Henkel – The Solution Provider

Truly Integrated, Truly International

Henkel is a world-wide operating, market-driven specialist in brands and technologies with affiliates in over 75 countries, providing technology competence from one single source. People in 125 countries around the world trust in brands and technologies from Henkel. The portfolio includes adhesives and sealants, products for direct glazing, corrosion protection, underbody and anti-chip coating, sound deadening solutions, body care and many other speciality chemicals.

Strong brands with proven and trusted names, such as Loctite® Nordbak® and Loctite® Hysol® Polymer Composites, are incorporated into this common platform and have long been the key to Henkel's success.

Around the world, Henkel also has an extensive commitment to motorsports. In 2004, the Henkel logo appeared for the first time on the rear-wing of the Team McLaren Mercedes race cars, thereby continuing the technical association with the team. The Dakar Rally is the latest in a long line of top-level competitive motor sport events in which Henkel has been involved. Loctite® and Teroson products from the Henkel portfolio have demonstrated their capability to provide fast and reliable repairs in the most difficult situations and have proved that they are more than a match for the world's most demanding conditions.

Meets all Needs

At Henkel, we understand plant maintenance – and the problems that you face in ensuring reliability, safety and durability. We see our duty as being an active partner in providing products that are going to help in the cost-efficient, trouble-free and effective maintenance and repair of industrial plant and equipment.

We're here to ensure that you receive all the help and support you need.
All you have to do – is ask.

For more information on the complete range of Loctite® products from the Henkel portfolio, please visit **www.loctite.com**, where you can download catalogues, data sheets, technical papers and application examples.

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LOCTITE® Nordbak® Hysol®

Surface Engineering Solutions

Rebuild, Repair and Protect Industrial Equipment

Henkel

Introduction

Advanced Solutions

Loctite® Nordbak® and Loctite® Hysol® Polymer Composites rebuild, repair and protect industrial equipment and surfaces, extending equipment life, improving efficiency and minimising down time.

Tried and proven for over 50 years, Loctite® Nordbak® and Loctite® Hysol® Polymer Composite products offer maintenance solutions to the problems caused by wear, abrasion, chemical attack, erosion, corrosion, impingement and mechanical damage.

With extremely hard fillers, Loctite® Nordbak® and Loctite® Hysol® Polymer Composite products have excellent wear resistance and superior adhesion. They are designed for specific service conditions and to protect and extend the service life of a wide range of plant areas and plant equipment. Their key advantage is their capability to create a sacrificial and renewable working surface, protecting the structural integrity of the original substrate.

Henkel offers a complete range of Loctite® Nordbak® and Loctite® Hysol® Polymer Composite products to treat, rebuild and protect your assets in the harshest industrial environments.

Your Professional Partner for Industrial Maintenance Solutions
With Loctite® branded products, Henkel offers one of the world's leading and proven industrial maintenance technologies, for effective solutions to specific problems in a wide range of industrial maintenance environments.

Our highly experienced Henkel Application Engineers are committed to providing the highest level of technical support and assistance in the industry. Working closely with local industrial suppliers and selected Engineering Service Agents, our Application Engineers provide full process support, from maintenance assessment to implementation of solutions.

With Henkel, you benefit from a trusted partner who is committed to your success.

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Did you know?

Surface Profile

Abrasive blasting not only removes visible surface rust and contaminates, but also creates a surface roughness ideal for bonding to. This surface roughness is known as surface profile.

Surface profile is critical to coating performance as it improves adhesion by increasing surface area and providing a keyed anchor pattern.

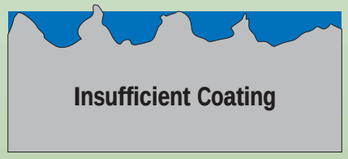
Surface profiles will vary depending on the type and size of abrasive particles, equipment and technique utilized. It is critical to achieve the correct profile depth, and product coating thickness. Loctite® Composite applications require a minimum 75 µm surface profile. See page 18 for surface specification.

The diagrams on the right hand side illustrate the importance of the correct surface profile.

For further information on surface profile, contact your local Henkel Engineer.

Surface profile is inadequate, providing a poor anchor pattern, resulting in adhesive failure.

Surface profile provides a very good anchor pattern, maximizing coating adhesion. Coating thickness is sufficient.



Insufficient coating, surface peaks may be exposed to rust and/or contamination.

Surface Preparation

Correct surface preparation is the most important factor affecting the total success of any surface treatment. Without suitable surface profile and surface cleanliness coating systems will quickly fail.

Surface Cleanliness

Chemical contaminants that are not readily visible, such as chlorides and sulphates, attract moisture through coating systems resulting in premature failure. It is fundamentally important to chemically clean all substrates with an industrial strength cleaner and degreaser. Loctite® Polymer Composite product applications require a surface profile of SP 2.5 to 3 (refer to page 18).

Loctite® 7840 multi-purpose cleaner & degreaser

Loctite® 7840 – Cleaner and degreaser

Before Abrasive Blasting
Biodegradable, solvent free, non-toxic and non flammable, diluted with water. Rated USFA-C1.
Meets the requirements of a wide range of industrial cleaning applications. Removes grease, oil, cutting fluids.

