LOCTITE®
638 Retainer

Product Description

LOCTITE® 638 provides the following product characteristics:

Technology	Acrylic
Chemical type	Urethane methacrylate
Appearance (uncured)	Green liquid[LMS]
Fluorescence	Positive under UV light[LMS]
Components	One component, requires no mixing
Viscosity	High
Cure	Anaerobic
Secondary cure	Activator
Application	Retaining
Strength	High

This Technical Data Sheet is valid for LOCTITE® 638™ manufactured from the dates outlined in the 'Manufacturing Date Reference' section.

LOCTITE® 638™ is designed for the bonding of cylindrical fitting parts, particularly where bond gaps can approach 0.25 mm and where maximum strength at room temperature is required. The product cures when confined in the absence of air between close fitting metal surfaces and prevents loosening and leakage from shock and vibration. Typical applications include locking bushings and sleeves into housings and on shafts. LOCTITE® 638™ provides robust curing performance. It not only works on active metals (e.g. mild steel) but also on passive substrates such as stainless steel and plated surfaces. The product offers high temperature performance and oil tolerance. It tolerates minor surface contaminations from various oils, such as cutting, lubrication, anti-corrosion and protection fluids.

NSF International

Registered to NSF Category P1 for use as a sealant where there is no possibility of food contact in and around food processing areas. **Note:** this is a regional approval. Please contact your local Technical Service Centre for more information and clarification.

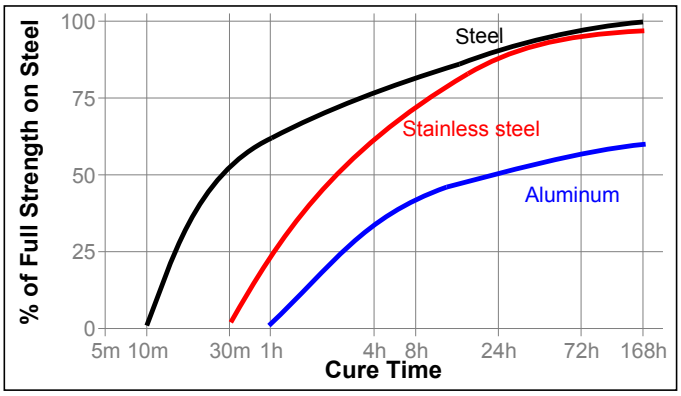
Typical Properties of Uncured Material

Specific Gravity @ 25°C	1.1
Flash point – see SDS	
Viscosity, Brookfield - RVT, 25°C, mPa·s (cP):	
Spindle 3, speed 20 rpm	2,000 to 3,000[LMS]
Viscosity, Cone & Plate, 25 °C, mPa·s (cP):	
Shear rate 129 s^{-1}	1,900 to 3,100

Typical Curing Performance

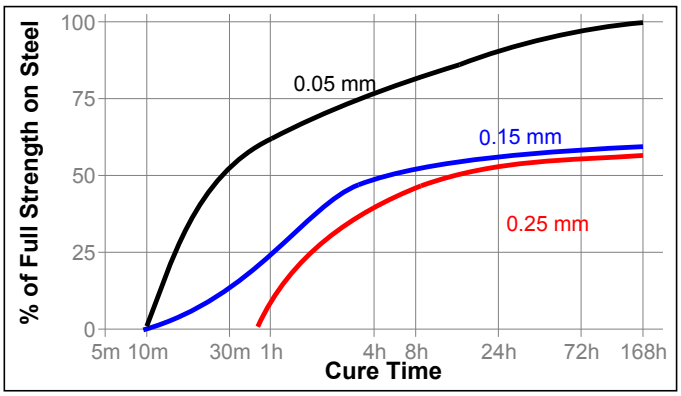
Cure Speed vs. Substrate

The rate of cure will depend on the substrate used. The graph below shows the shear strength developed with time on steel pins and collars compared to different materials and tested according to ISO 10123.



