3M™ Wind Epoxy Structural Adhesive W1115

Description

3M™ Wind Epoxy Structural Adhesive W1115 is a two-part, room temperature-curing epoxy adhesive for bonding composite wind blades and for other general purpose applications. This high performance, rigid adhesive combines high shear strength along with excellent peel strength, impact strength, and durability.

Features

3M Wind Epoxy Structural Adhesive W1115 provides the following benefits:

- 20 minute work life
- 2.5 hour set time
- Medium viscosity
- Tough
- High peel strength
- High shear strength

Note: The following information and data should be considered representative or typical only, and should not be used for specification purposes.

Typical Uncured Physical Properties

Properties	Part B (Base) Resin	Part A (Accelerator) Hardener
Chemistry	Epoxy	Amine
Color	White	Amber
Density	1.14 g/cm³	1.10 g/cm³
Viscosity	35,000 cP	10,000 cP
Mix Ratio (by Weight)	100 parts B	48 parts A
Mix Ratio (by Volume)	100 parts B	50 parts A
Mixed Viscosity	30,000 cP	
Work Life	20 minutes at 73°F (23ºC)	
Set Time	2.5 hours at 73°F (23ºC)	
Full Cure Time	1 day at 73°F (23ºC)	

Note: Viscosity measured using a Brookfield RVT Viscometer with a #7 spindle at 20 rpm and 80°F.

Typical Cured Physical Properties

Properties		Value	
Color		Off-white	
Density		1.13 g/cm³	
Overlap Shear	Aluminum	3,630 psi	25.0 MPa
	Steel	2,190 psi	15.1 MPa
	Stainless Steel	3,470 psi	23.9 MPa
	Glass Fiber Reinforced Epoxy	4,000 psi	27.6 MPa
	Glass Fiber Reinforced Polyester*	1,170 psi	8.1 MPa
	Polycarbonate*	1,100 psi	7.6 MPa
	Acrylic*	660 psi	4.6 MPa
	ABS	1,020 psi	7.0 MPa
	PVC	750 psi	5.2 MPa
	Nylon	660 psi	4.6 MPa
	Wood*	1,240 psi	8.5 MPa
Floating Roller Peel		50 lb/in	8.8 N/mm
Coefficient of Thermal Expansion		80 × 10^{-6}/ºF	85 × 10^{-6}/ºC
Shore D Hardness		75	

Notes: 1. Overlap shear values measured using DIN 1465 / ISO 4587 test method "Adhesives–Determination of Tensile Lap Shear Strength of Rigid-to-Rigid Bonded Assemblies;" 0.5 mm bond line thickness; samples pulled at 1 mm/min; adhesive cured for 1 day at room temperature; metal surface cleaned with the following procedure: (1) tissue wipe using MEK, (2) light abrasion with orbital sander using Scotch-Brite™ 7447 maroon pad, (3) tissue wipe using IPA; substrates for overlap shear testing were 1.6 mm thick aluminum, 1.0 mm thick steel, 3.2 mm thick epoxy, polyester, polycarbonate, and acrylic, and 6.4 mm thick ABS, PVC, and wood. Materials indicated by an asterisk (*) exhibited primarily substrate failure.

2. Floating roller peel values measured using ISO 4578 test method "Adhesives–Determination of Peel Resistance of High-Strength Adhesive Bonds–Floating Roller Method;" 0.5 mm bond line thickness; samples pulled at 100 mm/min; adhesive cured for 1 day at room temperature; etched aluminum substrates.

3. Hardness values measured using ASTM D2240 "Standard Test Method for Rubber Property–Durometer Hardness".

Properties	Temperature	Value	
Overlap Shear	-40°F (-40°C)	3,380 psi	23.3 MPa
	72°F (22°C)	3,630 psi	25.0 MPa
	122°F (50°C)	1,830 psi	12.6 MPa
	176°F (70°C)	200 psi	1.4 MPa

Tensile Properties

Properties	Value	
Tensile Modulus (E)	280,000 psi	1,930 MPa
Tensile Strength	6,100 psi	42.0 MPa
Strain at Break	3%	3%

Note: Tensile properties measured using ISO 527 test method "Plastics–Determination of Tensile Properties" and Type IV test specimens made according to ASTM D638 "Standard Test Method for Tensile Properties of Plastics;" adhesive cured for 1 day at room temperature; samples pulled at 5 mm/min.

