ThreeBond

Aug. 24, 2006
Three Bond Co., Ltd.

Technical Data

ThreeBond 1757

High moisture-resistant instant adhesive

1. Outline

ThreeBond 1757 is an instant adhesive having high moisture resistance. The adhesive can be used for bonding in areas where moisture resistance and water resistance are required and existing instant adhesives are inapplicable. It will find wide use.

Hereinafter, ThreeBond is abbreviated to TB.

2. Features

(1) High moisture resistance and water resistance, and high thermal resistance (120°C)
(2) Excellent adhesion to elastomers
(3) Excellent adhesion between materials differing in hardness, such as elastomer and metal
(4) The use of the special primer (TB1797E) for bonding elastomers and plastics improves the moisture resistance.

3. Use

(1) Automobile and transport machine parts which must have moisture resistance and water resistance
(2) Electric and electronic parts which must have moisture resistance and water resistance
(3) Bonding of automobile window frame parts (weatherstrips)
(4) Parts which must have thermal resistance (to 120°C)

4. Properties and characteristics

4.1 Properties and general characteristics

Table 1 Properties and general characteristics of TB1757

Test item		Unit	Result	Test method	Remarks
Appearance		-	Clear light yellow	3TS-201-01	
Viscosity		mPa·s	1200	3TS-210-01	NO.3 60rpm
Specific gravity		-	1.06	3TS-213-02	25℃
Setting time	NBR/NBR	sec	20	3TS-220-01	25℃, 50%RH
	Fe/Fe		30	3TS-220-04	
Tensile shear bond strength	Fe/Fe	MPa	19.2	3TS-301-11	(25℃,50%RH)×24h
	Al/Al		16.0		

4.2 Characteristics of cured adhesive

Table 2 Characteristics of TB1757 after curing

Test item		Unit	Characteristic	Test method
Linear expansion coefficient (0 to 100°C)		$\times 10^{-6}$/℃	90-140	3TS-501-05
Glass transition temperature Tg (DMA tanδ peak)		°C	122	3TS-501-04
Hardness		-	D 84	3TS-215-01
Dielectric breakdown voltage		kV/mm	24.0	3TS-406-01
Volume resistivity		Ω·m	5.1×10^{13}	3TS-401-01
Surface resistivity		Ω	1.5×10^{14}	3TS-402-01
Dielectric constant	1kHz	-	2.87	3TS-405-01
	1MHz	-	3.37	
Dielectric loss tangent	1kHz	-	0.029	
	1MHz	-	0.047	

4.3 Adhesion to metals

After test pieces were bonded with the adhesive at 25°C and 50%RH and the adhesive was cured for 24 hours in the same environment, the tensile shear bond strength was measured at room temperature. When TB1797E (primer) was used, TB1797E was applied to both substrate surfaces with a swab before bonding, and the surfaces were bonded after the solvent volatilized.

Table 3 Adhesion of TB1757 to metals (unit: MPa)

Metal	TB1757	TB1757/TB1797E	Test method
Iron/iron	19.2	9.4	3TS-301-11
Iron/aluminum	15.8	7.8	
Iron/SUS	20.2	11.8	
Iron/copper	16.5	10.9	
Iron/brass	12.4	8.3	
Aluminum/aluminum	16.0	12.6	
Aluminum/SUS	17.2	11.7	
Aluminum/copper	14.7	13.2	
Aluminum/brass	9.0	6.7	
SUS/SUS	21.4	12.4	
SUS/copper	20.0	12.2	
SUS/brass	14.6	8.7	
Copper/copper	18.6	16.5	
Copper/brass	14.7	8.7	
Brass/brass	14.1	8.5	

4.4 Adhesion to plastics

After test pieces were bonded with the adhesive at 25°C and 50%RH and the adhesive was cured for 24 hours in the same environment, the tensile shear bond strength was measured at room temperature. When TB1797E (primer) was used, TB1797E was applied to both substrate surfaces with a swab before bonding, and the surfaces were bonded after the solvent volatilized.