Colour	**Blue**
Pack Size	**750 ml trigger spray, 5 litre can, 20 litre drum**

Loctite® 7063 – Cleaner and degreaser

After Abrasive Blasting
No residue, rapid flash off cleaner ideal for removing greases and contaminates prior to adhesive bonding, coating and sealing applications. Compatible with metal, glass, rubber, most plastics and painted surfaces.

Colour	**Colourless / non-residue**
Pack Size	**400 ml aerosol pump, 10 litre**

Loctite® 7063 multi-purpose cleaner & degreaser

Metal Surface

Repair and Rebuild

Loctite® Hysol® Polymer Composites repair, rebuild and restore damaged machinery and equipment permanently and without the need for heat or welding.

Technically advanced and manufactured with over 50 years' product and application knowledge, the range includes putty or pourable formulations for aluminum, and steel.

- Low-shrinking
- Can be drilled, tapped, or machined after cure
- Superior adhesion to metal, ceramic, wood, glass, and some plastics
- Excellent resistance to aggressive chemicals
- Choice of mild steel, aluminium, or non-metalic fillers
- Create durable repairs

Loctite® Hysol® 3472 pourable steel-filled, self-levelling 2K-epoxy

Loctite® Hysol® 3473 fast curing steel-filled, non-sagging 2K-epoxy

Did you know?

100 % Solids

Loctite® Hysol® and Nordbak® Polymer Composites are formulated with 100 % solids. This means that unlike solvent based systems Loctite® Hysol® and Nordbak® composites will have no or low shrinkage when cured.

Metal Surface

Repair and Rebuild

Repair or rebuild damaged parts?

What material are you filling?

- **Steel**
  - **Kneadable** → **Solution:** **3463** Metal Magic Steel™ Stick
  - **High compressive strength** → **3478 A&B** Superior metal
  - **Putty** → **3471 A&B** Metal Set S1
  - **Pourable** → **3472 A&B** Metal Set S2
  - **Fast cure** → **3473 A&B** Metal Set S3
- **Aluminium**
  - **Multi purpose** → **3475 A&B** Metal Set A1
  - **High temperature resistant** → **3479 A&B** Metal Set HTA
- **Metal before coating**
  - **Rebuild badly worn metal surfaces before coating*** → **7222**
  - → **7232**

Description	2K-Epoxy	2K-Epoxy	2K-Epoxy	2K-Epoxy	2K-Epoxy	2K-Epoxy	2K-Epoxy	2K-Epoxy	2K-Epoxy
Mix ratio by volume/weight	N/A	4:1 / 7.25:1	1:1	1:1	1:1	1:1	1:1	2:1 / 4.8:1	4:1 / 5.33:1
Working life	3 min.	20 min.	45 min.	45 min.	6 min.	45 min.	40 min.	30 min.	45 min
Fixture time	10 min.	180 min.	180 min.	180 min.	15 min.	180 min.	150 min.	180 min	120 min
Shear strength (GBMS)	≥ 6 N/mm²	17 N/mm²	20 N/mm²	25 N/mm²	20 N/mm²	20 N/mm²	20 N/mm²	10 N/mm²	–
Compressive strength	82.7 N/mm²	125 N/mm²	70 N/mm²	70 N/mm²	60 N/mm²	70 N/mm²	90 N/mm²	80 N/mm²	103 N/mm²
Operating temperature	-30 to +120 °C	-30 to +120 °C	-20 to +120 °C	-20 to +120 °C	-20 to +120 °C	-20 to +120 °C	-20 to +190 °C	-30 to +105 °C	-30 to +205 °C
Pack sizes	50 g, 114 g	452 g tub kit	500 g tub kit	500 g tub kit	500 g tub kit	500 g tub kit	500 g tub kit	1.4 kg kit	1 kg kit

* Loctite® Nordbak® 7222 Wear Resistant Putty or Loctite® Nordbak® 7232 HighTemperature Wear Resistant Putty, are used prior to applying protective Loctite® Nordbak® composite coatings.
▸ Please see page 12 for product details.

Loctite® 3463
Sets in 10 minutes. Steel filled kneadable Stick. Adheres to damp surfaces and cures under water. Chemical and corrosion resistant. Can be drilled, filed and painted. ANSI/NSF Standard 61

Typical Applications:
- Emergency sealing of leaks in pipes and tanks
- Smoothes welds
- Repairs small cracks in castings
- Fills over-sized bolt holes

Loctite® Hysol® 3478 A&B
A ferro-silicon filled 2K-Epoxy with outstanding compression strength. Ideal for renewing surfaces subjected to compression, thrust, impact and harsh environments.

Typical Applications:
- Rebuilding keyways and spline assemblies
- Rebuilding worn cylindrical joints with a shaft mounted component like bearings, clamp connections, tensioning elements or gear wheels
- Rebuilding bearing seats

Loctite® Hysol® 3471 A&B
General-purpose steel-filled, non-sagging 2K-Epoxy. Cures to a metal-like finish. Used to rebuild worn metal parts.

Typical Applications:
- Seal cracks in tanks, castings, vessels and valves
- Patch non-structural defects in steel casings
- Make moulds and jigs for odd shaped parts
- Resurface worn air seals
- Repair pitting caused by cavitation and/or corrosion

Loctite® Hysol® 3472 A&B
Pourable, steel-filled, self levelling 2K-Epoxy. Recommended for casting into hard to reach areas, anchoring and levelling, forming moulds and parts.

