Adhesives, Sealants, Functional Coatings, Equipment and Services

Agricultural & Construction Equipment Solutions
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.
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 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

1. Reduce Welds and Fasteners
2. Bond and Seal Windscreen
3. Threadlocking
4. Gasket Seal Drive
5. Clean, Treat and A-Coat (Autophoretic)
6. Noise Reduction of Hood Assembly
7. Secure Bearing to Shaft
8. Seal Hydraulic Fittings

▲ Backhoes

1. Reduce Welds and Fasteners
2. Seal Weld Seam
3. Threadlocking
4. Gasket Seal Windscreen
5. Clean, Treat and A-Coat
6. Seal Hydraulic Fittings
7. Noise Reduction

▲ Combines

1. Clean, Treat and A-Coat
2. Reduce Welds and Fasteners
3. Seal Hydraulic Fittings
4. Bond and Seal Windscreen
5. Noise Reduction in Engine Cabin
6. Secure Bearing Assembly
7. Seal Weld Seam

▲ Skid Steers

1. Reduce Welds and Fasteners
2. Gasket Seal Dump Stop
3. Clean, Treat and A-Coat
4. Threadlocking
5. Seal Weld Seam
**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

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**Engine Assemblies**

1. Gasket Seal & Thread Seal Thermostat Housing
2. Gasket Seal, Threadlock, Thread Seal Intake Manifold Gasket
3. Threadlock Intake Manifold Bolts
4. Gasket Seal Valve Cover
5. Exhaust Gaskets
6. Threadlock & Gasket Seal Diesel Injectors
7. Thread Seal Water Pump
8. Thread Seal Water Pump Fittings
9. Threadlock and Thread Seal Water Pump Mounting Hardware
10. Gasket Seal Crankshaft Sleeve
11. Threadlock Connecting Rod Cap Bolts
12. Thread Seal Oil/Water Cooling Lines
13. Seal Threaded Core Plugs
14. Threadlock Flywheel Bolts
15. Seal Oil/Water Cooling Lines
16. Threadlock & Thread Seal Cylinder Head Bolts
17. Cylinder Head Bolts
18. Lubricate Turbo Mounting Flange
19. Lubricate Exhaust Manifold Studs
20. Lubricate Heat Shield Hardware
21. Lubricate Fuel Filter Mounting Block O-Rings
22. Lubricate Turbo Oil Filter Mounting
23. Lubricate Oil Filter Mounting
24. Threadlock Accessory Mounting Bolts
25. Threadlock & Accessory Mounting Bolts
26. Secure Dipstick Sleeve
27. Gasket Seal Water Pump

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**Cabin Assemblies**

1. Gasket Seal Roof to Cabin
2. Gasket Seal
3. Bond and Seal Windscreen
4. Seal Weld Seam
5. Threadlocking
6. Seal Hydraulic Fittings
7. Threadlocking
8. Reduce Welds and Fasteners
9. Seal Weld Seam
10. Clean, Treat and/or A-Coat
11. MPT
12. Gasket Seal & Thread Seal Thermostat Housing
13. Gasket Seal, Threadlock, Thread Seal Intake Manifold Gasket
14. Threadlock Intake Manifold Bolts
15. Gasket Seal Valve Cover
16. Exhaust Gaskets
17. Threadlock & Gasket Seal Diesel Injectors
18. Thread Seal Water Pump
19. Thread Seal Water Pump Fittings
20. Threadlock and Thread Seal Water Pump Mounting Hardware
21. Gasket Seal Crankshaft Sleeve
22. Threadlock Connecting Rod Cap Bolts
23. Thread Seal Oil/Water Cooling Lines
24. Seal Threaded Core Plugs
25. Threadlock Flywheel Bolts
26. Seal Oil/Water Cooling Lines
27. Threadlock & Thread Seal Cylinder Head Bolts
28. Cylinder Head Bolts
29. Lubricate Turbo Mounting Flange
30. Lubricate Exhaust Manifold Studs
31. Lubricate Heat Shield Hardware
32. Lubricate Fuel Filter Mounting Block O-Rings
33. Lubricate Turbo Oil Filter Mounting
34. Lubricate Oil Filter Mounting
35. Threadlock Accessory Mounting Bolts
36. Threadlock & Accessory Mounting Bolts
37. Secure Dipstick Sleeve
38. Gasket Seal Water Pump
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
- Secure Bearing to Housing and Wheels to Shaft
- Bond Elastomer Oil Seals and Identification Plate
- MPT to Protect Gearbox Housing
- Gasket Seal Gearbox Housing and Inspection Cover and Housing
- Lubricate Dowel Pins
- Skid Mounting and Leveling
- Seal and Lock Fittings

Transmission Assemblies
- Lubricate Plastic Electrical Plugs
- Secure Oil Dipstick Tube
- Threadlock Transmission Pan Bolts
- Threadlock Case Assembly Bolts
- Threadlock Torque Converter Bolts
- Seal Torque Converter
- Secure Case Dowel Pins
- Lubricate Slip Yokes and U-Joints
- Secure Input / Output Shaft Seals
- Gasket Seal Transmission Pan
- Threadlock PTO Mounting Bolts
- Threadlock Crossmember Bolts

Gearbox Assemblies
- Lubricate Drum Brake Hardware and Shoe Slides
- Seal Ring Gear Hardware and Shoe Slides
- Gasket Seal Differential Cover
- Threadlock Differential Cover Mounting Bolts
- Seal and Lock Fittings
- MPT to Protect Gearbox Housing
- Gasket Seal Gearbox Housing and Inspection Cover and Housing
- Lubricate Dowel Pins
- Skid Mounting and Leveling
- Seal and Lock Fittings
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
- Structural Bonding
- Seam Sealing of Sheet Metal Construction
- Gasketing of Gear Box
- Retaining of Bearings at Pick-Up Roller and Baler Chamber Rollers

Mowers
- Seam Sealing Along Metal Sheet Connections
- Bonding of Skirt to Machine
- MPT
- Surface Coatings for Underbody Protection

Seed Drills
- Surface Coatings on Inside Hopper to Prevent Abrasion
- Bonding Hopper to Replace Riveting, Bonding Handles
- Threadlocking
- Seal Hydraulic Threads

Harrow
- MPT
- Seal Hydraulic Threads
- Surface Coating on Discs
ATTACHMENT APPLICATIONS

