

## Permabond Adhesives for Medical Devices

**Permabond's medical device grade cyanoacrylate and UV-curable adhesives have been specially formulated to bond plastics and other materials commonly found in medical device manufacture. Permabond's technical team can help you select the most appropriate adhesive for your application or discuss your requirements for a custom formulation.**

**How do Permabond cyanoacrylate adhesives work?**  
Permabond cyanoacrylate adhesives are one-part adhesives that cure by reacting with minute traces of moisture on the surface of the material being bonded. They cure in seconds at ambient temperatures and have been formulated to bond flexible or rigid surfaces made from a wide range of plastics, rubbers or metals.

Permabond cyanoacrylates are available in a range of viscosities and material adhesion capabilities. These adhesives are formulated to bond a variety of porous and non-porous surfaces and to rigid or flexible materials.



**Which sterilisation procedures will the 4C range withstand?**

- Ethylene oxide sterilisation
- Gamma irradiation
- UV-irradiation
- Not suitable for autoclave sterilisation.

**Typical Applications:**

- Catheter bonding
- Bonding components for breathing masks
- Tacking wires and bonding materials for electro-cardiogram pads
- Bonding connectors to tubes
- Disposable scalpals - bonding blade to handle
- Bonding sponge swabs to swab stick

### Benefits of cyanoacrylates

- Cure in seconds - ideal for high-speed production
- No need for curing equipment
- Form high-strength bonds - often exceeding that of the substrate material.
- Colourless and transparent for a clean, aesthetically pleasing finish.
- Can adhere to difficult-to-bond materials

**Products pass USP Class VI and cytotoxicity testing.**

**How do Permabond UV-curable adhesives work?**  
UV curable adhesives cure during exposure to ultra violet light. The adhesives contain photo-initiators that react to specific wavelengths, causing the curing process to begin.



UV adhesives do not dissolve, melt or weaken the two components. They form strong chemical bonds between the two substrates and provide a high strength alternative to

other joining methods. They can be used to replace solvent welding to help reduce stress cracking and to increase bond strength and performance.



UV-curables are also a good alternative to ultrasonic welding as they are more able to cope with gaps or varying tolerances, this helps reduce reject rates.

**Typical Applications:**

- Face mask bonding
- Needle bonding
- Bonding connectors
- Catheter bonding
- Blood collection reservoirs

### Benefits of UV-curables

- Cure in seconds - ideal for high-speed production lines
- Form high-strength bonds - often exceeding that of the substrate material.
- Colourless and transparent for a clean, aesthetically pleasing finish.
- Can adhere to difficult-to-bond materials

**Permabond**  
Engineering Adhesives

## Permabond Cyanoacrylate Product Data

| PHYSICAL PROPERTIES        | 4C10                        | 4C20                        | 4C30                        | 4C40                        |
|----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Appearance                 | Colourless, transparent     | Colourless, transparent     | Colourless, transparent     | Colourless, transparent     |
| Viscosity @ 25°C           | 40 mPa.s                    | 500 mPa.s                   | 1,500 mPa.s                 | 2,000 mPa.s                 |
| Density                    | 1.05                        | 1.05                        | 1.05                        | 1.05                        |
| Flash Point                | 82°C                        | 82°C                        | 82°C                        | 82°C                        |
| Base Compound              | Ethyl cyanoacrylate         | Ethyl cyanoacrylate         | Ethyl cyanoacrylate         | Ethyl cyanoacrylate         |
| Cytotoxicity Approval      | Pass                        | Pass                        | Pass                        | Pass                        |
| PERFORMANCE PROPERTIES     |                             |                             |                             |                             |
| Fixture Time (steel)       | 5-15 seconds                | 10-30 seconds               | 15-50 seconds               | <10 seconds                 |
| (nitrile rubber)           | 5-15 seconds                | 10-25 seconds               | 15-40 seconds               | < 5 seconds                 |
| (phenolic)                 | 5-10 seconds                | 10-25 seconds               | 15-40 seconds               | < 5 seconds                 |
| Lap shear strength (steel) | 12 MPa                      | 14 MPa                      | 14 MPa                      | 14 MPa                      |
| (aluminium)                | 7 MPa                       | 8 MPa                       | 8 MPa                       | 8 MPa                       |
| (styrene)                  | 1 MPa (substrate failure)   | 1 MPa (substrate failure)   | 1 MPa (substrate failure)   | 1 MPa (substrate failure)   |
| (PVC)                      | 3.6 MPa (substrate failure) | 3.6 MPa (substrate failure) | 3.6 MPa (substrate failure) | 3.6 MPa (substrate failure) |
| Impact Strength            | 4-9.5 J                     | 4-9.5 J                     | 4-9.5 J                     | 4-9.5 J                     |

| CURED PROPERTIES    | ALL 4C PRODUCTS         |
|---------------------|-------------------------|
| Appearance          | Colourless, transparent |
| Softening Point     | 150-170°C               |
| Shore D Hardness    | 85                      |
| Dielectric Strength | 10,000 Volts/mm         |
| Service Temperature | -62 to +80°C            |
| Water Absorbtion    | <2%                     |
| Elongation          | <5%                     |

