ThreeBond

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ThreeBond Co., Ltd.

Technical Data

ThreeBond 1773E

Instant adhesive with light-curing property

1. Outline

ThreeBond 1173E is an α-cyanoacrylate-based instant adhesive with a light-curing property. With the aid of the unique photo-anionic polymerization technology developed by Three Bond, this instant adhesive can cure under irradiation with light (ultraviolet or visible light). Overflow of the adhesive can cure quickly before it causes blushing, and the adhesive even in wide clearances, where existing instant adhesives cure slowly, can cure quickly under irradiation with light. The adhesive has a high performance, on a par with the existing instant adhesives, and can be used for a wider range of purposes.

(Hereinafter, ThreeBond is abbreviated to TB.)

2. Features

(1) The light-curing property developed by the proprietary technology of Three Bond is added to the properties of existing instant adhesives.
(2) Overflow of the adhesive can be cured by irradiation with light.
(3) Since the adhesive penetrating between the substrates quickly cures, jigs for temporarily securing parts are not required.
(4) Blushing can be prevented by irradiation with light.
(5) Under irradiation with light, the adhesive can be used as a filler adhesive, which is difficult to do with existing instant adhesives.
(6) Since the adhesive is light-cured through anionic polymerization, its curing is not inhibited by oxygen, and its surface curability is excellent.
(* It does not adhere to soft vinyl chloride, silicone, polyolefin, fluoroplastics, or permeable materials.)
(7) It can serve as a substitute for adhesives used with accelerators.
(8) It has a high adhesion to a wide range of materials
(9) Since it has a medium viscosity, it excels both in penetrability into gaps between surfaces to be bonded and in anti-sagging property.

Disclaimer:

This product is covered by U.S. Patent Nos. 5,691,113, 5,877,230 and 5,652,280.

3. Major uses

- Electric, electronic, optical and general parts that are required to be free from blushing
- Securing and bonding of optical lens supports
- Securing and bonding of various light-shielding nonmetallic materials
- Securing and bonding of decorative materials
- Bonding of joints of printer heads and bearings
- Securing of floppy disk drive parts, such as carriages and magnetic shields
- Bonding of joints of drum motors and main shafts
- Bonding of glass frames and nameplates

4. Properties and characteristics

4.1 Properties and general characteristics

Table 1 Properties and general characteristics

Item		Unit	TB1773E	Test method
Appearance		-	Clear yellow	3TS-201-01
Viscosity		mPa·s (cP)	150 (150)	3TS-210-01
Setting time	NBR/NBR	sec	2	3TS-220-01
	Iron/iron		5	3TS-220-04
Tensile shear bond strength	Iron/iron	MPa (kgf/cm^2)	15.9	3TS-301-11
Linear expansion coefficient (0 to 100° C)		$\times 10^{-6}$/°C	75 - 99	3TS-501-05
Glass transition temperature, Tg		°C	123	3TS-501-02
Standard curing conditions:	UV curing	kJ/m^2 (J/cm^2)	10 (1)	4-kW high-pressure mercury vapor lamp
	Visible light curing	kJ/m^2 (J/cm^2)	0.2 (0.02)	250-W halogen lamp

The parenthesized values are given for your reference.

4.2 Electrical characteristic

Table 2 Electrical characteristics of cured adhesive

Item		Unit	TB1773E	Test method
Dielectric breakdown voltage		kV/mm	26.0	3TS-406-01
Volume resistivity		Ω·m	5.9×10^{13}	3TS-401-01
Surface resistivity		Ω	5.9×10^{12}	3TS-402-01
Dielectric constant	1MHz	-	2.69	3TS-405-01
	1KHz	-	3.34	
Dielectric loss tangent	1MHz	-	0.0529	
	1KHz	-	0.0534	

4-3. Adhesion to metals

Table 3 Adhesion to metals (tensile shear bond strength, MPa (kgf/cm^2))

