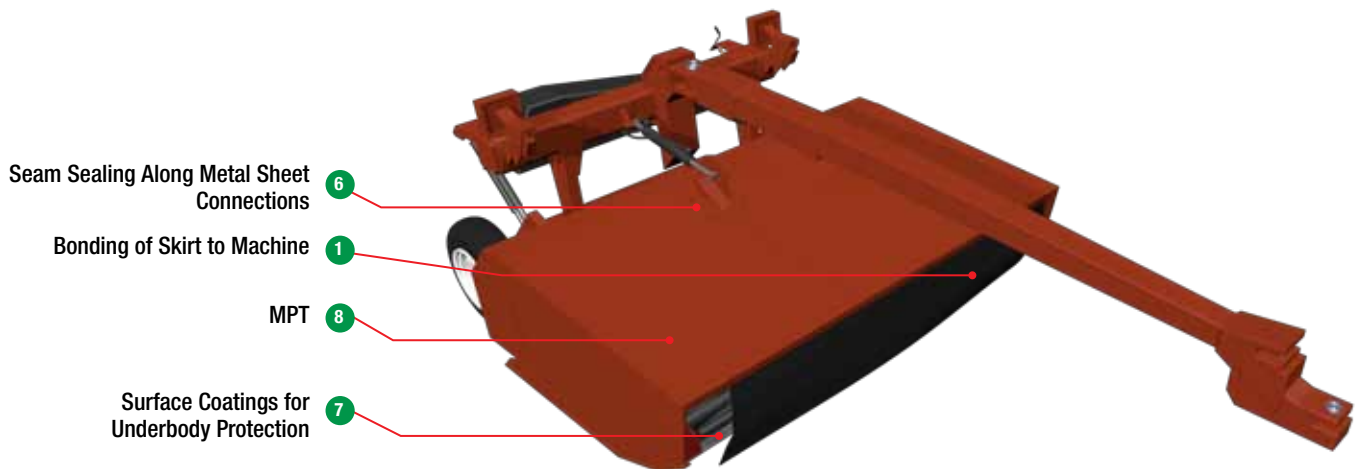
# ATTACHMENT APPLICATIONS

## Application Categories

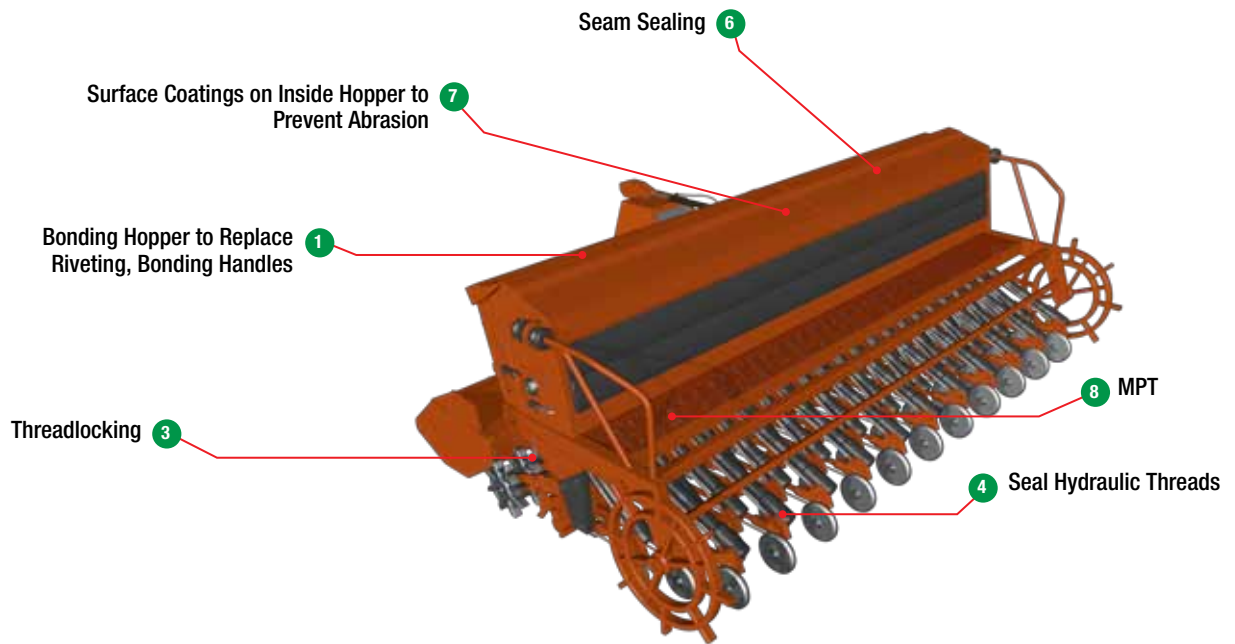
- 1 STRUCTURAL BONDING
- 2 GASKETING
- 3 THREADLOCKING
- 4 THREAD SEALING
- 5 RETAINING
- 6 SEAM SEALING
- 7 SURFACE COATINGS
- 8 METAL PRETREATMENT (MPT)
- 9 NOISE, VIBRATION, HARSHNESS (NVH)