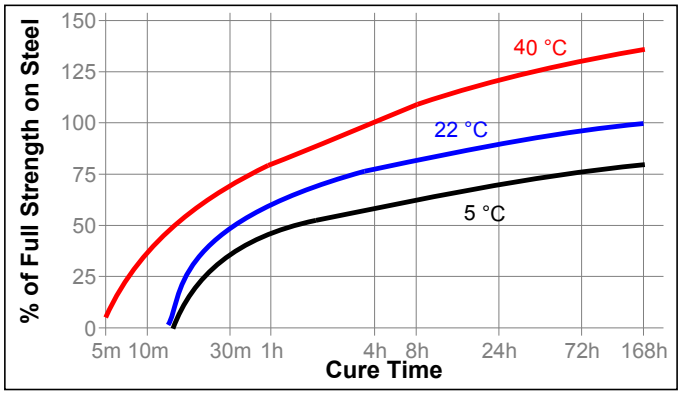
Cure Speed vs. Bond Gap

The rate of cure will depend on the bondline gap. The following graph shows shear strength developed with time on steel pins and collars at different controlled gaps and tested according to ISO 10123.



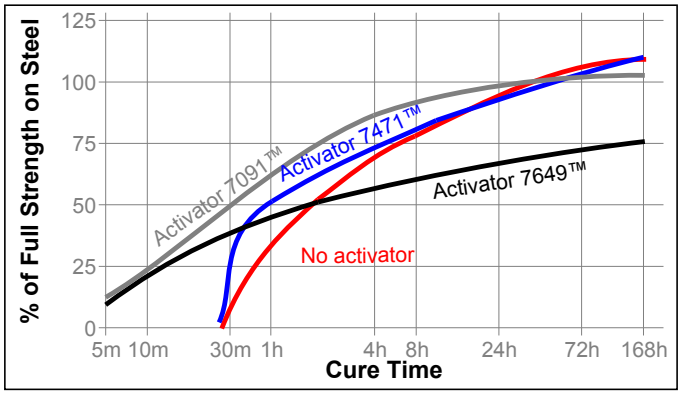
Cure Speed vs. Temperature

The rate of cure will depend on the temperature. The graph below shows the shear strength developed with time at different temperatures on steel pins and collars and tested according to ISO 10123.



Cure Speed vs. Activator

The graph below shows the shear strength developed with time on stainless steel pins and collars using Activator 7471™, 7649™ and 7091™ and tested according to ISO 10123.



Typical Properties of Cured Material

Physical Properties

Glass Transition Temperature ISO 11359-2, °C	76
Coefficient of Thermal Expansion, ISO 11359-2, K^{-1}:	
Below Tg	96×10^{-06}
Above Tg	192×10^{-06}

Typical Performance of Cured Material

Adhesive Properties

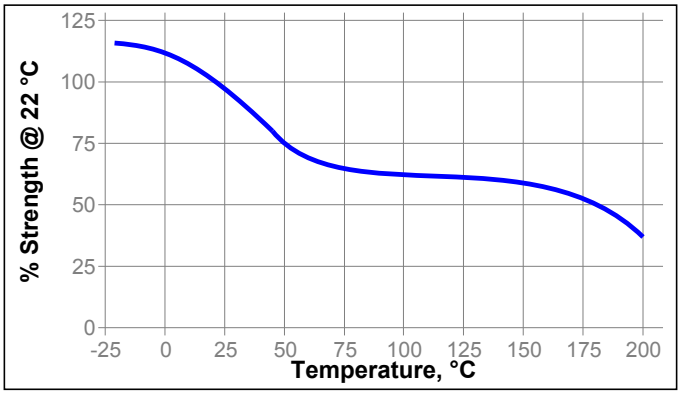
After 15 minutes @ 22°C		
Compressive Shear Strength, ISO 10123:	**N/mm²**	**psi**
Steel pins and collars	≥13.5[LMS]	1,960
After 24 hours @ 22°C		
Compressive Shear Strength, ISO 10123:	**N/mm²**	**psi**
Steel pins and collars	≥25[LMS]	3,625
After 7 days @ 22°C		
Compressive Shear Strength, ISO 10123:	**N/mm²**	**psi**
Steel pins and collars	29	4,200
Stainless steel pins and collars	28	3,990
Aluminium pins and collars	17	2,710
After 24 hours @ 22°C		
Breakaway Torque, ISO 10964:	**N.m**	**lb.in.**
M10 black oxide bolts and mild steel nuts	57	505
3/8 x 16 steel nuts (grade 2) and bolts (grade 5)	25	220
Prevail Torque, ISO 10964:	**N.m**	**lb.in.**
M10 black oxide bolts and mild steel nuts	22	195
3/8 x 16 steel nuts (grade 2) and bolts (grade 5)	9.4	85
Breakloose Torque, ISO 10964, Pre-torqued to 5 N·m:	**N.m**	**lb.in.**
3/8 x 16 steel nuts (grade 2) and bolts (grade 5)	23	205
Prevail Torque, ISO 10964, Pre-torqued to 5 N·m:	**N.m**	**lb.in.**
3/8 x 16 steel nuts (grade 2) and bolts (grade 5)	12	105