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

Grain Headers
8. NVH Reinforcement for Lighter Metal Construction

Plows
4. MPT
2. Structural Bonding
6. NVH Reinforcement for Lighter Metal Construction
7. Threadlocking
3. Surface Coating on Mouldboards

Corn Headers
8. NVH Reinforcement for Stabilization of Spray Boom

Sprayers
4. Thread Sealing
6. MPT

NOISE, VIBRATION, HARSNESS 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)

<table>
<thead>
<tr>
<th>NVH Technology Overview</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BARRIER</strong></td>
</tr>
<tr>
<td>Multilayer with EVA Sound Insulation</td>
</tr>
<tr>
<td>Fiber (Nonwoven) Absorber</td>
</tr>
<tr>
<td>Open Cell Foam Absorber</td>
</tr>
<tr>
<td>Preformed Mastic Parts (Non-Expanding)</td>
</tr>
<tr>
<td>Preformed Parts: Expandable Soft Foams</td>
</tr>
<tr>
<td><strong>ABSORPTION</strong></td>
</tr>
<tr>
<td>Bitumen Sheets</td>
</tr>
<tr>
<td>Constrained Layer Damping Pads (CLDP)</td>
</tr>
<tr>
<td>Aqueous Synthetic Damping - Large Surface (Rail)</td>
</tr>
<tr>
<td>Liquid Applied Sound Deadener (LASD)</td>
</tr>
<tr>
<td>Pumpable Anti-Flutter</td>
</tr>
<tr>
<td>Bonding With Semi-Structural Adhesives</td>
</tr>
<tr>
<td>Bonding With Structural Adhesives</td>
</tr>
<tr>
<td>Injection of Structural Hard Foams - RT - RIM</td>
</tr>
<tr>
<td>Preformed Parts: 3D Structural Foam - Thin Gauge Metal (Auto)</td>
</tr>
<tr>
<td>Preformed Parts: 2D Structural Tapes and Pads</td>
</tr>
<tr>
<td><strong>SEALING</strong></td>
</tr>
<tr>
<td><strong>DAMPING</strong></td>
</tr>
<tr>
<td><strong>REINFORCEMENT</strong></td>
</tr>
</tbody>
</table>

NVH, Vibration and Harshness Solutions (Figure 1)

<table>
<thead>
<tr>
<th>NEED</th>
<th>SOLUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase stiffness,</td>
<td>Reinforce With Stiffening Pads</td>
</tr>
<tr>
<td>shift resonant frequency</td>
<td></td>
</tr>
<tr>
<td>Attenuate vibration of</td>
<td>Liquid Applied Sound Deadener</td>
</tr>
<tr>
<td>panel structure</td>
<td>Water-Based Damping</td>
</tr>
<tr>
<td>Isolate noise sources</td>
<td>High Damping Foam</td>
</tr>
<tr>
<td>Reduce reverberant noise</td>
<td>Constrained Layer Pads</td>
</tr>
<tr>
<td>Block sound transmission</td>
<td></td>
</tr>
</tbody>
</table>

- Structural vibration reduction
- Allows metal design with thinner panels
- Reduction in mass
- High loss factor performance
- Structural vibration reduction
- Improves NVH performance
- Converts vibration into thermal energy
- Reduction in sound pressure levels
- Easy to apply on various substrates
- Less welding
- Less corrosion
- Process cost savings through automation
- High Sound Transmission Loss (STL) performance
- High absorption performance
- Tunable performance
- Complexity reduction
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**
- Robotic application of 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:

<table>
<thead>
<tr>
<th>NVH Analysis</th>
<th>Acoustic Material Testing</th>
<th>Other NVH Testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise source</td>
<td>Damping test (Oberst, impedance, free method)</td>
<td>Semi anechoic room test</td>
</tr>
<tr>
<td>Transmission path</td>
<td>Sound absorption</td>
<td>Reverberant room test</td>
</tr>
<tr>
<td>Contribution</td>
<td>Transmission loss</td>
<td>Vibraton test by laser meter</td>
</tr>
<tr>
<td>Frequency response</td>
<td></td>
<td>Acoustic camera (holography)</td>
</tr>
</tbody>
</table>

**NVH Simulation Capabilities**

<table>
<thead>
<tr>
<th>Simulation types</th>
<th>FEA</th>
<th>BEM</th>
<th>SEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strength</td>
<td>✔️</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Stiffness</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Modal</td>
<td>✔️</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Vibration</td>
<td>✗</td>
<td>✔️</td>
<td>✗</td>
</tr>
<tr>
<td>Noise</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Thermal</td>
<td>✔️</td>
<td>✗</td>
<td>✗</td>
</tr>
</tbody>
</table>

**NOISE, VIBRATION, HARSHNESS AND METAL REINFORCEMENT SOLUTIONS**
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 CO2.

- 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 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 CO₂
- 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**

**TRADITIONAL MULTI-STEP PROCESS**

**Henkel Autodeposition Solutions**

**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

**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.
YOUR APPLICATION

METAL AND PAINT PRETREATMENT

**SOLUTION**

- **BONDERITE® C-AK 305N™**: Phosphate-free
- **BONDERITE® C-AK 305™**: Steel
- **BONDERITE® C-AK 412™**: Aluminum
- **BONDERITE® C-IC 183B™**: Pickle
- **BONDERITE® C-AK 1520™**: Multi-Metal

**Application Temperature**

- **Phosphate-free**: 30°C-60°C (86°F-140°F)
- **Steel**: 30°C-60°C (86°F-140°F)
- **Aluminum**: 54°C-82°C (129°F-180°F)
- **Pickle**: 82°C (180°F)
- **Multi-Metal**: 40°C-60°C (104°F-140°F)

**Concentration by Volume**

- **Phosphate-free**: 1-3%
- **Steel**: 1-3%
- **Aluminum**: 2-4%
- **Pickle**: 1-5%
- **Multi-Metal**: 5-10%

**Contact Time**

- **Phosphate-free**: 1-6 sec.
- **Steel**: 1-6 sec.
- **Aluminum**: 2-4 sec.
- **Pickle**: 1-5 sec.
- **Multi-Metal**: 5-10 sec.

