ThreeBond

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ThreeBond Co., Ltd.

Technical Data
ThreeBond 2249K
Heat-curable, one-component epoxy-compound resin

1. Product description

ThreeBond 2249K is a one-component heat-curing epoxy resin having well-balanced shear bond strength and peel strength.

Hereinafter, ThreeBond is abbreviated to TB.

2. Features

(1) High adhesive strength
(2) Retains shape. Enabling vertical and ceiling applications.
(3) Excellent pot life

3. Applications

(1) Structural adhesive
(2) Weld bonding
(3) Bonding of various metals
(4) Bonding of other and general materials

4. Properties

4.1 Various properties

Table 1 Properties of TB2249K

Test item	Unit	Result	Test method	Remarks
Appearance	-	Black	3TS-2100-020	-
Viscosity	Pa·s	882	3TS-4200-001	Shear rate: 5.0 s^{-1}
TI value	-	1.9	3TS-2F10-008	Shear rate: $0.5s^{-1}/5.0s^{-1}$
Specific gravity	-	1.23	3TS-2500-002	25ºC

4.2 Flow curves

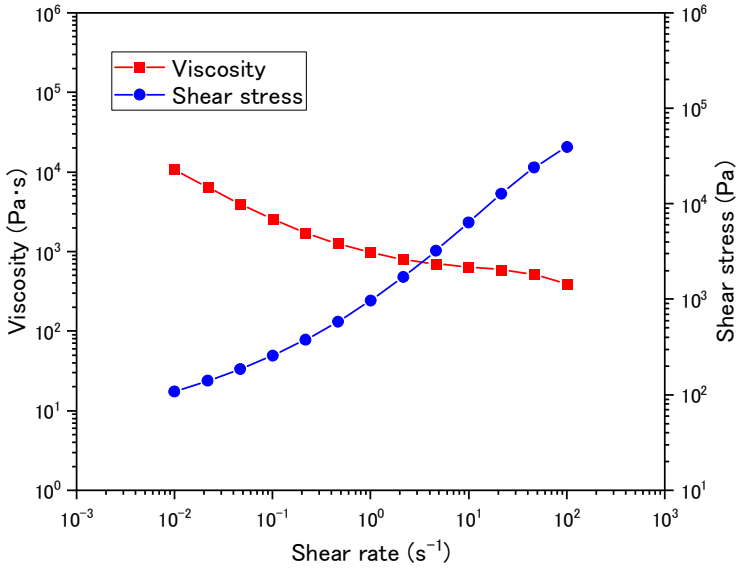

Fig. 1 Flow curves of TB2249K
Measuring temperature: 25°C
Measuring conditions: 3TS-4200-001
Measuring device: HAAKE MARS-60
Probe: C20/4

4.3 Temperature-viscosity curve

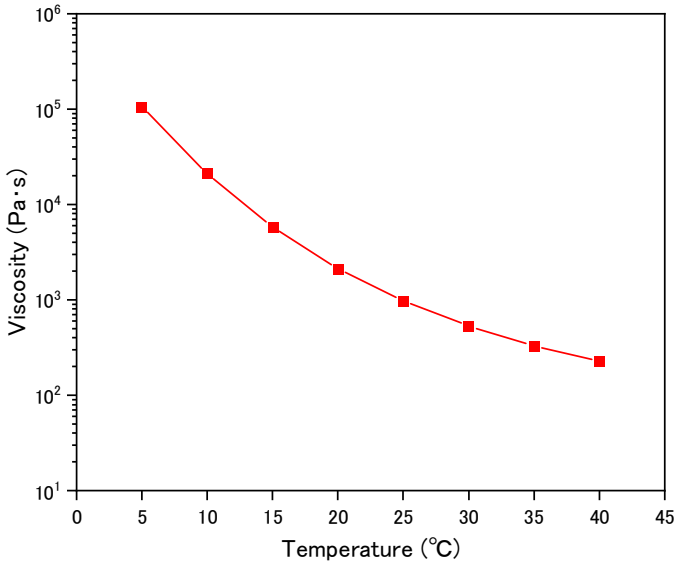

Fig. 2 Temperature-viscosity curve of TB2249K
Shear rate: 1.0 (s^{-1})
Measuring conditions: 3TS-4200-003
Measuring device: HAAKE MARS-60
Probe: C20/4