Typical Applications:
- Form moulds, fixtures and prototypes
- Repair threaded parts
- Repair pipes and tanks
- Repair and level broken metal components and parts

Loctite® Hysol® 3473 A&B
Fast curing, steel filled, non-sagging, 2K-Epoxy. Reaches functional cure in approx. 10 minutes. Ideal for emergency repair and repairing worn metal parts to prevent downtime.

Typical Applications:
- Repair holes in fuel and gas tanks
- Renew stripped threads
- Repair leaks in pipes and elbows
- Repair leaks in storage tanks
- Rebuild worn steel parts

Loctite® Hysol® 3475 A&B
A non sagging, heavily reinforced, aluminium powder filled 2K-Epoxy. Easily mixed and moulded to form odd shapes if required. Cures to a non-rusting, aluminium-like finish ideal for repairing aluminium parts.

Typical Applications:
- Repair aluminium castings
- Repair cracked or worn aluminium parts
- Make aluminium dies
- Repair stripped aluminium threads

Loctite® Hysol® 3479 A&B
A non sagging, heavily reinforced, aluminium powder filled 2K-Epoxy. Easily mixed and moulded to form odd shapes if required. Cures to a non-rusting, aluminium-like finish ideal for repairing aluminium parts.

Typical Applications:
- Repair aluminium castings
- Repair cracked or worn aluminium parts
- Make aluminium dies
- Repair stripped aluminium threads

Loctite® Nordbak® 7222
Ceramic filled, non rusting, trowelable putty. Excellent wear and abrasion resistance. Cures to a smooth, low friction finish for equipment exposed to wear, erosion and cavitation.

Typical Applications:
- Repair pitting caused by cavitation or corrosion
- Repair and coat pump impellers
- Add protective coating to pipes, elbows, pumps, transitions, butterfly valves, deflection plates and tanks

Loctite® Nordbak® 7232
A high temperature silicon carbide filled, trowelable putty that resists wear, and provides a smooth surface. Used as a wear-resistant coating and filler.

Typical Applications:
- Filling cavitation or providing protective coating on pump impellers and in pump housings
- Repairing wear or providing protective coating in pipe systems
- Repairing and resurfacing valve parts
- Filling areas subjected to sliding wear and abrasion
- Repairing or providing protective coating to turbine blades

Tips & Tricks

Preventing Flash Rusting

In high humidity conditions, flash rusting of a newly prepared metal surface can develop within minutes, causing contamination which will need to be removed again before a coating is applied.
The application of a thin coat of Loctite® Nordbak® Brushable Ceramic applied as soon as possible after preparing a metal surface will prevent flash rusting. Concentrate on edges, corners and hard to reach areas first and then “fill in” the remaining areas until totally covered.

Wear Indicator

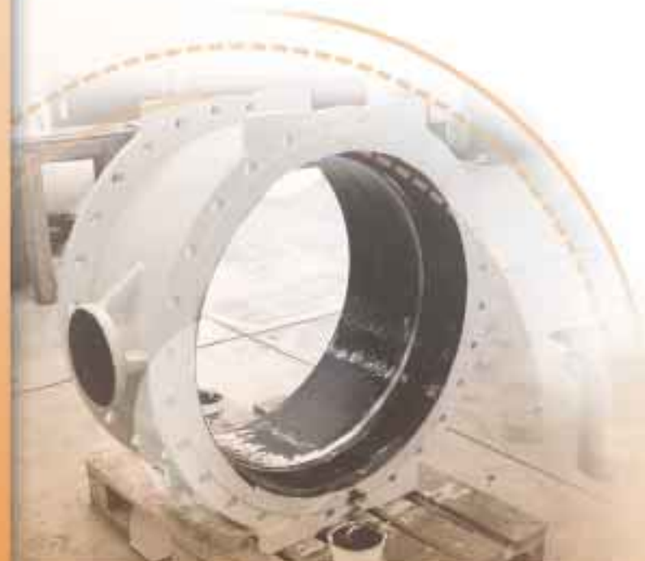
When applying two coats of Loctite® Nordbak® Brushable Ceramic, a different colour can be used for each – grey and white. When the first coat begins to wear the second coat colour will show through, providing an accurate visual indicator of wear.

Pressure Spraying

Loctite® Nordbak® Chemical Resistant Coating is suitable for brush, roller and pressure spray application. Pressure spraying Loctite® Nordbak® Chemical Resistant Coating can be achieved with standard pressure pot or airless systems with a tungsten tip orifice size of 0.19 to 0.21 mm and a maximum hose length of 3 to 5 meters. Depending on climatic conditions and technique, up to four of the 5.4 kg kits can be sprayed through the line before cleaning is required. This will cover approximately 20 square metres. A solvent such as industrial paint thinner or acetone should be used to clean equipment. Cleaning may be required more frequently if the product and ambient temperatures are higher, to prevent the line being clogged by curing product.

Loctite® Nordbak® Polymer Composite Compounds utilize the superior wear properties of ceramic and the convenience of two-part epoxies to protect equipment like pumps, chutes, and augers in harsh industrial environments. Available in trowelable and brushable formulations with special fillers for tough conditions, Loctite® Nordbak® products stand up to every corrosion, abrasion, and wear problem you can encounter, and are ideal for all those large-scale repairs that have to last.