Typical Environmental Resistance

Cured for 1 week @ 22°C
Compressive Shear Strength, ISO 10123:
Steel pins and collars

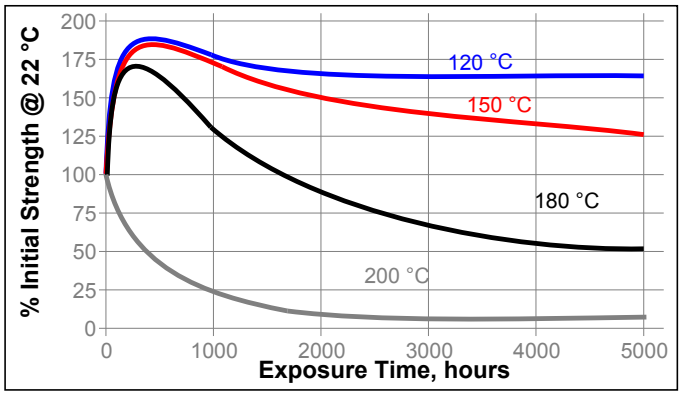
Hot Strength

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**	**500 h**	**1000 h**	**3000 h**	**5000 h**
Motor oil (5W40 -synthetic)	125	175	165	165	165
Unleaded petrol	22	105	105	105	105
Brake fluid	22	120	115	115	115
Water/glycol 50/50	87	145	145	145	145
Ethanol	22	110	110	100	100
Acetone	22	105	105	105	105
B100 biodiesel	22	115	115	115	115
DEF (AdBlue®)	22	115	105	105	105

Stainless Steel pins and collars

		% of initial strength			
Environment	**°C**	**500 h**	**1000 h**	**3000 h**	**5000 h**
Sodium Hydroxide, 20%	22	100	85	60	55
Phosphoric Acid, 10%	22	95	70	40	40

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.

Loctite Material Specification[LMS]

LMS dated July 11, 2013. Test reports for each batch are available for the indicated properties. LMS test reports include selected QC test parameters considered appropriate to specifications for customer use. Additionally, comprehensive controls are in place to assure product quality and consistency. Special customer specification requirements may be coordinated through Henkel Quality.

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 To accelerate cure speed or where large gaps are present, use activator and allow to dry.

3 For **slip fitted assemblies**, apply adhesive around the leading edge of the pin and the inside of the collar and use a rotating motion during assembly to ensure good coverage.

4 For **press fitted assemblies**, apply adhesive thoroughly to both bond surfaces and assemble at high press on rates.

5 For **shrink fitted assemblies**, the adhesive should be coated onto the part to produce a smooth, even film of material. If heating the hub for assembly, coat the pin. If the pin is to be cooled for assembly, coat the hub. If both heating and cooling is to be done, apply material to cooled part. Avoid condensation on cooled parts.

6 Parts should not be disturbed until sufficient handling strength is achieved.

For disassembly

1 Remove with standard hand tools.

2 If needed, apply localized heat to the assembly to approximately 250°C. Disassemble while hot.

3 If this temperature is not possible, heat as much as possible and use mechanical aids.

For cleanup

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 labelling.

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 Technical Service Centre or Customer Service Representative.

Conversions

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