

ThreeBond

December 10, 2012
Three Bond Co., Ltd.

Technical Data
ThreeBond 1533C
Single Component, Moisture Curable, Elastic Adhesive (Clear)

1. Product description

ThreeBond 1533C is a solvent-free, single component, moisture curable, elastic adhesive. With silyl-based special polymer as its primary component, this adhesive reacts with a trace amount of moisture in the air to cure. Forms a strong bonding after the joined substrates are allowed to stand for 5 to 10 minutes. Has excellent resistance to vibration and strong shock even under the stresses of expansion and contraction. Additionally, has strong adhesion to a wide range of materials, including metals, plastics, rubber, wood and inorganic materials. Applicable where conventional RTV silicone agents (sealing agent, potting agent, etc.) are used. Also, contain no low-molecular cyclic siloxane, therefore it will not cause electric contact fault. Hereinafter, ThreeBond is abbreviated as TB.

2. Features

- (1) Non-solvent and environment-friendly
- (2) Low odor
- (3) Single component and fast curing
- (4) Light- or heat-curing equipment not required
- (5) Has initial tackiness therefore temporary fixing not required
- (6) Its elasticity ensures excellent peel strength, vibrating and impact stress relaxation properties
- (7) Good adhesion to wide range of materials, including metals, plastics, rubbers, wood materials and inorganic materials (good bonding of differing substrates)
- (8) Cured adhesive is clear, and its overflow is invisible.
- (9) No dibutyltin compounds (in compliance with EU regulations)

3. Applications

Bonds (universal bonding), sealing, potting of various materials

4. Properties

4.1 General Properties

Table 1. Properties of TB1533C

Test item	Unit	Property value	Test method
Main component	-	Silyl-based special polymer	-
Appearance	-	Translucent	3TS-2100-002
Viscosity	Pa·s	100*	3TS-2F00-007
Specific gravity	-	1.30	3TS-2500-002
Tack-free time	min	7	3TS-3130-006

Measuring conditions: Shear rate: 5.0 (s-1)

4.2 Moisture curing ability

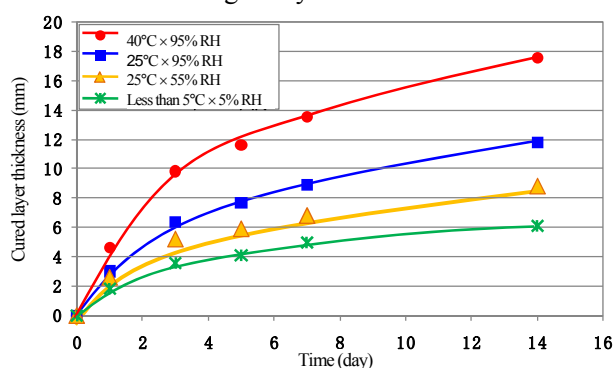


Figure 1. Curing temperature and relative humidity

Measurement conditions: 3TS-3160-005

5. After-cure property

5.1 After cured properties

Table 2 Characteristics of TB1533C after curing

Test item	Unit	Property value	Test method
Hardness	-	A50	3TS-2B00-004
Figure 7. Heat resistance (Tensile strength of TB1533 while heated)	MPa	3.8	3TS-4190-001
Elongation	%	145	3TS-4190-001
Cure shrinkage	%	3.6	3TS-2600-001*1
Glass transition point*2	° C	-64	3TS-4730-001
Thermal conductivity	W/m·k	0.29	3TS-4750-001
Moisture permeability	g/m ² ·24hr	12.7	JIS K 7129-C method*3
Coefficient of linear expansion	(-100~-60°C)	ppm/°C	42~144
	(0~150°C)		
			3TS-4740-001

