ThreeBond

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Three Bond Co., Ltd.

Technical Data
ThreeBond 1771M
Instant adhesive with light-curing property

1. Product description

ThreeBond 1771M is an α-cyanoacrylate-based instant adhesive with a light-curing property. Since the adhesive can cure in a short time under irradiation with UV light or visible light having a wavelength of 200 to 450 nm, it will be helpful in improving the production speed, saving energy and preventing blooming. In addition, since it has moisture curability, it can cure with absorbed water in substrates or moisture in the air even in narrow gaps in which it is difficult to irradiate light to the adhesive. Also, it conforms to ISO10993 (biological safety assessment).

(Hereinafter, ThreeBond is abbreviated to TB.)

2. Features

(1) It can be quickly cured by irradiation with light.
(2) Low viscosity and excellent gap penetration.
(3) Blushing can be prevented by irradiation with light.
(4) Since it cures with light through anionic polymerization, it is not affected by oxygen inhibition and has good surface curability.
(5) In areas not exposed to light, it can cure with moisture. Therefore, there is no possibility of curing failure.
(6) Reduces working hours and improves line productivity.
(7) Conforming to ISO10993 (biological safety assessment).

3. Applications

(1) Penetration into gaps for solidification.
(2) Electric, electronic, optical and general parts that must be free from blushing.
(3) Bonding of hard-to-bond materials which cannot be bonded with general UV-curing adhesives.

4. Properties and characteristics

4.1 Properties and general characteristics of TB1771M

Table 1 Properties and general characteristics of TB1771M

Test item	Substrate	Unit	Result	Test method
Appearance	-	-	Yellow to transparent yellow green	3TS-2100-001
Viscosity	-	mPa·s	2	3TS-2F00-001
Specific gravity (25ºC)	-	-	1.05	3TS-2500-002
Set time (25ºC, 50%RH)	NBR	sec	2	3TS-3140-001
	PC		30	3TS-3140-004
	Iron		10	
Curing conditions (UV light curing)	-	kJ/m^2	10	4kW High-pressure mercury lamp
Lap shear strength (25ºC, 50% RH) × 24hrs	NBR	MPa	0.8(*)	3TS-4100-011
	PC		10.8(*)	
	Iron		17.5	
Lap shear strength (10 kJ/m^2)	PC	MPa	11.0(*)	3TS-4100-011

(Note) Set time and lap shear strength: As iron test pieces, sandblasted SPCC-SD was used. Other test pieces were used without treatment.
The conditions of lap shear strength test (25°C, 50%RH, for 24 hrs.) are moisture curing conditions. (10 kJ/m2) is the UV dose for curing with a high-pressure mercury lamp.
(*) in the table indicates material failure of the substrate.

4.2 Adhesion to various substrates (substrates of same materials)

For the lap shear strength test, sandblasted metal test pieces were used. Other test pieces were used without treatment. The test pieces were bonded with the agent in an environment with a relative humidity of 50% at 25ºC, and the agent was cured for 24 hours in the same environment. Then, the lap shear strength was measured at room temperature.
Test method: Lap shear strength (3TS-4100-011)

Table 2 Adhesion to various substrates

Substrate	Lap shear strength (MPa)
Iron	17.5
Aluminum	13.3
SUS	19.0
Brass	10.5
Copper	12.3
Nickel	8.7
Zinc chromate	4.0
Zinc die-cast	8.2
Magnesium	5.3
Hard PVC	2.0
Soft PVC	2.3(*)
PC (polycarbonate)	10.8(*)
Phenol	7.4(*)
Nylon -6	2.3
Nylon -6,6	9.5(*)
ABS (acrylonitrile-butadiene-styrene resin)	5.2(*)
Glass epoxy	16.8
PBT (polybutylene terephthalate)	3.4
PET (polyethylene terephthalate)	8.9(*)
PPO (polyphenylene oxide)	2.6
PPS (polyphenylene sulfide)	1.4
HIPS (high impact polystyrene)	3.5(*)
Acrylic	7.0(*)
POM (polyacetal)	1.5
NR (natural rubber)	0.4(*)
CR (chloroprene rubber)	0.6(*)
NBR (nitrile rubber)	0.8(*)
SBR (styrene-butadiene rubber)	1.8(*)
EPDM (ethylene propylene diene monomer)	0.7(*)

Note: (*) in the table indicates material failure of the substrate.