**Application**

- **Phosphate-free**: Spray
- **Steel**: Spray
- **Aluminum**: Spray, Immersion
- **Pickle**: Spray, Immersion
- **Multi-Metal**: Spray, Immersion

**Acid/Alkaline**

- **Phosphate-free**: Alkaline
- **Steel**: Alkaline
- **Aluminum**: Alkaline
- **Pickle**: Acid
- **Multi-Metal**: Alkaline

**RECOMMENDED 2-STAGE PROCESS**

- **Cleaner**: BONDERITE® C-AK 305N™
- **Coater**: BONDERITE® C-AK 305™

- **Wand**: Spray, Immersion
- **Temperature**: 21-60°C (70-140°F)

**RECOMMENDED 4-STAGE PROCESS**

- **Cleaner**: BONDERITE® M-FE 500LT™
- **Coater**: BONDERITE® M-PT 100™
- **Rinse**: BONDERITE® M-PT 100™
- **Temperature**: 21-60°C (70-140°F)

**RECOMMENDED NANOCERAMICS PROCESS**

- **Cleaner**: BONDERITE® M-AK 305N™
- **Coater**: BONDERITE® M-PT 100™
- **Rinse**: BONDERITE® M-PT 100™
- **Temperature**: 21-60°C (70-140°F)

**METAL AND PAINT PRETREATMENT**

- **Cleaning**
  - Phosphate-free
  - Steel
  - Aluminum
  - Pickle
  - Multi-Metal

- **Conversion Coating**
  - 1-STAGE
  - 2-STAGE
  - 4-STAGE
  - 5-STAGE

- **Seal/Post Rinse**
  - Chrome-Free
  - Dry-In-Place
  - Organic
  - Inorganic

**Conversion Coating**

- **1-STAGE**: Spray Wand
- **2-STAGE**: Spray Wand
- **4-STAGE**: Spray, Immersion
- **5-STAGE**: Spray, Immersion

**SEAL/POST RINSE**

- **1-STAGE**: Spray Wand
- **2-STAGE**: Spray Wand
- **4-STAGE**: Spray, Immersion
- **5-STAGE**: Spray, Immersion

**Functional Coatings and Metal Pretreatment Solutions**

- **Recommended 2-Stage Process**: Spray Wand
- **Recommended 4-Stage Process**: Spray, Immersion

**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.
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.

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

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)
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.
**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

**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

---

**Assemble Solutions – Seam Sealing**

No matter what your needs are, we have a seam sealant that will adapt to your assembly and paint process.
**ASSEMBLY SOLUTIONS – SEAM SEALING**

**WHERE WILL THE SEALANT BE APPLIED?**

<table>
<thead>
<tr>
<th>YOUR APPLICATION CRITERIA</th>
<th>BODY SHOP</th>
<th>PAINT SHOP</th>
<th>TRIM SHOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Will the joint be visible?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>What cure method is desired?</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Does the sealant need to be clear?</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**SOLUTION**

<table>
<thead>
<tr>
<th>Chemistry</th>
<th>Core Type</th>
<th>Color</th>
<th>Expansion</th>
<th>Visible joints</th>
<th>Oil Tolerance</th>
<th>Cure Schedule</th>
<th>Application Temperature</th>
<th>Shore Hardness</th>
<th>Peak Metal Temp. Resistance</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVC plastisol</td>
<td>Heat Cure</td>
<td>Black</td>
<td>50-100%</td>
<td>N/A</td>
<td>No</td>
<td>Highly Recommended</td>
<td>Min.: 25 min.</td>
<td>@ 160°C (320°F)</td>
<td>High expansion, PVC plastisol sealant for use on large non-visible gaps.</td>
<td></td>
</tr>
<tr>
<td>Rubber</td>
<td>SFF</td>
<td>Black, Grey, Ochre</td>
<td>N/A</td>
<td>Yes</td>
<td>Highly Recommended</td>
<td>Mix</td>
<td>@ 190°C (374°F)</td>
<td>Fast 5 minute open-time epoxy with excellent sag and washout resistance. Primarily used on thick substrates with large gaps.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Epoxy</td>
<td>Epoxy</td>
<td>Grey</td>
<td>N/A</td>
<td>Yes</td>
<td>Yes</td>
<td>Recommended</td>
<td>Min.: 10 min.</td>
<td>@ 100°C (212°F)</td>
<td>Heat cure PVC/polyacrylate hybrid sealant with exceptional heat resistance for high temp. powder bake processes. Primarily used on primed metal.</td>
<td></td>
</tr>
<tr>
<td>Epoxy/Acrylic</td>
<td>Heat Cure</td>
<td>White</td>
<td>N/A</td>
<td>N/A</td>
<td>Yes</td>
<td>Recommended</td>
<td>Min.: 10 min.</td>
<td>@ 140°C (284°F)</td>
<td>Solvent-free PVC heat cure sealant for general use on primed metal.</td>
<td></td>
</tr>
<tr>
<td>Epoxy</td>
<td>Heat Cure</td>
<td>Ivory</td>
<td>N/A</td>
<td>N/A</td>
<td>Yes</td>
<td>Recommended</td>
<td>Min.: 10 min.</td>
<td>@ 140°C (284°F)</td>
<td>Solvent free elastic adhesive based on an encapsulated polyisocyanate. Cures at low paint bake temperatures (95°C/203°F). Ideal for use on demand applications with low temp. paint bake processes.</td>
<td></td>
</tr>
<tr>
<td>Epoxy</td>
<td>Heat Cure</td>
<td>Grey</td>
<td>N/A</td>
<td>N/A</td>
<td>Yes</td>
<td>Recommended</td>
<td>Min.: 10 min.</td>
<td>@ 140°C (284°F)</td>
<td>Moisture cure modified silane for use on primed metal to most substrates and excellent UV and moisture resistance.</td>
<td></td>
</tr>
<tr>
<td>Epoxy</td>
<td>Heat Cure</td>
<td>White</td>
<td>N/A</td>
<td>N/A</td>
<td>Yes</td>
<td>Recommended</td>
<td>Min.: 10 min.</td>
<td>@ 140°C (284°F)</td>
<td>Moisture cure modified silane with primerless adhesion to most substrates and excellent UV and moisture resistance.</td>
<td></td>
</tr>
<tr>
<td>Epoxy</td>
<td>Heat Cure</td>
<td>Ivory</td>
<td>N/A</td>
<td>N/A</td>
<td>Yes</td>
<td>Recommended</td>
<td>Min.: 10 min.</td>
<td>@ 140°C (284°F)</td>
<td>Ultra clear styrene modified polymer with excellent primerless adhesion to most substrates and UV resistance. Ideal for applications where paint color matching is important.</td>
<td></td>
</tr>
</tbody>
</table>

