

### Features & Benefits

- Adhesion to a wide variety of substrates
- Fast cure at room temperature
- Non-drip formulation
- Acid-free and non-corrosive
- No mix application
- High shear strength
- Good impact strength
- Good chemical resistance

### Description

PERMABOND® TA4590 is a structural acrylic adhesive designed primarily for bonding metals, ferrites, ceramics and some thermoplastics. This product was specifically designed to be non-corrosive to sensitive copper parts or other electrically conductive surfaces.

TA4590 is a no-mix system which has a 15-30 sec. fixture time on metal surfaces when used with Initiator 44.

### Physical Properties of Uncured Adhesive

Chemical composition	Urethane methacrylate
Appearance	Blue, thixotropic
Viscosity @ 25°C	20rpm: 15,000 – 25,000 mPa.s (cP) 2.5rpm: 50,000 – 120,000 mPa.s (cP)
Specific gravity (resin)	1.1

### Typical Curing Properties (with Initiator 44)

Ratio of use	10:1.5 approximately
Maximum gap fill	0.5 mm (0.02 in)
Fixture time (mild steel) @23°C*	15-30 secs
Handling time (mild steel) (0.3 N/mm <sup>2</sup> shear strength is achieved) @23°C*	30-60 secs
Working strength (mild steel) @23°C*	2-3 mins
Full cure @23°C	24 hours

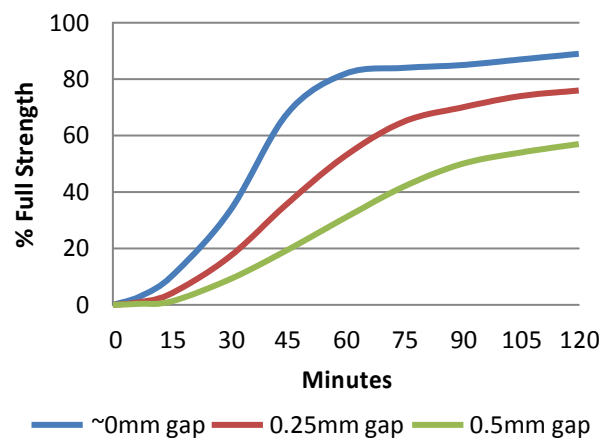
\*No induced gap

### Typical Performance of Cured Adhesive

Shear strength (ISO4587)*	<b>3 min cure @25°C:</b> Steel: 9 N/mm <sup>2</sup> (1300 psi) Steel/ferrite: 4 N/mm <sup>2</sup> (600 psi)
	<b>24hr cure @25°C:</b> Steel: 20-25 N/mm <sup>2</sup> (2900-3600 psi) Steel/ferrite: >14 N/mm <sup>2</sup> (>2000 psi) (substrate failure) Zinc: 12-18 N/mm <sup>2</sup> (1700-2610 psi)
Peel strength (aluminium) (ISO 4578)	85-100 N/25mm (18-22 PIW)
Tensile strength (ISO37)	20-30N/mm <sup>2</sup> (2900-4400 psi)
Impact strength (ASTM D-950)	15-20 kJ/m <sup>2</sup>
Coefficient of thermal expansion (ASTM D-696)	80 x 10 <sup>-6</sup> 1/K
Thermal conductivity (ASTM C-177)	0.1 W/(m.K)
Dielectric constant (ASTM D-150)	4.6
Dielectric strength (ASTM D-149)	30-50 kV/mm
Volume resistivity (ASTM D-257)	2 x 10 <sup>13</sup> Ohm.cm

\*Strength results will vary depending on the level of surface preparation and gap.

