ELLSWORTH ADHESIVES

SPECIALTY CHEMICAL DISTRIBUTION

August 29, 2012

Attn: Quality Department

Subject: Henkel Loctite 401, 406, 454, and 495 Reformulation

Dear Valued Customer:

On August 24, 2012, we were informed by Henkel Loctite of their plans to revise the formula of their 401, 406, 454, and 495 products. This reformulation is an enhancement that will increase the upper temperature resistance of these products from 180°F to 250°F. Shipments of the new formulation should begin in late Q1, 2012. All product labels will be clearly marked to identify packages containing the new formulation.

Henkel Loctite has stated that the overall composition of these products has changed by less than 1%, and that all other aspects of performance, application, and physical properties should remain unchanged.

This will also not affect MSDSs, product part numbers, Loctite material specifications, QC testing, Certificates of Analysis, shipping and transportation classifications, shelf life, or storage conditions. The only document that will be changed is the Technical Data Sheets, which are included with this notification.

We don't expect this to have any impact on your business or your interaction with Ellsworth. As always, we just want to make sure that you are kept up to date on any changes we are made aware of. For more details, please see the attached letter from Henkel Loctite.

Our Engineered Sales Representatives and Customer Service Representatives are available to help with any questions you may have. Please call 1-800-888-0698 to get in touch with your local representative.

We apologize for any inconvenience this may cause and will work with you in any way necessary to facilitate a smooth transition that will meet your current needs.

Sincerely,

Jacob R Bauer

Jake Bauer
Quality Manager
Ellsworth Adhesives Specialty Chemical Distribution

W129 N10825 Washington Drive Germantown, WI 53022
Phone: (262) 253-8600 | Fax: (262) 253-8619 | Toll Free: (800) 888-0698

Henkel Excellence is our Passion

August 24, 2012

Ms. Cindi Konitzer
Ellsworth Adhesives
W129 N10825 Washington Drive
Germantown, WI 53022

Dear Customer:

SUBJECT: Customer Notification - Loctite® 401™, 406™, 454™ and 495™

Henkel is committed to continuously improving the performance of our products, and today we would like to inform you of our global program to enhance the performance of Loctite® 401™, 406™, 454™ and 495™:

> We will improve the performance of these products to provide an upper temperature resistance of 250°F. Previously these products had an upper temperature resistance of 180°F. Less than 1% of the overall composition has been changed to provide this enhanced temperature resistance. We will provide this improved upper temperature resistance while maintaining all of the core performance features of Loctite® 401™, 406™, 454™ and 495™ against all current Henkel specifications.

We've been able to achieve this performance upgrade with NO change to:
- MSDSs
- Product part numbers
- Loctite® Material Specifications (LMS)
- QC testing or Certificates of Analysis
- Shipping and Transportation Classifications
- Shelf life or storage conditions

As a consequence of this performance enhancement the following will change:
- Loctite® Technical Data Sheets – TDSs will be updated to reflect the improved properties

Shipments of upgraded Loctite® 401™, 406™, 454™ and 495™ are planned to begin late Q1, 2012. All product labels will be clearly marked to identify packages containing the enhanced formulations.

We appreciate your continued use and support of Loctite® products. Please do not hesitate to contact your local technical service should you have any further questions.

Kind regards,

John Lafond

John Lafond
Technology Manager – Instant Adhesives

JL:lsm/

John Lafond
Technology Manager
Instant Adhesives

Henkel Corporation
One Henkel Way
Rocky Hill, CT 06067
USA

Phone: 860-571-2446
Mobile: 203-231-7987

John.Lafond@us.henkel.com
www.henkelna.com

LOCTITE® 401™

(TDS for new formulation of Loctite® 401™) February 2012

PRODUCT DESCRIPTION

LOCTITE® 401™ provides the following product characteristics:

Technology	Cyanoacrylate
Chemical Type	Ethyl cyanoacrylate
Appearance (uncured)	Transparent, colorless to straw colored liquid[LMS]
Components	One part - requires no mixing
Viscosity	Low
Cure	Humidity
Application	Bonding
Key Substrates	Metals , Plastics and Elastomers

This Technical Data Sheet is valid for LOCTITE® 401™ manufactured from the dates outlined in the "Manufacturing Date Reference" section.

LOCTITE® 401™ is designed for the assembly of difficult-to-bond materials which require uniform stress distribution and strong tension and/or shear strength. The product provides rapid bonding of a wide range of materials, including metals, plastics and elastomers. LOCTITE® 401™ is also suited for bonding porous materials such as wood, paper, leather and fabric.

NSF International

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

TYPICAL PROPERTIES OF UNCURED MATERIAL

Specific Gravity @ 25 °C	1.1
Flash Point - See MSDS	
Viscosity, Cone & Plate, mPa·s (cP):	
Temperature: 25 °C, Shear Rate: 3,000 s^{-1}	70 to 110[LMS]
Viscosity, Brookfield - LVF, 25 °C, mPa·s (cP):	
Spindle 1, speed 30 rpm	100 to 120

TYPICAL CURING PERFORMANCE

Under normal conditions, the atmospheric moisture initiates the curing process. Although full functional strength is developed in a relatively short time, curing continues for at least 24 hours before full chemical/solvent resistance is developed.

