Technical Data Sheet

LOCTITE® 221™

January 2025

PRODUCT DESCRIPTION

LOCTITE® 221™ provides the following product characteristics:

Technology	Acrylic
Chemical Type	Dimethacrylate ester
Appearance (uncured)	Purple liquid
Fluorescence	Positive under UV light
Components	One component- requires no mixing
Viscosity	Low
Cure	Anaerobic
Secondary Cure	Activator
Application	Threadlocking
Strength	Low

LOCTITE® 221™ is designed for the locking and sealing of threaded fasteners which require normal disassembly with standard hand tools. The product cures when confined in the absence of air between close fitting metal surfaces and prevents loosening and leakage from shock and vibration. Particularly suitable for applications such as adjustment of set screws, small diameter or long engagement length fasteners, where easy disassembly is required without shearing the screw.

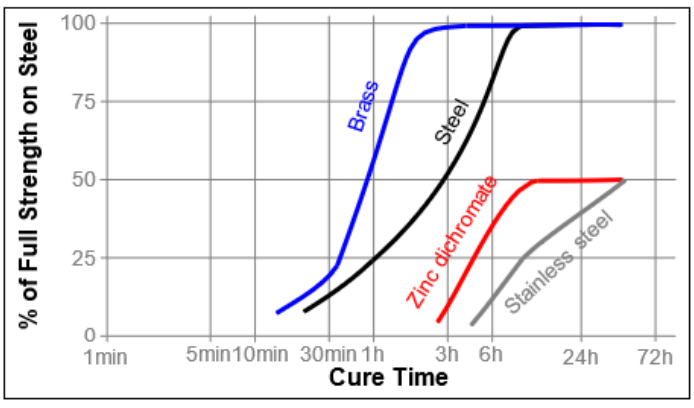
Typical properties of uncured material

Specific gravity @ 25°C	1.05
Flash point - see SDS	
Viscosity, Brookfield - RVT, 25 °C, mPa·s (cP):	
Spindle 1, speed 20 rpm	100 to 150

Typical curing performance

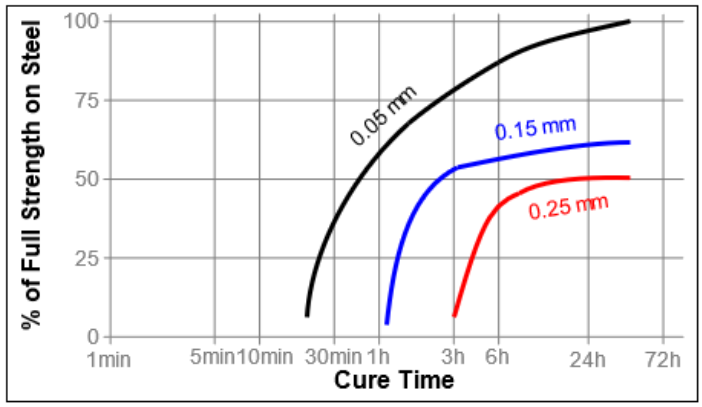
Cure Speed vs. Substrate

The rate of cure will depend on the substrate used. The graph below shows the breakaway strength developed with time on M10 black oxide bolts and steel nuts compared to different materials and tested according to ISO 10964.



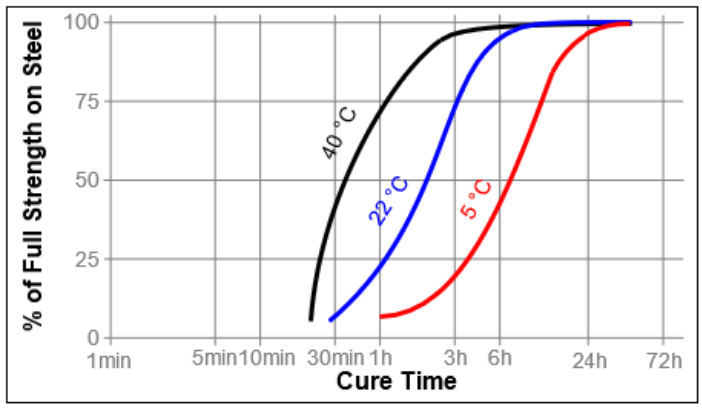
Cure Speed vs. Bond Gap

The rate of cure will depend on the bondline gap. Gaps in threaded fasteners depends on thread type, quality and size. The following graph shows shear strength developed with time on steel pins and collars at different controlled gaps and tested according to ISO 10123.

