ThreeBond

September 18, 2012
Three Bond Co., Ltd.

Technical Data

ThreeBond 1539B

(Single Component Low Temperature Fast Curing Elastic Adhesive)

1. Product description

ThreeBond 1539B is a single component low temperature fast curing elastic adhesive. The adhesive can be cured by heating at a relatively low temperature (approx. 60°C) in a short time and does not require a long-time curing process. Since it uses a plant-derived polymer as the main component, it is an environment-friendly adhesive. The cured material is an elastic body, which is resistant to vibration and impact and excels in relaxation of stress caused by expansion and contraction of parts. In addition, it has excellent adhesion to various materials.

Hereinafter, ThreeBond is abbreviated to TB.

2. Features

(1) Single component low temperature fast curing (in 1 min or more at approx. 60°C) type
* The curing conditions vary depending on the heat capacity of the parts used.

(2) Use of plant-derived polymer as main component

(3) Elastic in wide temperature range (-35°C to 100°C)

(4) Excellent adhesion to various materials

3. Applications

Bonding, sealing and potting of various materials

4. Properties

Table 1 Properties of TB1539B

Test item	Unit	Result	Test method
Main component	—	Urethane prepolymer	—
Appearance	—	White	3TS-2100-002
Viscosity	Pa·s	100*	3TS-2F00-007
Specific gravity	—	1.34	3TS-2500-002

* Measuring conditions: Shear rate:5 (s^{-1})

5. Curing ability

5.1 Curing behavior

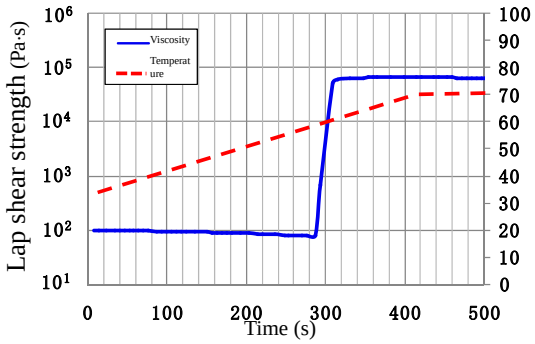

Fig. 1 Curing ability of TB1539B

Test method: 3TS-4200-007 Oscillation strain control

Rotor: 25ϕ4° cone

Rate of temperature rise: 5°C/min,

Strain: 1%, Frequency: 1Hz

5.2 Curing characteristics

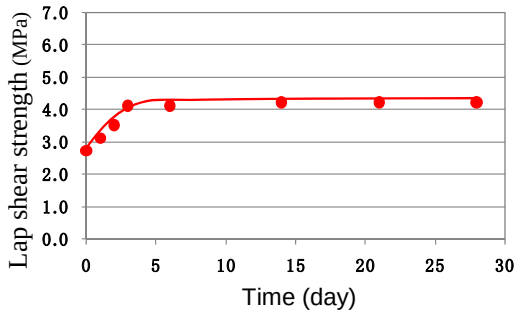

Fig. 2 Curing time and lap shear strength of TB1539B

Curing conditions: 60°C × 1.5h

Curing conditions: 23°C, 50%RH

Test method: 3TS-4100-013
Application of aluminum (A1050P) test pieces after application to both surfaces

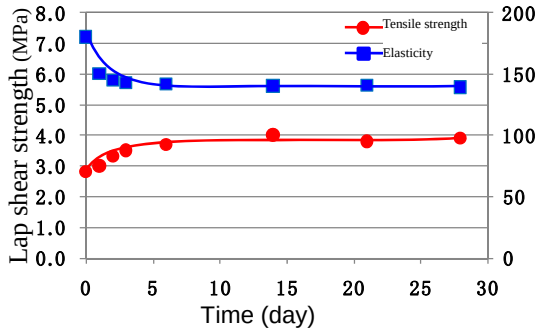

Fig. 3 Curing time, tensile strength and elongation of TB1539B

Curing conditions: 60°C × 1.5h

Curing conditions: 23°C, 50%RH

Test method: 3TS-4190-001

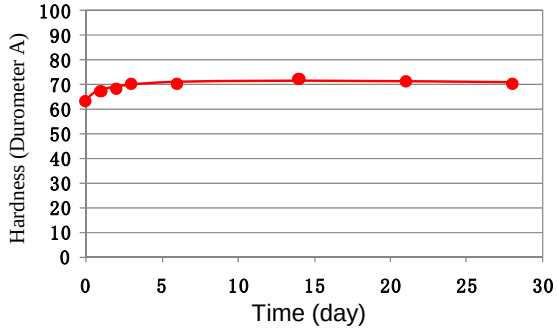

Fig. 4 Curing time and hardness of TB1539B

Curing conditions: 60°C × 1.5h

Curing conditions: 23°C, 50%RH

Test method: 3TS-2B00-004

Note: The curing conditions are 1.5 hrs at 60°C to make a reference cured material for the test by using jigs*.
Such curing conditions are used because the heating temperature and time are required to warm up the jigs.