Cure Speed vs. Substrate

The rate of cure will depend on the substrate used. The table below shows the fixture time achieved on different materials at 22 °C / 50 % relative humidity. This is defined as the time to develop a shear strength of 0.1 N/mm² .

Fixture Time, seconds:	
Steel	<5
Aluminum	<5
Neoprene	<5
Rubber, nitrile	<5
ABS	<5
PVC	<5
Polycarbonate	5 to 10
Phenolic	<5
Wood (balsa)	<5
Wood (oak)	15 to 30
Wood (pine)	15 to 20
Chipboard	<5
Fabric	10 to 20
Leather	15 to 30
Paper	<5

Cure Speed vs. Bond Gap

The rate of cure will depend on the bondline gap. Thin bond lines result in high cure speeds, increasing the bond gap will decrease the rate of cure.

Cure Speed vs. Humidity

The rate of cure will depend on the ambient relative humidity. Higher relative humidity levels result in more rapid speed of cure.

Cure Speed vs. Activator

Where cure speed is unacceptably long due to large gaps, applying activator to the surface will improve cure speed. However, this can reduce ultimate strength of the bond and therefore testing is recommended to confirm effect.

TYPICAL PERFORMANCE OF CURED MATERIAL

Adhesive Properties

Cured for 10 seconds @ 22 °C

Tensile Strength, ISO 6922:

Buna-N	N/mm²	≥6.9[LMS]
	(psi)	(≥1,000)

Cured for 72 hours @ 22 °C

Tensile Strength, ISO 6922:

Buna-N	N/mm²	13.7
	(psi)	(1,900)

Lap Shear Strength, ISO 4587:

Steel (grit blasted)	N/mm²	20
	(psi)	(2,900)
Aluminum (etched)	N/mm²	12.4
	(psi)	(1,800)
Zinc dichromate	N/mm²	2.5
	(psi)	(360)
ABS	* N/mm²	7.5
	* (psi)	(1,090)
PVC	* N/mm²	10
	* (psi)	(1,450)
Phenolic	* N/mm²	12.6
	* (psi)	(1,820)
Polycarbonate	* N/mm²	9.6
	* (psi)	(1,400)
Nitrile	* N/mm²	1.2
	* (psi)	(170)
Neoprene	* N/mm²	1.1
	* (psi)	(160)

Block Shear Strength, ISO 13445:

Polycarbonate	N/mm²	11
	(psi)	(1,600)
ABS	* N/mm²	23
	* (psi)	(3,340)
PVC	N/mm²	2.6
	(psi)	(380)
Phenolic	* N/mm²	21.3
	* (psi)	(3,090)

* substrate failure

TYPICAL ENVIRONMENTAL RESISTANCE

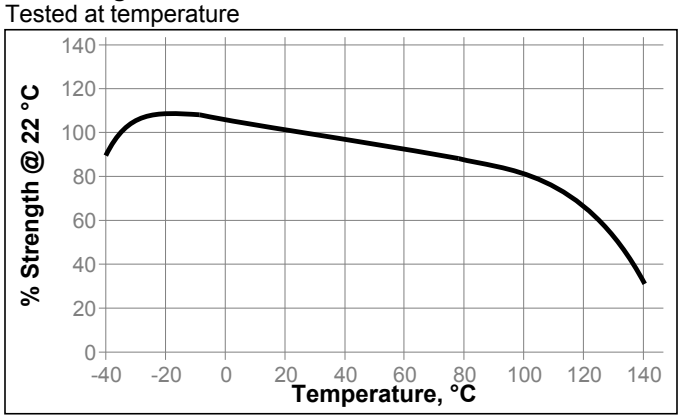
Cured for 1 week @ 22 °C

Lap Shear Strength, ISO 4587:

Steel (grit blasted)

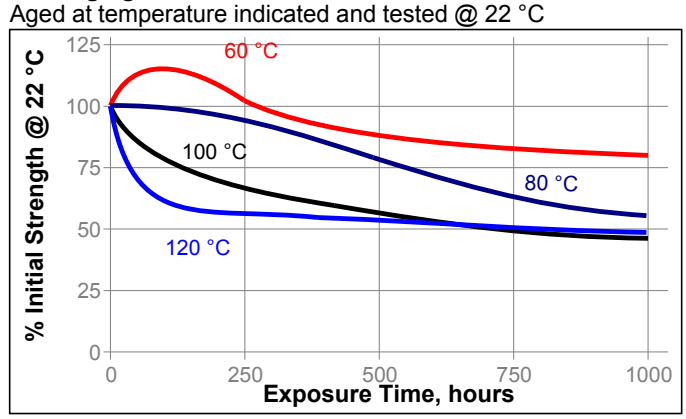
Hot Strength

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	40	115	85	85
Unleaded gasoline	22	85	90	95
Water	22	75	80	75
Water/glycol	22	85	75	65
Ethanol	22	100	110	130
Isopropanol	22	115	100	120
98% RH	40	80	65	65

Chemical/Solvent Resistance

Aged under conditions indicated and tested @ 22°C.