- Restore worn surfaces, use on new parts to extend life
- Provide superior protection from environmental impact
- Eliminate and break corrosion / erosion cycle
- Non-shrinking and non-sag formulations
- High compressive strength
- Good chemical resistance
- Wide range tailored to specific applications



Protecting Surfaces

Protect against particle abrasion or chemical attack?

	Coarse particle			Fine particle				Chemical attack
	Resists abrasion & corrosion	Resists abrasion & corrosion at high temperature	Resists impact & sliding abrasion	Resists fine particle abrasion	Resists fine particle abrasion at high temperature	Brushable protective coating	Brushable protective coating at high temperature	Chemical resistant brushable coating
	Wearing Compound	High Temperature Wearing Compound	High Impact Wearing Compound	Pneu-Wear	High Temperature Pneu-Wear	Brushable Ceramic	High Temperature Brushable Ceramic	Chemical Resistant Coating
Solution	**7218**	**7230**	**7219**	**7226**	**7229**	**7227 / 7228**	**7234**	**7221**
Colour	Grey	Grey	Grey	Grey	Grey	Grey/White	Grey	Grey
Temperature range	- 28 to +120 °C	- 28 to +230 °C	- 30 to +120 °C	- 29 to +120 °C	- 30 to +230 °C	- 29 to +95 °C	- 29 to +205 °C	- 30 to +65 °C
Mix ratio by volume	2:1	4:1	2:1	4:1	4:1	2.75:1 / 2.8:1	2.6:1	2.3:1
Working time	30 min.	30 min.	30 min.	30 min.	30 min.	30 min. / 15 min.	30 min.	20 min.
Cure time	7 hrs	7 + 2 hrs Post Cure	6 hrs	6 hrs	6 + 2 hrs Post Cure	6 hrs / 5 hrs	8 + 3 hrs Post Cure	16 hrs
Recommended layer thickness	min. 6 mm	min. 6 mm	min. 6 mm	min. 6 mm	min. 6 mm	min. 0.5 mm	min. 0.5 mm	min. 0.5 mm
Pack sizes	1 kg, 10 kg	10 kg	1 kg, 10 kg	1 kg, 10 kg	10 kg	1 kg	1 kg	5.4 kg

Badly worn surfaces are rebuilt using **Loctite® Nordbak® 7222 Wear Resistant Putty** or **Loctite® Nordbak® 7232 High Temperature Wear Resistant Putty,** prior to applying protective Loctite® Nordbak® composite coatings.

▸ Please see page 9 for product details.

Refere to your Henkel Engineer for further information.

Loctite® Nordbak® 7218
A two-part, trowelable, ceramic filled epoxy designed to protect, rebuild and repair high wear areas of processing equipment. Non-sagging and suitable for overhead applications and irregular surfaces.

Typical Applications:
- Cyclone and separator bodies
- Dust collectors and exhausters
- Pump liners and impellers
- Fan blades and housings
- Chutes and hoppers
- Elbows and transition points

Loctite® Nordbak® 7230
A two-part, ceramic filled epoxy paste designed to protect, rebuild and repair high wear areas of processing equipment. Requires post curing for ultimate performance and temperature resistance.

Typical Applications:
- Cyclone and separator bodies
- Dust collectors and exhausters
- Pump liners and impellers
- Fan blades and housings
- Chutes and hoppers
- Exhausters

Loctite® Nordbak® 7219
A two-part, rubber modified, ceramic filled epoxy paste that offers wear resistance properties and impact resistance. Recommended for areas exposed to abrasion and impact. Non-sagging and suitable for overhead applications and irregular surfaces.

Typical Applications:
- Dredge pump liners
- Flumes and troughs
- Pump impellers
- Vibrating feeders
- Material transfer chutes/ hoppers

Loctite® Nordbak® 7226
A two-component epoxy, filled with small ceramic beads and silicon carbide for protecting processing equipment from fine particle abrasion. This trowelable and non-sag epoxy is suitable for providing abrasion resistance on overhead and vertical surfaces.

Typical Applications:
- Elbows
- Chutes and hoppers
- Cyclones
- Air ducts

Loctite® Nordbak® 7229
A two-part, small ceramic bead filled epoxy putty, non-sag and trowelable. Designed to protect equipment from fine particle abrasion in dry, high temperature applications. Requires post curing for ultimate performance and temperature resistance.

Typical Applications:
- Providing protective lining in pneumatic conveyor systems
- Repairing and providing abrasion resistance in:
  - elbows
  - hoppers
  - cyclones
  - dust collectors

Loctite® Nordbak® 7227/7228
An ultra-smooth, ceramic reinforced epoxy that provides a high gloss, low friction coating to protect against turbulence and abrasion. Seals and protects equipment from corrosion and wear.

Typical Applications:
- Lining tanks and chutes
- Rudders and pintle housings
- Heat exchangers – butterfly valves
- Condensers
- Repairing cooling pump impellers

Loctite® Nordbak® 7234
A brushable two-part epoxy designed to protect against turbulence and abrasion under extreme heat.

Typical Applications:
- Protecting exhausters from cyclic heat and corrosion
- Repairing heat exchangers and condensers
- Lining tanks and chutes
- Repairing butterfly valves

Loctite® Nordbak® 7221
This advanced two-part epoxy is designed to protect equipment against extreme chemical attack and corrosion. It forms a smooth, glossy, low-friction finish that protects against turbulence and cavitation. It can be applied by brush or pressure sprayed.