Curing conditions: At 23°C and 50%RH for 7 days

*1 After cure dimensions: φ20mm×2mm

*2 DMA E peak top, frequency: 1Hz

*3 Test conditions: Table.C-3, Transmission area: 15.2cm², Thickness 1.5mm, n=3

5.2 Electrical properties after cured

Table 3. Electrical properties of TB1533C

Test item	Unit	Property value	Test method
Volume resistivity	$\Omega \cdot m$	8.8×10^9	3TS-5200-001
Surface resistivity	Ω	8.3×10^{13}	3TS-5200-002
Dielectric constant	1kHz	5.4	3TS-5220-001
	1MHz	4.8	
Dielectric dissipation factor	1kHz	0.028	
	1MHz	0.032	
Dielectric breakdown strength	kV/mm	25	3TS-5230-002

Curing conditions: At 23°C and 50%RH for 7 days

6. Adhesive strength

6.1 Tensile shear bond strength

Table 4. Lap shear strength of TB1533C

Test substrates(s)		Unit	Property value	Failure type
Metal	Aluminum (A1050P)	MPa	4.7	CF
	Steel (SPCC-SD)		4.6	CF
	Stainless steel (SUS304)		4.1	CF
	Copper		4.1	CF
Plastic(s)	Phenolic resin	MPa	4.3	CF
	Glass epoxy		4.5	CF
	Acryl		3.8	AF
	ABS		2.0	AF
	PC (polycarbonate)		3.2	CF
	6,6- nylon		3.3	AF
	PET (polyethylene terephthalate)		2.4	CF
	PBT (polybutylene terephthalate)		0.8	AF
	PPS (polyphenylene sulfide)		1.3	AF
Other	Glass	MPa	3.7	CF

AF: Adhesive failure CF: Cohesive failure

Curing conditions: At 23°C and 50%RH for 7 days

Test method: 3TS-4100-013 Bonding between various substrates after double-sided laminate coating and 5 minute open time

6.2 T-peel strength

Table 5. T-peel strength of TB1533C

Test material	Unit	Property value	Failure type	
Steel (SPCC-SD)	kN/m	2.5	CF	
Aluminum (A1050P)		3.2	CF	
Cotton canvas		1.1	CF	
Rubbers	kN/m	1.0	CF	
		CR	0.7	AF
		SBR	0.5	*1
		NR	1.4	*1
		EPDM	1.2	AF
		Silicone	0.2	*1
		soft PVC	0.8	CF

AF: Adhesive failure CF: Cohesive failure

※1: AF: Interfacial failure CF: Cohesive failure

*1: Substrate material failure

Curing conditions: At 23°C and 50%RH for 7 days

Test method: 3TS-4100-013 Adhere various substrates

after applying on both substrates and 5 minute open time

*The surface treatment for the test pieces in 6.1 and 6.2:
Metal: degreased with methylene chloride. Plastic: Wipe with ethanol. Rubber: After sanding with #100, degrease with xylene.

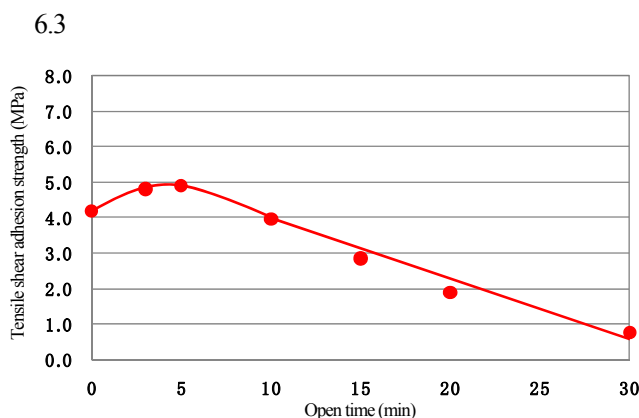


Fig. 2 Open time and lap shear strength

After prescribed open time, bond substrates

Curing conditions: At 23°C and 50%RH for 7 days

Measurement conditions: 3TS-4100-013

Coat one side of two aluminum (A1050P) substrates and bond after a prescribed open time.