### Suitability of medical device grade cyanoacrylate on different plastics:

|                     |                           |
|---------------------|---------------------------|
| ABS                 | Excellent                 |
| SBR                 | Excellent                 |
| Acrylic             | Good                      |
| High-Impact Acrylic | Excellent                 |
| Polystyrene         | Excellent                 |
| Polycarbonate       | Excellent**               |
| PVC-Rigid           | Excellent                 |
| PVC-Flexible        | Excellent                 |
| Nylon               | Poor long-term durability |
| SAN                 | Excellent                 |
| PBT                 | Excellent                 |
| Polyphenylsulfone   | Excellent                 |

\*\*Uncured adhesive may cause stress cracking.

### Butyl cyanoacrylate 1001

#### PHYSICAL PROPERTIES OF THE UNCURED ADHESIVE:

|                  |                     |
|------------------|---------------------|
| Base compound    | Butyl cyanoacrylate |
| Appearance       | Violet transparent  |
| Viscosity @ 25°C | 5 mPa.s             |
| Density          | 1.05                |
| Flash point      | 110°C               |

#### PERFORMANCE OF CURED ADHESIVE:

|                            |                       |
|----------------------------|-----------------------|
| Softening point            | 150-170°C             |
| Dielectric strength        | 10,000 Volts/mm       |
| Water absorbtion           | <2%                   |
| Elongation                 | <5%                   |
| Fixture time - Steel       | <60 seconds           |
| -Buna N                    | <60 seconds           |
| -Phenolic                  | <60 seconds           |
| Lap shear strength - Steel | 4.8 N/mm <sup>2</sup> |

**IMPORTANT: for tissue bonding adhesive, please contact Permabond**

## Permabond Medical Device UV-Adhesive Product Data

| PHYSICAL PROPERTIES   | 4UV80               | 4UV80 HV                       | 4UV80 HH                       |
|-----------------------|---------------------|--------------------------------|--------------------------------|
| Appearance            | Opaque, translucent | Opaque, translucent            | Opaque, translucent            |
| Viscosity @ 25°C      | 100-200 mPa.s       | 1800 - 2800 mPa.s              | 8000 - 12,000 mPa.s            |
| Density               | 1.1                 | 1.1                            | 1.1                            |
| Flash Point           | >100°C              | >100°C                         | >100°C                         |
| Base Compound         | Methacrylate ester  | Methacrylate ester             | Methacrylate ester             |
| Cytotoxicity Approval | Pass                | As 4UV80 with bio-inert filler | As 4UV80 with bio-inert filler |

Permabond can produce custom formulations to match customer's specific viscosity requirements.

| PERFORMANCE PROPERTIES                                    |                           |
|---|---------------------------|
| <b>Fixture Time (low-powered 4mW/cm<sup>2</sup> lamp)</b> |                           |
| Polycarbonate to polycarbonate                            | 55 seconds                |
| Acrylic to acrylic  | 6 seconds                 |
| PVC to PVC (rigid)  | 6 seconds                 |
| PVC to PVC (flexible)                                     | 5 seconds                 |
| Polycarbonate to ABS                                      | 55 seconds                |
| <b>Shear Strength</b>                                     |                           |
| Polycarbonate to polycarbonate                            | >9 N/mm <sup>2</sup> SF   |
| PVC to PVC (rigid)  | >5 N/mm <sup>2</sup> SF   |
| PVC to PVC (flexible)                                     | >2.5 N/mm <sup>2</sup> SF |
| Polycarbonate to ABS                                      | >7 N/mm <sup>2</sup> SF   |

| CURED PROPERTIES                 |                      |
|----------------------------------|----------------------|
| Appearance                       | Colourless, clear    |
| Shore D Hardness                 | 60                   |
| Tensile Strength                 | 12 N/mm <sup>2</sup> |
| Elongation                       | 110%                 |
| Dielectric Strength              | 12 KV/mm             |
| Dielectric Constant<br>1MHz@25°C | 4                    |
| Service Temperature              | -55°C to + 120°C     |

SF = Substrate Failure

**UV-Fluorescence:** The 4UV80 range products are UV-fluorescent for easy in-line QC inspection. These products can be supplied without UV fluorescence if desired.

**Light Sensitivity:** The 4UV80 range is highly reactive to allow cure through difficult plastics. Should a less-active product be required due to strong factory lighting, Permabond can produce light insensitive versions of the above products.

**OTHER MEDICALLY APPROVED UVS:** Permabond UV630 series UV-curables have cytotoxicity approval.

\*Other Permabond adhesives commonly used in medical device manufacture include acrylic adhesives, epoxy adhesives and anaerobic adhesives.

- Two part epoxy **ET500** for glass to metal
- Anaerobic **MH052** for metal connections in oxygen delivery devices
- Anaerobic **A1042** for tamper proofing medical equipment case covers
- Structural Acrylic **TA 440 A&B** for sealing attachment points of equipment carts, gurneys and stretchers.

\*These products have not been tested for biocompatibility.

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