**ASSEMBLY SOLUTIONS – SEAM SEALING**

<table>
<thead>
<tr>
<th>TYPE</th>
<th>HEAT CURE</th>
<th>MOISTURE CURE</th>
<th>1K BOOSTED</th>
<th>2K REACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comp.</td>
<td>1K</td>
<td>1.2</td>
<td>2K</td>
<td>2K</td>
</tr>
<tr>
<td>Method</td>
<td>Cure on-demand</td>
<td>Humidity</td>
<td>Controlled Cure</td>
<td>Controlled Cure</td>
</tr>
<tr>
<td>Cure Cond.</td>
<td>Heat (open)</td>
<td>Ambient</td>
<td>Homogenous</td>
<td>Homogenous</td>
</tr>
<tr>
<td>Cure Dir.</td>
<td>Outside in</td>
<td>Outside in</td>
<td>Homogenous</td>
<td>Homogenous</td>
</tr>
<tr>
<td>Mixing</td>
<td>No mixing</td>
<td>No mixing</td>
<td>Mixing</td>
<td>Mixing</td>
</tr>
<tr>
<td>Cure Time</td>
<td>&lt;1 hr.</td>
<td>3-4 mm/day</td>
<td>&lt;1 hr.</td>
<td>&lt;24 hrs.</td>
</tr>
<tr>
<td>Fixture Time</td>
<td>N/A</td>
<td>&lt;20 min.</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**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.
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

Typical Windscreen Installation Process

HOW TO USE WINDOW GLAZING PRODUCTS

1. Clean/Abraze
   - Wipe bondline with solvent cleaner
   - Abrade bondline to promote adhesion

2. Activate/Prime
   - Wipe bondline with activator
   - Apply primer to paint and glass to promote adhesion

3. Apply Window Glazing Product
   - Apply adhesive to glass
   - Position glass onto cabin before skin formation

4. Fixture
   - Make final adjustments/alignments
   - Fixture glass with tape or clamps until drive-away time

5. Backfill
   - Seam seal gaps around glass
   - Smooth bead with gloved finger or spatula

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- 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:

<table>
<thead>
<tr>
<th>Moisture curing window glazing products include:</th>
<th>Controlled curing window glazing products include:</th>
<th>Primerless window glazing products include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>High modulus single-component PU based adhesives</td>
<td>Boosted single-component PU and SMP based adhesives</td>
<td>Single-component moisture cure or boosted PU and SMP based adhesives</td>
</tr>
<tr>
<td>Low modulus single-component SMP based adhesives</td>
<td>Dual-component SMP-based elastomeric adhesives</td>
<td>Dual-component SMP-based elastomeric adhesives</td>
</tr>
</tbody>
</table>

CROSS SECTION OF TRADITIONAL WINDOW GLAZING APPLICATION

Glass window
Ceramic coating (e.g., frit)
Glass primer
Window glazing adhesive
Paint primer
Paint system
Metal substrate
### ASSEMBLY SOLUTIONS – WINDOW GLAZING

#### YOUR APPLICATION CRITERIA

<table>
<thead>
<tr>
<th>Clean/Activate</th>
<th>Prime</th>
<th>GLAZE</th>
<th>Glass Bonding/Sealing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cold Applied</strong></td>
<td><strong>High Sag</strong></td>
<td><strong>What type of glazing compound is preferred?</strong></td>
<td><strong>Is your process paint sensitive?</strong></td>
</tr>
<tr>
<td>No</td>
<td>Yes</td>
<td>PU</td>
<td>No</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>SMP</td>
<td>Yes</td>
</tr>
</tbody>
</table>

#### SOLUTION

<table>
<thead>
<tr>
<th>Chemistry</th>
<th>Isopropanol</th>
<th>Benzene</th>
<th>3,4-Methylenedioxymethane</th>
<th>Isopropanol</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Solve</strong></td>
<td>PU 8550™</td>
<td>TEROSON®</td>
<td>TEROSON®</td>
<td>TEROSON®</td>
</tr>
<tr>
<td><strong>Mixing</strong></td>
<td>No mixing</td>
<td>Mixing</td>
<td>Mixing</td>
<td>Mixing</td>
</tr>
<tr>
<td><strong>Cure</strong></td>
<td>Outside in</td>
<td>Homogenous</td>
<td>Homogenous</td>
<td>Homogenous</td>
</tr>
<tr>
<td><strong>Application Temperature</strong></td>
<td>Ambient</td>
<td>Ambient</td>
<td>Ambient</td>
<td>Ambient</td>
</tr>
<tr>
<td><strong>Shore Hardness</strong></td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>General purpose glass, ceramic frit and painted metal cleaner based on isopropanol.</td>
<td>Universal window glazing cleaner based on white spirits specially formulated to remove silicone residue from windscreens.</td>
<td>Isopropanol-based activated cleaner containing silanes for enhanced adhesion promotion.</td>
<td>Black primer formulated specially for enhancing UV resistance and promoting adhesion on glass and ceramic frit.</td>
</tr>
</tbody>
</table>

#### SELECT YOUR STEP IN THE GLAZING PROCESS

<table>
<thead>
<tr>
<th>Clean/Activate</th>
<th>Prime</th>
<th>Glaze</th>
<th>Glass Bonding/Sealing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Do you need an active cleaner?</strong></td>
<td><strong>What substrate are you trying to prime?</strong></td>
<td><strong>What type of glazing compound is preferred?</strong></td>
<td><strong>Is your process paint sensitive?</strong></td>
</tr>
<tr>
<td>No</td>
<td>Glass/Coat</td>
<td>Cold Applied</td>
<td>No</td>
</tr>
<tr>
<td>Yes</td>
<td>Paint/Metal</td>
<td>Cold Applied</td>
<td>Yes</td>
</tr>
</tbody>
</table>

#### TYPE

<table>
<thead>
<tr>
<th><strong>MOISTURE CURVE</strong></th>
<th><strong>1K BOOSTED</strong></th>
<th><strong>2K REACTION</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>Method</td>
<td>Humidity</td>
<td>Controlled Cure</td>
</tr>
<tr>
<td>Cure Cond.</td>
<td>Ambient</td>
<td>Ambient</td>
</tr>
<tr>
<td>Cure Dir.</td>
<td>Outside in</td>
<td>Homogenous</td>
</tr>
<tr>
<td>Mixing</td>
<td>No mixing</td>
<td>Mixing</td>
</tr>
<tr>
<td>Core Time</td>
<td>4-8 mm/day</td>
<td>&lt;24 hrs</td>
</tr>
<tr>
<td>Skin Over Time</td>
<td>&lt;12 hrs</td>
<td>&lt;20 min</td>
</tr>
</tbody>
</table>

---

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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 design versatility, even stress distribution, and robust long-term performance compared to traditional assembly methods are now available.