6.4 Lap shear strength while heated

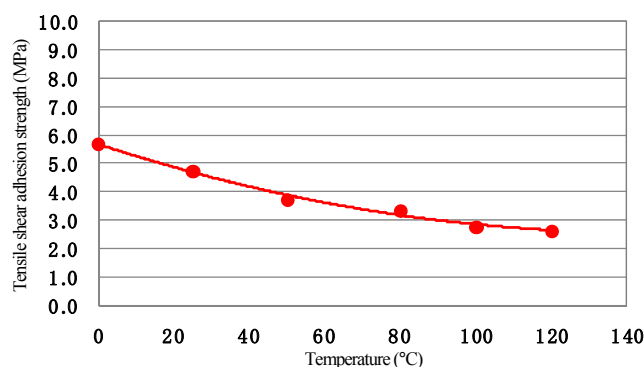


Figure 3. Lap shear strength while heated

Curing conditions: At 23°C and 50%RH for 7 days

Measuring conditions: 3TS-4100-013 z

Coat one side of two aluminum (A1050P) substrates and bond after 5 minute open time.

6.5 Curing time and lap shear strength

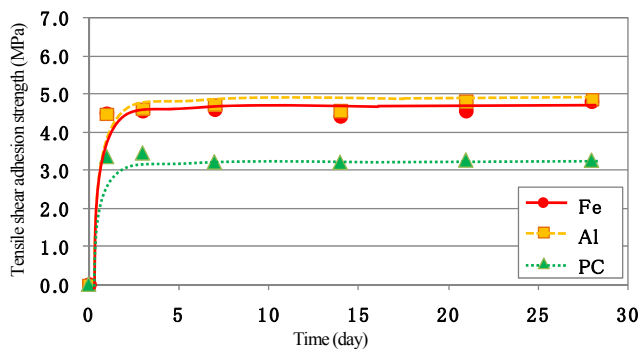


Figure 4. Open time and lap shear strength

Curing conditions: 23°C, 50%RH
 Measurement method: 3TS-4100-013 After a 5 minute open time, apply to iron-iron (SPCC-SB) (Fe) substrates on both sides, aluminum-aluminum (A1050P) (Al) substrates on both sides, polycarbonate-polycarbonate (Al) substrates on both sides

6.6 Curing time and T-peel adhesion strength

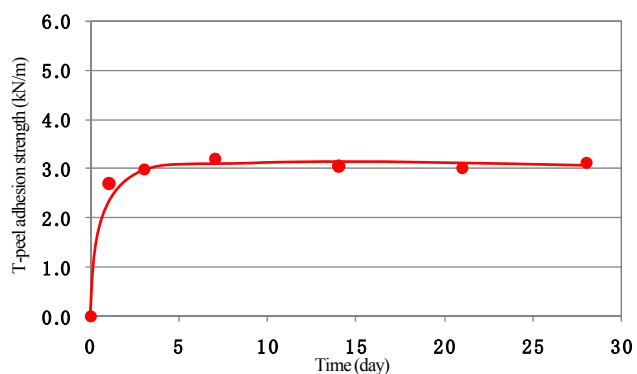


Figure 5. Curing time and T-peel adhesion strength

Curing conditions: 23°C, 50%RH
 Measurement conditions: 3TS-4130-023
 Coat one side of two aluminum (A1050P) substrates and bond after 5 minute open time.

