ThreeBond

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ThreeBond Co., Ltd.

Technical Data
ThreeBond 2235L
Heat-curable, one-component epoxy-compound resin

1. Product description

ThreeBond 2235L is a heat-curable, one-component, epoxy-compound resin.

It has a high glass transition temperature and can keep a high storage modulus even in a high-temperature environment. It is suitable for applications where thermal resistance is required.

Hereinafter, ThreeBond is abbreviated to TB.

2. Features

(1) One-component heat-curing adhesive
(2) With high glass transition temperature
(3) With low linear expansion coefficient

3. Applications

Bonding and filling where thermal resistance is required

4. Properties

4.1. Properties

Table 1 Properties of TB2235L

Test item	Unit	Result	Test method	Remarks
Appearance	-	Black	3TS-2100-020	-
Viscosity	Pa·s	80	3TS-2F00-007	Shear rate:10.0[s^{-1}]
Specific gravity	-	1.69	3TS-2500-002	25°C

4.2. Rheogram

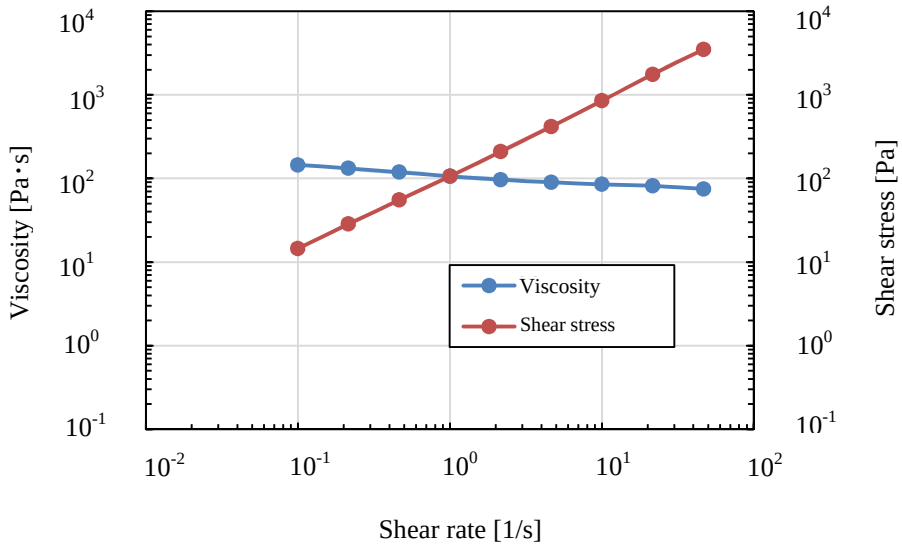

Fig. 1 Flow curves of TB2235L
Measuring temperature: 25°C
Measuring conditions: 3TS-4200-001
Measuring device: HAAKE MARS-III
Probe: C35/2

4.3. Temperature-viscosity curve

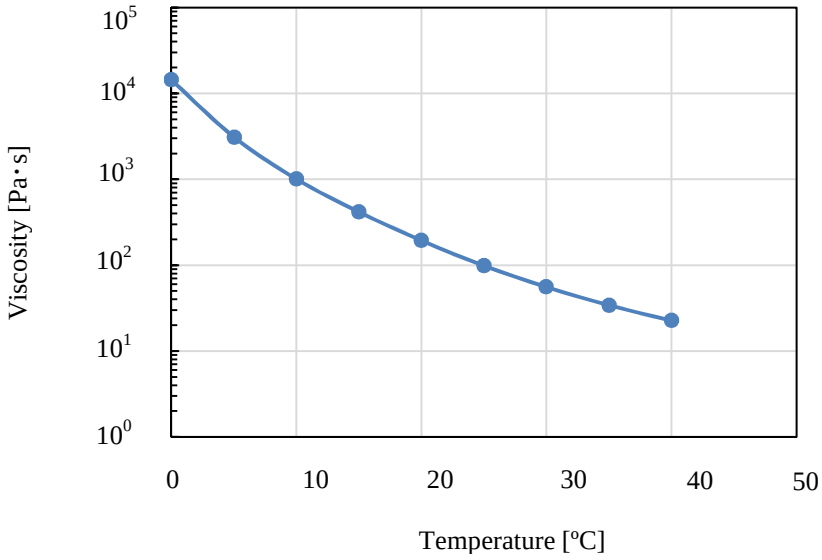

Fig. 2 Temperature-viscosity curve of TB2235L
Shear rate: 5.0 [s^{-1}]
Measuring conditions: 3TS-4200-003
Measuring device: HAAKE MARS-III
Probe: C35/2