4.3 Characteristics of TB1771M after curing

Table 3 Characteristics of TB1771M after curing

Test item		Unit	Result	Test method
Linear expansion coefficient	0 to 100°C	$\times 10^{-6}$/°C	90	3TS-4740-001
	130 to 150°C		125	
Glass transition point (DMA E" peak)		°C	125	3TS-4730-001
Hardness		-	D80	3TS-2B00-004
Dielectric breakdown strength		kV/mm	29	3TS-5230-001
Volume resistivity		Ω·m	2.2×10^{13}	3TS-5200-001
Surface resistivity		Ω	6.4×10^{15}	3TS-5200-002
Dielectric constant	1kHz	-	3.9	3TS-5220-001
	1MHz	-	3.3	
Dielectric loss tangent	1kHz	-	0.036	
	1MHz	-	0.033	

4.4 Curing speed comparison between moisture curing and light curing

In the case of moisture curing, test pieces were bonded with the adhesive in an environment with a relative humidity of 50% at 25°C, and the adhesive was cured away from light in the same environment for the predetermined time. Then, the lap shear strength was measured.

In the case of light curing, test pieces were bonded with the adhesive in an environment with a relative humidity of 50% at 25°C, and immediately the adhesive was exposed to the light of a 4-kW high-pressure mercury lamp at a UV dose of 10 kJ/m2.Then, after the adhesive was cured for the predetermined time, the lap shear strength was measured.

Test method: Lap shear strength (3TS-4100-011)
Test piece: Polycarbonate

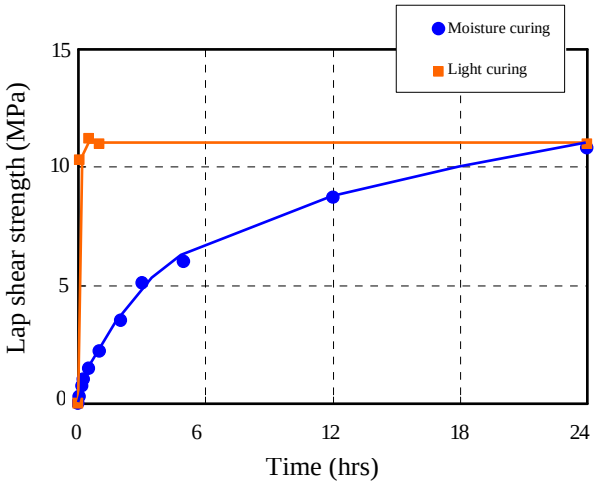

Fig.1 Curing speed comparison between moisture curing and light curing

5. Durability

5.1 Thermal resistance

Steel sheet test pieces were bonded with the adhesive in an environment with a relative humidity of 50% at 25°C, and the adhesive was cured for 24 hours in the same environment. Then, the test pieces were aged at various temperatures for the predetermined time, and the lap shear strength was measured after they were cooled to room temperature. (3TS-4100-011)

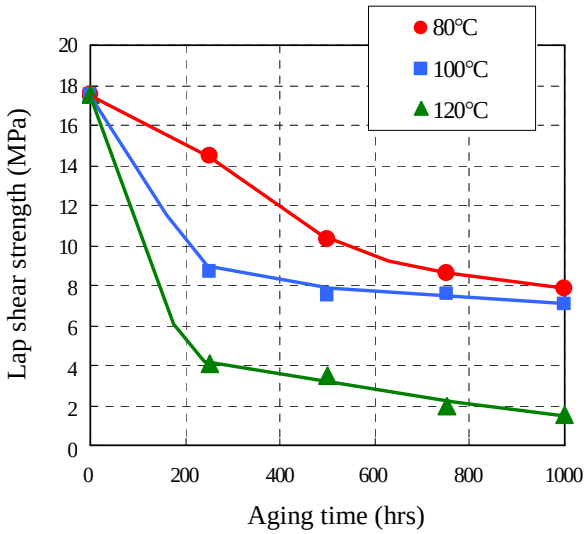

Fig.2 Heat resistance of TB1771M

5.2 Thermal resistance during heating

After steel sheet test pieces were bonded with the adhesive in an environment with a relative humidity of 50% at 25ºC and the adhesive was cured for 24 hours in the same environment, they were exposed to each temperature for 2 hours, and the lap shear strength was measured at the temperature.
(3TS-4100-011)

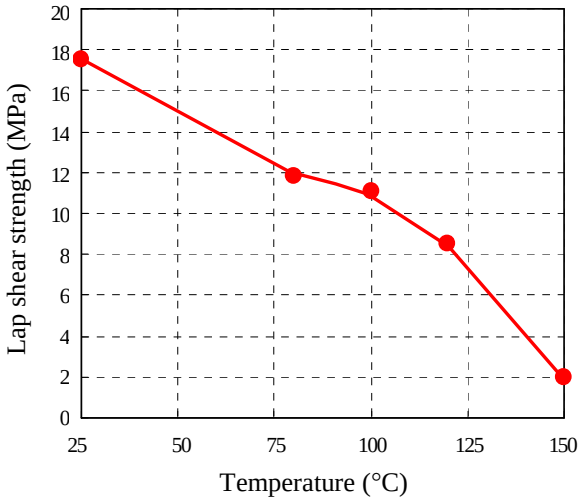

Fig.3 Heat resistance of TB1771M during heating

5.3 Moisture resistance

Aluminum test pieces were bonded with the adhesive in an environment with a relative humidity of 50% at 25°C, and the adhesive was cured for 24 hours in the same environment. Then, after aging at various temperatures and amount of moisture for the predetermined time, they were cooled to room temperature, and the lap shear strength was measured.
(3TS-4100-011)