Typical Applications:
- Impellers, butterfly valves, and cavitated pumps
- Rudders and pintel housings
- Lining tanks and chutes
- Lining chemical containment areas

Metal Surface Repair and Rebuild

Pump Rebuild

So bad was the condition of the split case pump (pictured right) that replacement was considered the most viable option. However, using Loctite® Nordbak® products, the pump was repaired and returned to service with superior protection qualities and at a lower cost.
Before any repairs began the surface was thoroughly perpared, and then a thin coat of Loctite® Nordbak® Brushable Ceramic was applied to prevent flash rusting or further contamination. Next, a wire frame was used to recreate the shape of the centre web surface which had totally eroded. This frame was then filled with Loctite® Nordbak® 7222 Wear Resistant Putty. The wear ring channels were then rebuilt by applying Loctite® 3478 Superior Metal to the affected area. Next the rings were secured into position and excess product that was displaced was removed and smoothed. The rings were precoated with a release agent and when cured were removed leaving perfectly engineered channels.
Finally pits were filled with Loctite® Nordbak® 7222 Wear Resistant Putty and the entire surface sealed with Loctite® Nordbak® 7227 Brushable Ceramic, forming an ultra smooth low friction surface.

Pitting and erosion was clearly evident

Reclaiming totally eroded surface

Restored and ready for assembly

Fan Impellers in Steel Mill

Two impellers before abrasive blasting

First impeller is coated

Application steps:

1. Removal and cleaning of any grease, oils
2. Drying of the impeller surface
3. Abrasive blasting of impeller surface (SP 2.5 - 3; refer to page 18)
4. Removal of dust from the surface
5. Application of two coats of Loctite® Nordbak® 7227
6. 24-hour cure time allowed

In coke production in steel mills, big fans are in operation, 24 hours a day. Their impellers are in contact with air coming from the coke production, containing corrosive gases with very fine dust. Corroding very quickly, the impellers in this Slovakian Steel Mill needed repainting regularly, hence interrupting costly production. Loctite® Nordbak® 7227 is able to protect against these severe conditions. When coated with Loctite® Nordback® 7227 the working life of the impellers was increased to more than two years.

Protecting Surfaces

Pump Protection in Copper Mine

Pic.1: Corrosion and erosion were clearly evident

Pic.2: Surface was abrasive blasted to surface profile of 75 µm

In a copper mine, plant equipment is exposed to extremely harsh conditions. Damage or failure to plant components and equipment can cause very expensive downtime. In this Polish copper mine pumps that had been operating without protective coatings were exposed to extreme wear and corrosion (Pic. 1).
To prevent further damage, increase efficiency and prolong service life, all new pumps are now coated with Loctite® Nordbak® Polymer Composite Compounds.

After surface preparation (Pic. 2), the casing and impellers are coated with Loctite® Nordbak® 7227 Brushable Ceramic Grey (Pic. 4). In places exposed to wear a 1.5 mm layer of ceramic filled epoxy has been applied (Pic. 3). To maximise protection the pumps are checked and re-surfaced where necessary, once a year.

Pic.3: Application of Loctite® 7227 to casing and Cutwater

Pic.4: Full surface coated, then after partial cure the second coat was applied

Did you know?

Traditional methods vs. modern solutions

Traditional repair methods such as hard face welding are time consuming and expensive. Alternatively, Loctite® Nordbak® composite products are easily applied and offer superior compressive strength and protection qualities. Consider the following comparison of the process required to repair a 600 cm^2 surface area;

Loctite® Nordbak® Wearing Compound

Step 1: Prepare surface
Step 2: Mix resin and hardener
Step 3: Apply to surface with trowel

TOTAL LABOUR: 1 HOUR

+Additional benefits
- **No specialised labour required**
- **No heat distortion of the substrate**

Hard Face Weld

Step 1: Prepare surface
Step 2: Preheat rods & substrate
Step 3: Lay 6 mm x 3 mm beads x 210 mm long. Overlap each bead by 50 %
Step 5: Lay second pass of beads to achieve 6 mm thickness. Total of 176 passes.
Step 6: Relieve stress caused by application of heat

TOTAL LABOUR: 8 HOURS

Protecting Surfaces

Detergent Mixing Tank

Mechanical removal of rusted patches and drying of inner surface

Abrasive blast to surface profile of 75 µm and surface cleanliness SA 3

Application of Loctite® 7227 on weld lines

Full surface coated, then after partial cure the second coat was applied

After 24 hrs, the tank was ready to be filled

Due to the absence of oxygen on the tank surface, corrosion was attacking the stainless steel in this German detergent factory. The customer needed to prevent this corrosion-erosion cycle from causing leaks in the tank, and seriously interrupting production.
In the past, the customer used to resurface the tank inner parts with a product based on vinyl ester resin, needing 7 days cure after application. With a repair time of 24 hrs, Loctite® Nordbak® 7227 Brushable Ceramic has not only prevented further corrosion and achieved protection against turbulence and abrasion, but has provided a cost effective solution.

