## Properties and performance

<table>
<thead>
<tr>
<th>Chemical type</th>
<th>Key features</th>
<th>Metals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mild steel</td>
</tr>
<tr>
<td>Conditions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unit</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### EP: Epoxy adhesives

- **Araldite® 2011 EP**
  - > Multi purpose
  - > Long working life
  - > Good resistance to dynamic loading

- **Araldite® 2012 EP**
  - > Fast curing
  - > General purpose
  - > Good long term durability

- **Araldite® 2013 EP**
  - > Metal coloured paste
  - > Suitable for vertical applications
  - > Good environmental, chemical and temperature durability

- **Araldite® 2014-1 EP**
  - > Grey paste
  - > High temperature and chemical resistance
  - > Excellent durability on metals and against many chemicals

- **Araldite® 2015 EP**
  - > Toughened paste
  - > Ideal for GRP, SMC and dissimilar substrates
  - > Excellent resistance to dynamic loading

- **Araldite® 2031 EP**
  - > Toughened adhesive, resilient bond
  - > Suitable for metal and composite bonding, good adhesion onto polyamides

- **Araldite® 2018 PUR**
  - > Good UV stability
  - > Ideal for bonding thermoplastics
  - > Long working life

- **Araldite® 2028-1 PUR**
  - > Transparent
  - > Fast curing
  - > UV stable

- **Araldite® 2029 PUR**
  - > Medium open time
  - > Designed to bond composites and metals
  - > Well balanced strength and durability

- **Araldite® 2021 MMA**
  - > Rapid curing
  - > High peel and shear strength
  - > Multi purpose

- **Araldite® 2022 MMA**
  - > Ideal for bonding thermoplastics
  - > Multi purpose
  - > Good sanding properties

- **Araldite® 2047-1 MMA**
  - > Outstanding adhesion to copper, brass, galvanized and stainless steel
  - > Requires minimal surface treatment
  - > Gap filling up to 5 mm

- **Araldite® 2048 MMA**
  - > Tolerant to “less than ideal” pretreatment
  - > Gap filling up to 8 mm
  - > Tough flexible bonds for use in dynamic environment

- **Araldite® 2052-1 MMA**
  - > Very high temperature and chemical resistance
  - > Tolerant to “less than ideal” pretreatment
  - > Excellent on metals

---

**Suitability**

- **Excellent**
- **Good**
- **Moderate**
<table>
<thead>
<tr>
<th>Thermosets/composites</th>
<th>Thermoplastics</th>
<th>Miscellaneous substrates</th>
<th>Viscosity</th>
<th>Work time</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRP (UP)</td>
<td>GRP (EP)</td>
<td>CFRP</td>
<td>SMC</td>
<td>PVC</td>
</tr>
<tr>
<td>EP</td>
<td>&gt;</td>
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</tr>
</tbody>
</table>

**Properties and performance**

**Chemical type**

- Thermosets
- Thermoplastics
- Miscellaneous substrates

**Key features**

- Metals
- Viscosity
- Work time
- Cure speed
- Mechanical properties
- Bond strength
- Durability in Colour
- Packaging

**Conditions**

- Pot life (100 g at 23°C)
- Cure time at 23°C to LSS* = 1 N / mm²
- E-modulus at 23°C
- Elongation at break at 23°C
- LSS* aluminium at 23°C
- Water / humidity
- Chemicals
- Heat

**Units**

- Pa·s
- min

**Products**

- Araldite® 2011
- Araldite® 2012
- Araldite® 2013
- Araldite® 2014-1
- Araldite® 2015
- Araldite® 2018
- Araldite® 2028-1
- Araldite® 2029
- Araldite® 2021
- Araldite® 2022
- Araldite® 2047-1
- Araldite® 2048
- Araldite® 2052-1

**Araldite® 2011**

- EP
- > Multi purpose
- > Long working life
- > Good resistance to dynamic loading
- Viscosity: 40 Pa·s
- Work time: 100 min
- Colour: yellow

**Araldite® 2012**

- EP
- > Fast curing
- > General purpose
- > Good long term durability
- Viscosity: 30 Pa·s
- Work time: 6 min
- Colour: yellow

**Araldite® 2013**

- EP
- > Metal coloured paste
- > Suitable for vertical applications
- > Good environmental, chemical and temperature durability
- Viscosity: thixotropic 65
- Work time: 60 min
- Colour: grey

**Araldite® 2014-1**

- EP
- > Grey paste
- > High temperature and chemical resistance
- > Excellent durability on metals and against many chemicals
- Viscosity: thixotropic 35
- Work time: 240 min
- Colour: grey

**Araldite® 2015**

- EP
- > Toughened paste
- > Ideal for GRP, SMC and dissimilar substrates
- > Excellent resistance to dynamic loading
- Viscosity: thixotropic 35
- Work time: 240 min
- Colour: beige

**Araldite® 2018**

- PUR
- > Good UV stability
- > Ideal for bonding thermoplastics
- > Long working life
- Viscosity: 8 Pa·s
- Work time: 40 min
- Colour: colourless

**Araldite® 2028-1**

- PUR
- > Transparent
- > Fast curing
- > UV stable
- Viscosity: 5 Pa·s
- Work time: 16 min
- Colour: transparent

**Araldite® 2029**

- PUR
- > Medium open time
- > Designed to bond composites and metals
- > Well balanced strength and durability
- Viscosity: thixotropic 40
- Work time: 240 min
- Colour: grey