## ▲ Balers



## ▲ Mowers



## ▲ Seed Drills

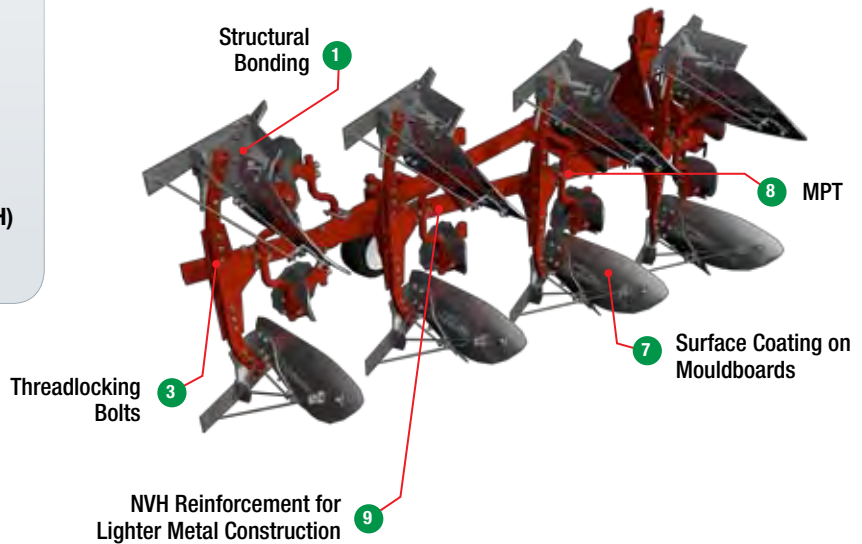


## ▲ Harrows

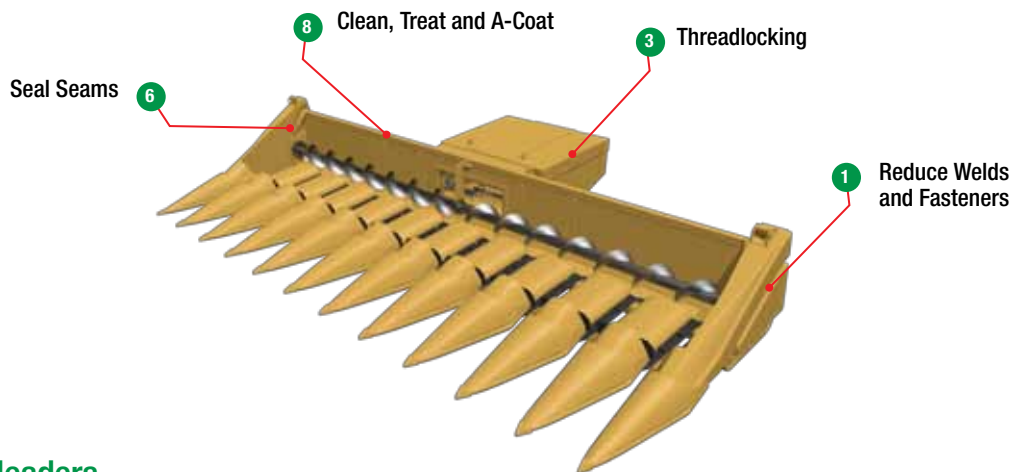
# ATTACHMENT APPLICATIONS

## Application Categories

- 1 STRUCTURAL BONDING
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- 3 THREADLOCKING
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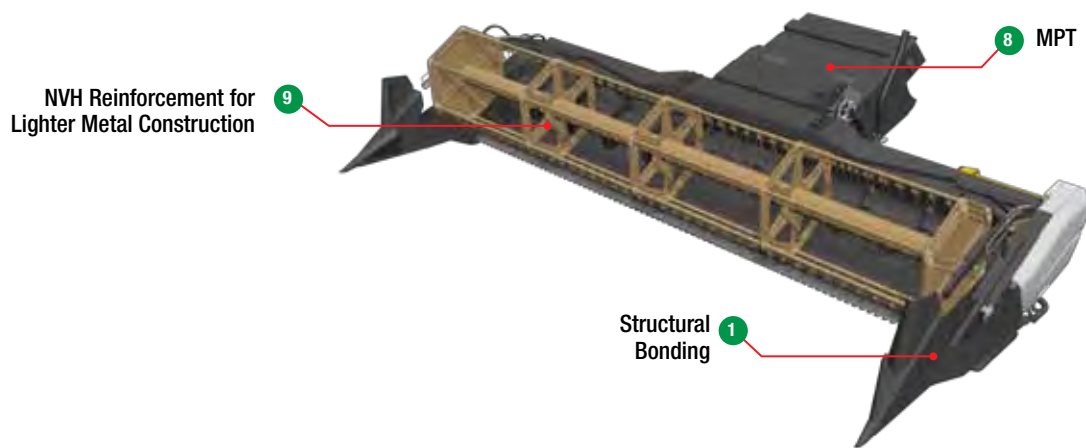


## ▲ Ploughs



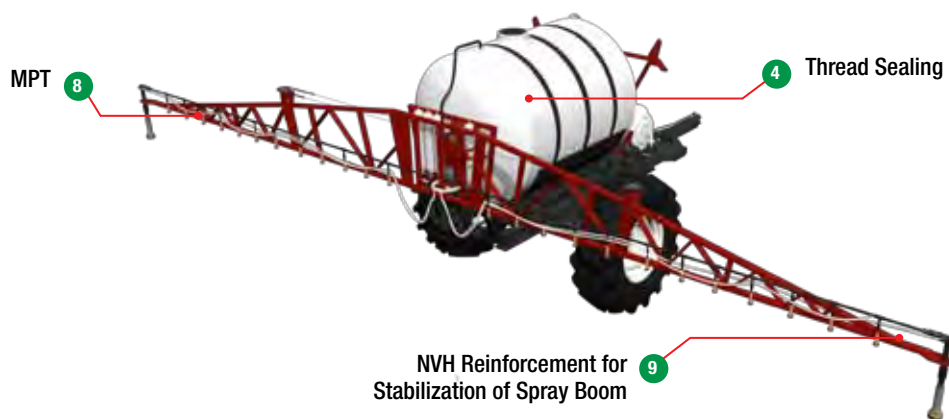
## ▲ Corn Headers





## ▲ Grain Headers

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## ▲ Sprayers

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## 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?

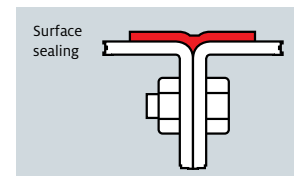
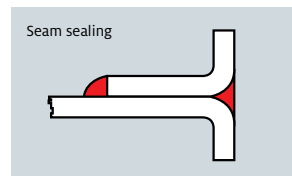
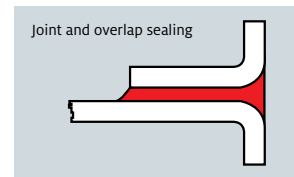
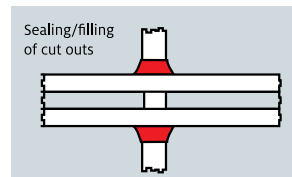
- Seal in/out heat, liquids, solids and gases (moisture, dirt and exhaust)
- Prevent corrosion between metal joints
- Improve aesthetics by eliminating rust bleed and creating a seamless appearance
- Reduce airborne and structural-borne noise
- Simplify designs and assembly process
- Enhance paint quality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



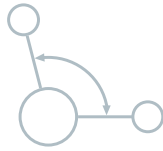
### Room temperature curing seam sealants include:

- 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



## CONSIDERATIONS



## SOLUTIONS

### BODY SHOP

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

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

### PAINT SHOP

Post Metal Pretreatment  
Pre E-Coat/Primer

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

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

### PAINT SHOP

Post E-Coat/Primer  
Pre Powder/Top Coat

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

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

### TRIM SHOP

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

- Silyl Modified Polymers
- Silicones

\*liquid paint process only

# ASSEMBLY SOLUTIONS – SEAM SEALING

## YOUR APPLICATION CRITERIA

Yes

What cure method is desired?

General Purpose

Static Mix

Heat Cure

Sprayable Sealant

Fast Cure

Long Open Time

Plastisol

## SOLUTION

**TEROSON  
PU 8590 N/M**

**LOCTITE  
EA E-04SS**

**LOCTITE  
EA 9460**

**TEROSON 1002 AAIN**

**Chemistry**

Polyurethane

Epoxy

Epoxy

Acrylic and Urethane based  
PVC free Duplex

**Cure Type**

Moisture

Static Mix

Static Mix

Moisture

**Color**

Black

Grey

Grey

Black

**Expansion**

N/A

N/A

N/A

N/A

**Visible Joints**

N/A

Yes

Yes

N/A

**Oil Tolerance**

N/A

Recommended

Recommended

N/A

**Cure Schedule**

7 Days Full Cure, 4mm per  
24 hr.

Fixture Time:  
6 min.  
90% cured  
after 24 hrs.

Fixture Time:  
3 hrs. 90% cured  
after 24 hrs.

Minimum 190 °C to 230  
for 20 Min.