Butterfly Valve

The corroded butterfly valve – before and after repair

A butterfly control valve at a Waste Water Treatment Plant was corroded and therefore unable to seal effectively. The components were abrasive blasted and a thin coat of Loctite® Nordbak® 7228 Brushable Ceramic (White) applied to seal the newly cleaned surface. The rough and corroded edges of the valve were then re-profiled with Loctite® Nordbak® 7222 Wear Resistant Putty before a final coat of Loctite® Nordbak® 7227 Brushable Ceramic (Grey) was applied. The two coat colours can be utilised as a wear indicator for any future repairs or maintenance. The butterfly valve was returned to service within 1 day.

Pipes & Ducts

Coke Plant Pipe Elbow

Pipes and ducts are a common wear point in almost every industrial plant. The coke plant pictured was forced to repair or replace duct elbows every 3 months at significant cost of labour and material.
After application of Loctite® Nordbak® 7229 Pneu-Wear, the same pipe elbows remained in service for 3 years without need for further repair.

Pump Efficiency Improvement

600 Megawatt Electricity Consumption Savings in a Year!

Impeller and casing before repair. Serious wear and cavitations on the impeller

The pit holes on the impeller were reclaimed by using Loctite® Superior Metal Putty. Loctite® Nordbak® 7227 Brushable Ceramic was coated as the second layer.

Casing after repair.

Due to the cavitation effects and wear on the impeller and casing, this 1,400-kilowatt water circulation pump in a Chinese petrochemical plant was losing its efficiency, and could break down anytime. It would cost a fortune to replace it with a new pump.
In addition to the anti-abrasion and anti-cavitation capabilities, the smooth surface of Loctite® Nordbak® 7227 Brushable Ceramic coating has minimized resistance to the water flow inside the pump. As a direct result, current draw dropped to 160 amps from previous 170 amps. The cost saved in terms of energy consumption alone is EUR 30,000 each year. The pump can now work to its optimum efficiency. A Loctite® solution has brought the customer significant economic and social benefits:

"A Total of 2,400 Megawatt Energy Saved within 7 Months and Productivity Increased by 8.06 % in the plant", reported by local newspaper. Loctite® contributed 1,200 Megawatt saving in a year for 2 pumps!

3 amps less current!

This 20" pump is used to pump potable water to fill three gravity feed reservoirs that supply drinking water to Brisbane Australia. The pump has been in service for many years without any major overhaul. The refurbishment program was to reclaim and rebuild the worn housing and impeller of the pump. After recommissioning of the pump, it runs smoother and quieter. The use of Loctite® coatings has increased water flow and draws 3 amps less current. All these factors will contribute to a more cost effective and higher efficiency unit.

Top cap and bronze impeller before repair. The first step is to abrasive blast these parts to SA-3 White Blast 75 µm profile.

Loctite® Nordbak® 7227 Brushable Ceramic Grey applied to seal the blast. Fill the corroded and abraded areas using Loctite® Wear 7222 Resistant Putty.

Repair the worn and corroded shaft using Loctite® 3478 Superior Metal. After it's cured, machine it to complete the repair. Coat all parts with Loctite® Nordbak® 7228 Brushable Ceramic White (certified for use in contact with drinking water).

Surface Preparation Grades of Blast

Loctite® composite applications require a minimum 75 µm surface profile (see page 4) and a 2.5 blast class.

Rust Grade

A	Steel with mill scale layer intact and very minor, or no rusting
B	Steel with spreading surface rust and the mill scale commenced flaking
C	Rusty steel with mill scale layer flaked and loose or lost but only minor occurrence of pitting
D	Very rusty steel with mill scale layer all rusted and extensive occurrence of pitting

Blast Class

1	(SP-7/N4)	Very light over clean with removal of loose surface contaminants
2	(SP-6/N3)	Substantial blast clean with wide spread, visible contaminate removal and base metal colour appearing
2.5	(SP-10/N2)	Intensive blast clean leaving shading grey metal with only contaminates
3	(SP-5/N1)	Complete blast clean with consistent metal colour all over and no visible contaminates