* Dimensions of jigs and supplementary explanation

Two aluminum plates (Teflon-treated surfaces) having a length of 200 mm, a width of 230 mm and a thickness of 8 mm and spacers are used to make a cured material 2 mm in thickness. After the adhesive is applied to one of the aluminum plates, the other plate is put on the adhesive, and pressure is applied to the plate to uniform the thickness of the adhesive during heating.

6. Characteristics of cured sealant

6.1 Characteristics of cured sealant

Table 2 Characteristics of TB1539B after curing

	Unit	Result	Test method
Hardness	-	A70	3TS-2B00-004
Tensile strength	MPa	3.5	3TS-4190-001
Elongation	%	140	3TS-4190-001
Cure shrinkage	%	0.02	3TS-2600-001*1

*1 Dimensions of cured adhesive: ϕ20 mm × 2 mm

Curing conditions:
(60°C × 1.5h) + (23°C, 50%RH) × 3 days

6.2 Electrical characteristics of cured adhesive

Table 3 Electrical characteristics of TB1539B

Test item		Unit	Result	Test method
Volume resistivity		Ω·m	6.5×1010	3TS-5200-001
Surface resistivity		Ω	1.9×1014	3TS-5200-002
Dielectric constant	1kHz	—	5.8	3TS-5220-001
	1MHz		5.0	
Dielectric loss tangent	1kHz	—	0.034	
	1MHz		0.055	
Dielectric breakdown strength		kV/mm	22	3TS-5230-002

7. Adhesive strength

7.1 Lap shear strength

Table 4 Lap shear strength of TB1539B

Test material		Unit	Result	Failure type
Metals	Aluminum (A1050P)	MPa	4.1	CF
	Iron (SPCC-SD)		3.6	CF
	Stainless steel(SUS304)		2.5	CF
	Copper(C1100P)		3.0	CF
Plastics	Phenolic resin	MPa	4.0	CF
	Glass epoxy		4.3	CF
	Acryl		0.7	AF
	ABS		0.9	AF
	PC (Polycarbonate)		1.4	AF
	6,6-Nylon		0.7	AF
	PET(Polyethylene terephthalate)		4.1	CF
	PBT(Polybutylene terephthalate)		2.5	CF
	PPS(Polyphenylene sulfide)		1.8	AF
	Hard PVC		2.6	CF
Others	Glass	MPa	3.3	CF
	Philippine mahogany plywood		3.1	CF

AF: Interfacial failure

CF: Cohesive failure

Curing conditions:
(60°C × 1.5h) + (23°C, 50%RH) × 3 days

Test method: 3TS-4100-013Lamination of test pieces of the same material after application of adhesive to both surfaces

* Surface treatment of test pieces used in tests

Metallic test pieces:
Degreasing with methylene chloride

Plastic and rubber test pieces: Wiping with ethanol

7.2 Peel strength

Table 5 Peel strength of TB1539B

	Unit	Result	Failure type
Iron (SPCC-SD)	kN/m	1.3	AF
Aluminum (A1050P)		1.5	CF
Cotton canvas		2.3	CF

AF: Interfacial failure

CF: Cohesive failure

Curing conditions:
(60°C × 1.5h) + (23°C, 50%RH) × 3 days

Test method: 3TS-4130-230
Lamination of test pieces of the same material after application of adhesive to both surfaces

* Surface treatment of test pieces used in tests

Metallic test pieces:
Degreasing with methylene chloride

Plastic and rubber test pieces: Wiping with ethanol

7.3 Lap shear strength while heated

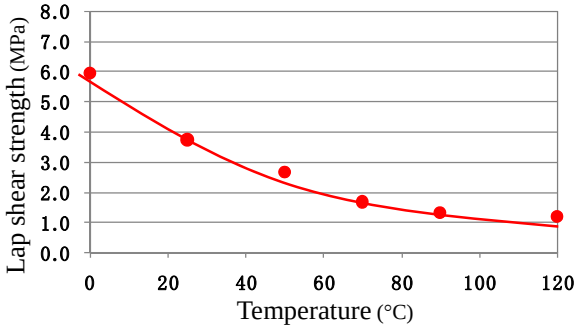

Fig. 5 Lap shear strength of TB1539B while heated

Curing conditions:
(60°C × 1.5 h) + (23°C, 50%RH) × 3 days

Test method: 3TS-4100-013
Application of aluminum (A1050P) test pieces after application to both surfaces