5. Result

5.1. Characteristics of cured resin

Table 2 Characteristics of TB2235L after curing

Test item	Unit	Result	Test method	Remarks
Hardness	-	D92	3TS-2B00-010	10-g circular (40 in diam.) cured material
Cure shrinkage	%	1.7	3TS-2600-001	-
Lap shear strength	MPa	23	3TS-4100-011	Fe/Fe(SPCC-SD)
		20		SUS/SUS(SUS304)
		3.2		PPS/PPS (TOSOH SUSTEEL®)
T-peel strength	kN/m	2.0	3TS-4130-021	Fe/Fe(SPCC-SD)
Water absorption	%	0.7	3TS-2530-003	Boiling for 2 hrs 10-g circular (40 in diam.) cured material
Storage modulus (E')	GPa	10	3TS-4730-001	25°C
		8.2		100°C
		3.3		150°C
		0.9		180°C
Loss modulus (E") peak	°C	154		DMA method, 1 Hz
Loss tangent (tan δ) peak	°C	170		DMA method, 1 Hz
Linear expansion coefficient (α_1)	$\times 10^{-6}$/°C	16	3TS-4740-001	20-40°C
Linear expansion coefficient (α_2)		24		160-200°C

Curing conditions: 140°C for 30 min

5.2. Electrical characteristics of cured resin

Table 3 Electrical characteristics of TB2235L after curing

Test item	Unit	Result	Test method	Remarks
Volume resistivity	Ω·m	4.9×10^{15}	3TS-5200-001	-
Surface resistivity	Ω	1.1×10^{16}	3TS-5200-002	-
Dielectric breakdown strength	kV/mm	23	3TS-5230-002	-
Dielectric constant	-	5.9	3TS-5220-001	1kHz
	-	5.6		1MHz
Dielectric loss tangent	-	0.008		1kHz
	-	0.017		1MHz