5. Characteristics

5.1 Characteristics of cured resin

Table 2 Characteristics of TB2249K after curing

Test item	Unit	Result	Test method	Remarks
Hardness	-	D81	3TS-2B00-010	10-g circular (40 in diam.) cured material
Water absorption rate	%	1.1	3TS-2530-003	10-g circular (40 in diam.) cured material Boiling for 2 hrs
Tensile shearing adhesion strength	MPa	34.6	3TS-4100-011	Fe/Fe (SPCC-SD)
		30.2		Al/Al (A6061P)
		26.1		SUS/SUS (SUS304)
		24.6		Cu/Cu (C1100P)
		19.0		GFRP/GFRP
		2.1		PC/PC
T-peel strength	kN/m	5.2	3TS-4130-021	Fe/Fe (SPCC-SD)
		5.7		Al/Al (A1050P)
Storage modulus (E')*1	GPa	4.6	3TS-4730-001	25ºC
		1.6		80ºC
		0.25		120ºC
Loss modulus (E") peak*1	ºC	111		DMA method, 1 Hz
Loss tangent (tan δ) peak*1	ºC	126		DMA method, 1 Hz
Glass transition temperature*1	ºC	118	3TS-4740-001	TMA method
Linear expansion coefficient (α_1)*1	$\times 10^{-6}$/°C	62		0-40ºC
Linear expansion coefficient (α_2)*1		184		180-220ºC

Curing condition: 130°C for 30 min
*1 Curing condition: 130°C for 60 min

5.2 Electrical characteristics of cured resin

Table 3 Electrical characteristics of TB2249K after curing

Test item	Unit	Result	Test method	Remarks
Volume resistivity	Ω·m	3.1×10^{12}	3TS-5200-001	-
Surface resistivity	Ω	2.1×10^{14}	3TS-5200-002	-
Dielectric breakdown strength	kV/mm	25.7	3TS-5230-002	-
Dielectric constant	-	3.5	3TS-5220-001	1kHz
	-	3.3		1MHz
Dielectric loss tangent	-	0.013		1kHz
	-	0.022		1MHz

Curing condition: 130°C for 30 min

5.3 Adhesion strength to oily surfaces

Table 4 Adhesion strength of TB2249K to oily surfaces

Oil concentration (wt%)	Unit	Result	Test method	Remarks
0 (degreased surface)	MPa	31.3	3TS-4100-011	Fe/Fe (SPCC-SD)
5		30.9		
10		30.5		
15		29.1		
20		28.4		
30		27.9		
50		27.5		
100		27.0		

Curing condition: 130°C for 30 min
Test piece preparation method: After dipping the test piece in an oil[*1] solution diluted with toluene, dry for 1 hour at room temperature and assemble.
*1 Oil: Mineral oil-based rust preventive oil

6. Durability

6.1 Heat resistance

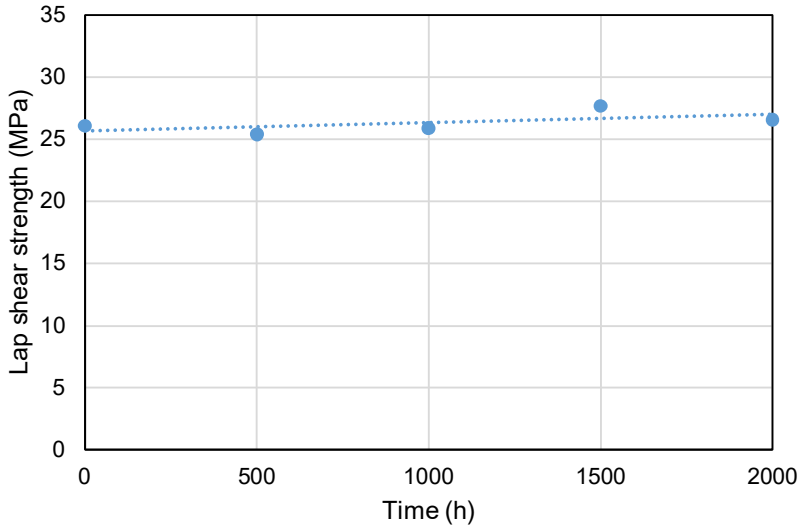

Fig. 3 Heat resistance (tensile shearing adhesion strength) of TB2249K
Curing condition: 130°C for 30 min
Environmental condition: 150°C
Measuring conditions: 3TS-4100-011
Test piece material: SUS/SUS (SUS304)