**Shore Hardness**

65

70D

75D

**Temp. Resistance**

90°C

220°C

210°C

240°C (short exposure  
30 min)

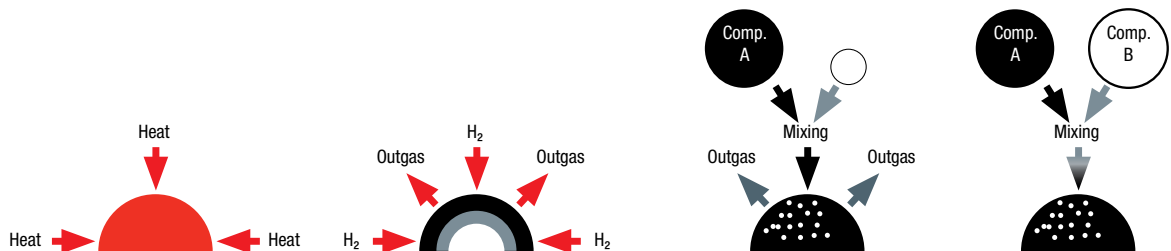
**Description**

Very good sag resistance,  
High cure rate High  
shear strength and good  
elasticity, even after aging  
Excellent adhesion to  
glass, glass with ceramic  
coating, encapsulation  
and to painted surfaces,  
in connection with primer/  
activator.

Fast 5-minute epoxy with  
excellent sag and washout  
resistance. Primarily used  
on thick substrates with  
large gaps.

Robust extended open-  
time epoxy with excellent  
sag and washout  
resistance. Primarily used  
on thick substrates with  
large gaps.

The material can be  
painted with many usual  
filler and top coat paints;  
powder paints without  
adverse effect on the  
surface. Being a PVC  
free material, it provide  
superior anti corrosion and  
overbake properties.



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.

**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.

PAINT SHOP					TRIM SHOP	
What cure method is desired?					Does the sealant need to be clear?	
Heat Cure			Moisture		No	Yes
What thermal resistance is required?			What type of top coat paint is used?			
180°C to 220°C	140°C to 180°C	95°C to 140°C	Liquid Top Coat	Powder Paint		
Powder Paint Sealant	Epoxy/PU Paint Sealant	Low Temp. Paint Bake	General Purpose	High Temp. Resistance	Fast Skin Time	Clear
<b>TEROSON AL 6302R</b>	<b>TEROSON PV 3046</b>	<b>TEROSON PU 1104 AA25</b>	<b>LOCTITE UR 3370</b>	<b>TEROSON MS 9380HT</b>	<b>TEROSON MS 930</b>	<b>TEROSON SI 33</b>
PVC/Polyacrylate	PVC plastisol	PU	PU	SMP	SMP	Amine Curing Silicone Rubber
Heat Cure	Heat Cure	Heat Cure	Moisture	Moisture	Moisture	Moisture
White	Ivory	Grey	Black, White, Grey	Grey	White, Grey, Black	Black
N/A	N/A	N/A	N/A	N/A	N/A	N/A
Yes	Yes	Yes	Yes	Yes	Yes	N/A
Not	Not	Not	Not	Not	Not	N/A
Recommended	Recommended	Recommended	Recommended	Recommended	Recommended	
Min.: 10 min. @ 150°C	Min.: 10 min. @ 140°C	Min.: 10 min. @ 85°C	Skin Over Time: 30 min.	Skin Over Time: 7 min.	Skin Over Time: 25 min.	2mm per 24 hrs.
Max: 60 min. @ 220°C	Max: 20 min. @ 200°C	Max: 60 min. @ 140°C	80% cure after 24 hrs.	Cure rate: 3mm/day	Cure rate 4 mm/day	
55A	70A	58A	55A	65A	30A	22
220°C	180°C	140°C	170°C	180°C	150°C	150°C
Heat cure PVC/ polyacrylate hybrid sealant with exceptional heat resistance for high temp. powder bake processes. Primarily used on primed metal.	Solvent-free PVC heat cure sealant for general use on primed metal.	Solvent free elastic adhesive based on an encapsulated polyisocyanate. Cures at low paint bake temperatures (85°C). Ideal for cure on-demand applications with low temp. paint bake processes.	General purpose moisture cure urethane for sealing joints on primed metal.	Moisture cure modified silane for use on primed metal prior to powder paint processes.	Moisture cure modified silane with primerless adhesion to most substrates and excellent UV and moisture resistance.	Teroson SI 33 is odourless, light resistant and demonstrates good adhesion properties and a good chemical resistance. Due to its curing system, no corrosion in edge areas, as well as on laminated materials is to be expected.

# 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

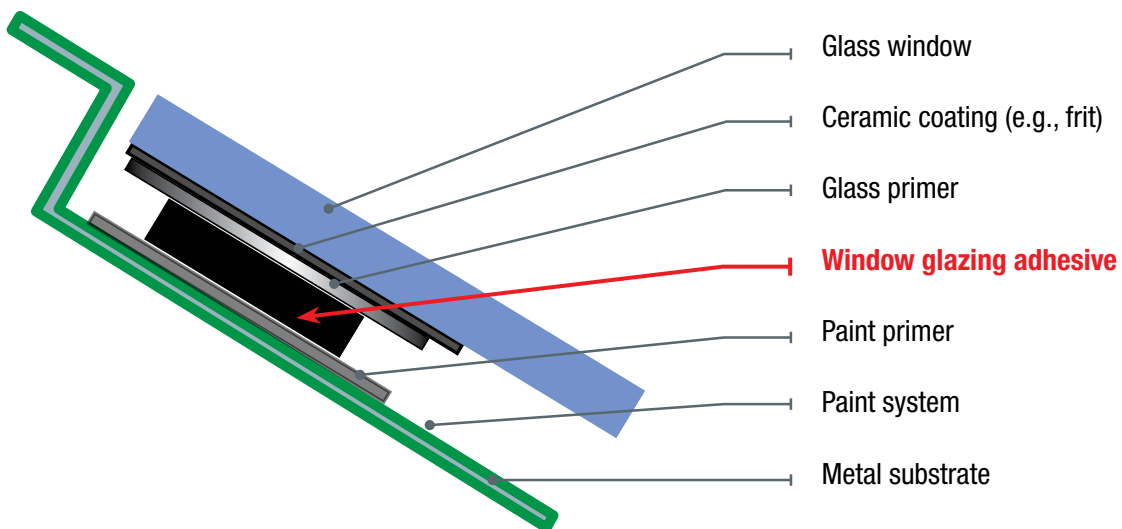
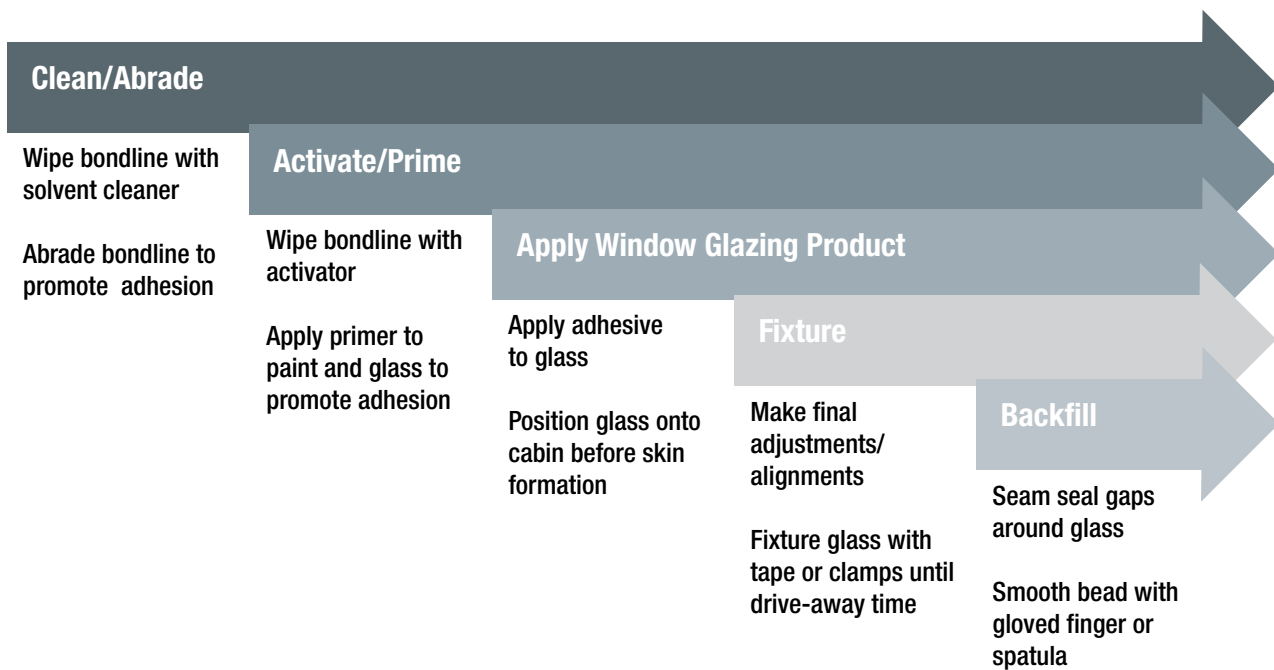
### Types of window glazing products:

