LOCTITE® H4710™

May 2009

PRODUCT DESCRIPTION

LOCTITE® H4710™ provides the following product characteristics:

Technology	Acrylic
Chemical Type	Methacrylate
Appearance (Part A)	Off-white viscous liquid
Appearance (Part B)	Black viscous liquid
Appearance (Mixed)	Grey[LMS]
Components	Two component - requires mixing
Mix Ratio, by volume - Part A: Part B	10 : 1
Cure	Room temperature cure
Application	Bonding

LOCTITE® H4710™ is a thixotropic, two-component, room temperature curing methacrylate adhesive designed for structural bonding of most metals, including galvanized steel, seel and aluminum. This product has excellent environmental resistance and also exhibits excellent adhesion to ferrite magnets. Its non-sag characteristics are well suited for filling gaps up to 9 mm, but influenced by part geometry. LOCTITE® H4710™ has excellent peel and impact resistance, even at cold temperatures without the need for surface preparation.

TYPICAL PROPERTIES OF UNCURED MATERIAL

Part A:

Specific Gravity @ 25 °C 1.03

Flash Point - See MSDS

Viscosity, Cone & Plate, 25 °C, mPa·s (cP):

Cone CP50-1 @ shear rate 50 s^{-1} 18,700

Viscosity, Brookfield - HBD, 25 °C, mPa·s (cP):

Spindle 5, speed 10 rpm 50,000 to 90,000

Viscosity, Brookfield - HBD, 25 °C, mPa·s (cP):

Spindle 5, speed 30 rpm 35,000 to 65,000

Part B:

Specific Gravity @ 25 °C 0.95

Flash Point - See MSDS

Viscosity, Cone & Plate, 25 °C, mPa·s (cP):

Cone CP50-1 @ shear rate 50 s^{-1} 7,400

Viscosity, Brookfield - HBD, 25 °C, mPa·s (cP):

Spindle 4, speed 5 rpm 40,000 to 120,000

Viscosity, Brookfield - HBD, 25 °C, mPa·s (cP):

Spindle 4, speed 20 rpm 20,000 to 60,000

Mixed:

Specific Gravity @ 25 °C 1.05

Flash Point - See MSDS

Working Time @ 25 °C, minutes (maximum time before assembly):

Polyethylene 9

Steel 9

Aluminum 9

Working life, minutes 5.3

TYPICAL CURING PERFORMANCE

Fixture Time

Fixture time is defined as the time to develop a shear strength of 0.1 N/mm² .

Fixture Time, ISO 4587, minutes:

Grit Blasted Mild Steel 10 to 15

Aluminum 2 to 2.5

Polycarbonate 4 to 4.5

Peak Exotherm Temperature

Peak Exotherm Temperature, 10 gram mass:

Peak Temperature Time, minutes 30

Peak Temperature, °C 152

TYPICAL PROPERTIES OF CURED MATERIAL

Physical Properties:

Glass Transition Temperature (Tg) , ISO 11359-2, °C 97

Coefficient of Thermal Expansion, ISO 11359-2 K^{-1}:

Pre Tg 87.3×10^{-6}

Post Tg 212×10^{-6}

Shore Hardness, ISO 868, Durometer D 78

Linear Shrinkage, ISO 1675 % 3.7

Volume Shrinkage, ISO 1675 % 11

Elongation, at break, ISO 527-2, % 7

Elongation, at yield, ISO 527-2, % 3

Tensile Strength, at yield, ISO 527-2 N/mm² (psi) 31 (4,610)

Tensile Strength, at break, ISO 527-2 N/mm² (psi) 29 (4,220)

Tensile Modulus, ISO 527-2 N/mm² (psi) 2,605 (377,810)

TYPICAL PERFORMANCE OF CURED MATERIAL

Adhesive Properties

Cured for 24 hours @ 22 °C

Lap Shear Strength, ISO 4587:

Steel N/mm² (psi) ≥12.41[LMS] (≥1,799)

Cured for 72 hours @ 22 °C.