6.2 Moisture resistance

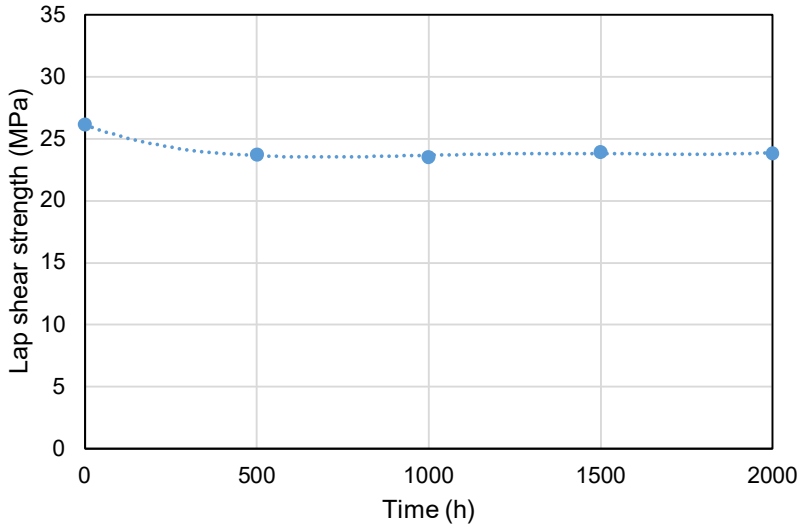

Fig. 4 Moisture resistance (tensile shearing adhesion strength) of TB2249K
Curing condition: 130°C for 30 min
Environmental conditions: 85°C, 85%RH
Measuring conditions: 3TS-4100-011
Test piece material: SUS/SUS (SUS304)

6.3 Heat cycle resistance

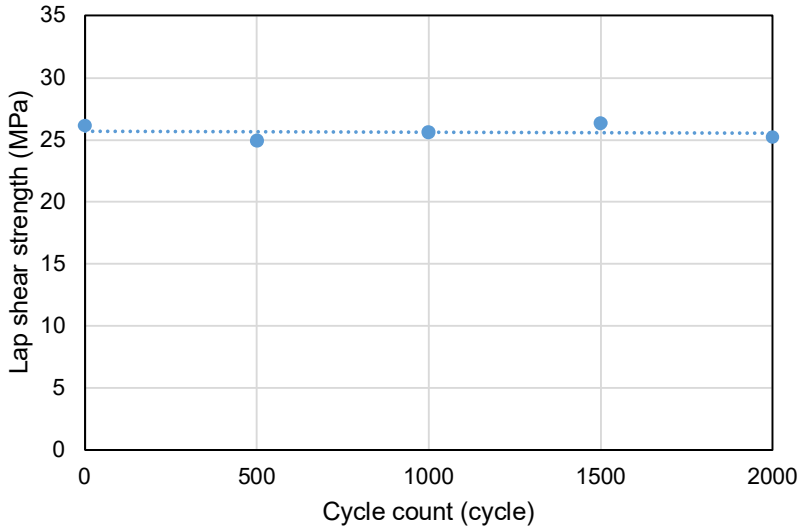

Fig. 5 Heat cycle resistance (tensile shearing adhesion strength) of TB2249K
Curing condition: 130°C for 30 min
Environmental conditions: -40°C×30 min + 150°C×30 min
Measuring conditions: 3TS-4100-011
Test piece material: SUS/SUS (SUS304)

7. Storage stability at 40°C

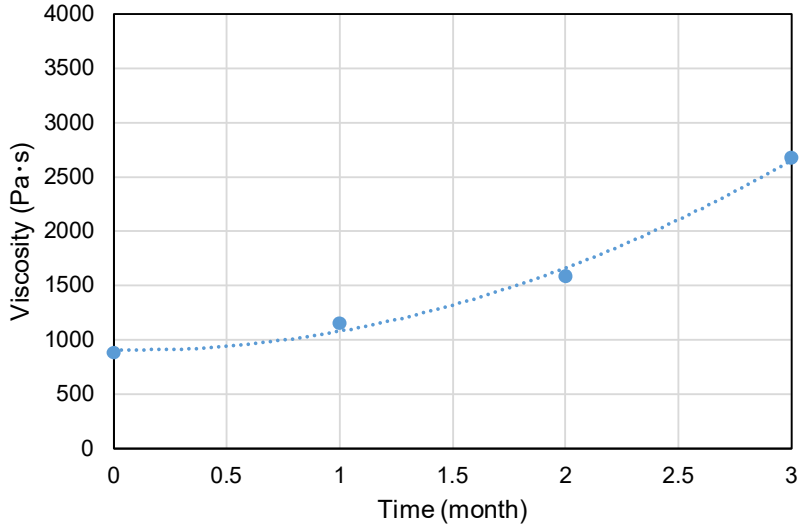

Figure 6 Storage stability at 40°C
Storage style: 330 ml cartridge
Storage volume: 380 g

8. 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 parts and the application method.
Check the conditions with actual parts and determine the optimum curing conditions.

9. Directions for use

(1) Before using, sufficiently confirm whether the method of application and the purpose are appropriate.
(2) The filler may settle or the resin may increase in viscosity if it is stored at 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 resin on the substrates must be confirmed by the operator in advance. Refrain from using the resin 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 vapors.
(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 on skin, wipe away with a cloth and wash with soap.
(11) If any bodily abnormalities occur, discontinue use and get medical attention.
(12) Persons who have 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).

10. Storage

(1) Store 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.

11. Disposal

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

12. Precautions

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 rights.
- 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