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

## YOUR APPLICATION CRITERIA



## SOLUTION

**Chemistry**

**Cure Type/Ratio**

**Color**

**Dry/Skin Time**

**Elongation**

**Tensile Strength (MPa)**

**Shore Hardness**

**Description**

## SELECT YOUR STEP IN THE GLAZING PROCESS

CLEAN/ACTIVATE				PRIME	
Do you need an active cleaner?					
No		Yes		What substrate are you trying to prime?	
General Purpose	Silicone Removal	PU Activator	SMP Activator	Glass/Frit	Paint/Metal

TEROSON PU 8550	TEROSON VR20	TEROSON PU 8560	TEROSON SB 450	TEROSON PU 8517H	TEROSON 8521
Isopropanol	Benzene	Silane/Benzene	Silane/Isopropanol	PU	Polyurethane
Solvent	Solvent	Solvent	Solvent	Solvent	Solvent Evaporation
Clear	Clear	Clear	Clear	Black	Black
2 min.	2 min.	30 sec.	10 sec.	5 to 15 min.	2 to 10 min.
N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A

General purpose glass, ceramic frit and painted metal cleaner based on isopropanol.

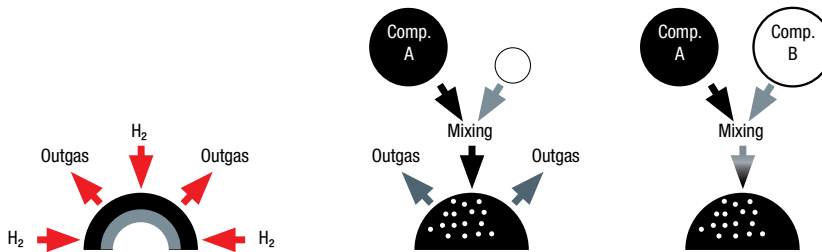
Universal window glazing cleaner based on white spirits specially formulated to remove silicone residue from windscreens.

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.

TEROSON PU 8521 is a black, thin liquid, solvent containing primer on the basis of polyurethane. The product is notable for its excellent covering properties and its good UV-stability. It is free from chlorinated hydrocarbons and aromatic solvents.



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.



**LEARN MORE:**

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GLAZE							GLASS BONDING/SEALING	
What type of glazing compound is preferred?							Is your process paint sensitive?	
Standard Primer System		Primerless System			Controlled Cure		No	Yes
Cold Applied	High Sag Resistance	Cold Applied	High Position Tack	Low Modulus	Static Mix	PU Booster	Clear RTV	Paintable
<b>TEROSON PU 8590 N/M</b>	<b>TEROSON PU 8590 UHV</b>	<b>TEROSON PU 9095</b>	<b>TEROSON PU 9095HV</b>	<b>TEROSON MS 939</b>	<b>TEROSON MS 9399</b>	<b>TEROSON PU 8590 BB-05</b>	<b>LOCTITE SI 595</b>	<b>TEROSON MS 5510</b>
Polyurethane	Polyurethane	PU	PU	SMP	SMP	Glycerol Booster	Silicone	SMP
Moisture Cure	Moisture Cure	Moisture	Moisture	Moisture	Static Mix (1:1)	Static Mix (1-5%)	Moisture	Moisture
Black	Black	Black	Black	Black	Black	Beige	Clear	Clear
30 min.	30 min.	20 min.	30 min.	10 min.	30 min.	5-20 min.	45 min.	20 min.
450%	450%	400%	400%	250%	150%	N/A	275%	140%
8MPa	7MPa	8.0	8.0	3.0	2.0	N/A	0.9	1.7
65A	approx 60A	60A	60A	55A	60A	N/A	14A	44A
TEROSON PU 8590 N/M is used for the bonding and sealing of front, rear and side screens to the body of motor vehicles (car, truck, bus, cabs of agricultural and construction equipments).	TEROSON PU 8590 UHV/M is used for the bonding of front, rear and side screens to the body of motor vehicles (car, truck, bus, cabs of agricultural and construction equipments).	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.