Lap Shear Strength, ISO 4587, Polycarbonate

		% of initial strength		
Environment	**°C**	**100 h**	**500 h**	**1000 h**
Air	22	110	120	115
98% RH	40	110	120	105

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 Material Safety Data Sheet (MSDS).

Directions for use:

1. Bond areas should be clean and free from grease. Clean all surfaces with a Loctite® cleaning solvent and allow to dry.
2. To improve bonding on low energy plastic surfaces, Loctite® Primer may be applied to the bond area. Avoid applying excess Primer. Allow the Primer to dry.
3. LOCTITE® Activator may be used if necessary. Apply it to one bond surface (do not apply activator to the primed surface where Primer is also used). Allow the Activator to

dry.

4. Apply adhesive to one of the bond surfaces (do not apply the adhesive to the activated surface). Do not use items like tissue or a brush to spread the adhesive. Assemble the parts within a few seconds. The parts should be accurately located, as the short fixture time leaves little opportunity for adjustment.
5. LOCTITE® Activator can be used to cure fillets of product outside the bond area. Spray or drop the activator on the excess product.
6. Bonds should be held fixed or clamped until adhesive has fixtured.
7. Product should be allowed to develop full strength before subjecting to any service loads (typically 24 to 72 hours after assembly, depending on bond gap, materials and ambient conditions).

Storage

Store product in the unopened container in a dry location. Storage information may be indicated on the product container labeling.

Optimal Storage: 2 °C to 8 °C. Storage below 2 °C or greater than 8 °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 Center or Customer Service Representative.

Loctite Material Specification[LMS]

LMS dated December 22, 2011. 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.

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

Manufacturing Date Reference

This Technical Data Sheet is valid for LOCTITE® 401™ manufactured from the dates below:

Made in:	**First manufacturing date**:
EU	November 2011
China	Pending
India	Pending
U.S.A.	Pending

The manufacturing date can be determined from the batch code on the pack. For assistance please contact your local Technical Service Center or Customer Service Representative.

Note

The data contained herein are furnished for information only and are believed to be reliable. We cannot assume responsibility for the results obtained by others over whose methods we have no control. It is the user's responsibility to determine suitability for the user's purpose of any production methods mentioned herein and to adopt such precautions as may be advisable for the protection of property and of persons against any hazards that may be involved in the handling and use thereof. In light of the foregoing, **Henkel Corporation specifically disclaims all warranties expressed or implied, including warranties of merchantability or fitness for a particular purpose, arising from sale or use of Henkel Corporation's products. Henkel Corporation specifically disclaims any liability for consequential or incidental damages of any kind, including lost profits.** The discussion herein of various processes or compositions is not to be interpreted as representation that they are free from domination of patents owned by others or as a license under any Henkel Corporation patents that may cover such processes or compositions. We recommend that each prospective user test his proposed application before repetitive use, using this data as a guide. This product may be covered by one or more United States or foreign patents or patent applications.

Trademark usage

Reference 2.5

LOCTITE® 406™

(TDS for new formulation of Loctite® 406™) February 2012

PRODUCT DESCRIPTION

LOCTITE® 406™ provides the following product characteristics:

Technology	Cyanoacrylate
Chemical Type	Ethyl cyanoacrylate
Appearance (uncured)	Transparent, colorless to straw colored liquid[LMS]
Components	One part - requires no mixing
Viscosity	Low
Cure	Humidity
Application	Bonding
Key Substrates	Plastics and Rubbers

This Technical Data Sheet is valid for LOCTITE® 406™ manufactured from the dates outlined in the "Manufacturing Date Reference" section.

LOCTITE® 406™ is designed for bonding of plastics and elastomeric materials where very fast fixturing is required.

Commercial Item Description A-A-3097:

LOCTITE® 406™ has been qualified to Commercial Item Description A-A-3097. **Note:** This is a regional approval. Please contact your local Technical Service Center for more information and clarification.

TYPICAL PROPERTIES OF UNCURED MATERIAL

Specific Gravity @ 25 °C	1.1
Viscosity, Cone & Plate, mPa·s (cP):	
Temperature: 25 °C, Shear Rate: 3,000 s^{-1}	12 to 22[LMS]
Viscosity, Brookfield - LVF, 25 °C, mPa·s (cP):	
Spindle 1, speed 30 rpm	15 to 25
Flash Point - See MSDS	

TYPICAL CURING PERFORMANCE

Under normal conditions, the atmospheric moisture initiates the curing process. Although full functional strength is developed in a relatively short time, curing continues for at least 24 hours before full chemical/solvent resistance is developed.

Cure Speed vs. Substrate

The rate of cure will depend on the substrate used. The table below shows the fixture time achieved on different materials at 22 °C / 50 % relative humidity. This is defined as the time to develop a shear strength of 0.1 N/mm² .