Environmental Resistance

Properties		Value	
Overlap Shear	No exposure	3,630 psi	25.0 MPa
	1000 hours in salt water	3,400 psi	23.4 MPa
	1000 hours in diesel fuel	3,480 psi	24.0 MPa
	1000 hours in acid solution (pH=4)	3,500 psi	24.1 MPa
	1000 hours in base solution (pH=10)	3,460 psi	23.9 MPa
	1000 hours at 50°C	3,560 psi	24.5 MPa
	1000 hours in 50°C water	3,170 psi	21.9 MPa
	1000 hours at 50°C and 80% relative humidity	2,670 psi	18.4 MPa
	1000 hours weathering cycle	2,690 psi	18.5 MPa

Notes: 1. Overlap shear values measured using DIN 1465/ISO 4587 test method; adhesive cured for 1 day at room temperature; lightly abraded 1.6 mm thick aluminum test substrates; 0.5 mm bond line thickness; samples pulled at 1 mm/min.

2. Weathering cycle involves daily humidity changes and temperature variations from -40°C to 60°C.

Directions for Use

1. To obtain high strength structural bonds, all surfaces must be clean, rough, and dry. For molded composite laminates, these conditions can typically be achieved using a peel-ply material that must be removed immediately prior to adhesive application. Otherwise, the surface must be prepared using the following procedure:

   A. Dust, mold release agents, oils, and all other surface contaminants must be completely removed using a solvent or some other degreaser.**

   B. The surface must then be lightly abraded using either Scotch-Brite™ pads or fine to medium grit sandpaper to increase surface area and remove gloss.

   C. The loose debris from abrasion must then be removed using a clean cloth and solvent (such as a 50:50 mixture of isopropyl alcohol and water).**

2. The two adhesive components must be thoroughly mixed using either the weight or volume mix ratio specified in this document. The mixed adhesive should be a uniform off-white color with no streaks.

   When using a cartridge, follow these instructions: Store adhesive cartridges upright (cap end up). Place cartridge into applicator and remove cap. Dispense and discard a small amount of adhesive to ensure free flow from both sides of cartridge, then attach mixing nozzle. Store unused adhesive with mixing nozzle attached, then remove and attach new mixing nozzle when ready to continue use.

3. The mixed adhesive should be applied to the bond area, and the two surfaces mated together, before the work life stated in this document expires. Keep the joined parts together using contact pressure or clamps during the cure process until the set time is reached. Optimal bond line thickness ranges from 4 to 40 mils (0.1 to 1.0 mm).

4. Although this two-part epoxy adhesive will cure at room temperature, a thermal cure can also be used to accelerate the curing process. The following are approximate times required to achieve full cure at several different temperatures.

Temperature	Time
73°F (23°C)	1 day
120°F (49°C)	1 hour
150°F (66°C)	30 minutes
200°F (93°C)	10 minutes

These values represent the actual adhesive bond line temperature, not the oven temperature. Allow sufficient time for the bonded parts and adhesive to reach the desired temperature. Other times and temperatures are also possible depending on the exact cure conditions and performance attributes desired. The optimal cure cycle will need to be determined for each specific application.

**Note: When using solvents, extinguish all ignition sources, including pilot lights, and follow the manufacturer's precautions and directions for use. Use solvents in accordance with local regulations.

Storage

Store products at 59–77°F (15–25°C) for maximum shelf life. Opened bulk containers with leftover adhesive should be resealed after applying a nitrogen purge of the headspace.

Shelf Life

This product has a shelf life of 24 months in bulk containers, or 15 months in cartridges from date of manufacture, when stored in the original sealed containers at room temperature.

Precautionary Information

Refer to the product label and Material Safety Data Sheet for health and safety information before using this product. For additional health and safety information, call 1-800-364-3577 or (651) 737-6501.

For more information on our wind energy product line, contact 3M Renewable Energy at 800-755-2654 or visit us at www.3M.com/wind.

Renewable Energy Division
3M Center, Building 235-1S-67
St. Paul, MN 55144-1000
1-800-755-2654
www.3M.com/wind

Please recycle. Printed in USA.
Issued: 4/12 8626HB
98-0150-0092-4