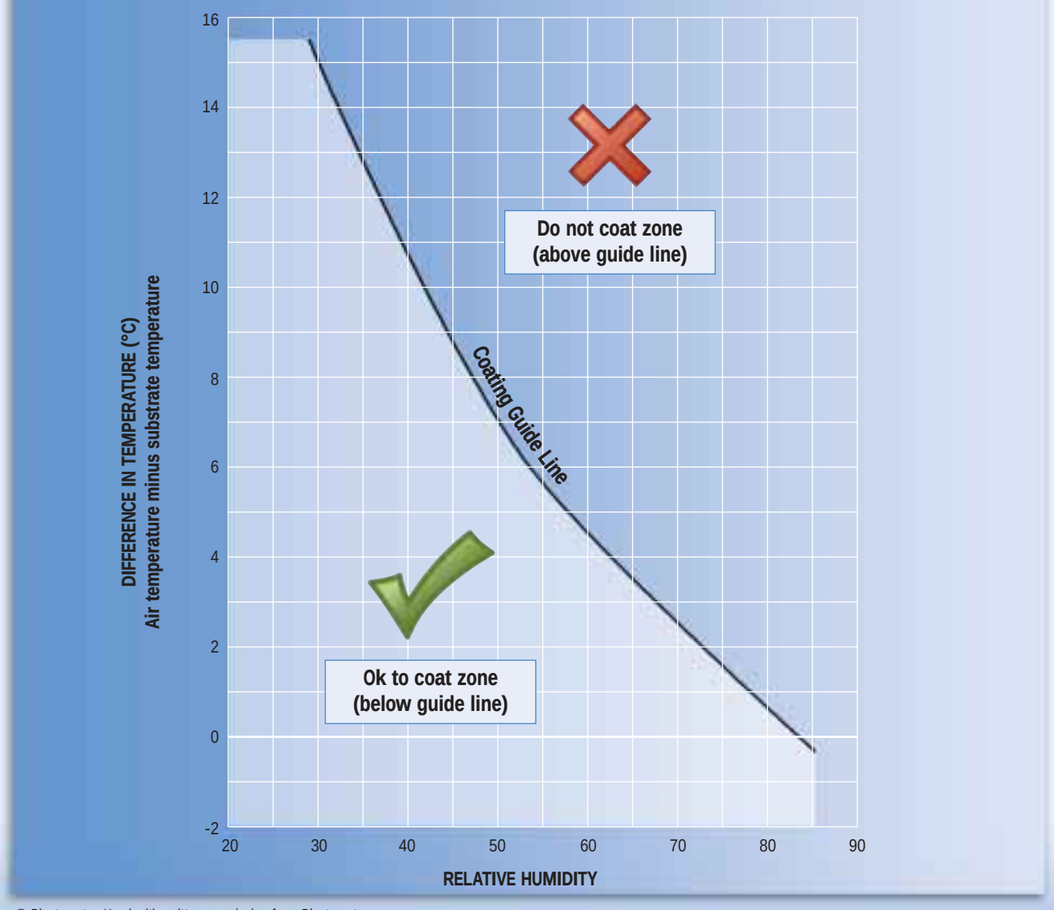
Environmental Conditions for Effective Coating

It is critical to the success of most coating systems that the surface is completely free of moisture prior to and during product application and curing.

Dewpoint

Condensation of water (dew) from the atmosphere on to the surface will occur, given the right conditions. For a given set of conditions, the temperature at which condensation will occur is called the dewpoint. As long as the surface temperature is 3 °C (or more) above the dewpoint temperature, it is generally considered safe to coat as far as risk of condensation is concerned.

Atmospheric conditions for coating application



Application Tips

For maximum adhesion

After surface preparation, pre-coat the application surface by rubbing the mixed composite into the substrate. This technique, called “wetting out the surface”, helps the repair material fill all the crevices in the application surface, creating a superior bond between the composite and substrate. The rest of the mixed product can then be applied over the pre-coat to finish the application.

Creating a smooth finish

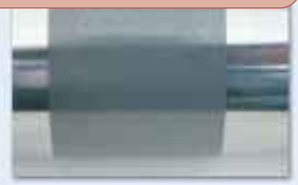
Smooth out the uncured product with a warm towel for a smooth, glossy finish. A heat gun can also be used to create a smooth finish.

Machining with a lathe

- **Tooling:**
  - Tipped tooling with hard metal insert or diamond insert, like CBN
- **Machining parameters:**
  - Cutting speed: 125 m/min
  - In feed: 0.08 mm/RPM
  - No cooling/lubricating is necessary
- **Achievable surface roughness:**
  Example Loctite® Hysol® 3478 Superior Metal or Brushable Ceramic (Loctite® Nordbak® 7227/7228)
  - Ra ~5 µm; Rz ~30 µm

Machining with the grinding machine

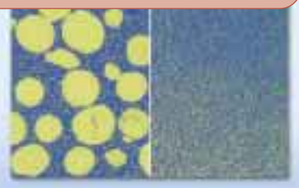
- **Tooling:**
  - Silicon carbide grinding disk
- **Machining parameters:**
  - Cutting speed: 15 m/sec
  - Cooling with emulsion during grinding is important in order not to damage the polymer
- **Achievable surface roughness:**
  Example Loctite® Hysol® 3478 Superior Metal or Brushable Ceramic (Loctite® Nordbak® 7227/7228)
  - Ra ~0.8 µm; Rz ~10 µm



Limitations in machining

Polymer Composites filled with abrasive filler with a large diameter cannot be ground or machined after cure.
Try to obtain the required depth of application and evenness to avoid unnecessary machining.

- **Polymer Composites not recommended to machine:**
  - Loctite® Nordbak® 7218
  - Loctite® Nordbak® 7219
  - Loctite® Nordbak® 7226
  - Loctite® Nordbak® 7229
  - Loctite® Nordbak® 7230



not machinable *machinable*

Troubleshooting Guide

Problem	Possible causes	Suggested solution
Curing too fast	- Air temperature too high - Application surface too hot - Composite temperature too hot - Too much material being mixed	Working time and cure time depend on temperature and the amount of material being mixed; the higher the temperature, the faster the cure. The larger the amount of material mixed, the faster the cure. To slow the cure at high temperatures, mix in smaller amounts to prevent rapid curing and/or cool resin/hardener components and application surface.
Curing too slow	- Air temperature too cold - Composite temperature too cold - Application surface too cold	To speed the cure at low temperatures (< +15 °C), store at room temperature (+20 °C) and/or pre-heat application surface until warm to the touch.
Loss of adhesion	- Surface contamination - Surface too smooth	Prepare surface by grit blasting, if possible. For less severe application, roughening the surface with hand tools is suitable. Solvent clean with a residue-free cleaner such as Loctite® 7063 – Cleaner and degreaser, non-residue or Loctite® 7840 Cleaner & degreaser, biodegradable and solvent free. Product should be applied as soon as possible after surface preparation to avoid surface rust or contamination. For further details please refer to page 4/5.
Excessive shrinking and cracking	- Too much product being applied or poured resulting in high heat build-up	Applying too much material at one time will cause excessive heat build-up, which will cause shrinking and cracking. Apply material in layers of 25 mm at a time, allowing the layer to cool before applying the next layer.

