



# Rolling stock adhesives selector guide

Reliable and comprehensive bonding solutions

**Araldite®**



## The power of excellence

We are your partner of choice, embracing your vision and sharing your challenges as we progress towards a greener future together.

### Shared challenges

We have a strong worldwide network working with regional development centers to support cross-national developments. Our regional headquarters allow us to act quickly, work flexibly, focus on local needs, and be cooperative. We work closely with suppliers and we network with market influencers to identify the required technology of tomorrow. We look forward to offering you total solutions that fit your business.

### Powerful partnership

We're determined to not only understand your business and your interests, but also to embrace your vision, serve your needs, and solve your problems. We would like to partner with you and share knowledge in order to improve your productivity, maximize your returns, and help you succeed. We are the best choice of partners.

### Dedicated sustainability

We will build a deep understanding of your needs so that we can use our knowledge to meet and exceed your expectations. We are passionate and committed to building lasting relationships of mutual benefit to sustain and progress towards a greener future.

### Diverse people

Our people are from diverse backgrounds. They are curious and perseverant, enthusiastic and energetic, and continually seeking new technological and green solutions to create advanced materials for you.





## High performance adhesives for rolling stock

Huntsman's recognised expertise in research and development allows us to offer a uniquely wide range of innovative solutions for rolling stock. With one of the most trusted brands – Araldite®, bonding materials from different substrates is no longer an arduous problem.

### Glorious history for over 60 years

- 1946** Araldite® adhesives launched into the market as the first epoxy resin product.
- 1955** The first toothpaste type DIY Araldite® adhesive was launched into the market.
- 1966** Araldite® adhesives were used for the construction of Sydney Opera House in Australia.
- 1977** Araldite® adhesives helped a rescue boat to complete a mission.
- 1983** Araldite® structural adhesives were used to bond key structure of TGV high speed train.
- 1995** Araldite® rapid adhesives launched to the market in a new small package
- 1999** Araldite® adhesives were used in China's aerospace engineering for its self-developed spaceship – "Shenzhou", which was successfully launched and returned.
- 2002** Araldite® adhesives were used to build first Maglev train made in Germany for Shanghai Pudong line.
- 2004** Araldite® adhesives were chosen to be used on A380, the most advanced passenger plane at that time, for composite materials bonding
- 2006** Araldite® adhesives were used for the bonding of Barcelona landmark – Torre Agbar's circle roof.
- 2008** Araldite® epoxy adhesives were selected for the renovation and extension of Beijing Worker Stadium.

### Reliable adhesives which meet stringent requirements

Provide reliability and efficiency in the production of mass transit vehicles, which can meet the stringent requirement of fire retardant regulation including BS 6853\*, code of practice for the precautions in the design and construction of passenger carrying trains and DIN5510-2\*, preventive fire protection in railway vehicles.

\* Certain products have met the standards already while others are applying the tests





# Araldite®

Reliable and comprehensive bonding solutions for rolling stock

## Sandwich panel laminating

Bonding **honeycomb/foam core** to metal panel



Metal sandwich panel

Honeycomb/foam core

**Araldite® adhesive solutions**

- Araldite® AW 146/HV957
- Araldite® AW 2105/XD 4419-1
- Araldite® XD 4495/XB 5304
- Araldite® AV 4854/HV 4854
- Araldite® 420 A/B

Bonding **fire retardant wooden panel** to metal panel



Fire retardant wooden panel

Steel or Aluminum panel

**Araldite® adhesive solutions**

- Araldite® AW 146/HV957
- Araldite® AW 2105/XD 4419-1
- Araldite® XD 4495/XB 5304

Bonding **elastic rubber** to fire retardant wooden/metal panel



Elastic rubber

Metal or fire retardant wood

**Araldite® adhesive solutions**

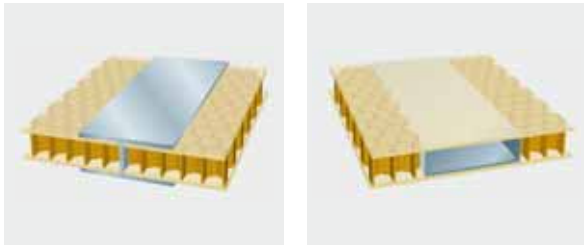
- Araldite® XD 4495/XB 5304
- Araldite® AV 4854/HV 4854

# Araldite®

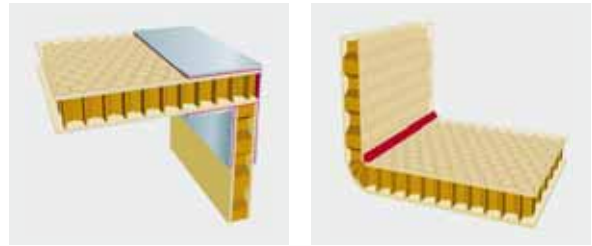
Reliable and comprehensive bonding solutions for rolling stock

