ThreeBond

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Three Bond Co., Ltd.

Technical Data

ThreeBond 1771E
Instant adhesive with light-curing property

1. Outline

ThreeBond 1771E 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). Existing instant adhesives may cause blushing on adhesive overflow, and in wide clearances where the adhesives cure slowly. Since this adhesive has a high performance, on a par with the existing instant adhesives, and can cure quickly under irradiation with light, it can be used for various 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 into the substrate 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 strongly adheres to a wide range of materials.

(9) Its viscosity is so low that it can penetrate into gaps between surfaces to be bonded.

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	TB1771E	Test method
Appearance		—	Clear yellow	3TS-201-01
Viscosity		mPa·S (cP)	2 (2)	3TS-210-01
Set time	NBR/NBR	sec	2	3TS-220-01
	Iron/iron		3	3TS-220-04
Tensile shear bond strength	Iron/iron	MPa (kgf/cm^2)	15.1	3TS-301-11
Linear expansion coefficient (0 - 100°C		$\times 10^6$/°C	81 - 103	3TS-501-05
Glass transition temperature Tg		°C	124	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)	0.4 (0.04)	250 W Halogen lamp

The parenthesized values are given for your reference.

4.2 Electrical characteristics

Table 2 Electrical characteristics of cured adhesive

Item		Unit	TB1771E	Test method
Dielectric breakdown voltage		kV/mm	27.0	3TS-406-01
Volume resistivity		Ω·m	5.4×10^{13}	3TS-401-01
Surface resistivity		Ω	1.2×10^{13}	3TS-402-01
Dielectric constant	1MHz	—	3.27	3TS-405-01
	1KHz	—	4.05	
Dielectric loss tangent	1MHz	—	0.0511	
	1KHz	—	0.0522	

4.3 Adhesion to metals

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

Metal	TB1771E	Test method
Iron/Iron	15.1 (153)	3TS-301-11
Iron/aluminum	12.2 (124)	
Iron/SUS	13.8 (140)	
Iron/copper	13.3 (136)	
Iron/brass	11.3 (115)	
aluminum/aluminum	10.6 (108)	
aluminum/SUS	9.4 (96)	
aluminum/copper	11.9 (121)	
aluminum/brass	8.3 (85)	
SUS/SUS	11.9 (121)	
SUS/copper	9.3 (96)	
SUS/brass	9.0 (93)	
copper/copper	11.5 (117)	
copper/brass	11.7 (119)	
brass/brass	9.2 (94)	

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	TB1771E	Test method
Polycarbonate	11. 0 (112)*	3TS-301-11
Phenol	8. 8 (89)*	
Nylon 6	7. 1 (73)*	
Nylon 6/6	2. 4 (25)	
ABS	7. 4 (75)*	
Glass epoxy	13. 1 (134)	
PET	12. 2 (124)*	
PBT	6. 0 (62)	
PPO	10. 4 (106)*	
PPS	1. 2 (12)	
Polyacetal	0. 5 (5. 2)	
Acrylic	5. 8 (59)*	
Polystyrol	3. 5 (36)*	
HIPS	3. 7 (38)*	

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

The parenthesized values are given for your reference.
* indicates material failure of the substrate.