Metals	TB1773E	Test method
Iron/iron	15.9 (162)	3TS-301-11
Iron/aluminum	12.9 (131)	
Iron/SUS	11.5 (117)	
Iron/copper	14.4 (147)	
Iron/brass	10.9 (111)	
Aluminum/aluminum	11.2 (115)	
Aluminum/SUS	12.7 (129)	
Aluminum/copper	12.0 (122)	
Aluminum/brass	12.7 (129)	
SUS/SUS	11.3 (115)	
SUS/copper	9.7 (99)	
SUS/brass	10.5 (108)	
Copper/copper	13.5 (137)	
Copper/brass	10.9 (111)	
Brass/brass	10.3 (105)	

The parenthesized values are given for your reference.

4-4. Adhesion to plastics

Table 4 Adhesion to plastics (tensile shear bond strength, MPa (kgf/cm^2))

Plastic	TB1773E	Test method
Polycarbonate	8.9 (91)*	3TS-301-11
Phenol	8.9 (91)*	
Nylon 6	7.1 (72)*	
Nylon 6,6	4.0 (41)	
ABS	6.7 (68)*	
Glass epoxy	14.5 (148)	
PET	12.9 (132)*	
PBT	8.5 (87)	
PPO	9.8 (100)*	
PPS	1.8 (18)	
Polyacetal	1.2 (12)	
Acrylic	8.4 (85)*	
Polystyrol	3.6 (37)*	
HIPS	3.9 (40)*	

The parenthesized values are given for your reference.

ABS: Acrylonitrile-butadiene-styrene resin
PET: Polyethylene terephthalate
PBT: Polybutylene terephthalate
PPO: Polyphenylene oxide
PPS: Polyphenylene sulfide
HIPS: High-impact polystyrene

* indicates material failure of the substrate.

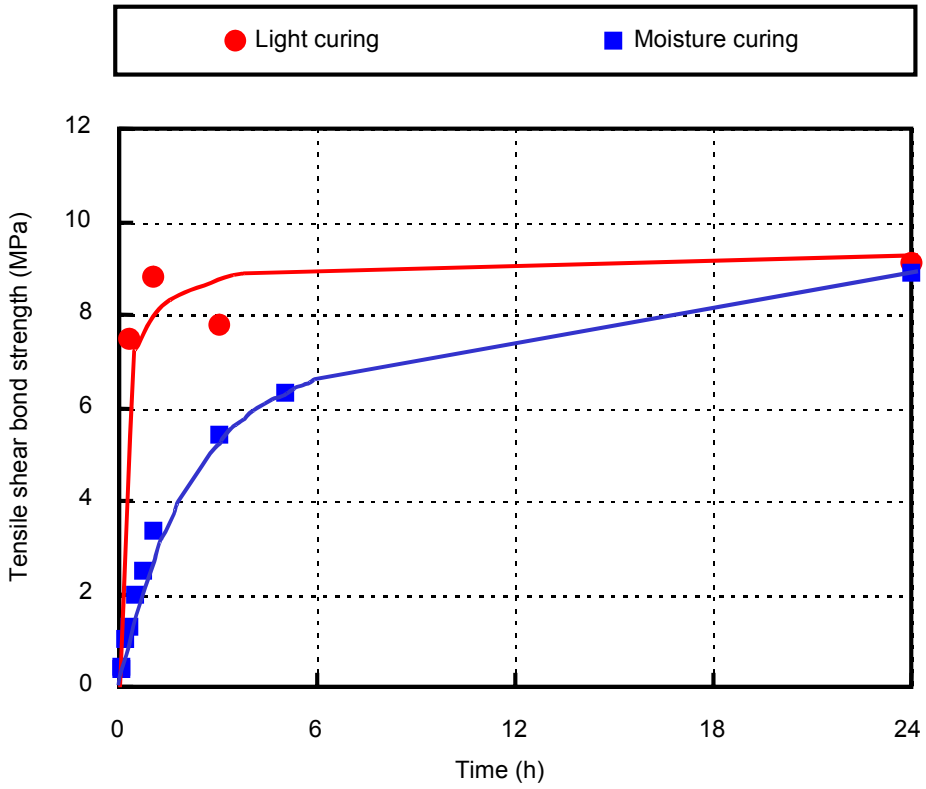

Fig. 1 Comparison of light curing speed and moisture curing speed (substrate: polycarbonate)