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

Different joint methods lead to different stress distribution:

Bolting
- Very irregular stress distribution
- Stress concentration at holes

Welding
- Uneven stress distribution
- Concentration within small welding line

Bonding
- Reasonable even stress distribution
- Distribution over a large area

ASSEMBLY SOLUTIONS – STRUCTURAL BONDING

Structural Adhesive Solutions

<table>
<thead>
<tr>
<th>TECHNOLOGY</th>
<th>PRIMARY USES</th>
<th>ADVANTAGES</th>
<th>CONSIDERATIONS</th>
</tr>
</thead>
</table>
| Epoxies    | For metal in body shops where high cohesive, cleavage and adhesive strength is required. | • High shear & impact strength on metal
• Oily surface adhesion (heat cure)
• Excellent moisture resistance
• Excellent heat resistance (up to 1 hr. @ 120°C/250°F)
• Weld-through compatible | • Slow fixture/cure times (2k)
• Requires mixing and/or fixturing during cure
• Poor elongation and damping
• Below average oil tolerance as 2k
• Poor adhesion to plastics |
| 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. | • Excellent adhesion on plastic & metal
• High peel & impact resistance
• Excellent oily surface adhesion
• Good corrosion resistance
• High heat resistance (50 min. @ 200°C/400°F) | • Requires mixing and/or fixturing
• Refrigerated storage
• Strong odor (HMA) Modified Methacrylate Acrylics
• Not weld-through capable (flammable)
• May create read-through on thin metals |
| Two-Step Acrylics | For a wide range of substrates in body and paint shops where rapid on-demand fixture is needed. | • No mixing, cure on-demand
• Good corrosion resistance
• High strength on wide range of substrates
• Light oily surface adhesion
• High heat resistance (50 min. @ 200°C/400°F) | • Activator may contain solvents
• Resin has moderate odor
• Low cure through depth, ~1mm
• Fillets remain uncured
• Not weld-through capable |
| Polyurethanes (PU) | For plastic and treated/ painted sheet metal parts where fatigue resistance and elastic bonding is needed. | • Excellent flexibility
• Great for noise & vibration reduction
• Great adhesion on plastics & painted metal
• Great on dissimilar materials
• Excellent paintability after cure up to 7 days | • Limited temp. resistance (1 hr. @ 140°C/284°F)
• Poor adhesion to bare and oily metal
• Poor corrosion resistance
• Contains isocyanates
• Moisture sensitive before cure |
| Silyl Modified Polymers (SMPs) | For plastic and treated/ painted sheet metal where fatigue resistance, weather resistance and elastic bonding is needed. | • Primerless adhesion to most substrates
• Excellent anti-flutter material
• Great UV stability
• No solvent, xylene or silicone
• Good paintability after cure up to 3 days | • Poor adhesion on oily metal
• Max temp. resistance (1 hr. @ 177°C/351°F)
• Low cohesive strength
• Skin exposed during cure
• Slow fixture and cure speed
• Moisture sensitive |
| Reactive Rubbers | For sheet metal in body and paint shops where applications as a flexible anti-flutter material are needed. | • Wide range of expansions (0 to ~100%)
• Good adhesion on oily metal
• Weld-through capable
• Excellent washout resistance
• Good heat resistance (up to 1 hr. @ 200°C/400°F) | • Limited to hidden/non-visible joints
• Limited shelf life (3 to 6 months)
• Limited availability
• Pumps / dispense require preheating |

Structural Adhesive Solutions

<table>
<thead>
<tr>
<th>TECHNOLOGY</th>
<th>PRIMARY USES</th>
<th>ADVANTAGES</th>
<th>CONSIDERATIONS</th>
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• Below average oil tolerance as 2k
• Poor adhesion to plastics |
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• High peel & impact resistance
• Excellent oily surface adhesion
• Good corrosion resistance
• High heat resistance (50 min. @ 200°C/400°F) | • Requires mixing and/or fixturing
• Refrigerated storage
• Strong odor (HMA) Modified Methacrylate Acrylics
• Not weld-through capable (flammable)
• May create read-through on thin metals |
| Two-Step Acrylics | For a wide range of substrates in body and paint shops where rapid on-demand fixture is needed. | • No mixing, cure on-demand
• Good corrosion resistance
• High strength on wide range of substrates
• Light oily surface adhesion
• High heat resistance (50 min. @ 200°C/400°F) | • Activator may contain solvents
• Resin has moderate odor
• Low cure through depth, ~1mm
• Fillets remain uncured
• Not weld-through capable |
| Polyurethanes (PU) | For plastic and treated/ painted sheet metal parts where fatigue resistance and elastic bonding is needed. | • Excellent flexibility
• Great for noise & vibration reduction
• Great adhesion on plastics & painted metal
• Great on dissimilar materials
• Excellent paintability after cure up to 7 days | • Limited temp. resistance (1 hr. @ 140°C/284°F)
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• Great UV stability
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• Limited availability
• Pumps / dispense require preheating |
### ASSEMBLY SOLUTIONS – STRUCTURAL BONDING

#### YOUR APPLICATION CRITERIA

**WHAT TYPE OF BONDING IS REQUIRED?**

<table>
<thead>
<tr>
<th>Structural Metal Bonding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are the substrates oily or cleaned/coated?</td>
</tr>
</tbody>
</table>

##### Oily Metal

**What cure method is desired?**

<table>
<thead>
<tr>
<th>Two-Step</th>
<th>Static Mix</th>
<th>Heat Cure</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Strength</td>
<td>High Impact Resistance</td>
<td>High Performance</td>
</tr>
</tbody>
</table>

#### SOLUTION

<table>
<thead>
<tr>
<th>Chemistry</th>
<th>Cure Mechanism</th>
<th>Color</th>
<th>Viscosity (Pa-S)</th>
<th>Fixture/Cure Time</th>
<th>Tensile Strength (MPa)</th>
<th>Elongation</th>
<th>Hardness</th>
<th>Shear Strength (Steel) (MPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acrylic</td>
<td>Two-Step</td>
<td>Yellow</td>
<td>85,000</td>
<td>2 min. / 2 hrs.</td>
<td>N/A</td>
<td>17.8</td>
<td>700</td>
<td>17.9</td>
</tr>
<tr>
<td>MMA</td>
<td>Two-Part</td>
<td>Grey</td>
<td>160,000</td>
<td>30 min. / 24 hrs.</td>
<td>16.8</td>
<td>70</td>
<td>700</td>
<td>22.9</td>
</tr>
</tbody>
</table>