Table 4 Adhesion of TB1757 to plastics (unit: MPa)

Plastic	TB1757	TB1757/TB1797E	Test method
Hard PVC	3.2(*)	3.1(*)	3TS-301-11
Polycarbonate	5.1(*)	5.1(*)	
Phenol	8.4(*)	8.4(*)	
Nylon 6	2.7	2.6	
Nylon 6/6	5.4	4.8	
Noryl	2.8	5.9	
ABS	8.1(*)	7.9(*)	
Glass epoxy	10.8	12.4	
PBT	2.5	4.4	
PET	4.8	7.0	
PPO	2.6	8.1	
PPS	2.0	2.2	
HIPS	4.4(*)	3.7(*)	
Acrylic	5.0(*)	5.0(*)	
Polyacetal	1.2	3.0	

(*) indicates material failure of the substrates.

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

4.5 Adhesion to rubbers

After test pieces were bonded with the adhesive at 25°C and 50%RH and the adhesive was cured for 24 hours in the same environment, the tensile shear bond strength was measured at room temperature. When TB1797E (primer) was used, TB1797E was applied to both substrate surfaces with a swab before bonding, and the surfaces were bonded after the solvent volatilized.

Table 5 Adhesion of TB1757 to rubbers (unit: MPa)

Rubber	TB1757	TB1757/TB1797E	試験方法
NR	0.4(*)	0.4(*)	3TS-301-13
CR	0.6(*)	0.6(*)	
NBR	0.8(*)	0.8(*)	
SBR	1.7(*)	1.7(*)	
EPDM	0.8(*)	0.8(*)	
SEBS	0.7(*)	0.7(*)	

(*) indicates material failure of the substrates.

NR: Natural rubber
CR: Chloroprene rubber
NBR: Nitrile-based rubber
SBR: Styrene-butadiene rubber
EPDM: Ethylene propylene diene monomer
SEBS: Styrene-(ethylene/butylene)-styrene block copolymer

5. Durability

5.1 Thermal resistance

5.1.1 Thermal resistance (strength at room temperature)

After steel plate test pieces were bonded with the adhesive at 25°C and 50% and the adhesive was cured for 72 hours in the same environment, they were exposed to each temperature for the specified time, and the tensile shear bond strength was measured after they returned to room temperature (3TS-301-11).

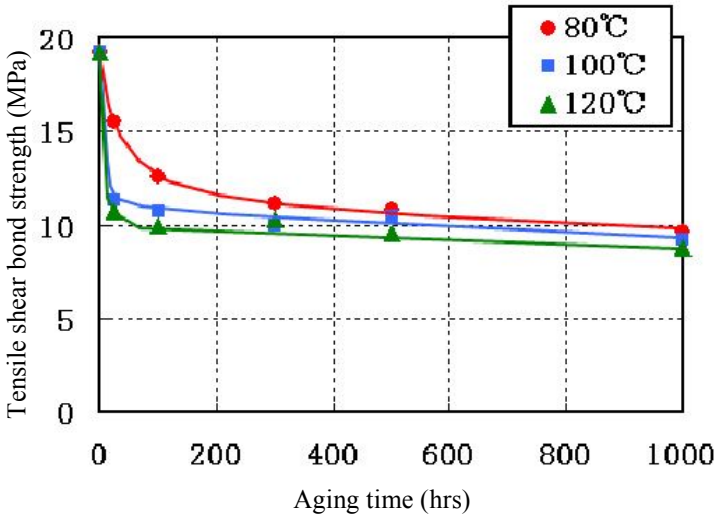

Fig. 1 Thermal resistance of TB1757 (strength at room temperature)

5.1.2 Thermal resistance (strength under heat)

After steel plate test pieces were bonded with the adhesive at 25°C and 50%RH and the adhesive was cured for 72 hours in the same environment, they were exposed to each temperature for 2 hours, and the tensile shear bond strength was measured at the temperature (3TS-301-11).