Fixture Time, seconds:	
Steel (degreased)	20 to 45
Aluminum (etched)	<5
Neoprene	<5
Rubber, nitrile	<5
ABS	<5
PVC	<5
Polycarbonate	10 to 20
Phenolic	<5

Cure Speed vs. Bond Gap

The rate of cure will depend on the bondline gap. Thin bond lines result in high cure speeds, increasing the bond gap will decrease the rate of cure.

Cure Speed vs. Humidity

The rate of cure will depend on the ambient relative humidity. The best results are achieved when the relative humidity in the working environment is 40% to 60% at 22°C. Lower humidity leads to slower cure. Higher humidity accelerates it, but may impair the final strength of the bond.

Cure Speed vs. Activator

Where cure speed is unacceptably long due to large gaps, applying activator to the surface will improve cure speed. However, this can reduce ultimate strength of the bond and therefore testing is recommended to confirm effect.

TYPICAL PERFORMANCE OF CURED MATERIAL

Adhesive Properties

After 24 hours @ 22 °C

Lap Shear Strength, ISO 4587:

Steel (grit blasted)	N/mm²	15.5
	(psi)	(2,250)
Aluminum (etched)	N/mm²	12
	(psi)	(1,740)
Zinc dichromate	N/mm²	14
	(psi)	(2,030)
ABS	* N/mm²	8.8
	* (psi)	(1,280)
PVC	* N/mm²	8.7
	* (psi)	(1,260)
Polycarbonate	* N/mm²	9.1
	* (psi)	(1,320)
Phenolic	* N/mm²	11.3
	* (psi)	(1,640)
Neoprene	* N/mm²	1
	* (psi)	(150)
Nitrile	* N/mm²	1.2
	* (psi)	()

Block Shear Strength, ISO 13445:

Polycarbonate	N/mm²	13.1
	(psi)	(1,900)
ABS	* N/mm²	23.7
	* (psi)	(3,440)
PVC	N/mm²	1.8
	(psi)	(260)
Phenolic	* N/mm²	13.8
	* (psi)	(2,000)

* substrate failure

Tensile Strength, ISO 6922:

Buna-N	N/mm²	13
	(psi)	(1,890)

After 10 seconds @ 22 °C

Tensile Strength, ISO 6922:

Buna-N	N/mm²	≥6.9[LMS]
	(psi)	(≥1,000)

TYPICAL ENVIRONMENTAL RESISTANCE

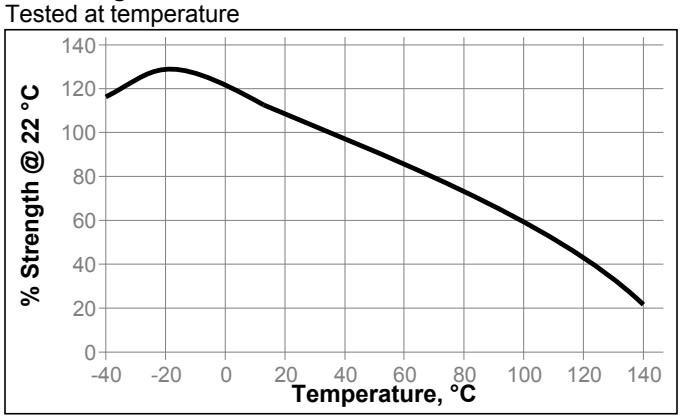
Cured for 1 week @ 22 °C

Lap Shear Strength, ISO 4587:

Mild Steel (grit blasted)

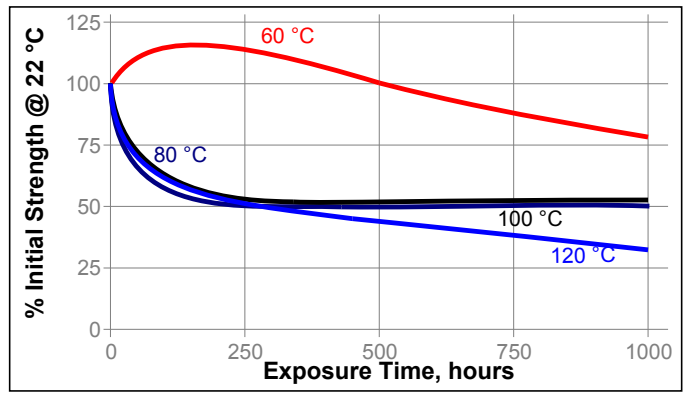
Hot Strength

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	40	100	85	70
Gasoline	22	90	100	95
Water	22	55	70	70
Water/glycol	22	85	75	80
Ethanol	22	105	105	100
Isopropanol	22	120	110	120
98% RH	40	50	60	45

Chemical/Solvent Resistance

Aged under conditions indicated and tested @ 22°C.

Lap Shear Strength, ISO 4587, Polycarbonate

		% of initial strength		
Environment	**°C**	**100 h**	**500 h**	**1000 h**
Air	22	100	100	105
98% RH	40	85	90	85

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 Material Safety Data Sheet (MSDS).