**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 binder 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 binder formulated with high position tack and excellent wash-off resistance. Ideal for panel stiffener bonding applications. Weld-through capable.
- Ultra clear, fast-filling 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

### WHAT TYPE OF BONDING IS REQUIRED?

<table>
<thead>
<tr>
<th>General Purpose Elastic Bonding</th>
<th>What cure method is desired?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture Cure</td>
<td>Static Mix</td>
</tr>
<tr>
<td>General Purpose</td>
<td>Heat Cure</td>
</tr>
</tbody>
</table>

## SOLUTION

### General Purpose

| TEROSON® MS 939™ | Polyurethane | Moisture Cure | Black | 10 min / 72 hrs. | 3.0 | 400% | 150% | 90 | 74% | 410 | 7.0 |

**Chemistry**
- MS Polymer

**Cure Mechanism**
- Moisture

**Color**
- Black

**Viscosity (Pa-s)**
- Paste

**Flexure/Cure Time**
- 10 min / 72 hrs.

**Tensile Strength (MPa)**
- 10 mm @ 85°C (185°F)

**Elongation**
- 200%

**Hardness**
- A1%

**Shear Strength (Steel) (MPa)**
- 1.5

**Description**
- Highly resistant to a wide variety of substrates.
- Strong, high performance static mix urethane adhesive for general-purpose bonding, highly flexible, impact and moisture resistant with high peel and shear strength on many substrates.

### High Position Tack

| TEROSON® PU 5095™ HV | Polyurethane | High Position Tack | Black | 2 hrs / 72 hrs. | 3.0 | 150% | 410 | 7.0 |

**Chemistry**
- MS Polymer

**Cure Mechanism**
- Two-Part

**Color**
- Black

**Viscosity (Pa-s)**
- Paste

**Flexure/Cure Time**
- 2 hrs / 72 hrs.

**Tensile Strength (MPa)**
- 2.5 hrs / 24 hrs.

**Elongation**
- 74%

**Hardness**
- 60A

**Shear Strength (Steel) (MPa)**
- 4.0

**Description**
- Non-sag, two-component modified silane adhesive. Mixed adhesive provides primerless adhesion to a wide variety of substrates.

### Fast Cure

<table>
<thead>
<tr>
<th>TEROSON® MS 9399™</th>
<th>Polyurethane</th>
<th>Fast Cure</th>
<th>Off-white</th>
<th>100,000</th>
</tr>
</thead>
</table>

**Chemistry**
- MS Polymer

**Cure Mechanism**
- Two-Part

**Color**
- Black

**Viscosity (Pa-s)**
- Paste

**Flexure/Cure Time**
- 2.5 hrs / 24 hrs.

**Tensile Strength (MPa)**
- 90 |

**Elongation**
- 74%

**Hardness**
- 60A

**Shear Strength (Steel) (MPa)**
- 4.0

**Description**
- Solvent-free, two-component, modified silane adhesive. Mixed adhesive provides primerless adhesion to a wide variety of substrates.

### Composite/Plastic Bonding

<table>
<thead>
<tr>
<th>LOCTITE® AA H3300™</th>
<th>Polyurethane</th>
<th>Composite/Plastic Bonding</th>
<th>Green</th>
<th>110,000</th>
</tr>
</thead>
</table>

**Chemistry**
- Polyurethane

**Cure Mechanism**
- Two-Part

**Color**
- Green

**Viscosity (Pa-s)**
- Paste

**Flexure/Cure Time**
- 10 min @ 85°C (185°F)

**Tensile Strength (MPa)**
- 70

**Elongation**
- 70%

**Hardness**
- 80D

**Shear Strength (Steel) (MPa)**
- 14.6 (PVC)

**Description**
- Highly toughened, high performance, static mix urethane adhesive for general-purpose bonding. Highly flexible, impact and moisture resistant with high peel and shear strength on many substrates.

### Fast Cure

<table>
<thead>
<tr>
<th>LOCTITE® 4090™</th>
<th>Polyurethane</th>
<th>Fast Cure</th>
<th>Yellow</th>
<th>35 sec / 24 hrs.</th>
</tr>
</thead>
</table>

**Chemistry**
- Polyurethane

**Cure Mechanism**
- Two-Part

**Color**
- Yellow

**Viscosity (Pa-s)**
- Paste

**Flexure/Cure Time**
- 5 min / 24 hrs.

**Tensile Strength (MPa)**
- 29.0

**Elongation**
- 80%

**Hardness**
- 80D

**Shear Strength (Steel) (MPa)**
- 14.6 (PVC)

**Description**
- Highly toughened, high performance, static mix urethane adhesive for general-purpose bonding. Highly flexible, impact and moisture resistant with high peel and shear strength on many substrates.

### Instant Bonding

<table>
<thead>
<tr>
<th>LOCTITE® 411™</th>
<th>Polyurethane</th>
<th>Instant Bonding</th>
<th>Clear</th>
<th>3 min / 24 hrs.</th>
</tr>
</thead>
</table>

**Chemistry**
- Polyurethane

**Cure Mechanism**
- Two-Part

**Color**
- Clear

**Viscosity (Pa-s)**
- Paste

**Flexure/Cure Time**
- 3 min / 24 hrs.

**Tensile Strength (MPa)**
- 29.0

**Elongation**
- 80%

**Hardness**
- 80D

**Shear Strength (Steel) (MPa)**
- 14.6 (PVC)

**Description**
- Highly toughened, fast setting, structural adhesive for bonding a variety of plastics and composites.
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.
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 thermostet 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

Detailed Features:

- **Threadlocking**
  - LOCTITE® threadlockers dramatically increase the reliability of threaded assemblies.
  - Available as liquids or semi-solids.
  - Applied to threads and cured to a hard thermoset plastic.
  - Cures in the absence of oxygen.

- **Helpful Hints**:
  - Use LOCTITE® SF 7649™ Primer for faster fixture times and on inactive metals.
  - threaded assemblies have 15% contact with 85% air void.

- **Inactive Metals**:
  - Plated Parts
  - Anodized Aluminum
  - Titanium
  - Stainless Steel
  - Galvanized Steel
  - Zinc
  - Aluminum
  - Black Oxide

- **Threadlocking 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 – reduced inventory costs.
  - Long open time – cures in absence of oxygen and presence of active metal.