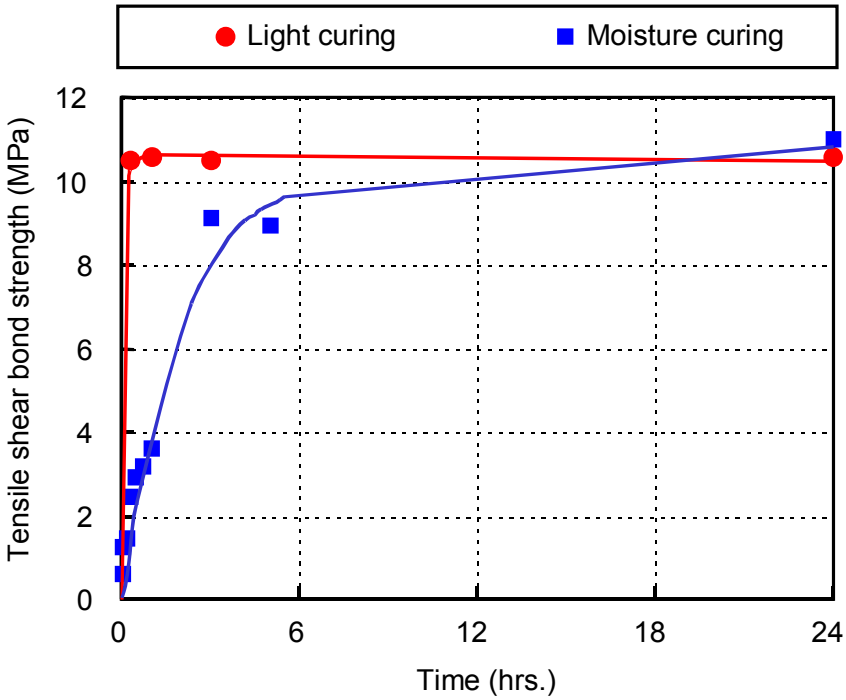

Fig. 1 Comparison of light curing speed and moisture curing speed (substrate: polycarbonate)

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°C and shaded from light.

4.5 Adhesion to rubbers

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

Rubber	TB1771E	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 Monomer

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).