## 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.

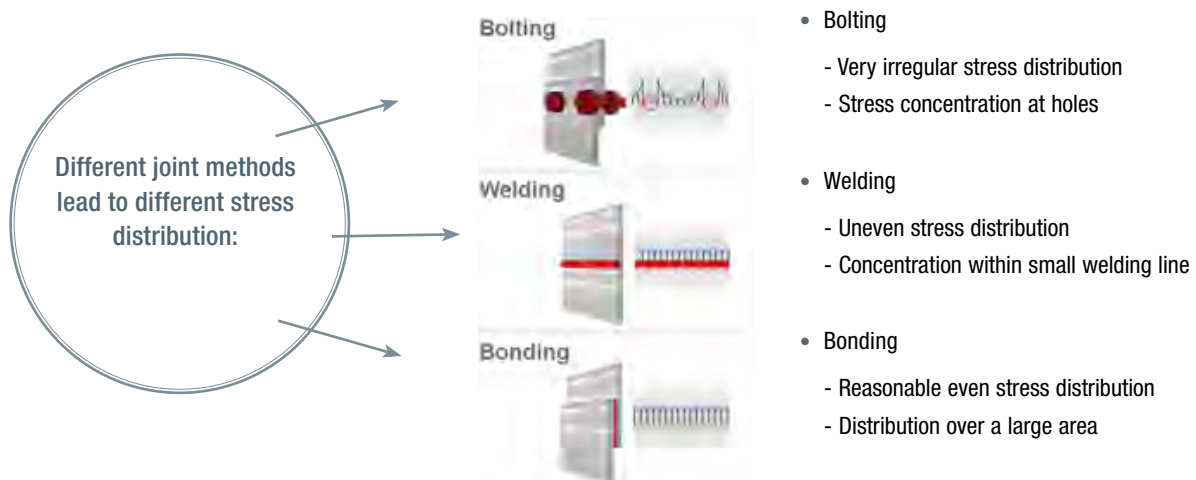
Primarily designed to replace welds, rivets and other mechanical fasteners in the body, paint or trim shops, our wide range of high strength structural and elastic bonders simplify and improve the design and assembly processes while improving aesthetics, performance and processing costs.

#### 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
<b>Epoxies</b>	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)</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>
<b>Two-Part (2k) Acrylics</b>	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)</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>
<b>Two-Step Acrylics</b>	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)</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>
<b>Polyurethanes (PU)</b>	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)</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>
<b>Silyl Modified Polymers (SMPs)</b>	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)</li> <li>• Low cohesive strength</li> <li>• Slow fixture and cure speed</li> <li>• Moisture sensitive</li> </ul>
<b>Reactive Rubbers</b>	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)</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

## YOUR APPLICATION CRITERIA



## WHAT TYPE OF BONDING IS REQUIRED?

Structural Metal Bonding

Are the substrates oily or cleaned/coated?

Oily Metal

What cure method is desired?

Two-Step

Static Mix

Heat Cure

Fast Cure

High Strength

High Impact Resistance

High Performance

## SOLUTION

**Chemistry**

**Cure Mechanism**

**Color**

**Viscosity (Pa-S)**

**Fixture/Cure Time**

**Tensile Strength (MPa)**

**Elongation**

**Hardness**

**Shear Strength (Steel) (MPa)**

**Description**

**LOCTITE  
AA 334/7387**

Acrylic

Two-Step

Yellow

85,000

2 min./ 24 hrs.

N/A

N/A

70D

17.8

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.

**LOCTITE  
AA H8000**

MMA

Two-Part

Green

190,000

30 min./ 24 hrs.

14.8

13%

70D

22.9

Robust, static mix acrylic designed for structurally bonding oily metal in weld and rivet reduction applications. Excellent weather resistance.

**LOCTITE  
AA H8510**

MMA

Two-Part

Grey

45,000

30 min./ 24 hrs.

16.2

41%

70D

19.9

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.

**TEROSON  
EP 5089**

Epoxy

Heat

Purple

100,000

10 min. @ 155°C

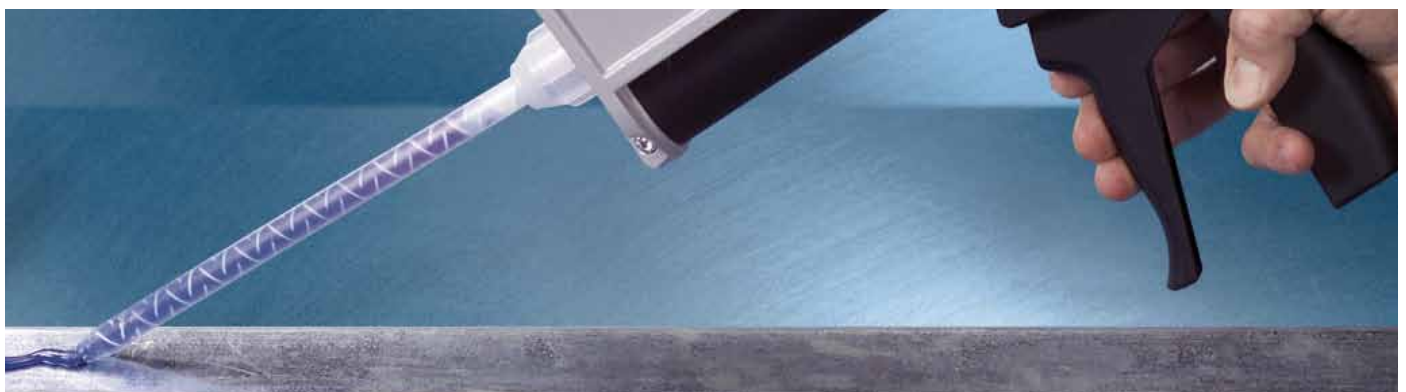
> 30.0

9%

68D

31.1

Toughened heat cure epoxy offering high shear strength, thermal resistance and extremely good peel and impact resistance. Weld-through capable.



**LEARN MORE:**

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**Cleaned or Coated Metal**



**High Position Tack**

**Fast Cure**

**High Impact Strength**

**General Purpose**

**TEROSON  
RB 5197**

**LOCTITE  
EA E-05MR**

**LOCTITE  
EA E-30UT**

**LOCTITE  
EA E-60HP**

Rubber Based

Epoxy

Epoxy

Epoxy

Heat

Two-Part

Two-Part

Two-Part

Black

Clear

Purple

Off-White

180,000

25,000

65,000

45,000

15 min. @ 175°C

15 min./ 24 hrs.

3 hrs./ 24 hrs.

4 hrs./ 24 hrs.

12.0

49.9

36.8

35.2

10%

5%

3%

9%

N/A

78D

80D

80D

15.0

23.3

29.0

29.8

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

## YOUR APPLICATION CRITERIA



## 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>

## WHAT TYPE OF BONDING IS REQUIRED?

General Purpose Elastic Bonding

What cure method is desired?

Moisture Cure

Static Mix

General Purpose

High Position Tack

Fast Cure

General Purpose

**TEROSON  
MS 939**

**TEROSON  
PU 9095 HV**

**TEROSON  
MS 9399**

**LOCTITE  
UK U-05FL**

MS Polymer

Polyurethane

MS Polymer

Polyurethane

Moisture

Moisture

Two-Part

Two-Part

Black

Black

Black

Off-White

Paste

Paste

Paste

100,000

10 min./ 72 hrs.

30 min./ 72 hrs.

2 hrs./ 72 hrs.

2.5 hrs./ 24 hrs.

3.0

8.0

3.0

9.0

250%

400%

150%

74%

55A

55A

60A

45D

1.5

2.3

3.0

7.0

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.