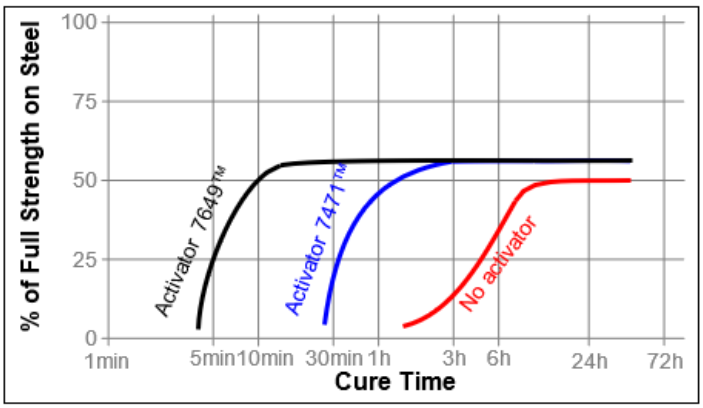


Cure Speed vs. Temperature

The rate of cure will depend on the temperature. The graph below shows the breakaway strength developed with time at different temperatures on M10 black oxide bolts and steel nuts and tested according to ISO 10964.



Cure speed vs. activator
Where cure speed is unacceptably long, or large gaps are present, applying activator to the surface will improve cure speed. The graph below shows the breakaway strength developed with time on M10 zinc dichromate steel nuts and bolts using Activator 7471™ or 7649™ and tested according to ISO 10964.



Typical properties of cured material

Physical properties:

Coefficient of Thermal Expansion, ISO 11359-2, K^{-1}:	$100x10^{-6}$
Coefficient of Thermal Conductivity, ISO 8302, W/(m·K)	0.1
Specific heat, $kJ.kg^{-1}\ K^{-1}$	0.3

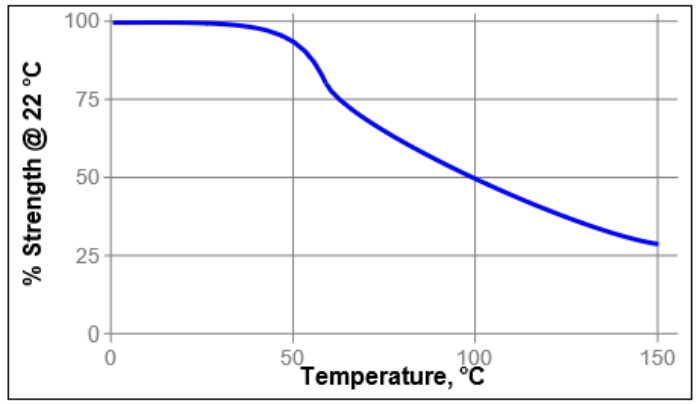
Typical performance of cured material

Adhesive Properties
Cured for 24 hours @ 22°C

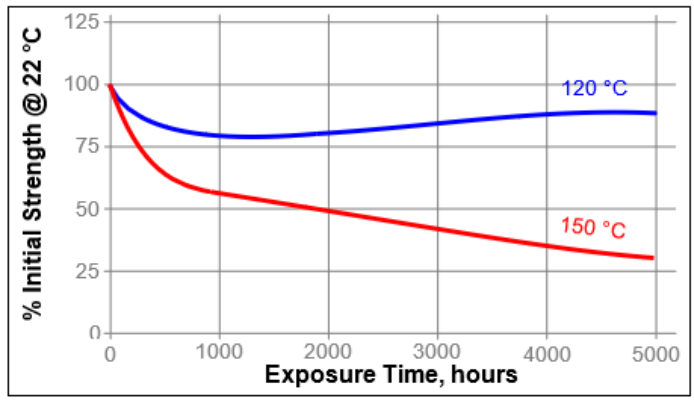
Breakaway torque, ISO 10964: M10 steel nuts and bolts	N·m (lb·in)	5 to 12 (40 to 110)
Prevail Torque, ISO 10964: M10 steel nuts and bolts	N·m (lb·in)	2 to 8 (20 to 70)
Breakloose Torque, ISO 10964, Pre-torqued to 5 N·m: M10 steel nuts and bolts	N·m (lb·in)	9 to 21 (80 to 90)
Max. Prevail Torque, ISO 10964, Pre-torqued to 5 N·m 3/8 x 16 steel nuts and bolts	N·m (lb·in)	9 to 21 (80 to 90)
Compressive Shear Strength, ISO 10123: Steel pins and collars	N/mm^2 (psi)	3 to 10 (430 to 1,450)