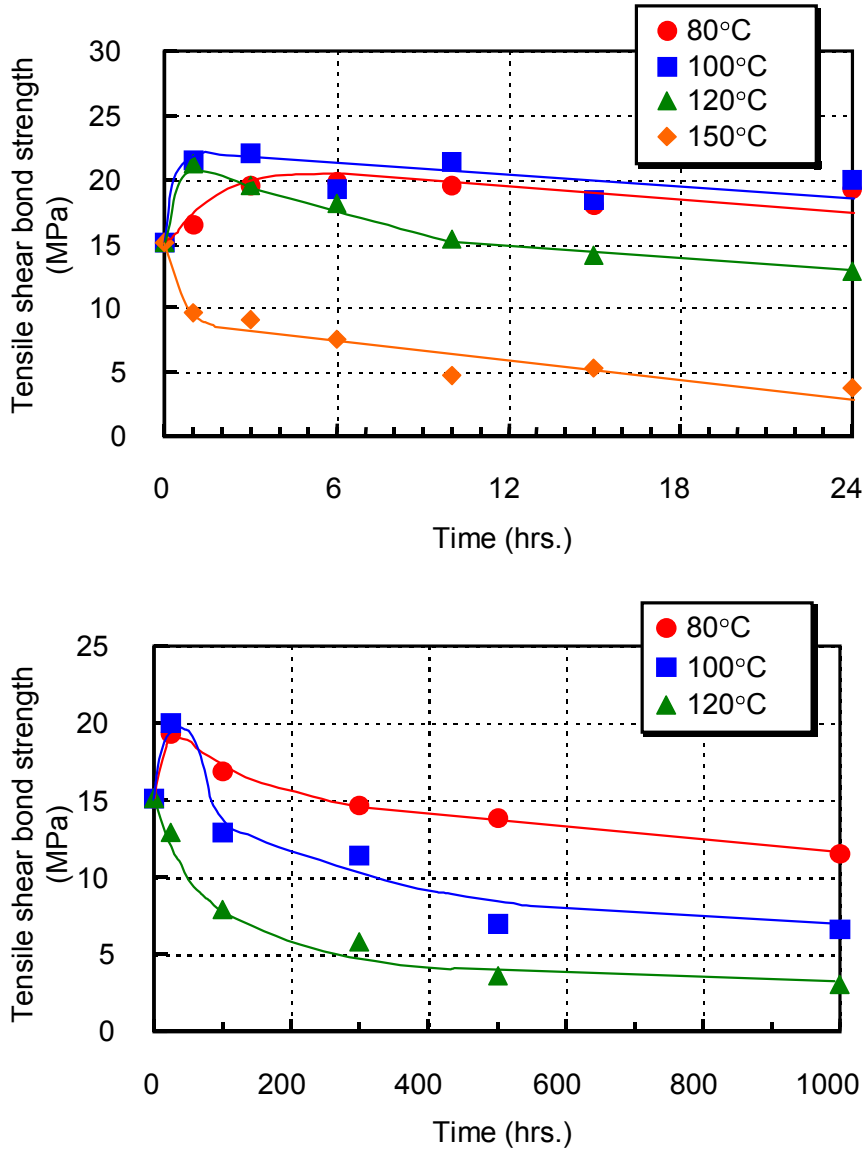

Fig. 2 Thermal resistance of TB1771E

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 temperatures 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).

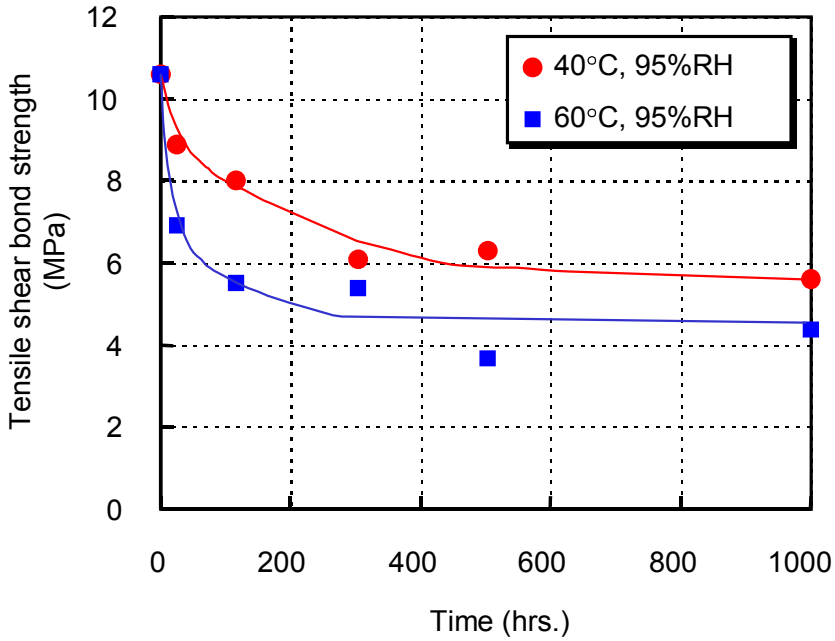

Fig. 3 Moisture resistance of TB1771E

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 adhesive out of reach of children.
- It is flammable. Do not use it near fire.

- It can irritate the eyes, skin and respiratory organs.
- When using it, wear appropriate protective clothings, such as a mask, gloves (not permeable) 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 an agent, as doing so may damage the eyeballs.
- If it adheres to the skin, wipe it away with a 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 adhesive 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 condensation, unseal the container after it reaches room temperature.
- Ascertain in advance whether or not it affects the parts to be bonded with it. If any problem occurs, do not use it.
- Some materials may be deformed by the heat of chemical reaction.
- Some materials 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.
- The adhesive slowly cures under interior lighting or sunlight. Bond the part immediately after applying it.
- 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).
- It does not adhere to polyethylene, polypropylene, fluoroplastics, silicone resin, soft vinyl chloride 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 away from 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. Safety precautions

For industrial use only (It is not intended for household use)

Before using the product, approve the following conditions of sale.

(1)This technical information gives experimental values obtained by our specified test methods. We cannot thoroughly guarantee the correctness and perfectness of the data.

The user should determine whether the product is appropriate to the use and purpose before using it, and take all responsibilities for danger caused by it. The guarantee applies only to replacement of apparently defective product.

(2)We are not liable to injuries and damages caused by improper handling of this product.

(3)We do not take responsibility for any matter not mentioned herein unless otherwise mutually agreed in the contract.