Note: The adhesive was irradiated with light at an integrated light intensity of 3.5 kJ/m^2 with a 4-kW high-pressure mercury vapor lamp.
For moisture curing, the adhesive was kept in an environment with a humidity of 50% at 25℃ and shaded from light.

4-5. Adhesion to rubbers

Table 5 Adhesion to rubbers (tensile shear bond strength, MPa (kgf/cm^2))

Rubber	TB1773E	Test method
NR	Material failure in all cases	3TS-301-13
CR		
NBR		
SBR		
EPDM		

NR: Natural rubber
CR: Chloroprene rubber
NBR: Nitrile-based rubber
SBR: Styrene-butadiene rubber
EPDM: Ethylene-propylene-diene terpolymer

5. Durability

5-1. Thermal resistance

Steel sheet test pieces were bonded with the adhesive, and the adhesive was cured for 24 hours. Then, after aging at various temperatures for the specified time, the test pieces were cooled to room temperature, and the tensile shear bond strength was measured (3TS-301-11).

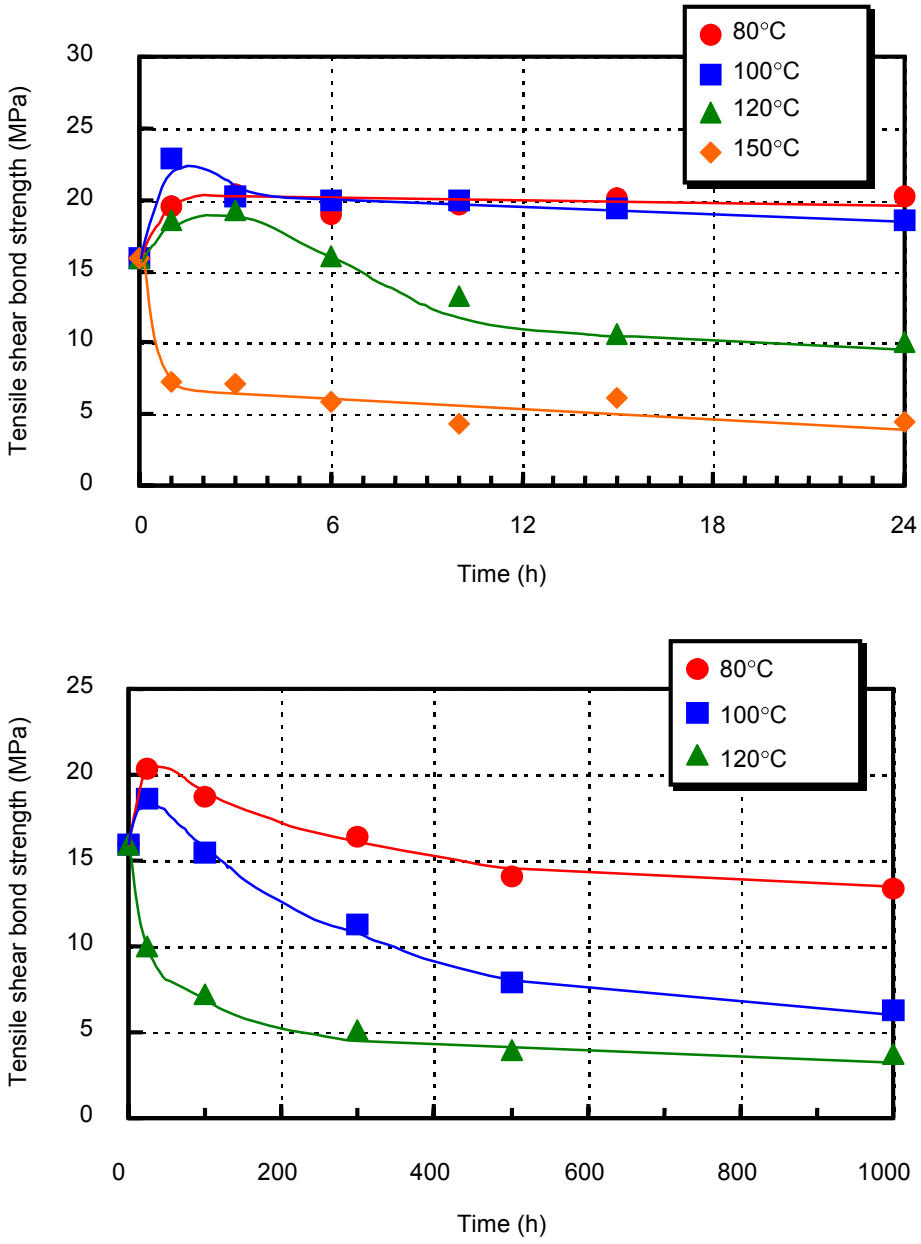

Fig. 2 Thermal resistance of TB1773E

5-2. Moisture resistance

Aluminum test pieces were bonded with the adhesive, and the adhesive was cured for 24 hours. Then, after aging at various temperaturs and amount of moistures for the specified time, the test pieces were cooled to room temperature, and the tensile shear bond strength was measured (3TS-301-11).

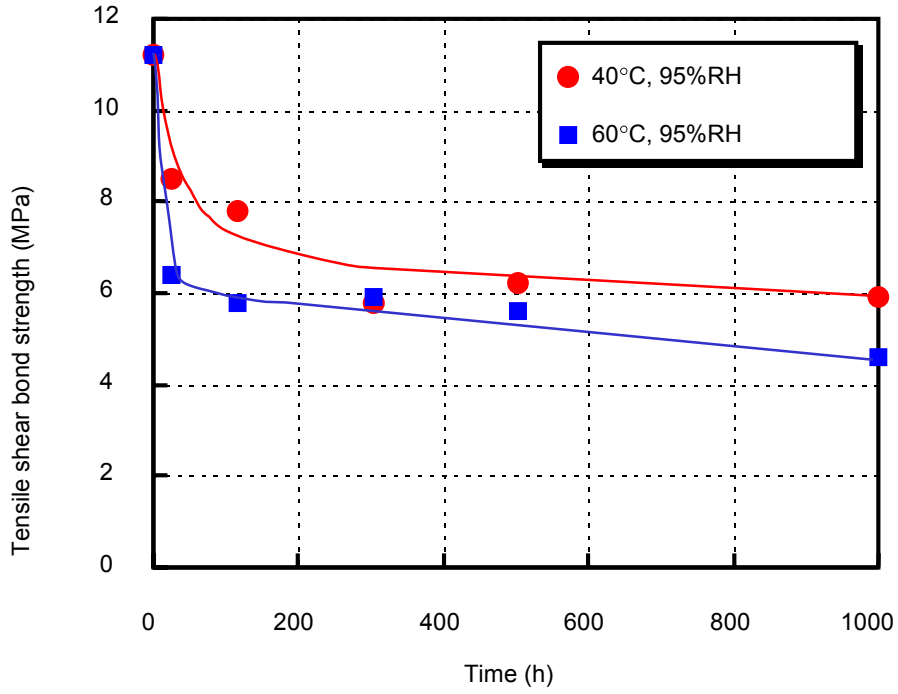

Fig. 3 Moisture resistance of TB1773E

6. Usage

(1) Remove moisture, oil, rust and other contaminants from the surface to be bonded and the fitting area.