**LEARN MORE:**

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Heat Cure		Composite/Plastic Bonding			Instant Bonding	
Cure on-demand	Flexible Substrates	Rigid Substrates	Fast Cure	Large Gaps	Toughened	
<b>TEROSON PU 1103 AA25</b>	<b>LOCTITE UK 1366 B10</b>	<b>LOCTITE UK 1351 B25</b>	<b>LOCTITE AA H3300</b>	<b>LOCTITE HY 4090</b>	<b>LOCTITE 411</b>	
Polyurethane	Polyurethane	Polyurethane	MMA	Cyanoacrylate	Cyanoacrylate	
Heat	Two-Part	Two-Part	Two-Part	Two-Part	Moisture	
Crème	Green	Green	Yellow	Off-White	Clear	
95,000	34,000	29,000	110,000	17,000	6,000	
10 min. @ 85°C	35 min./ 72 hrs.	75 min./ 72 hrs.	5 min./ 24 hrs.	3 min./ 24 hrs.	35 sec./ 24 hrs.	
5.0	10.0	26.0	29.0	7.0	7.0	
200%	58%	1%	30%	4%	N/A	
74A	55D	84D	80D	67D	N/A	
4.0	10.3 (PVC)	8.8 (PVC)	14.6 (PVC)	17.0	29.0	
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

## 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.

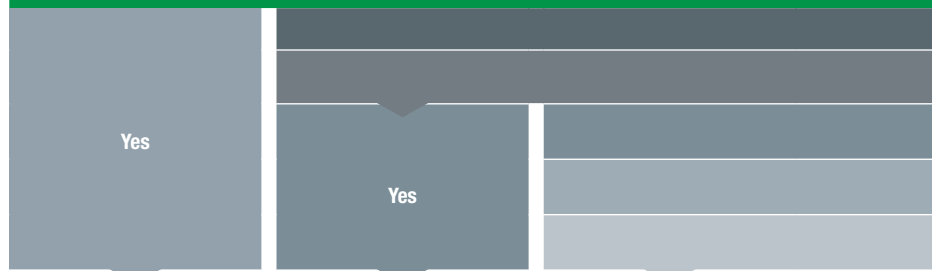
## Benefits

- 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

### YOUR APPLICATION CRITERIA



### ARE THE PARTS ALREADY ASSEMBLED?



Wicking Grade

High Strength

Medium Strength/  
Primerless

### SOLUTION

<b>Color</b>
<b>Breakaway/Prevail Torque (N-m)</b>
<b>Temperature Resistance</b>
<b>Oil Resistance (1,000h @ 121°C)</b>
<b>Water/glycol resistance (1,000h @ 87°C)</b>
<b>Gasoline Resistance (1,000h @ 22°C)</b>
<b>Description</b>

LOCTITE 290

Green

10/29

-54° to 149°C

Recommended

Highly Recommended

Highly Recommended

Recommended for locking pre-assembled fasteners. Mil Spec (S-46163A) Type III, Grade R. NSF/ANSI 61 Certified.

LOCTITE 277

Red

31/31

150°C

Recommended

Recommended

Recommended

LOCTITE® 277 is designed for the permanent locking and sealing of threaded fasteners. Typical applications include the locking and sealing of large bolts and studs (M25 and larger)

LOCTITE 243

Blue

26/5

-54° to 182°C

Highly Recommended

Highly Recommended

Highly Recommended

General purpose removable strength liquid threadlocker. Reliably seals, locks and protects metal fasteners up to 3/4". NSF/ANSI 61 Certified. CFIA Approved.





**LEARN MORE:**

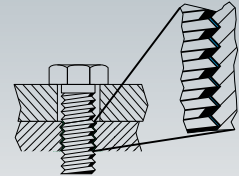
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**INACTIVE METALS**

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

**Helpful Hints:**

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



No

Are your bolts larger than 7/8"?

No

What temperature resistance do you need?

182°C

232°C

343°C

**High Strength/ Primerless**

**Medium Strength**

**Medium Strength**

**LOCTITE 263**

**LOCTITE 246**

**LOCTITE 2422**

Red

Blue

Blue

33/33

19/5

12/1

-54° to 182°C

-54° to 232°C

-54° to 343°C

Highly Recommended

Highly Recommended

Highly Recommended

Highly Recommended

Highly Recommended

Highly Recommended

Highly Recommended

Highly Recommended

Highly Recommended

General purpose permanent strength liquid threadlocker.  
Reliably seals, locks and protects metal fasteners up to 1". CFIA Approved.

Removable strength liquid threadlocker for high temp. applications.  
(Note: Also available in High Strength Red, LOCTITE 272)

Removable strength liquid threadlocker for ultra high temp. applications (e.g. 343°C).  
(Note: Also available in High Strength Red, LOCTITE 2620)

# MACHINERY ADHESIVES – THREAD SEALING

## 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

### 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**

### SOLUTION

<b>Color</b>
<b>Fixture/Cure Time</b>
<b>Pressure Resistance (MPa) (hydraulic)</b>
<b>Temperature Resistance</b>
<b>Oil Resistance (1,000h @ 125°C)</b>
<b>Gasoline Resistance (1,000h @ 22°C)</b>
<b>Water/Glycol Resistance (1,000h @ 87°C)</b>
<b>Description</b>

### General Purpose

#### LOCTITE 567

Color	White
Fixture/Cure Time	6 hrs./ 72 hrs.
Pressure Resistance (MPa) (hydraulic)	69
Temperature Resistance	-54° to 250°C
Oil Resistance (1,000h @ 125°C)	Highly Recommended
Gasoline Resistance (1,000h @ 22°C)	Highly Recommended
Water/Glycol Resistance (1,000h @ 87°C)	Highly Recommended

General purpose thread sealant specially formulated with anti-galling properties for stainless steel substrates. ABS Approved.

### Coarse Threads

#### LOCTITE 577

Color	White
Fixture/Cure Time	6 hrs./ 72 hrs.
Pressure Resistance (MPa) (hydraulic)	69
Temperature Resistance	-54° to 250°C
Oil Resistance (1,000h @ 125°C)	Highly Recommended
Gasoline Resistance (1,000h @ 22°C)	Highly Recommended
Water/Glycol Resistance (1,000h @ 87°C)	Highly Recommended

Primerless thread sealant formulated to have higher strength for coarse threads and anti-galling properties for use on stainless steel substrates.



**LEARN MORE:**

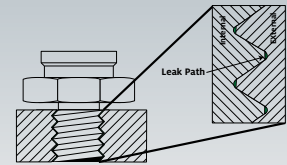
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**INACTIVE METALS**

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

**Helpful Hints:**

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



**PLASTIC**

Coated Multi-Filament Thread

Universal Sealant

LOCTITE 55 Pipe Cord

Yes (non-fouling)

What size are your fittings?

Upto 3/4"

1/2" or greater

3/8" or less

Low Viscosity

High Viscosity

Low Viscosity

LOCTITE 542

LOCTITE 5452

LOCTITE 545

Brown

Purple

Purple

White

Full Cure after 24 Hours

5 min. / 24 hrs.

4 hrs. / 24 hrs.

Non-reactive

69.0

69.0

69.0

69.0

150 °C

-54° to 149°C

-54° to 149°C

-54° to 149°C

Recommended

Highly Recommended

Highly Recommended

Highly Recommended

Recommended

Highly Recommended

Highly Recommended

Highly Recommended

Recommended

Highly Recommended

Highly Recommended

Highly Recommended

LOCTITE 542 is designed for the locking and sealing of metal pipes and fittings. Hydraulic & Pneumatic joints

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.