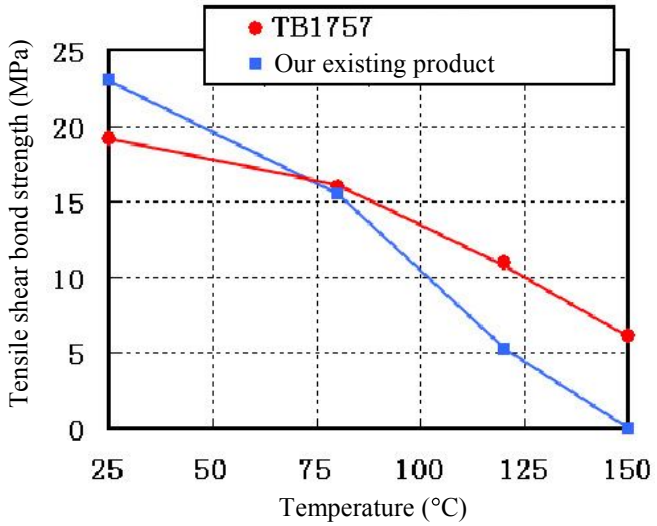

Fig. 2 Thermal resistance of TB1757 (strength under heat)

5.1.3 Thermal resistance (strength under heat after aging)

After steel plate test pieces were bonded with the adhesive at 25°C and 50%RH and the adhesive was cured for 72 hours in the same environment, they were exposed to 120°C for the specified time, and the tensile shear bond strength was measured at 120°C (3TS-301-11).

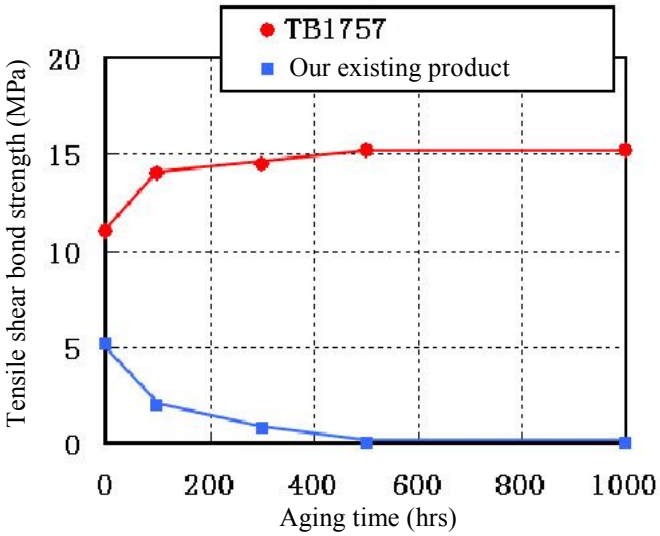

Fig. 3 Thermal resistance of TB1757 (strength under heat after aging)

5.2 Heat cycle resistance

After steel plate test pieces were bonded with the adhesive at 25°C and 50%RH and the adhesive was cured for 72 hours in the same environment, they were exposed to the specified number of heat cycles (-40°C for 1 hour and 120°C for 1 hour), and the tensile shear bond strength was measured after they returned to room temperature (3TS-301-11).

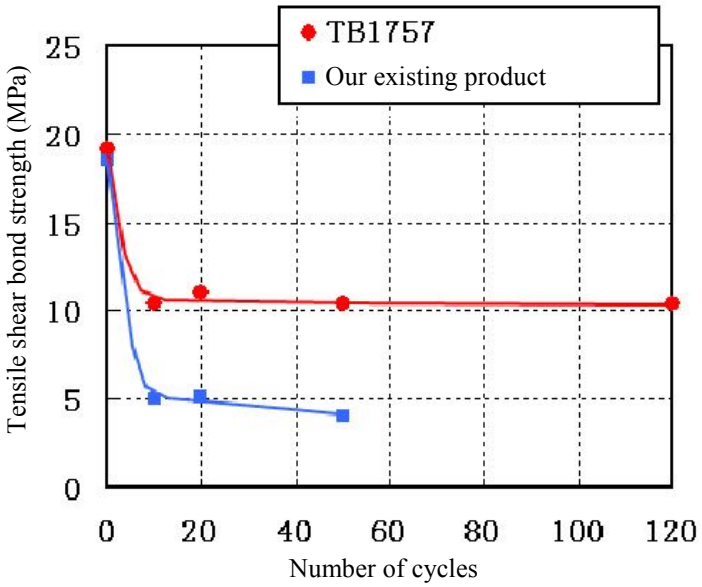

Fig. 4 Heat cycle resistance of TB1757

5.3 Water resistance

After aluminum test pieces were bonded with the adhesive at 25°C and 50%RH and the adhesive was cured for 72 hours in the same environment, they were immersed in a water tank at each temperature for the specified time. After they were taken out of the tank and dried at room temperature for 24 hours, the tensile shear bond strength was measured (3TS-301-11).