Typical environmental resistance
Cured for 1 week @ 22 °C
Breakloose Torque, ISO 10964, Pre-torqued to 5 N·m:
M10 stainless steel nuts and bolts

Hot Strength
Tested at temperature



Heat Aging
Aged at temperature indicated and tested @ 22 °C.



Chemical/Solvent Resistance
Aged under conditions indicated and tested @ 22°C.

		% of initial strength		
Environment	°C	100 h	500 h	1000 h
Motor oil (MIL-L-46152)	125	100	95	95
Unleaded gasoline	22	95	95	95
Brake fluid	22	95	95	90
Water/glycol 50/50	87	80	80	80
Acetone	22	100	90	90
Ethanol	22	95	95	90

GENERAL INFORMATION
This product is not recommended for use in pure oxygen and/or oxygen rich systems and should not be selected as a sealant for chlorine or other strong oxidizing materials.

For safe handling information on this product, consult the Safety Data Sheet (SDS).

Where aqueous washing systems are used to clean the surfaces before bonding, it is important to check for compatibility of the washing solution with the adhesive. In some cases these aqueous washes can affect the cure and performance of the adhesive.
This product is not normally recommended for use on plastics (particularly thermoplastic materials where stress cracking of the plastic could result). Users are recommended to confirm compatibility of the product with such substrates.

Directions for Use:

For Assembly
1. For best results, clean all surfaces (external and internal) with a LOCTITE® cleaning solvent and allow to dry.
2. If the material is an inactive metal or the cure speed is too slow, spray all threads with Activator (e.g., LOCTITE SF 7649 or LOCTITE SF 7471) and allow to dry.
3. Shake the product thoroughly before use.
4. To prevent the product from clogging in the nozzle, do not allow the tip to touch metal surfaces during application.
5. **For Thru Holes**, apply several drops of the product onto the bolt at the nut engagement area.
6. **For Blind Holes**, apply several drops of the product to the lower third of the internal threads in the blind hole, or the bottom of the blind hole.
7. Assemble and tighten as required.
8. **For Sealing Applications,** apply a 360° bead of product to the leading threads of the male fitting, leaving the first thread free. Force the material into the threads to thouroughly fill the voids.

For Disassembly
1. Remove with standard hand tools.
2. In rare instances where hand tools do not work because of excessive engagement length, apply localized heat, approximately 250°C to nut or bolt. Disassemble while hot.

Clean-up:
1. Cured product can be removed with a combination of soaking in a LOCTITE® solvent and mechanical abrasion such as a wire brush.

Storage
Store product in the unopened container in a dry location. Storage information may be indicated on the product container labeling.
Optimal Storage: 8°C to 21°C. Storage below 8°C or greater than 28°C can adversely affect product properties.
Material removed from containers may be contaminated during use. Do not return product to the original container. Henkel Corporation cannot assume responsibility for product which has been contaminated or stored under conditions other than those previously indicated. If additional information is required, please contact your local Henkel representative.

Product Specification
The technical data contained herein are intended as reference only and are not considered specifications for the product. Product specifications are located on the Certificate of Analysis or please contact Henkel representative.

Approval and Certificate
Please contact a Henkel representative for related approval or certificate of this product.

Data Ranges
The data contained herein may be reported as a typical value. Values are based on actual test data and are verified on a periodic basis.

Temperature/Humidity Ranges: 23°C / 50% RH = 23±2°C / 50±5% RH

Conversions
(°C x 1.8) + 32 = °F
kV/mm x 25.4 = V/mil
mm / 25.4 = inches
µm / 25.4 = mil
N x 0.225 = lb
N/mm x 5.71 = lb/in
N/mm² x 145 = psi
MPa x 145 = psi
N·m x 8.851 = lb·in
N·m x 0.738 = lb·ft
N·mm x 0.142 = oz·in
mPa·s = cP

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