# MACHINERY ADHESIVES – GASKETING

## 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

### YOUR APPLICATION CRITERIA



### SOLUTION

<b>Color</b>	Red
<b>Shear Strength (MPa)</b>	5.0
<b>Temperature Resistance</b>	-54° to 204°C
<b>Functional Cure Time</b>	4 hrs.
<b>Oil Resistance (1,000h @ 125°C)</b>	Highly Recommended
<b>Gasoline Resistance (1,000h @ 22°C)</b>	Recommended
<b>Water/Glycol Resistance (1,000h @ 87°C)</b>	Highly Recommended
<b>Description</b>	Rigid, general purpose, form-in-place anaerobic flange sealant formulated for use in high temp. rigid metal gasketing applications.

### 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	150°C		
High Temp.	Flexible	Oil Tolerant	Fast Cure
<b>LOCTITE 510</b>	<b>LOCTITE 5188</b>	<b>LOCTITE 5182</b>	<b>LOCTITE 518</b>
Color	Red	Red Gel	Red
Shear Strength (MPa)	5.0	> 6 (Compressive Shear)	7.0
Temperature Resistance	-54° to 204°C	150°C	-54° to 149°C
Functional Cure Time	4 hrs.	30 mins.	4 hrs.
Oil Resistance (1,000h @ 125°C)	Highly Recommended	Recommended	Highly Recommended
Gasoline Resistance (1,000h @ 22°C)	Recommended	Recommended	Recommended
Water/Glycol Resistance (1,000h @ 87°C)	Highly Recommended	Recommended	Highly Recommended
Description	Rigid, general purpose, form-in-place anaerobic flange sealant formulated for use in high temp. rigid metal gasketing applications.	Flexible, general purpose, form-in-place anaerobic flange sealant designed for use on metal substrates (especially aluminum).	LOCTITE 5182 is a flexible, solvent resistant flange sealant that will not tear or decay. It is a red, gel-like, 1-part, high viscosity, thixotropic, medium strength, methacrylate ester acrylic sealant.

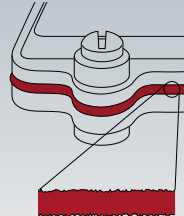
Rigid, general purpose, form-in-place anaerobic flange sealant for use on rigid metal flanges where fast cure time is needed. NSF/ANSI 61 Certified. CFIA Approved.

**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.

**Helpful Hints:**

- Even machined flanges have surface irregularities that can create leak paths.



Plastic or Stamped Metal (> 0.25 mm gap)

What temperature resistance do you need?

232°C

260°C

371°C

Oil Tolerant

Oil Tolerant

High Temp.

LOCTITE SI 5060

LOCTITE SI 5900

LOCTITE SI 5920

Black

Black

Copper

1.0

1.0

0.65

-54° to 200°C

-54° to 260°C

-54° to 371°C

30 min.

20 min.

1 hr.

Highly Recommended

Highly Recommended

Highly Recommended

NA

Not Recommended

Not Recommended

NA

Highly Recommended

Not Recommended

Non-slumping, non-corrosive, low odor, low volatile silicone adhesive. Designed for flange sealing for manual transmission, gear axle and general powertrain applications.

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.





# MACHINERY ADHESIVES – RETAINING

## 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

### YOUR APPLICATION CRITERIA



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

No

What temperature resistance is required?

150°C

180°C

High Gap

Low Strength

General Purpose/  
Stainless Steel

### SOLUTION

LOCTITE 660

LOCTITE 641

LOCTITE 648

Color

Metalic Gray

Yellow liquid

Green

Shear Strength (Steel) (MPa)

23.0

11.5

27.0

Clearance

Up to 0.5mm

up to 0.15 mm

Up to 0.15mm

Temperature Resistance

150°C

150°C

-54° to 180°C

Fixture/Cure Time

20 min/24 hr.

20 min/24 hr.

10 min. / 24 hrs.

Oil Resistance (1,000 hrs. @ 250°C)

Recommended

Recommended

Highly Recommended

Gasoline Resistance (1,000 hrs. @ 22°C)

Recommended

Recommended

Highly Recommended

Water/Glycol Resistance (1,000 hrs. @ 87°C)

Recommended

Recommended

Highly Recommended

Description

LOCTITE 660 is designed for the bonding of cylindrical fitting parts, particularly where bond gaps can approach 0.50 mm.

LOCTITE 641 is designed for the bonding of cylindrical fitting parts, particularly where disassembly is required for service operations.

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

**LEARN MORE:**

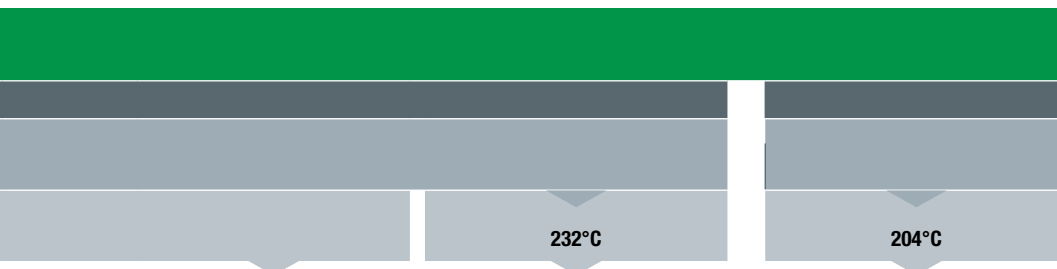
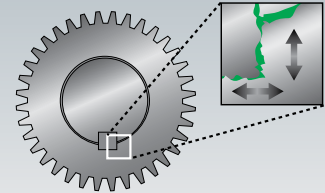
This catalog lists the most common products used in each application. Many additional products are available. Not all products are available in all countries. Contact your Henkel representative for assistance.

**INACTIVE METALS**

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

**Helpful Hints:**

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



**Slip Fit/High Strength**

**Slip Fit/High Temp.**

**Slow Cure for Large Parts and Active Metals**

LOCTITE 638	LOCTITE 620	LOCTITE 640
Green	Green	Green
31.0	26.0	22.0
Up to 0.25mm	Up to 0.2mm	Up to 0.1mm
-54° to 180°C	-54° to 232°C	-54° to 204°C
15 min. / 24 hrs.	10 min. / 24 hrs.	10 min. / 24 hrs.
Highly Recommended	Highly Recommended	Highly Recommended
Highly Recommended	Highly Recommended	Highly Recommended
Highly Recommended	Highly Recommended	Highly Recommended

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

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

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







## 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

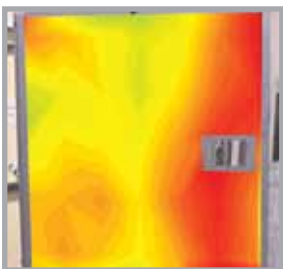
Henkel is a leading source worldwide for NVH (noise, vibration and harshness) solutions. We provide advanced NVH technologies and comprehensive design and engineering support to our customers. Henkel has been an NVH partner with the top automotive manufacturers for more than 20 years, and our expertise 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.