7. Durability

7.1 Heat resistance properties

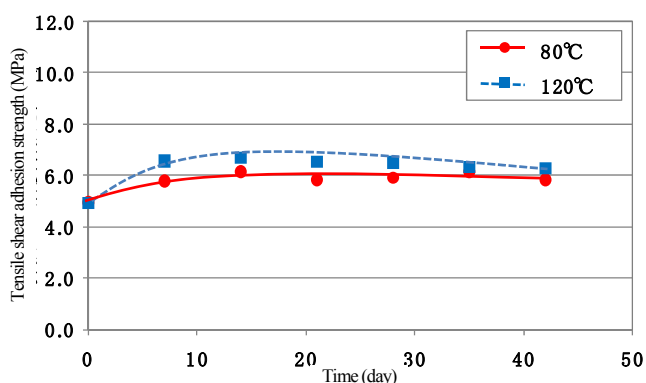


Figure 6. Heat resistance (Lap shear strength while heated)

Curing conditions: At 23°C and 50%RH for 7 days
 Measurement conditions: 3TS-4100-013
 Coat one side of two aluminum (A1050P) substrates and bond after 5 minute open time.

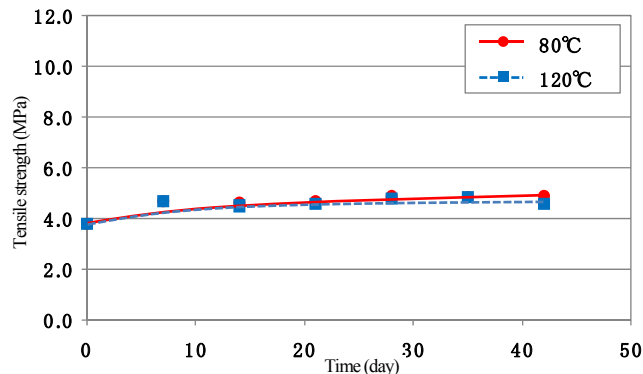


Fig. 7 Heat resistance (tensile strength)

Curing conditions: At 23°C and 50%RH for 7 days
 Measurement conditions: 3TS-4190-001

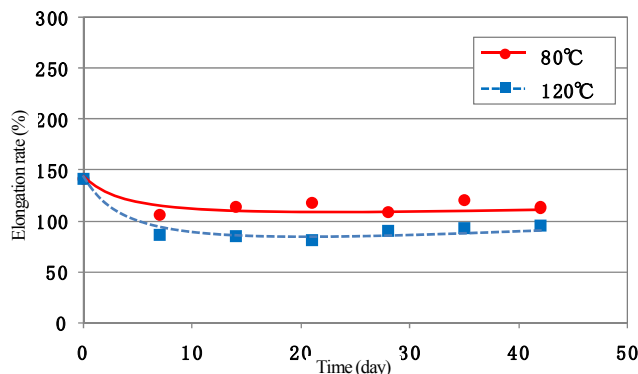


Figure 8. Heat resistance (Elongation rate)

Curing conditions: At 23°C and 50%RH for 7 days
 Measurement conditions: 3TS-4190-001

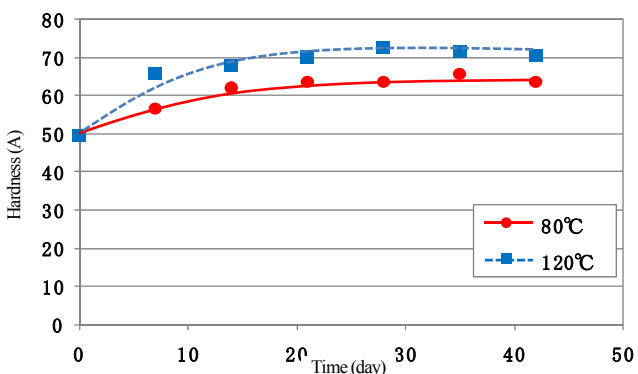


Figure 9. Heat resistance (Hardness)

Curing conditions: At 23°C and 50%RH for 7 days
 Measurement conditions: 3TS-2B00-004