- **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**

- **ARE THE PARTS ALREADY ASSEMBLED?**
  - Yes
  - No

- **Temperature Resistance**
  - 182°C/360°F
  - 232°C/450°F
  - 343°C/650°F

- **SOLUTION**

<table>
<thead>
<tr>
<th>Wicking Grade</th>
<th>High Lubricity</th>
<th>Medium Strength/Primerless</th>
<th>Medium Strength Health and Safety Grade</th>
<th>High Strength/Primerless</th>
<th>High Strength Health and Safety Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LOCTITE® 290™</strong></td>
<td>Blue</td>
<td>3,070</td>
<td>400/600</td>
<td>350/750</td>
<td>2,600</td>
</tr>
<tr>
<td><strong>LOCTITE® 2047™</strong></td>
<td>Black</td>
<td>2,000/3,000</td>
<td>90 min./24 hrs.</td>
<td>10 min./24 hrs.</td>
<td>5 min./24 hrs.</td>
</tr>
<tr>
<td><strong>LOCTITE® 243™</strong></td>
<td>Blue</td>
<td>1,300/3,000</td>
<td>10 min./24 hrs.</td>
<td>5 min./3 hrs.</td>
<td>20/30</td>
</tr>
<tr>
<td><strong>LOCTITE® 2400NA™</strong></td>
<td>Green</td>
<td>20 min./24 hrs.</td>
<td>10 min./24 hrs.</td>
<td>10 min./24 hrs.</td>
<td>10 min./24 hrs.</td>
</tr>
<tr>
<td><strong>LOCTITE® 263™</strong></td>
<td>Red</td>
<td>5 min./24 hrs.</td>
<td>5 min./24 hrs.</td>
<td>5 min./24 hrs.</td>
<td>10 min./24 hrs.</td>
</tr>
<tr>
<td><strong>LOCTITE® 2700NA™</strong></td>
<td>Blue</td>
<td>Paste</td>
<td>30 min./24 hrs.</td>
<td>10 min./24 hrs.</td>
<td>10 min./24 hrs.</td>
</tr>
<tr>
<td><strong>LOCTITE® 246™</strong></td>
<td>Blue</td>
<td>2,600</td>
<td>5 min./24 hrs.</td>
<td>5 min./24 hrs.</td>
<td>5 min./24 hrs.</td>
</tr>
<tr>
<td><strong>LOCTITE® 2422™</strong></td>
<td>Blue</td>
<td>30 min./24 hrs.</td>
<td>10 min./24 hrs.</td>
<td>5 min./24 hrs.</td>
<td>5 min./24 hrs.</td>
</tr>
</tbody>
</table>

- **Color**
  - Green
  - Black
  - Blue

- **Viscosity (Pa·s)**
  - 25/55
  - 2,000/12,000
  - 1,300/3,000

- **Fixture/Cure Time**
  - 20 min./24 hrs.
  - 90 min./24 hrs.
  - 10 min./24 hrs.

- **Breakaway/Prayal Torque (N-m)**
  - 10/29
  - 47/9
  - 26/9

- **Temperature Resistance**
  - 54° to 182°C (-65° to 360°F)
  - 54° to 232°C (-65° to 450°F)
  - 54° to 343°C (-65° to 650°F)

- **Oil Resistance (1,000h @ 121°C/250°F)**
  - Recommended
  - Highly Recommended
  - Highly Recommended

- **Water/glycol resistance (1,000h @ 87°C/189°F)**
  - Highly Recommended
  - Highly Recommended
  - Highly Recommended

- **Gasoline Resistance (1,000h @ 22°C/72°F)**
  - Highly Recommended
  - Highly Recommended
  - Highly Recommended

- **Description**
  - Recommended for locking pre-assembled fasteners. MIL Spec (S-46163A) Type III, Grade R. NSF/ANSI 61 Certified.
  - This product is specially formulated with lubricant additions to aid in the assembly of large nuts and bolts.
  - General purpose removable strength liquid threadlocker. Reliably seals, locks and protects metal fasteners up to 3/4”. NSF/ANSI 61 Certified. CFIA Approved.
  - General purpose permanent strength liquid threadlocker. Reliably seals, locks and protects metal fasteners up to 1”. CFIA Approved.
  - General purpose permanent strength liquid threadlocker. Reliably seals, locks and protects metal fasteners up to 1”. CFIA Approved.
  - Permanent strength threadlocker formulated to have a 'white' health and safety label. Tested and deemed a non-skin allergen/irritant. CFIA Approved.
  - Permanent strength threadlocker formulated to have a 'white' health and safety label. Tested and deemed a non-skin allergen/irritant. CFIA Approved.
  - Removable strength liquid threadlocker formulated to have a 'white' health and safety label. Tested and deemed a non-skin allergen/irritant. CFIA Approved.
  - Removable strength liquid threadlocker for ultra high temp. applications. (Note: Also available in High Strength Red, LOCTITE® 2620™)
  - Removable strength liquid threadlocker for ultra high temp. applications. (Note: Also available in High Strength Red, LOCTITE® 2820™)
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

Helpful Hints:

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

Inactive Metals

- Plated Parts
- Anodized Aluminum
- Zinc
- Stainless Steel
- Black Oxide

Your Application Criteria

Are the parts metal or plastic?

- Metal
- Plastic

Are you working with hydraulic fittings?

- Yes
- No

What is your preferred application technique?

- Liquid Paste
- Semi-Solid Stick
- Coarse Threads
- Health and Safety Grade
- Fixture/Cure Time
- Pressure Resistance (MPa) (Hydraulic)
- Temperature Resistance
- Oil Resistance (1,000h @ 125°C/257°F)
- Gasoline Resistance (1,000h @ 22°C/72°F)
- Water/Diesel Resistance (1,000h @ 85°C/185°F)

Description

- 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.