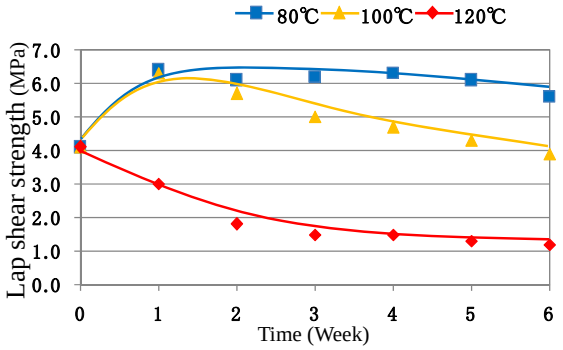

Fig. 6 Heat resistance of TB1539 (lap shear strength)

Curing conditions:
(60°C × 1.5h) + (23°C, 50%RH) × 3 days

Test method: 3TS-4100-013
Lamination of aluminum (A1050P) test pieces after application to both surfaces

8. Durability

8.1 Heat resistance

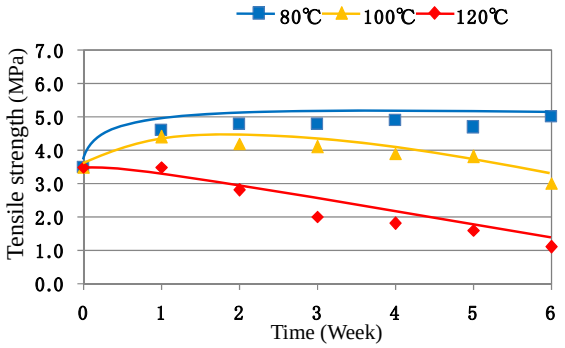

Fig. 7 Heat resistance of TB1539B (tensile strength)

Curing conditions:
(60°C × 1.5h) + (23°C, 50%RH) × 3 days

Test method: 3TS-4190-001

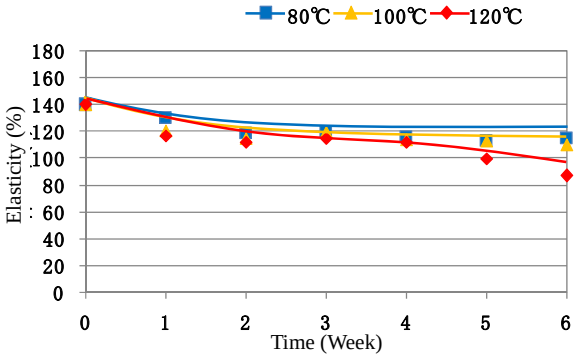

Fig. 8 Heat resistance of TB1539B (elongation)

Curing conditions:
(60°C × 1.5h) + (23°C, 50%RH) × 3 days

Test method: 3TS-4190-001

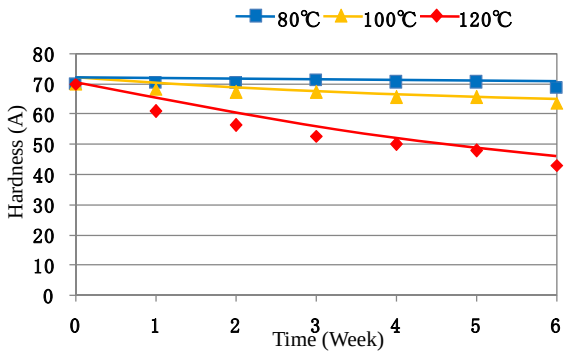

Fig. 9 Heat resistance of TB1539 (hardness)

Curing conditions:
(60°C × 1.5h) + (23°C, 50%RH) × 3 days

Test method: 3TS-2B00-004

8.2 Water resistance and moisture resistance

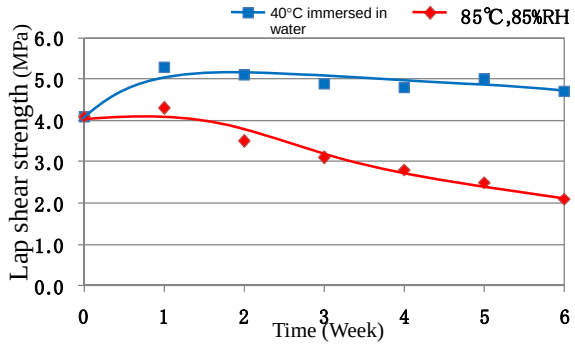

Fig. 10 Lap shear strength of TB1539B immersed in water at 40°C and exposed to environment at 85°C, 85%RH

Curing conditions:
(60°C × 1.5h) + (23°C, 50%RH) × 3 days

Test method: 3TS-4100-013
Application of aluminum (A1050P) test pieces after application to both surfaces