Curing conditions: 140°C for 30 min

5.3. Curing behavior

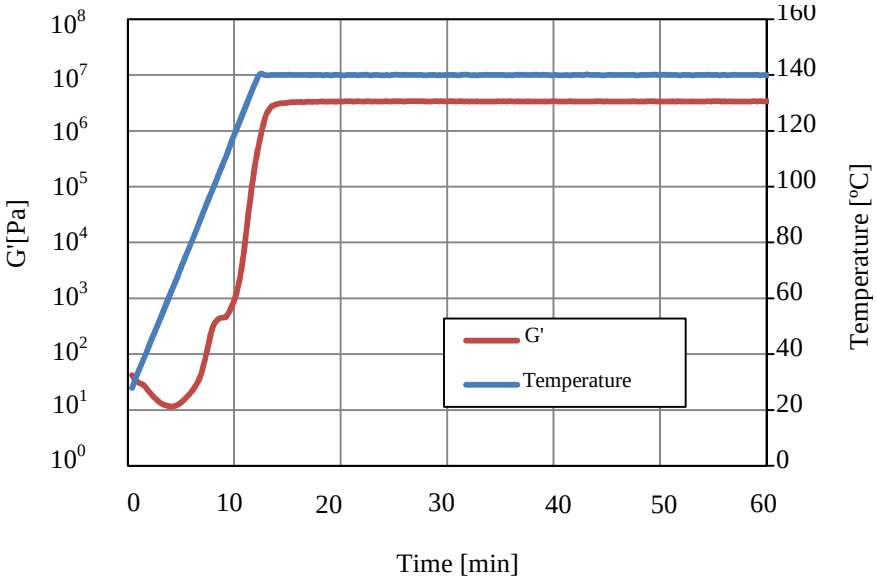

Fig. 3 Curing behavior of TB2235L

Temperature conditions: 25°C → (10°C/min) → 140°

Frequency: 1.0 Hz Distortion: 1.0%

Sample thickness (gap): 1.0 mm

Measuring device: Visco Analyser VAR50

Probe: P25

G’ effective measurement range: 10^6 Pa or less

5.4. Lap shear strength while heated

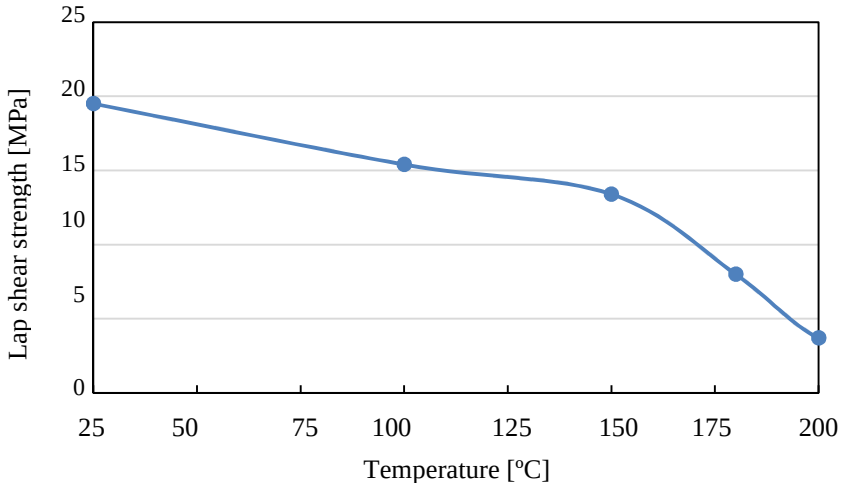

Fig. 4 Lap shear strength of TB2235L when heated

Curing conditions: 140°C for 30 min

Measuring conditions: 3TS-4100-011 Material: SUS/SUS (SUS304)

6. Durability

6.1. Thermal resistance

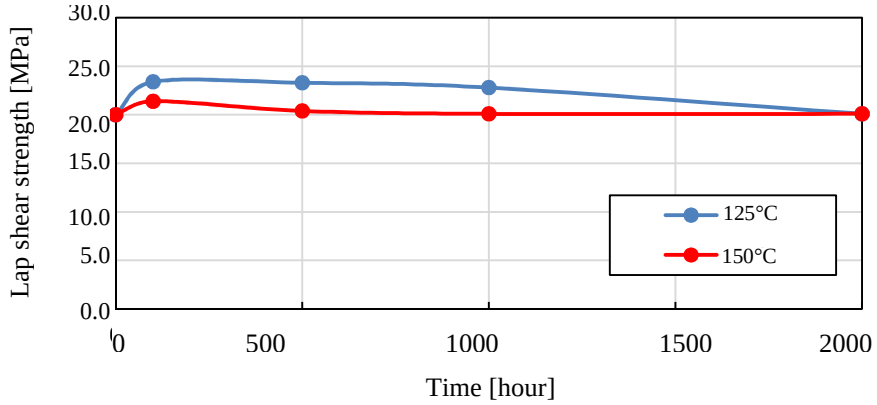

Fig. 5 Heat resistance (lap shear strength) of TB2235L
Curing conditions: 140°C for 30 min Environmental conditions: 125°C/150°C
Measuring conditions: 3TS-4100-011 Material: SUS/SUS (SUS304)

6.2. Moisture resistance

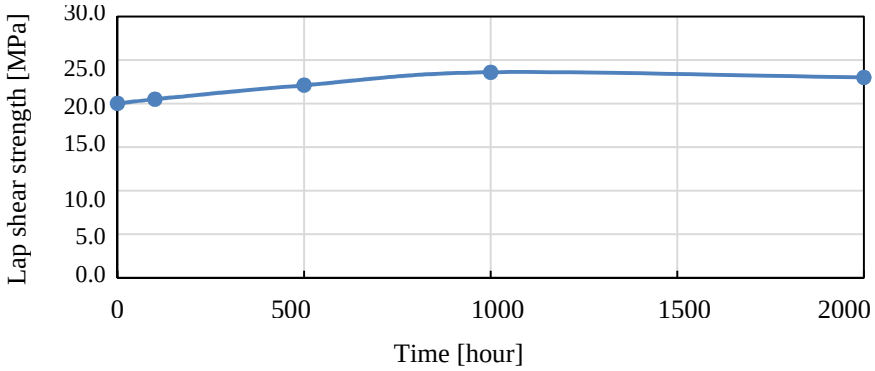

Fig. 6 Moisture resistance (lap shear strength) of TB2235L
Curing conditions: 140°C for 30 min Environmental conditions: 85°C, 85%RH
Measuring conditions: 3TS-4100-011 Material: SUS/SUS (SUS304)