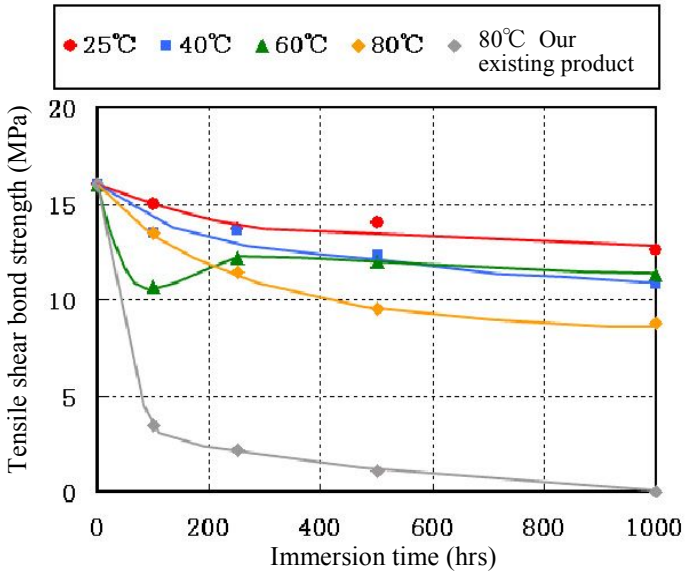

Fig. 5 Water resistance of TB1757

5.4 Moisture resistance

5.4.1 Moisture resistance (substrates of the same material)

After iron or aluminum plate test pieces were bonded with the adhesive at 25°C and 50%RH and the adhesive was cured for 72 hours in the same environment, they were exposed to 80°C and 95%RH for the specified time. After they returned to room temperature, the tensile shear bond strength was measured (3TS-301-11).