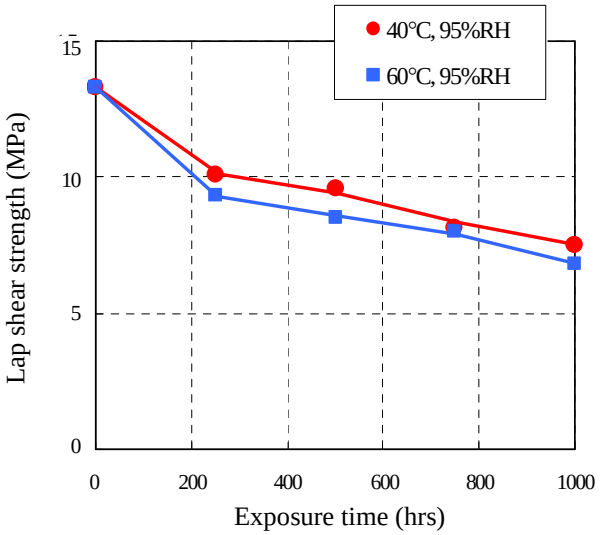

Fig.4 Moisture resistance of TB1771M

6. Chemical resistance

Steel sheet test pieces were bonded with the adhesive in an environment with a relative humidity of 50% at 25°C, and the adhesive was cured for 24 hours in the same environment. Then, they were immersed in various chemicals for 250 hours under the following conditions. After they were taken from the chemicals and dried, the lap shear strength was measured at room temperature.
(3TS-4100-011)

Table 4 Chemical resistance of TB1771M

Chemical	Immersion temperature	Lap shear strength (MPa)
Before immersion	-	17.5
Isopropyl alcohol	25°C	16.3
Toluene	25°C	14.4
Gasoline	25°C	16.0
Engine oil	40°C	13.8
Long-life coolant (50%aq.)	25°C	12.6

7. Usage

(1) Completely 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.
The thinner the adhesive layer, the higher the adhesion.
(3) Rub the surfaces to spread the adhesive liquid thin and uniformly, and fix them in the specified position.
(4) The set time slightly differs depending on the kind of substrate or surface conditions. In the case of moisture curing, the adhesive interlocks after several seconds to 3 minutes and develops practical strength after 30 minutes to 2 hours.
(5) In the case of light curing, cure the adhesive using an irradiator after bonding. Cure the overflow in the same manner. The adhesion can be immediately increased to the practical strength.

8. Storage

Store it in a dark dry place at 5 to 10ºC avoiding direct sunlight. Do not put it near alkaline substances, such as cure accelerators and epoxy resin cure agents. Such substances may solidify it. After use, store with the cap tightly fitted to prevent deterioration and contamination.

9. Disposal

After the adhesive has all been used, ask a licensed waste disposal company to dispose of the container as industrial waste.

10. Directions for use

- 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.
- Harmful to health. Do not inhale or ingest.
- If swallowed, induce vomiting, and immediately get medical attention.
- It may irritate the eyes, skin and respiratory organs. Handle it carefully.
- 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.
- It strongly and quickly bonds the skin and mucous membranes. Handle it carefully.
- If it adheres to the skin, wipe it away with a cloth, and wash the skin with soap.
- If fingers are bonded together, do not forcibly separate. Separate by rubbing affect area with about 40ºC warm water.
- If any bodily abnormality occurs, discontinue use, and get medical attention.
- Do not use on human body.
- Keep out of reach of children.
- Combustible. Keep away from fire.
- The product may spout from the nozzle. Do not point nozzle towards people.
- Persons with allergies or sensitive skin should avoid using it.
- If it adheres to clothing, it will generate heat, thereby causing scald. Handle it carefully.
- Some materials may be deformed by the heat of chemical reaction.
- Some substrates may deteriorate if this product is used.
- Before using, sufficiently confirm whether the method of application and the purpose are appropriate.
- 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.
- If some adhesive overflows, the exposed portion may whiten due to adhesive vapor solidification.
- It cures slowly under the influence of interior lamps or sunlight.
  Bond the substrates immediately after applying.
- To prevent condensation, unseal the container after it reaches room temperature.
- It does not adhere to polyethylene, polypropylene, fluoroplastics, silicone resin or glass. Use the special primer.
- For other hazard and toxicity information, see the safety data sheet (SDS).

11. 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 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.

12. Registered trademark

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