Properties Chart

Products	Size	Coverage	Colour	Dry service temperature range	Compressive strength ASTM D695 N/mm²	Shear strength ASTM D1002 N/mm²	Page
Loctite® 3463 Metal Magic Steel™	114g tube	45cm² 6mm thick per tube	dark grey	-30°C to+120°C	82.7	6	8
Loctite® Hysol® 3471 A&B	500g tub kit	–	grey	-20°C to+120°C	70	20	8
Loctite® Hysol® 3472 A&B	500g tub kit	–	grey	-20°C to+120°C	70	25	8
Loctite® Hysol® 3473 A&B	500g tub kit	–	grey	-20°C to+120°C	60	20	9
Loctite® Hysol® 3475 A&B	500g tub kit	–	grey	-20°C to+120°C	70	20	9
Loctite® Hysol® 3479 A&B	500g tub kit	–	grey	-20°C to+190°C	90	20	9
Loctite® Hysol® 3478 A&B Superior Metal	454g	500cm² @ 6mm thick per 1kg	grey	-30°C to+120°C	124.1	12.4	8
Loctite® Nordbak® 7218	1kg kit 10kg kit	740cm² @ 6mm thick per 1kg	grey	-30°C to+120°C	110.3	–	12
Loctite® Nordbak® 7219	1kg kit 10kg kit	740cm² @ 6mm thick per 1kg	grey	-30°C to+120°C	82.7	–	12
Loctite® Nordbak® 7230	10kg kit	740cm² @ 6mm thick per 1kg	grey	-30°C to+230°C	103.4	–	12
Loctite® Nordbak® 7226	1kg kit 10kg kit	740cm² @ 6mm thick per 1kg	grey	-30°C to+120°C	103.4	34.5	13
Loctite® Nordbak® 7229	10kg kit	740cm² @ 6mm thick per 1kg	grey	-30°C to+230°C	103.4	34.5	13
Loctite® Nordbak® 7227	1kg kit	1.2m² @ 0.5mm per 1kg	grey	-30°C to+90°C	86.2	13.8	13
Loctite® Nordbak® 7228	1kg kit	1.2m² @ 0.5mm per 1kg	white	-30°C to+90°C	86.2	13.8	13
Loctite® Nordbak® 7234	1kg kit	1.2m² @ 0.5mm per 1kg	grey	-30°C to+205°C			13
Loctite® Nordbak® 7232	1kg kit	750cm² @ 6mm thick	grey	-30°C to+205°C	103	–	9
Loctite® Nordbak® 7221	5.4kg kit	6.8m² @ 0.5mm per kit	grey	-30°C to+65°C	69	–	13
Loctite® Nordbak® 7222	1.4	750cm² @ 6mm thick per 1kg	grey	-30°C to+105°C	80	10	9

Products	Tensile strength ASTN D638 N/mm²	Hardness ASTM D-2240 Shore D	Working time minutes at 25°C	Functional cure hours at 25°C	Mix ratio by volume (R:H)	Mix ratio by weight (R:H)	Page
Loctite® 3463 Metal Magic Steel™	17	80	3	0.5	N/A	N/A	8
Loctite® Hysol® 3471 A&B	60	85	50	12	1:1	1:1	8
Loctite® Hysol® 3472 A&B	65	85	50	12	1:1	1:1	8
Loctite® Hysol® 3473 A&B	45	85	6	1	1:1	1:1	9
Loctite® Hysol® 3475 A&B	50	85	50	12	1:1	1:1	9
Loctite® Hysol® 3479 A&B	60	85	50	12	1:1	1:1	9
Loctite® Hysol® 3478 A&B Superior Metal	38	90	20	6	4:1	7.25:1	8
Loctite® Nordbak® 7218	–	90	30	7	2:1	2:1	12
Loctite® Nordbak® 7219	–	85	30	6	2:1	2:1	12
Loctite® Nordbak® 7230	–	90	30	Post cure 2hrs at 150°C	4:1	3.9:1	12
Loctite® Nordbak® 7226	–	85	30	6	4:1	4:1	13
Loctite® Nordbak® 7229	–	85	30	Post cure 2hrs at 150°C	4:1	4:1	13
Loctite® Nordbak® 7227	–	85	30	6	2.75:1	4.8:1	13
Loctite® Nordbak® 7228	–	85	15	5	2.8:1	4.5:1	13
Loctite® Nordbak® 7234	–	–	30	Post cure 3hrs at 150°C and 3hrs at 205°C	2.75:1	4.8:1	13
Loctite® Nordbak® 7232	59	90	45	Post cure 3hrs at 150°C and 3hrs at 200°C	4:1	5.33:1	9
Loctite® Nordbak® 7221	–	83	20	16	2.3:1	3.4:1	13
Loctite® Nordbak® 7222	33.8	89	30	6	2:1	2:1	13