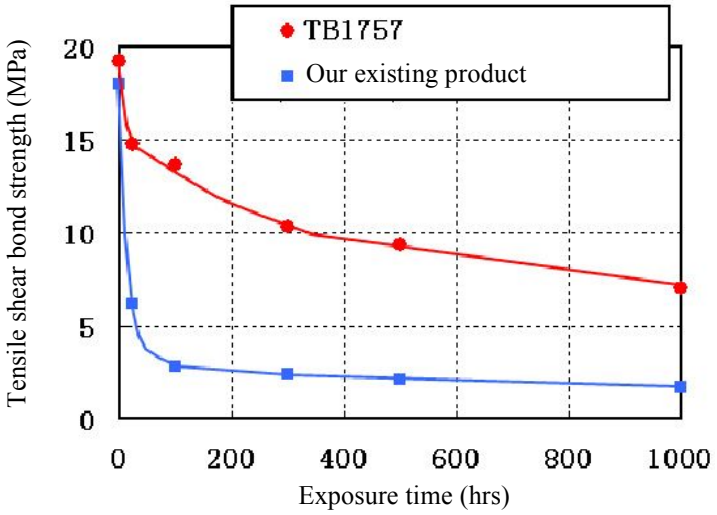

Fig. 6 Moisture resistance of TB1757 between iron test pieces

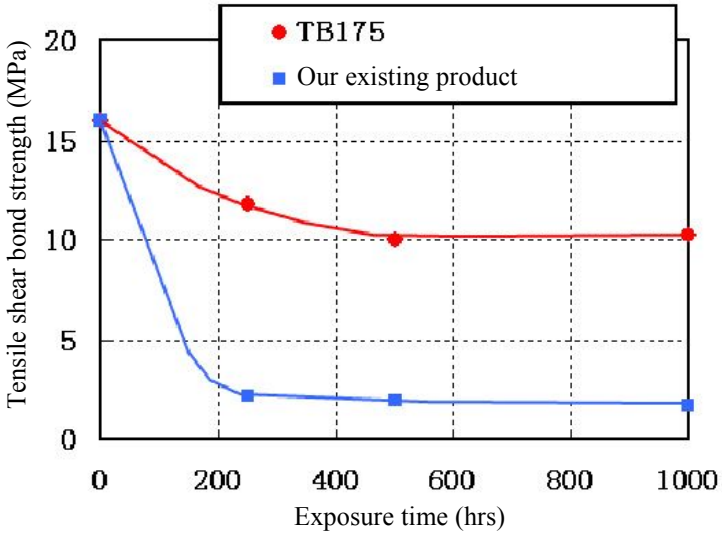

Fig. 7 Moisture resistance of TB1757 between aluminum test pieces

5.4.2 Moisture resistance (substrates of different materials)

After SEBS and cation electrodeposition coated iron (SPCC-SD) test pieces were bonded with the adhesive at 25°C and 50%RH and the adhesive was cured for 72 hours in the same environment, they were exposed to 80°C and 95%RH for the specified time. After they returned to room temperature, the 90° peel strength was measured (test piece size: 15 × 50 × 3 mm, bonded area size: 15 × 25 mm, rate of pulling: 50 mm/min). To test the moisture resistance in the case of use of the primer, the primer was applied to the SEBS surface before bonding. After the solvent volatilized, the adhesive was applied to the cation electrodeposition coated iron surface, and the test pieces were bonded. Then, the 90° peel strength was measured as stated above (TB1757/TB1797E in the figure).

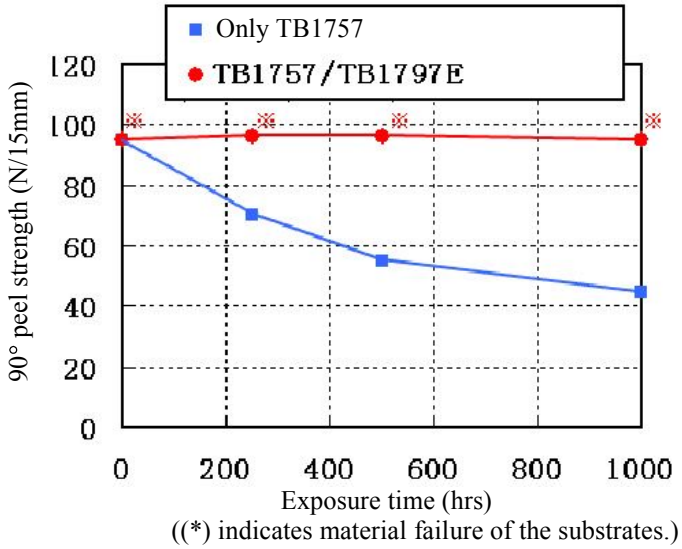

Fig. 8 Moisture resistance between different materials

Note: When rubber and elastomer substrates are bonded, the adhesion and moisture resistance of the adhesive greatly vary depending on the kinds and contents of the components (aging inhibitor, plasticizer, etc.) of the materials. Test these properties prior to use.

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. The thinner the adhesive is applied, the higher the adhesion can be obtained.

(3) Rub the surfaces to spread the adhesive liquid thin and uniformly, and fix them in the specified position.

(4) The setting time slightly varies depending on the kind and surface condition of the substrate. In most cases, the adhesive interlocks within about 10 seconds to 3 minutes and develops the practical strength after 30 minutes to 2 hours.

(5) When elastomer and plastic parts are bonded, higher moisture resistance can be obtained by bonding them after the special primer (TB1797E) is applied and dried.

7. Instructions for use

- Use and store the product out of reach of children.
- It is flammable. Do not use it near 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, and 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 sealant, 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 about 40°C
- If it adheres to clothing, the skin may be scalded with the heat generated by chemical reaction. Handle it carefully.
- 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.
- It does not adhere to polyethylene, polypropylene, fluoroplastics, silicone resin, soft PVC or glass.

- For hazard and toxicity information not mentioned herein, see the material safety data sheet (MSDS).

8. Storage

The quality of the adhesive deteriorates owing to high temperature, high humidity and UV light. 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, ask an authorized disposal firm to dispose of the container as industrial waste.

10. Applicable laws

(1) Fire Defense Law: Fourth class, third type petroleum product. Hazard class III. Cyanoacrylate adhesive. Flammable

(2) 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.