Directions for use:

1. Bond areas should be clean and free from grease. Clean all surfaces with a Loctite® cleaning solvent and allow to dry.
2. To improve bonding on low energy plastic surfaces, Loctite® Primer may be applied to the bond area. Avoid applying excess Primer. Allow the Primer to dry.
3. LOCTITE® Activator may be used if necessary. Apply it to one bond surface (do not apply activator to the primed surface where Primer is also used). Allow the Activator to dry.
4. Apply adhesive to one of the bond surfaces (do not apply the adhesive to the activated surface). Do not use items like tissue or a brush to spread the adhesive. Assemble the parts within a few seconds. The parts should be accurately located, as the short fixture time leaves little opportunity for adjustment.
5. LOCTITE® Activator can be used to cure fillets of product outside the bond area. Spray or drop the activator on the excess product.
6. Bonds should be held fixed or clamped until adhesive has fixtured.
7. Product should be allowed to develop full strength before subjecting to any service loads (typically 24 to 72 hours after assembly, depending on bond gap, materials and ambient conditions).

Loctite Material Specification[LMS]
LMS dated December 22, 2011. 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.

Storage
Store product in the unopened container in a dry location. Storage information may be indicated on the product container labeling.
Optimal Storage: 2 °C to 8 °C. Storage below 2 °C or greater than 8 °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 Center or Customer Service Representative.

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

Manufacturing Date Reference
This Technical Data Sheet is valid for LOCTITE® 406™ manufactured from the dates below:

Made in:	**First manufacturing date**:
EU	November 2011
China	Pending
India	Pending
U.S.A.	Pending

The manufacturing date can be determined from the batch code on the pack. For assistance please contact your local Technical Service Center or Customer Service Representative.

Note
The data contained herein are furnished for information only and are believed to be reliable. We cannot assume responsibility for the results obtained by others over whose methods we have no control. It is the user's responsibility to determine suitability for the user's purpose of any production methods mentioned herein and to adopt such precautions as may be advisable for the protection of property and of persons against any hazards that may be involved in the handling and use thereof. In light of the foregoing, **Henkel Corporation specifically disclaims all warranties expressed or implied, including warranties of merchantability or fitness for a particular purpose, arising from sale or use of Henkel Corporation's products. Henkel Corporation specifically disclaims any liability for consequential or incidental damages of any kind, including lost profits.** The discussion herein of various processes or compositions is not to be interpreted as representation that they are free from domination of patents owned by others or as a license under any Henkel Corporation patents that may cover such processes or compositions. We recommend that each prospective user test his proposed application before repetitive use, using this data as a guide. This product may be covered by one or more United States or foreign patents or patent applications.

Trademark usage

Reference 1.4

LOCTITE® 454™

(TDS for new formulation of Loctite® 454™) January 2012

PRODUCT DESCRIPTION

LOCTITE® 454™ provides the following product characteristics:

Technology	Cyanoacrylate
Chemical Type	Ethyl cyanoacrylate
Appearance (uncured)	Clear to slightly cloudy gel[LMS]
Components	One part - requires no mixing
Viscosity	High, thixotropic
Cure	Humidity
Application	Bonding
Key Substrates	Metals, Plastics and Elastomers

This Technical Data Sheet is valid for LOCTITE® 454™ manufactured from the dates outlined in the "Manufacturing Date Reference" section.

LOCTITE® 454™ is designed for the assembly of difficult-to-bond materials which require uniform stress distribution and strong tension and/or shear strength. The product provides rapid bonding of a wide range of materials, including metals, plastics and elastomers. The gel consistency prevents adhesive flow even on vertical surfaces. LOCTITE® 454™ is also suited for bonding porous materials such as wood, paper, leather and fabric.

NSF International

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

TYPICAL PROPERTIES OF UNCURED MATERIAL

Specific Gravity @ 25 °C	1.1
Flash Point - See MSDS	
Casson Viscosity, 25 °C, mPa·s (cP):	
Cone and Plate Rheometer	150 to 450[LMS]
Viscosity, Brookfield - RVT, 25 °C, mPa·s (cP):	
Spindle TC, speed 2.5 rpm, Helipath	*100,000 to 300,000[LMS]
Spindle TC, speed 20 rpm, Helipath	*18,000 to 40,000[LMS]

* Applies to material made in N. America

TYPICAL CURING PERFORMANCE

Under normal conditions, the atmospheric moisture initiates the curing process. Although full functional strength is developed in a relatively short time, curing continues for at least 24 hours before full chemical/solvent resistance is developed.

Cure Speed vs. Substrate

The rate of cure will depend on the substrate used. The table below shows the fixture time achieved on different materials at 22 °C / 50 % relative humidity. This is defined as the time to develop a shear strength of 0.1 N/mm² .

Fixture Time, seconds:

Steel	30 to 60
Aluminum	2 to 10
Neoprene	10 to 15
Rubber, nitrile	<5
ABS	<5
PVC	5 to 10
Polycarbonate	10 to 15
Phenolic	<5
Wood (balsa)	<5
Wood (oak)	30 to 60
Wood (pine)	15 to 30
Chipboard	5 to 10
Fabric	10 to 20
Leather	5 to 15
Paper	5 to 10

Cure Speed vs. Bond Gap

The rate of cure will depend on the bondline gap. Thin bond lines result in high cure speeds, increasing the bond gap will decrease the rate of cure.