6.3. Heat cycle

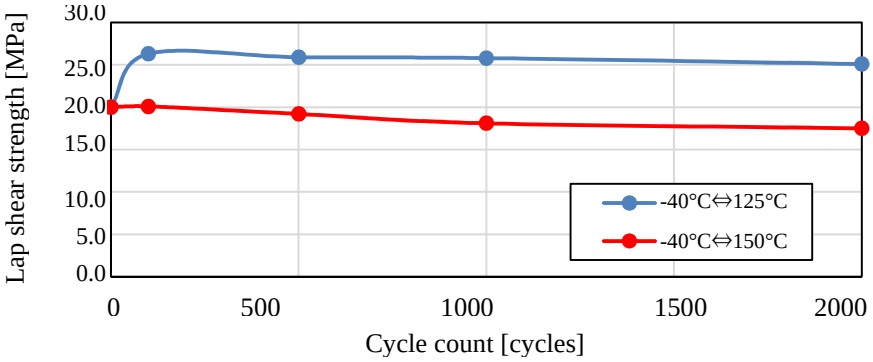

Fig. 7 Heat cycle resistance (lap shear strength) of TB2235L
Curing conditions: 140°C for 30 min
1 cycle: (-40°C × 30 min + 125°C × 30 min)
(-40℃×30min+150℃×30min)
Measuring conditions: 3TS-4100-011 Material: SUS/SUS (SUS304)

7. Usage

(1) To prevent dew condensation, unseal and use the resin after it has reached room temperature.

(2) Completely remove dust, oil and other contaminants from the surfaces to be coated with the resin.

(3) The curing conditions vary depending on the thermal capacities of the substrate and peripheral components and the applying method.
Check the conditions with actual parts, and determine the optimum curing conditions.

8. Directions for use

(1) Before using, sufficiently confirm whether the method of application and the purpose are appropriate.

(2) Settlement of the filler or increase in resin viscosity may be caused if it is stored at a high temperature or for a long time. Therefore, store it in a refrigerator (-5 to 10°C), and return it to room temperature prior to use. (If it is unsealed before it reaches room temperature, dew condensation can occur, and nonconformity, such as gelation, may be caused when the resin gets into contact with the dew.) After unsealing, use entire contents as soon as possible.

(3) Some materials may deteriorate if this product is used. The effects of the adhesive on the substrates must be confirmed by the operator in advance. Refrain from using the adhesive if any detrimental effects are observed.

(4) When heated, it generates heat through curing reaction. Take care not to burn yourself.

(5) Due to the properties of the resin, slight discoloration may occur.

(6) It is harmful to the health. Do not touch it directly or inhale its vapor.

(7) Use suitable protective equipment, such as a mask, goggles and gloves (impervious). Use in a well-ventilated outdoor area or in a place equipped with a local exhaust system.

(8) If swallowed, do not induce vomiting. Immediately rinse the mouth, and get medical attention.

(9) If in eyes, repeatedly and sufficiently rinse with clean water, and get medical attention.

(10) If it adheres to the skin, wipe it away with a cloth, and wash the skin with soap.

(11) If any bodily abnormalities occur, discontinue use, and get medical attention.

(12) Persons with allergies or sensitive skin should avoid using it.

(13) This product is not designated as a hazardous material under the Fire Service Act. However, as with general adhesives, take precautions against fires.

(14) Keep out of reach of children.

(15) For detailed hazard information of the product, see the Safety Data Sheet (SDS).

9. Storage

(1) Store it with the cap tightly fitted to prevent deterioration and contamination.

(2) Store in an indoor dark dry place at -5 to 10°C avoiding fire, heat sources and direct sunlight.

10. Disposal

Ask an industrial waste disposal firm authorized by the governor to dispose of the product and its empty container as industrial waste.

11. Cautions

For Industrial Use Only

(Do not use for household purposes.)

This product is developed for general industrial use. Before using this product, the user must accept the following 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.
- Before using this product, confirm the appropriateness and safety of the use for the application in question, and bear all responsibilities and risks involved in the use. Never embed or inject into bodies nor use as a medical implant that may be 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 Safety Data Sheets (SDS).

To obtain the SDS, contact our sales office or customer service center.

- Information in this document is subject to change at our own discretion.

13. Registered trademark

ThreeBond is a trademark or a registered trademark of ThreeBond Co., Ltd. s