(2) Apply the adhesive to the surface to be bonded and the fitting area.

(3) When using as a filler adhesive, cure the adhesive using an irradiator.

(4) To bond surfaces, rub the surfaces to spread the adhesive liquid thin and uniformly, and fix them in the specified position.

(5) Cure the overflow or any adhesive away from the bonded surfaces with an irradiator.

7. Instructions for use

- Use and store the product out of reach of children.
- Do not use it near fire. Doing so may cause a fire.
- It irritates the eyes, skin and respiratory organs.
- When using it, wear appropriate protective clothing, such as a mask, gloves (impervious) and goggles. Use it in a well-ventilated outdoor area or in a place equipped with a local exhaust system.
- If it gets in the eyes, wash them with clean water for about 15 minutes, and get medical attention. While washing the eyes, take care not to blink too frequently or rub the eyes. Never use a stripper or a solvent, as doing so may damage the eyeballs.
- If it adheres to the skin, immediately wipe it away with cloth, and wash the skin with soap.
- If any abnormality is found in the body, stop using the adhesive, and get medical attention.
- Do not use it on the human body.
- People who have allergies or sensitive skin should avoid using it.
- The agent may spout from the nozzle. Do not open the cap with the nozzle pointing towards someone.
- It strongly and quickly bonds the skin and mucous membranes. Handle it carefully.
- If fingers are bonded with it and cannot be separated, do not separate the fingers forcibly. Separate them by rubbing them in warm water at 40°C or so.
- If it adheres to clothing, the skin may be scalded with the heat generated by chemical reaction. Handle it carefully.
- The curing speed varies depending on the type of light source and irradiation distance. Check the curing speed prior to use.
- It may generate a large amount of heat and foams depending on the curing conditions. Sufficiently check the conditions prior to use.
- Do not put it near alkaline substances, such as cure accelerators and epoxy resin cure agents.
- To prevent dew condensation, unseal the container after it returns to room temperature.
- Ascertain in advance whether or not it affects the parts to be sealed with it. If any problem occurs, do not use it.
- Some material may be deformed by the heat of chemical reaction.
- Some material may deteriorate if this product is used.
- If some adhesive overflow remains, the periphery of the bonded part becomes whitish with the solidified vapor of the adhesive. Irradiate the overflow with light, or treat it appropriately.
- It cures slowly under the influence of interior lamps or sunlight. Bond the substrates immediately after applying.
- After using this adhesive, store it with the cap tightly fitted.

- Store it in a dark dry place at 5 to 10°C avoiding direct sunlight (in a refrigerator).
- The adhesive does not adhere to polyethylene, polypropylene, fluoroplastics, silicone resin, soft PVC or glass.
- For hazard and toxicity information not mentioned herein, see the MSDS (material safety data sheet).

8. Storage

After using, fit the cap tightly, and store it in a dark dry place at 5 to 10°C avoiding direct sunlight (in a refrigerator).

9. Disposal

After the adhesive has all been used, seal the container, and dispose of it as non-burnable garbage.

10. Applicable laws

Fire Defense Law:	Fourth class, third type petroleum product. Hazard class III. Cyanoacrylate adhesive. Flammable
Labor Safety and Sanitation Law:	Not applicable

11. Cautions

For industrial use only (Do not use it for household products.)

This product has been developed for general industrial use. Before using the 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 introduced herein do not conflict with any intellectual property right.
- Users are asked to evaluate the validity and safety of the use of the product for the relevant purpose prior to use and bear all responsibilities and hazards involved in its use.
  Never use the product for medical implants that will be implanted or injected into the body or 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 and use of the relevant product are unknown, never use it.
- For detailed information on product safety, see the material safety data sheet (MSDS).
  To obtain the MSDS, contact our sales department or customer service office.
- This document is subject to change at our discretion.