Cure Speed vs. Humidity

The rate of cure will depend on the ambient relative humidity. The best results are achieved when the relative humidity in the working environment is 40% to 60% at 22°C. Lower humidity leads to slower cure. Higher humidity accelerates it, but may impair the final strength of the bond.

Cure Speed vs. Activator

Where cure speed is unacceptably long due to large gaps, applying activator to the surface will improve cure speed. However, this can reduce ultimate strength of the bond and therefore testing is recommended to confirm effect.

TYPICAL PERFORMANCE OF CURED MATERIAL

Adhesive Properties

Cured for 30 seconds @ 22 °C
Tensile Strength, ISO 6922:

Buna-N	N/mm²	≥6.0[LMS]
	(psi)	(≥870)

Cured for 72 hours @ 22 °C
Tensile Strength, ISO 6922:

Buna-N	N/mm²	15.1
	(psi)	(2,190)

Lap Shear Strength, ISO 4587:

Steel (grit blasted)	N/mm²	20.9
	(psi)	(3,030)
Aluminum (etched)	N/mm²	17.1
	(psi)	(2,480)
Zinc dichromate	N/mm²	11.5
	(psi)	(1,670)
ABS	* N/mm²	8.3
	* (psi)	(1,200)
PVC	* N/mm²	7.1
	* (psi)	(1,030)
Phenolic	* N/mm²	12.3
	* (psi)	(1,780)
Polycarbonate	N/mm²	7.7
	(psi)	(1,120)
Nitrile	* N/mm²	1.3
	* (psi)	(190)
Neoprene	* N/mm²	1.1
	* (psi)	(160)

Block Shear Strength, ISO 13445:

Polycarbonate	N/mm²	9.6
	(psi)	(1,390)
ABS	N/mm²	23.3
	(psi)	(3,380)
PVC	N/mm²	3.3
	(psi)	(480)
Phenolic	* N/mm²	6.7
	* (psi)	(970)

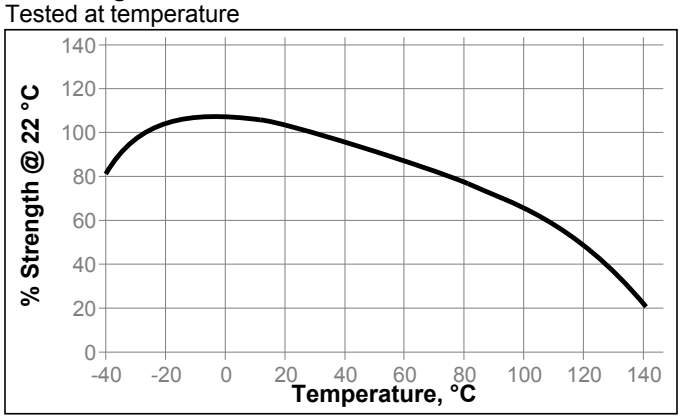
* substrate failure

TYPICAL ENVIRONMENTAL RESISTANCE

Cured for 1 week @ 22 °C
Lap Shear Strength, ISO 4587:
Steel (grit blasted)

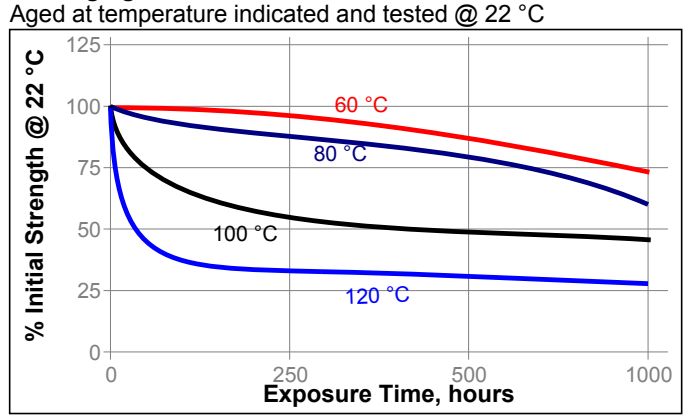
Hot Strength

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	40	105	85	80
Unleaded gasoline	22	95	120	125
Water	22	75	70	75
Water/glycol	22	90	85	85
Ethanol	22	120	125	120
Isopropanol	22	100	130	135
98% RH	40	70	55	55

Chemical/Solvent Resistance

Aged under conditions indicated and tested @ 22°C.
Lap Shear Strength, ISO 4587, Polycarbonate

		% of initial strength		
Environment	**°C**	**100 h**	**500 h**	**1000 h**
Air	22	105	105	105
98% RH	40	105	105	105

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 Material Safety Data Sheet (MSDS).