Solution

- LOCTITE® 1400™
- LOCTITE® 561™
- LOCTITE® 577™
- LOCTITE® 545™
- LOCTITE® 55™
- LOCTITE® 5452™

Color

- White
- Yellow
- Purple
- White
- White
- White

Viscosity (Pa-s)

- 14,000
- 54,000
- 55,000
- 69.0
- 69.0
- 69.0

Curing Time

- 30 min. / 72 hrs.
- 6 hrs. / 72 hrs.
- 30 min. / 24 hrs.
- 5 min. / 24 hrs.
- 5 min. / 24 hrs.
- Non-reactive

Pressure Resistance (MPa) (Hydraulic)

- 69.0
- 69.0
- 69.0
- 69.0
- 69.0
- 69.0

Temperature Resistance

- -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 169°C (-65° to 300°F)
- -54° to 169°C (-65° to 300°F)
- -54° to 169°C (-65° to 300°F)

Oil Resistance (1,000h @ 125°C/257°F)

- Highly Recommended
- Highly Recommended
- Highly Recommended
- Highly Recommended
- Highly Recommended
- Highly Recommended

Water/Glycol Resistance (1,000h @ 87°C/189°F)

- Highly Recommended
- Highly Recommended
- Highly Recommended
- Highly Recommended
- Highly Recommended
- Highly Recommended

Description

- 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.
- General purpose thread sealant formulated for use on larger fine-threaded fittings as used in hydraulic and pneumatic installations. ABS Approved. CFIA Listed.

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.
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 thinning 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

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

<table>
<thead>
<tr>
<th>Solution</th>
<th>Casted or Machined Metal (&gt; 0.25 mm gap)</th>
<th>Flexible</th>
<th>Oil Tolerant</th>
<th>Fast Cure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SOLVENT</strong></td>
<td>LOCTITE® 510®</td>
<td>LOCTITE® 1800®</td>
<td>LOCTITE® 518®</td>
<td>LOCTITE® 528®</td>
</tr>
<tr>
<td>Color</td>
<td>Red</td>
<td>Red</td>
<td>Red</td>
<td>Red</td>
</tr>
<tr>
<td>Viscosity (Pa-s)</td>
<td>310,000</td>
<td>21,000</td>
<td>20,000</td>
<td>50,000</td>
</tr>
<tr>
<td>Shear Strength (MPa)</td>
<td>5.0</td>
<td>2.0</td>
<td>2.0</td>
<td>10.0</td>
</tr>
<tr>
<td>Temperature Resistance</td>
<td>-54° to 204°C (-65° to 400°F)</td>
<td>-54° to 149°C (-65° to 300°F)</td>
<td>-54° to 149°C (-65° to 300°F)</td>
<td>-54° to 149°C (-65° to 300°F)</td>
</tr>
<tr>
<td>Functional Cure Time</td>
<td>4 hrs.</td>
<td>2 hrs.</td>
<td>3 hrs.</td>
<td>4 hrs.</td>
</tr>
<tr>
<td>Oil Resistance (1,000h @ 105°C/221°F)</td>
<td>Highly Recommended</td>
<td>Highly Recommended</td>
<td>Recommended</td>
<td>Recommended</td>
</tr>
<tr>
<td>Water/Oil Resistance (1,000h @ 85°C/185°F)</td>
<td>Recommended</td>
<td>Recommended</td>
<td>Recommended</td>
<td>Recommended</td>
</tr>
</tbody>
</table>

**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).
- 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.
- 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, osmium for use in high-temp, gasketing applications.
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 – even 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?**

<table>
<thead>
<tr>
<th>Health and Safety Grade</th>
<th>General Purpose/ Stainless Steel</th>
<th>Slip Fit/High Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCTITE® 630®</td>
<td>Green</td>
<td>Green</td>
</tr>
<tr>
<td>LOCTITE® 640®</td>
<td>Green</td>
<td>Green</td>
</tr>
<tr>
<td>LOCTITE® 638®</td>
<td>Green</td>
<td>Green</td>
</tr>
<tr>
<td><strong>Color</strong></td>
<td>Green</td>
<td>Green</td>
</tr>
<tr>
<td><strong>Viscosity (Pa·s)</strong></td>
<td>350</td>
<td>500</td>
</tr>
<tr>
<td><strong>Shear Strength (MPa)</strong></td>
<td>15.0</td>
<td>27.0</td>
</tr>
<tr>
<td><strong>Temperature Resistance</strong></td>
<td>-54° to 180°C (-65° to 356°F)</td>
<td>-54° to 180°C (-65° to 356°F)</td>
</tr>
<tr>
<td><strong>Fixture/Cure Time</strong></td>
<td>60 min. / 24 hrs.</td>
<td>3 min. / 24 hrs.</td>
</tr>
<tr>
<td><strong>Oil Resistance (1,000 hrs. @ 250°C/482°F)</strong></td>
<td>Highly Recommended</td>
<td>Highly Recommended</td>
</tr>
<tr>
<td><strong>Gasoline Resistance (1,000 hrs. @ 22°C/72°F)</strong></td>
<td>Highly Recommended</td>
<td>Highly Recommended</td>
</tr>
<tr>
<td><strong>Water/Glycol Resistance</strong> (1,000 hrs. @ 87°C/189°F)</td>
<td>Highly Recommended</td>
<td>Highly Recommended</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>General purpose, high strength, retaining compound for bonding cylindrical metal parts (especially stainless steel) with a clearance or interference fit. NSF/ANSI 61 Certified.</td>
<td>General purpose, high strength, retaining compound for bonding cylindrical metal parts with slip fits or larger gaps. NSF/ANSI 61 Certified.</td>
</tr>
</tbody>
</table>

**HELPFUL HINTS**

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

**SOLUTION**

- **Inactive Metals**
  - Plated Parts
  - Galvanized Steel
  - Anodized Aluminum
  - Zinc
  - Titanium
  - Aluminum
  - Stainless Steel
  - Black Oxide

**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.
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.
From simple hand-held 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® and TEROSON® Standard Equipment**

**BOTTLE DISPENSING**

- **50 mL HAND PUMP**
  - 508166
  - Retaining Compounds, Threadlockers
  - 50 ml bottle
  - 250 ml bottle
  - Low to Medium
  - Manual
  - Dispense Tips and Accessories

**TUBE DISPENSING**

- **50 ML TUBE SQUEEZE DISPENSER**
  - 108345
  - Thread Sealants, Gasketing Compounds
  - 50 ml tubes
  - Low to High
  - Manual
  - N/A

**LOCTITE® PRODUCT IDH**

**ADHESIVE AND SEALANT EQUIPMENT SOLUTIONS**

**EQUIPMENT**

- Custom-built dispensing equipment that can be integrated easily into your manufacturing process.

**ADDITIONAL EQUIPMENT OFFERINGS**

- 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.

**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-component adhesive dispensing needs.

**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 meet customer needs for any handheld, bench top, stationary work cell or fully automated production process.

**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

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

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

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

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## Equipment Solutions

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

1-800-562-8483