7.2 Moisture resistance properties

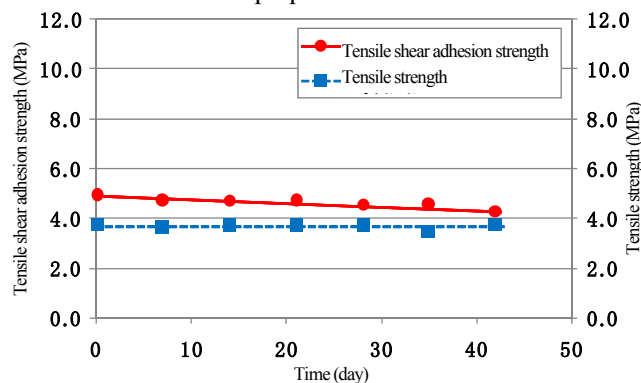


Figure 10. Humidity resistance (Lap shear strength while heated)

Curing conditions: At 23°C and 50%RH for 7 days

Environmental conditions: 85°C, 85%RH

Measurement conditions: 3TS-4190-001, 3TS-4100-013

Coat one side of two aluminum (A1050P) substrates and bond after 5 minute open time.

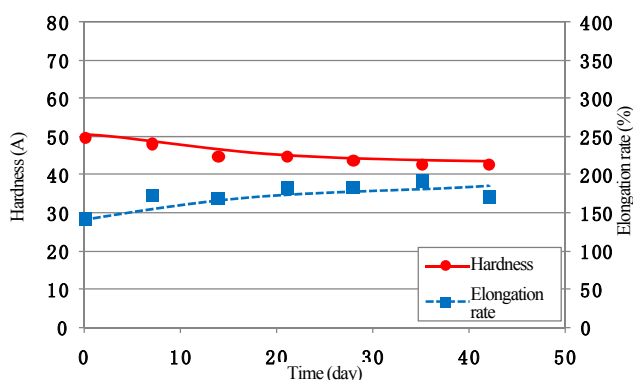


Figure 11. Moisture resistance (Hardness, elongation)

Curing conditions: At 23°C and 50%RH for 7 days

Environmental conditions: 85°C, 85%RH

Measurement conditions: 3TS-2B00-004, 3TS-4190-001

8. Usage

- (1) Before applying the adhesive, cleanly remove moisture, oil, rust and other contaminants from the surfaces to be bonded.
- (2) Apply the appropriate amount on the usage area.
- (3) Keep the surfaces from moving until the adhesive cures.

*Cure rate for

Cures by reacting to moisture in the air, therefore the adhesive thickness and curing temperature will affect the curing time.

9. Storage

The adhesive quality is affected by high temperature, high humidity and UV light. Seal tightly, store in a dark dry place at -5 to 25°C avoiding direct sunlight.

10. Disposal

After the adhesive has all been used, ask an authorized specialist to dispose the container as industrial waste.

11. Directions for use

- Do not inhale or drink the product. It is harmful to the health.
- When handling this product, wear protective equipment.
- Keep out of reach of children.
- If in eyes, rinse with clean water for at least 15 minutes, and get medical attention.
- If on skin, wipe away with a cloth, and wash the skin with water or soap and water.
- If any bodily abnormality occurs, discontinue use and receive medical attention.
- For industrial use. Do not use as household use.
- Avoid contact with human body.
- To prevent condensation, unseal the container after reaching room temperature.
- Before using, sufficiently confirm whether the method of application and the purpose are appropriate.
- The affects on the substrates should be confirmed in advance. If there are any problems, do not use.
- For other hazard and toxicity information, see the material safety data sheet (MSDS).

12. Cautions

For Industrial
Use Only

(Do not use as a household product)

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 an example of experimental values obtained by our specified test method, and are not guaranteed values. Furthermore, we do not guarantee that the uses described herein do not conflict with any intellectual property right.
- Users are asked to examine whether the product is appropriate to the purpose of use and can be used safely before use. and bear all responsibilities and hazards. 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 and usage of this product are unknown, do not use.
- For detailed safety information, see Material Safety Data Sheet (MSDS). To obtain the MSDS, contact our sales department or customer service office.
- Information in this document is subject to change at our discretion.