Impact Strength, ISO 9653, J:

Grit Blasted Mild Steel (GBMS) >14

Aluminum (abraded)		>14
FRP		>14
Grit Blasted Mild Steel (GBMS) @ -40 °C		>14
FRP @ -40 °C		>14

"T" Peel Strength, ISO 11339:

Steel	N/mm	12.32
	(lb/in)	(70)
Aluminum	N/mm	2.81
	(lb/in)	(16)

Block Shear Strength, ISO 13445:

Ferrite Magnet to Steel	N/mm²	30
	(psi)	(4,400)

Lap Shear Strength, ISO 4587:

Grit Blasted Mild Steel (GBMS)	N/mm²	31
	(psi)	(4,520)
Aluminum	N/mm²	29
	(psi)	(4,180)
Stainless Steel	N/mm²	32
	(psi)	(4,630)
Galvanized Steel	N/mm²	22
	(psi)	(3,150)
FRP	N/mm²	8
	(psi)	(1,200)
Gelcoat	N/mm²	5
	(psi)	(790)
Polycarbonate	N/mm²	7
	(psi)	(1,040)
PVC	N/mm²	6
	(psi)	(880)
ABS	N/mm²	4
	(psi)	(540)
Epoxy	N/mm²	12
	(psi)	(1,760)
Acrylic	N/mm²	3
	(psi)	(420)
Glass	N/mm²	3
	(psi)	(440)

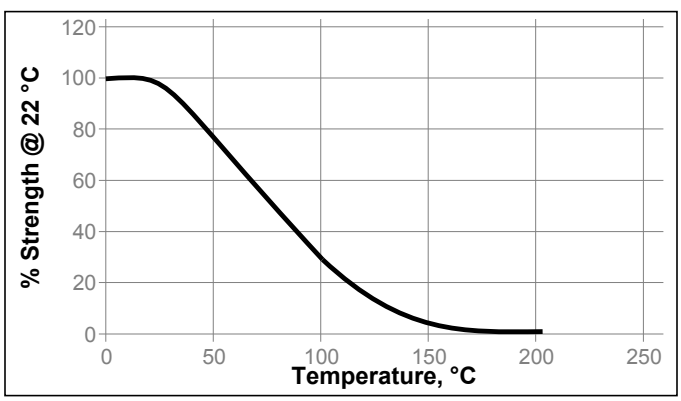
TYPICAL ENVIRONMENTAL RESISTANCE

Cured for 72 hours @ 22 °C

Lap Shear Strength, ISO 4587:

Grit Blasted Mild Steel (GBMS)

Hot Strength



Heat Aging

Aged at temperature indicated and tested @ 22 °C

Temperature, °C	% of initial strength	
GBMS	**500h**	**1000h**
100	100	100
177	22	11
Aluminum	**500h**	**1000h**
100	100	100
177	65	55
205	40	20
Galvanized Steel	**500h**	**1000h**
100	100	100
177	10	7
205	6	0

Chemical/Solvent Resistance

Aged under conditions indicated and tested @ 22 °C.

		% of initial strength	
Environment	**°C**	**500 h**	**1000 h**
Air	87	100	100
Motor oil (10W30)	87	105	110
Unleaded gasoline	87	55	25
Water/glycol 50/50	87	80	70
Water	22	100	90
Acetone	22	75	75
Isopropanol	22	100	95
95% RH	40	95	95
100% RH	49	85	85
Salt fog	22	80	80
Salt Fog on Al	38	75	75
Salt Fog on Galvanized Steel	38	100	90
100%RH on Al	49	50	50
100%RH on Galvanized Steel	49	85	86

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. For high strength structural bonds, remove surface contaminants such as paint, oxide films, oils, dust, mold release agents and all other surface contaminants.
2. Use gloves to minimize skin contact. DO NOT use solvents for cleaning hands.
3. For maximum bond strength apply adhesive evenly to both surfaces to be joined.

4. **Dual Cartridges:** To begin using a new cartridge, remove cartridge cap and dispense a small amount of adhesive, making sure both parts A&B are extruding. Attach nozzle and dispense approximately 25 to 50mm, before applying onto part to be bonded. Partially used cartridges can be stored with the mixing nozzle attached. To reuse, remove and discard old nozzle, attach the new nozzle, dispense approximately 25 to 50mm, before applying onto part to be bonded.
   Bulk Containers: Normally material is dispensed through volumetric metered mixing equipment, attached to static mix nozzles.
5. Application to the substrates should be made as soon as possible. Larger quantities and/or higher temperatures will reduce the working time.
6. Join the adhesive coated surfaces and allow to cure. Higher temperatures will speed up curing.
7. Keep assembled parts from moving during cure. The bond should be allowed to develop full strength before subjecting to any service load.
8. Excessive uncured adhesive can be cleaned up with ketone type solvents.

Loctite Material Specification[LMS]
LMS dated March 13, 2008 (Part A) and LMS dated April 22, 2008 (Part B). 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 Loctite Quality.

Storage
The product is classified as flammable and must be stored in an appropriate manner in compliance with relevant regulations. Do not store near oxidizing agents or combustible materials. Store product in the unopened container in a dry location. Storage information may also be indicated on the product container labelling.
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 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 Representive.

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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Reference 0.7