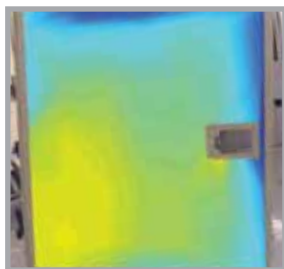
## Vibration Response Test (Figure 2)

> BEFORE

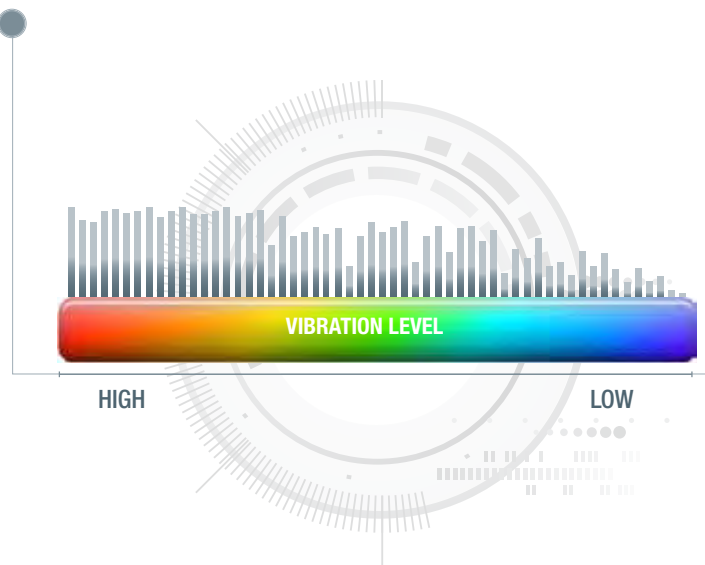



Vibration response test for side panel. Red/yellow indicates high levels of vibration.

> AFTER



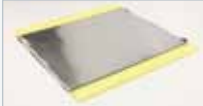



Test results for side panel using Henkel expandable material. Blue/green indicates low levels of vibration.



APPLICATION	
NEED	<b>Increase stiffness, shift resonant frequency</b>
SOLUTION	Reinforce With Stiffening Pads
	<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>



## NOISE, VIBRATION AND HARSHNESS SOLUTIONS (FIGURE 1)

	<b>SEALING</b> 	<b>ABSORPTION</b> 	<b>BARRIER</b> 
<b>Attenuate vibration of panel structure</b>	<b>Isolate noise sources</b>	<b>Reduce reverberant noise</b>	<b>Block sound transmission</b>
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>• 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>	

### 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	
			SEALING	
	100Hz	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>
	0.1Hz		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





## 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	Dispense Tips and Accessories	
VOLUMETRIC DISPENSING	<b>TUBE DISPENSING</b>								
		50 ML-F TUBE SQUEEZE DISPENSER	1083845	Thread Sealants, Gasketing Compounds	50 ml tubes	Low to High	Manual	N/A	
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 200 g squeeze tube	Low to Medium	Yes	Dispense Tips and Accessories
		1390321	0 to 100 psi Viscosity 0 to 3,000 cP	Medium to High			Yes		
	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		S-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		

#### ADDITIONAL EQUIPMENT OFFERINGS

<b>ROBOTIC SYSTEMS</b>		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.
<b>DISPENSE VALVES, RESERVOIRS AND CONTROLLERS</b>		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.
<b>MIX NOZZLES</b>		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.
<b>DISPENSE TIPS, ROLLERS AND NEEDLES</b>		
<b>CUSTOM EQUIPMENT</b>		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





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:



### PROCESS OPTIMIZATION

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.

Product Solutions	
Product Name	Page No.
BONDERITE C-AK 305	30
BONDERITE C-AK 305N	30
BONDERITE C-AK 412	30
BONDERITE C-AK 1520	30
BONDERITE C-IC 182B	30
BONDERITE M-FE 101	31
BONDERITE M-FE 200	31
BONDERITE M-FE 500LT	31
BONDERITE M-FE 700	31
BONDERITE M-FE 1030	31
BONDERITE M-FE 1090	31
BONDERITE M-NT 1	31
BONDERITE M-PT 50NC	31
BONDERITE M-PT 99X	31
BONDERITE M-PT 7100	31
LOCTITE 55 Pipe Cord	55
LOCTITE 232	59
LOCTITE 243	52
LOCTITE 246	53
LOCTITE 263	53
LOCTITE 290	52
LOCTITE 411	49
LOCTITE 510	56
LOCTITE 518	56
LOCTITE 545	55
LOCTITE 561	55
LOCTITE 567	54
LOCTITE 577	54
LOCTITE 620	59
LOCTITE 638	58
LOCTITE 640	59
LOCTITE 648	58
LOCTITE 2047	52
LOCTITE 2400	53
LOCTITE 2422	53
LOCTITE 2700	53
LOCTITE 4090	49
LOCTITE 5016	38
LOCTITE 5128	56
LOCTITE 5188	56
LOCTITE 5400	54
LOCTITE 5452	55
LOCTITE 5800	56
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LOCTITE AA H3300	49
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Product Solutions	
Product Name	Page No.
LOCTITE AA H8510	46
LOCTITE EA 9460	38
LOCTITE EA E-04SS	38
LOCTITE EA E-05MR	47
LOCTITE EA E-30UT	47
LOCTITE EA E-60HP	47
LOCTITE SI 5033	57
LOCTITE SI 5600	57
LOCTITE SI 5900	57
LOCTITE SI 5920	57
LOCTITE UK 1351 B25	49
LOCTITE UK 1366 B10	49
LOCTITE UK U-05FL	48
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TEROSON PU 9095	43
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TEROSON PV 1297	38
TEROSON PV 3046	39
TEROSON RB 3216	38
TEROSON RB 5197	47
TEROSON SB 450	42
TEROSON SI 595	43
TEROSON VR20	42

## Equipment Solutions

Product Name	IDH No.	Page No.
LOCTITE 50 ml Dual Cartridge Manual Applicator	720228	63
LOCTITE 50 ml Dual Cartridge Manual Applicator	1034026	63
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## Henkel Adhesives Technologies India Private Limited

### Mumbai

#### Corporate Office

L & T Seawoods, Grand Central,  
401, B Wing, 4<sup>th</sup> Floor, Tower 1,  
Seawoods, Navi Mumbai - 400 706,  
Maharashtra, India.  
Phone : +91 22 7130 1300

### Chennai

Arunodayam, No. 14 & 16,  
Raman Street, North Boag Road,  
T. Nagar, Chennai - 600 017,  
Tamil Nadu, India.  
Phone : +91 44 3354 6123

### Pune

Survey No. 234, 235 and 245,  
India Land Global Industrial Park,  
Phase 1, Hinjewadi, Pune - 411 057,  
Maharashtra, India.  
Phone : +91 20 7199 7000

### Delhi

74, Industrial Corporation,  
Mehrauli Gurgaon road,  
Gurgaon - 122 001,  
Haryana, India.  
Phone : +91 0124 509 7000

### Factory

D3/D4, MIDC Industrial Estate,  
Jejuri, Purandhar, Pune - 412 303,  
Maharashtra, India.  
Phone : +91 2115 718 000

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