Directions for use:

1. Bond areas should be clean and free from grease. Clean all surfaces with a Loctite® cleaning solvent and allow to dry.
2. To improve bonding on low energy plastic surfaces, Loctite® Primer may be applied to the bond area. Avoid applying excess Primer. Allow the Primer to dry.
3. LOCTITE® Activator may be used if necessary. Apply it to one bond surface (do not apply activator to the primed surface where Primer is also used). Allow the Activator to dry.

4. Apply adhesive to one of the bond surfaces (do not apply the adhesive to the activated surface). Do not use items like tissue or a brush to spread the adhesive. Assemble the parts within a few seconds. The parts should be accurately located, as the short fixture time leaves little opportunity for adjustment.
5. LOCTITE® Activator can be used to cure fillets of product outside the bond area. Spray or drop the activator on the excess product.
6. Bonds should be held fixed or clamped until adhesive has fixtured.
7. Product should be allowed to develop full strength before subjecting to any service loads (typically 24 to 72 hours after assembly, depending on bond gap, materials and ambient conditions).

Loctite Material Specification[LMS]

LMS dated December 22, 2011. 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.

Storage

Store product in the unopened container in a dry location. Storage information may be indicated on the product container labeling.

Optimal Storage: 2 °C to 8 °C. Storage below 2 °C or greater than 8 °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 Center or Customer Service Representative.

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

Manufacturing Date Reference

This Technical Data Sheet is valid for LOCTITE® 454™ manufactured from the dates below:

Made in:	**First manufacturing date**:
EU	December 2011
China	Pending
India	Pending
U.S.A.	Pending

The manufacturing date can be determined from the batch code on the pack. For assistance please contact your local Technical Service Center or Customer Service Representative.

Note

The data contained herein are furnished for information only and are believed to be reliable. We cannot assume responsibility for the results obtained by others over whose methods we have no control. It is the user's responsibility to determine suitability for the user's purpose of any production methods mentioned herein and to adopt such precautions as may be advisable for the protection of property and of persons against any hazards that may be involved in the handling and use thereof. In light of the foregoing, **Henkel Corporation specifically disclaims all warranties expressed or implied, including warranties of merchantability or fitness for a particular purpose, arising from sale or use of Henkel Corporation's products. Henkel Corporation specifically disclaims any liability for consequential or incidental damages of any kind, including lost profits.** The discussion herein of various processes or compositions is not to be interpreted as representation that they are free from domination of patents owned by others or as a license under any Henkel Corporation patents that may cover such processes or compositions. We recommend that each prospective user test his proposed application before repetitive use, using this data as a guide. This product may be covered by one or more United States or foreign patents or patent applications.

Trademark usage

Reference 2.6

LOCTITE® 495

(TDS for new formulation of Loctite® 495™) February 2012

PRODUCT DESCRIPTION

LOCTITE® 495 provides the following product characteristics:

Technology	Cyanoacrylate
Chemical Type	Ethyl cyanoacrylate
Appearance (uncured)	Transparent, colorless to straw colored liquid[LMS]
Components	One part - requires no mixing
Viscosity	Low
Cure	Humidity
Application	Bonding
Key Substrates	Plastics, Rubbers and Metals

This Technical Data Sheet is valid for LOCTITE® 495 manufactured from the dates outlined in the "Manufacturing Date Reference" section.

LOCTITE® 495 is a general purpose cyanoacrylate instant adhesive.

Commercial Item Description A-A-3097:

LOCTITE® 495 has been qualified to Commercial Item Description A-A-3097. **Note:** This is a regional approval. Please contact your local Technical Service Center for more information and clarification.

TYPICAL PROPERTIES OF UNCURED MATERIAL

Specific Gravity @ 25 °C	1.1
Viscosity, Cone & Plate, mPa·s (cP):	
Temperature: 25 °C, Shear Rate: 3,000 s^{-1}	20 to 45[LMS]
Viscosity, Brookfield - LVF, 25 °C, mPa·s (cP):	
Spindle 1, speed 30 rpm	20 to 60
Flash Point - See MSDS	

TYPICAL CURING PERFORMANCE

Under normal conditions, the atmospheric moisture initiates the curing process. Although full functional strength is developed in a relatively short time, curing continues for at least 24 hours before full chemical/solvent resistance is developed.

Cure Speed vs. Substrate

The rate of cure will depend on the substrate used. The table below shows the fixture time achieved on different materials at 22 °C / 50 % relative humidity. This is defined as the time to develop a shear strength of 0.1 N/mm² .

Fixture Time, seconds:	
Mild Steel (degreased)	5 to 10
Aluminum (degreased)	<5
Neoprene	<5
Rubber, nitrile	<5
ABS	<5
PVC	<5
Polycarbonate	10 to 15
Phenolic	<5

Cure Speed vs. Bond Gap

The rate of cure will depend on the bondline gap. Thin bond lines result in high cure speeds, increasing the bond gap will decrease the rate of cure.

Cure Speed vs. Humidity

The rate of cure will depend on the ambient relative humidity. The best results are achieved when the relative humidity in the working environment is 40% to 60% at 22°C. Lower humidity leads to slower cure. Higher humidity accelerates it, but may impair the final strength of the bond.