### Strength Development

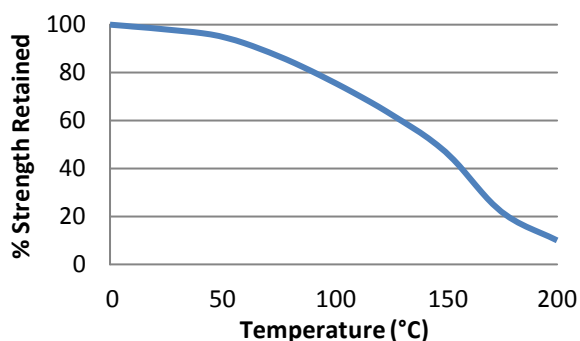


Graph shows typical strength development of bonded components at 23°C. An increase of 8°C in temperature will halve the cure time. Lower temperatures will result in a slower cure time.

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## Hot Strength



"Hot strength" shear strength tests performed on mild steel. Fully cured specimens conditioned to pull temperature for 30 minutes before testing at temperature. TA4590 can withstand higher temperatures for brief periods (such as for paint baking and wave soldering processes) providing the joint is not unduly stressed. The minimum temperature the cured adhesive can be exposed to is -55°C (-65°F) depending on the materials being bonded.

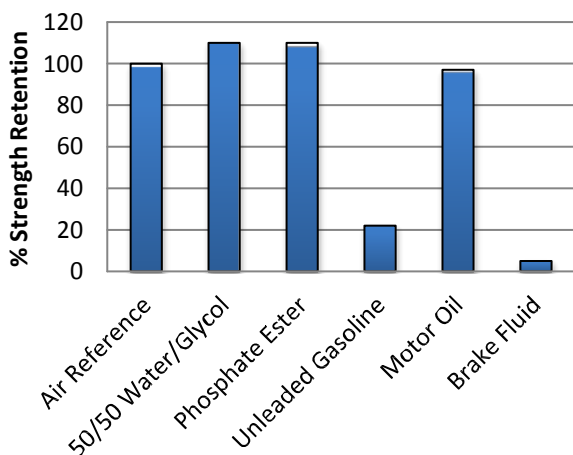
## Environmental Resistance

All values were generated on as received steel lap shears as described in ISO4587. Adhesive was cured at room temperature for 48 hours prior to environmental exposure. Test pieces were assembled with no induced gap and subjected to continuous exposure for 1000 hours at the testing temperature and then the shear strength was tested at room temperature.

1000 hours @	% strength retention
95°C	110% *
120°C	118% *
150°C	132% *
175°C	127% *
205°C	87%

\*The shear strength is higher the room temperature control because heating the adhesive causes it to become more rigid, resulting in a higher strength.

## Chemical Resistance



Specimens were immersed for 30 days at 85°C and tested at room temperature.

## Additional Information

This product is not recommended for use in contact with strong oxidizing materials. This product may affect some thermoplastics and users must check compatibility of the product with such substrates.

Information regarding the safe handling of this material may be obtained from the Safety Data Sheet.

Users are reminded that all materials, whether innocuous or not, should be handled in accordance with the principles of good industrial hygiene.

**This Technical Datasheet (TDS) offers guideline information and does not constitute a specification.**

## Surface Preparation

Surfaces should be clean, dry and grease-free before applying the adhesive. Permabond Cleaner A is recommended for the degreasing of most surfaces. Some metals such as aluminium, copper and its alloys will benefit from light abrasion with emery cloth (or similar), to remove the oxide layer.

## Directions for Use

- 1) Surfaces must be clean, dry and grease-free. Apply Initiator to one surface.
- 2) Apply adhesive to the other surface.
- 3) Assemble the components using sufficient force to spread the adhesive thinly. Parts should be bonded immediately and within a maximum of two hours of applying the Initiator.
- 4) Maintain pressure until handling strength is achieved. The time required will vary according to the joint design, gap and surfaces being bonded.
- 5) Allow 24 hours for adhesive to fully cure. Accelerated cure times may be achieved by heating.

## Storage & Handling

Storage Temperature	5 to 25°C (41 to 77°F)
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- UK: 0800 975 9800
  - General Enquiries: +44 (0)1962 711661
  - US: 732-868-1372
  - Asia: + 86 21 5773 4913
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