**Araldite® 2021**

- MMA
- > Rapid curing
- > High peel and shear strength
- > Multi purpose
- Viscosity: thixotropic 3
- Work time: 2 min
- Colour: yellow

**Araldite® 2022**

- MMA
- > Ideal for bonding thermoplastics
- > Multi purpose
- > Good sanding properties
- Viscosity: thixotropic 10
- Work time: 18 min
- Colour: yellow

**Araldite® 2047-1**

- MMA
- > Outstanding adhesion to copper, brass, galvanized and stainless steel
- > Requires minimal surface treatment
- > Gap filling up to 5 mm
- Viscosity: thixotropic 5
- Work time: 15 min
- Colour: brown

**Araldite® 2048**

- MMA
- > Tolerant to “less than ideal” pretreatment
- > Gap filling up to 8 mm
- > Tough flexible bonds for use in dynamic environment
- Viscosity: thixotropic 10
- Work time: 15 min
- Colour: red

**Araldite® 2052-1**

- MMA
- > Very high temperature and chemical resistance
- > Tolerant to “less than ideal” pretreatment
- > Excellent on metals
- Viscosity: thixotropic 15
- Work time: 20 min
- Colour: red

**EP**: Epoxy adhesives

**PUR**: Polyurethane adhesives

**MMA**: Methacrylate adhesives
The data below indicates the detailed properties and performance of each product. This data was obtained following recommended pre-treatment of substrates.

<table>
<thead>
<tr>
<th>Cure speed</th>
<th>Mechanical properties</th>
<th>Bond strength</th>
<th>Durability in</th>
<th>Colour (mixed)</th>
<th>Packaging</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>50ml</td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>min</td>
</tr>
<tr>
<td>420</td>
<td>1900</td>
<td>9</td>
<td>26</td>
<td>● ● ● ●</td>
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<tr>
<td>20</td>
<td>2520</td>
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<td>18</td>
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<tr>
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<tr>
<td>180</td>
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<td>1</td>
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<tr>
<td>240</td>
<td>2000</td>
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<td>16</td>
<td>● ● ● ● ●</td>
<td>beige</td>
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<tr>
<td>360</td>
<td>1000</td>
<td>5</td>
<td>19</td>
<td>● ● ● ● ●</td>
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</tr>
<tr>
<td>240</td>
<td>16</td>
<td>45</td>
<td>7</td>
<td>● ● ●</td>
<td>colourless</td>
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<tr>
<td>15</td>
<td>16</td>
<td>60</td>
<td>15</td>
<td>● ● ●</td>
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<tr>
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<td>39</td>
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<tr>
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<td>2300</td>
<td>5</td>
<td>23</td>
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<td>2050</td>
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<tr>
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<td>850</td>
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<td>19</td>
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<tr>
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<td>20</td>
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<td>7</td>
<td>24</td>
<td>● ● ● ● ●</td>
<td>red</td>
</tr>
</tbody>
</table>

* LSS = Lap Shear Strength
## Key questions

<table>
<thead>
<tr>
<th>Adhesives</th>
<th>Epoxy</th>
<th>Methacrylate</th>
<th>Polyurethane</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load-bearing adhesives good for metals and composites</td>
<td>Fast setting and resilient for composites, thermoplastics and metals</td>
<td>Flexible adhesive for composites and certain thermoplastics</td>
<td></td>
</tr>
<tr>
<td>1. Do you require a multi-purpose adhesive with a rapid cure?</td>
<td>Araldite® 2012</td>
<td>Araldite® 2047-1</td>
<td>–</td>
</tr>
<tr>
<td>2. Do you require a multi-purpose adhesive with a long working life?</td>
<td>Araldite® 2011</td>
<td>–</td>
<td>Araldite® 2029</td>
</tr>
<tr>
<td>3. Do you require a fast cure adhesive?</td>
<td>Araldite® 2012</td>
<td>Araldite® 2021 Araldite® 2047-1</td>
<td>Araldite® 2028-1</td>
</tr>
<tr>
<td>4. Do you have large areas for bonding and/or require a long working time?</td>
<td>Araldite® 2013 Araldite® 2014-1 Araldite® 2031</td>
<td>–</td>
<td>Araldite® 2029 Araldite® 2018</td>
</tr>
<tr>
<td>5. Do you require high toughness and the ability to bond different substrates?</td>
<td>Araldite® 2015 Araldite® 2031</td>
<td>Araldite® 2022 Araldite® 2048 Araldite® 2047-1</td>
<td>Araldite® 2029</td>
</tr>
<tr>
<td>6. Do you require chemical resistance or performance at high temperatures?</td>
<td>Araldite® 2014-1</td>
<td>Araldite® 2052-1</td>
<td>–</td>
</tr>
<tr>
<td>7. Do you require an adhesive for gap filling or vertical applications?</td>
<td>Araldite® 2013 Araldite® 2014-1 Araldite® 2015 Araldite® 2031</td>
<td>Araldite® 2021 Araldite® 2022 Araldite® 2047-1 Araldite® 2048</td>
<td>Araldite® 2029</td>
</tr>
<tr>
<td>8. Do you require a flexible adhesive?</td>
<td>–</td>
<td>Araldite® 2048</td>
<td>Araldite® 2018 Araldite® 2028-1</td>
</tr>
<tr>
<td>9. Do you require a transparent adhesive?</td>
<td>–</td>
<td>–</td>
<td>Araldite® 2028-1</td>
</tr>
</tbody>
</table>
Huntsman Advanced Materials

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