Cure Speed vs. Activator

Where cure speed is unacceptably long due to large gaps, applying activator to the surface will improve cure speed. However, this can reduce ultimate strength of the bond and therefore testing is recommended to confirm effect.

TYPICAL PERFORMANCE OF CURED MATERIAL

Adhesive Properties

After 24 hours @ 22 °C

Lap Shear Strength, ISO 4587:

Steel (grit blasted)	N/mm²	14.2
	(psi)	(2,060)
Aluminum (grit blasted)	N/mm²	10.8
	(psi)	(1,570)
Zinc dichromate	N/mm²	5.9
	(psi)	(860)
ABS	* N/mm²	7.9
	* (psi)	(1,150)
PVC	* N/mm²	8.7
	* (psi)	(1,260)
Polycarbonate	* N/mm²	8
	* (psi)	(1,160)
Phenolic	N/mm²	9.9
	(psi)	(1,440)
Neoprene	* N/mm²	1
	* (psi)	(145)
Nitrile	* N/mm²	1.3
	* (psi)	(190)

Block Shear Strength, ISO 13445:

Polycarbonate	N/mm²	8.4
	(psi)	(1,220)
ABS	* N/mm²	22.3
	* (psi)	(3,230)
PVC	N/mm²	2.9
	(psi)	(420)
Phenolic	* N/mm²	16.0
	* (psi)	(2,320)

* substrate failure

Tensile Strength, ISO 6922:

Buna-N	N/mm²	13.7
	(psi)	(1,990)

"T" Peel Strength, ISO 11339:

Steel (degreased)	N/mm	<0.5
	(lb/in)	(<2.8)

After 10 seconds @ 22 °C

Tensile Strength, ISO 6922:

Buna-N	N/mm²	≥6.0[LMS]
	(psi)	(≥870)

TYPICAL ENVIRONMENTAL RESISTANCE

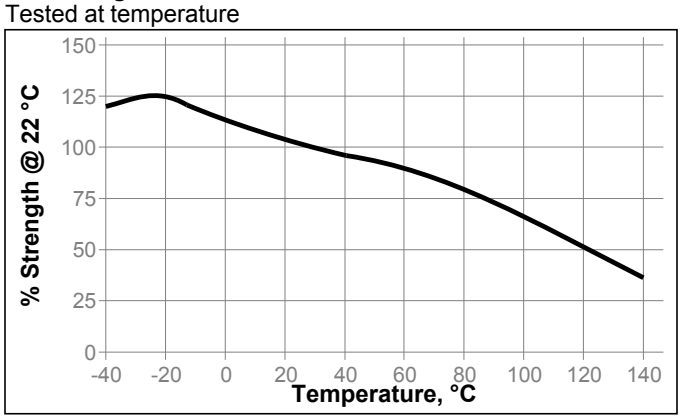
After 1 week @ 22 °C

Lap Shear Strength, ISO 4587:

Mild Steel (grit blasted)

Hot Strength

Tested at temperature



Heat Aging

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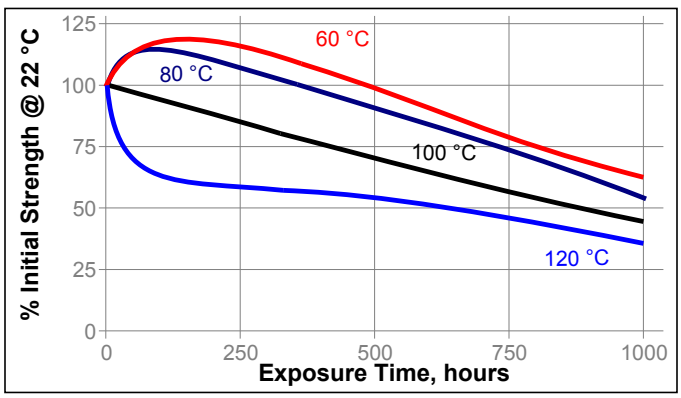
Block shear Strength, ISO 13445,

Polycarbonate



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)	40	120	130	95
Gasoline	22	100	120	105
Isopropanol	22	110	110	120
Ethanol	22	110	115	120
98% RH	40	80	65	55
Water	22	85	75	70
Water/glycol 50/50	22	95	85	80

Chemical/Solvent Resistance

Aged under conditions indicated and tested @ 22°C.

Lap Shear Strength, ISO 4587, Polycarbonate

		% of initial strength		
Environment	**°C**	**100 h**	**500 h**	**1000 h**
Air	22	105	110	110
98% RH	40	120	125	110

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Loctite Material Specification[LMS]
LMS dated January 03, 2012. 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.

Storage
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N·m x 8.851 = lb·in
N·m x 0.738 = lb·ft
N·mm x 0.142 = oz·in
mPa·s = cP

Manufacturing Date Reference
This Technical Data Sheet is valid for LOCTITE® 495 manufactured from the dates below:

Made in:	**First manufacturing date**:
EU	Pending
China	Pending
India	Pending
U.S.A.	Pending

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Trademark usage

Reference 1.2