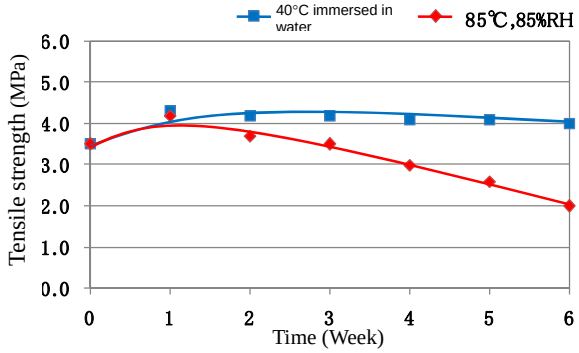

Fig. 11 Tensile strength of TB1539B immersed in water at 40°C and exposed to environment at 85°C, 85%RH

Curing conditions:
(60°C × 1.5h) + (23°C, 50%RH) × 3 days

Test method: 3TS-4190-001

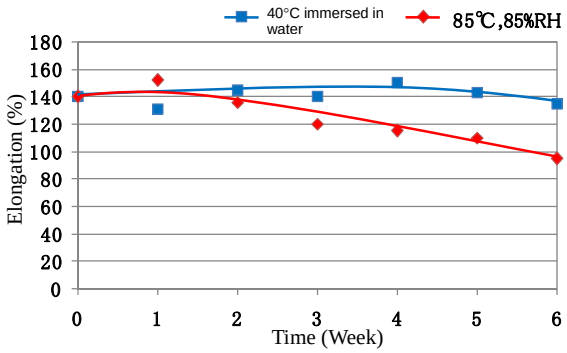

Fig. 12 Elongation of TB1539B immersed in water at 40°C and exposed to environment at 85°C, 85%RH

Curing conditions:
(60°C × 1.5h) + (23°C, 0%RH) × 3 days

Test method: 3TS-4190-001

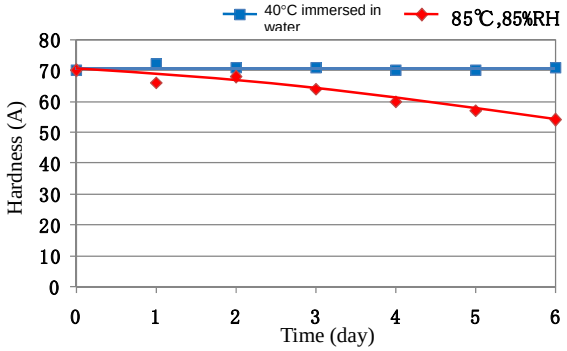

Fig. 13 Hardness of TB1539B immersed in water at 40°C and exposed to environment at 85°C, 85%RH

Curing conditions:
(60°C × 1.5h) + (23°C, 50%RH) × 3 days

Test method: 3TS-2B00-004

9. Usage

(1) Before applying the adhesive, cleanly remove moisture, oil, rust and other contaminants from the surfaces to be bonded.

(2) Apply the appropriate amount to the usage area.

(3) Until the adhesive cures, do not move. ** Cautions when curing

* The curing conditions vary depending on the heat capacity of the parts used. Carefully check the curing temperature and curing time prior to use.

10. Storage

The adhesive deteriorates when it is exposed to heat, moisture and UV light. After using it, fit the cap tightly, and store it in a dark dry place at -5 to 10°C avoiding direct sunlight.

11. Disposal

After the adhesive has all been used, ask an authorized specialist to dispose of the container as industrial waste.

12. Laws and regulations

Fire Service Act: Non-hazardous material

13. Directions for use

- Do not inhale or swallow. Harmful to health. Do not inhale or ingest.
- When handling this product, wear protective equipment.
- Keep out of reach of children.
- If in eyes, rinse with clean water for over 15 minutes, and get medical attention.
- If on skin, wipe off with cloth, and wash the skin well with soap.
- If any bodily abnormalities occur, discontinue use, and get medical attention.
- For industrial use. Do not use for household purposes.
- Do not use on human body.
- To prevent condensation, unseal the container after reaching room temperature.
- Before using, sufficiently confirm whether the method of application and the purpose are appropriate.
- The effects on the substrates should be confirmed in advance. If there are any problems, do not use.
- For hazard and toxicity information not mentioned herein, see the material safety data sheet (MSDS).

14. Cautions

For Industrial Use Only (Do not use for household purposes.)

Before using this product, you must accept the following sales terms.

- The technical data given herein are not guaranteed values, but examples of experimental values obtained by our specified test methods. We do not guarantee that the uses described herein do not conflict with any intellectual property right.
- Users are asked to examine whether the product is appropriate to the purpose of use and can be used safely before they use it and bear all responsibilities and hazards involved in its use. Never use the product for medical implants that may be embedded, injected or left in the body.
- We are not liable for personal injury or property damage caused by improper handling of this product. If the properties or usage of the product to be used are unclear, never use it.
- For detailed safety information of the product, see the material safety data sheet (MSDS). To obtain the MSDS, contact our sales office or customer service center.
- Information in this technical document is subject to change at our discretion without notice.