## Sandwich panel assembly

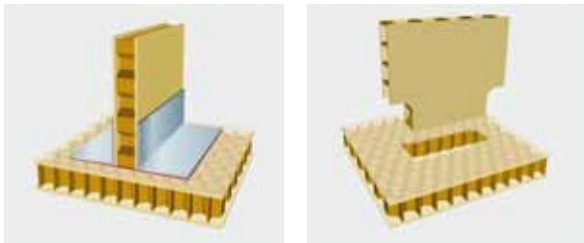
Horizontal assembly



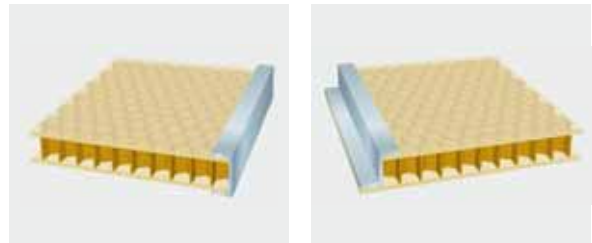
Typical corner joints



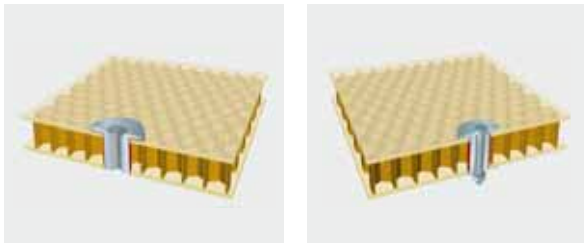
“T” joints



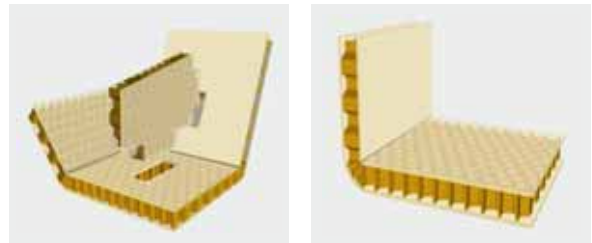
Typical edge closure methods



Typical panel fixings



Cut and fold processing



### Araldite® adhesive solutions

Araldite® 2015 • Araldite® AV/HV4854 • Araldite® 2015-1 Black FR • Araldite® 2021 • Araldite® 2013 • Agomet® P79A/B

# Araldite®

Reliable and comprehensive bonding solutions for rolling stock

## Parts bonding, sealing and assembly

### 1 Rail joint bonding

**Bonding applications**

- Metal to metal bonding

**Araldite® adhesive solutions**

Araldite® 2013  
Araldite® 2014-1  
Araldite® AV 138M-1/HV 998

### 2 Outer door and inner door

**Bonding applications**

- Door fringe sealing
- Metal parts bonding
- Sandwich panel laminating
- Sandwich panel assembly

**Araldite® adhesive solutions**

Araldite® 2015  
Araldite® AV 4854/HV 4854  
Araldite® AW 146/HV 957  
Araldite® 2027  
Agomet® P 79 A/B

### 3 Luggage carrier

**Bonding applications**

- Luggage metal parts setting
- FR-wooden panel bonding

**Araldite® adhesive solutions**

Araldite® 2015  
Araldite® AV 4854/HV 4854  
Agomet® P 79 A/B

### 4 Air pipeline

**Bonding applications**

- Aluminum panel with metal frame bonding
- FRP air pipeline setting

**Araldite® adhesive solutions**

Araldite® 2011  
Araldite® 2015  
Araldite® 2027  
Araldite® AV 4854/HV 4854

### 5 Air dam

**Bonding applications**

- Top FRP air dam with metal parts setting
- Low FRP air dam with metal frame bonding

**Araldite® adhesive solutions**

Araldite® 2012  
Araldite® 2015  
Araldite® AV 4854/HV 4854

### 6 Rolling stock's transformer bonding

**Bonding applications**

- Transformer sealing

**Araldite® adhesive solutions**

Araldite® 2013  
Araldite® 2014-1

### 7 Driving cabin

**Bonding applications**

- FRP cab bonding
- Driving platform bonding

**Araldite® adhesive solutions**

Araldite® 2015  
Araldite® 2021  
Araldite® AV 4854/HV 4854

### 8 Window

**Bonding applications**

- SMC window sheet bonding
- SMC window with metal frame bonding
- Window fringe sealing

**Araldite® adhesive solutions**

Araldite® 2015-1 Black FR  
Araldite® 2015  
Araldite® 2027  
Araldite® AV 4854/HV 4854

### 9 Table and chair

**Bonding applications**

- Metal and SMC bonding
- SMC and SMC bonding

**Araldite® adhesive solutions**

Araldite® 2015  
Araldite® AV 4854/HV 4854  
Agomet® P 79 A/B

### 10 FRP, metal and wood made kitchen

**Bonding applications**

- Metal and SMC bonding
- Metal and metal bonding
- SMC and SMC bonding
- Panel assembly

**Araldite® adhesive solutions**

Araldite® 2011  
Araldite® 2015  
Araldite® 2015-1 Black FR  
Araldite® AV 4854/HV 4854  
Agomet® P 79 A/B

## 11 Sandwich panels bonding

### Bonding applications

- Aluminum-honeycomb floor panel laminating
- Elastic rubber floor panel laminating
- Inner door FR-wooden panel laminating
- Metal parts setting in wall and door panel

### Araldite® adhesive solutions

Araldite® AW 146/HV 957  
Araldite® 2011  
Araldite® 2015  
Araldite® 2021  
Araldite® AW 2105/XD 4419-1  
Araldite® XD 4495/XB 5304  
Araldite® AV 4854/HV 4854

## 12 FRP and metal toilet

### Bonding applications

- FRP toilet shell with metal parts bonding
- Metal parts setting in washing platform
- SMC parts with metal bonding

### Araldite® adhesive solutions

Araldite® 2011  
Araldite® 2012  
Araldite® 2015  
Araldite® 2021  
Araldite® AV 4854/HV 4854

## 13 Maglev train panel bonding

### Bonding applications

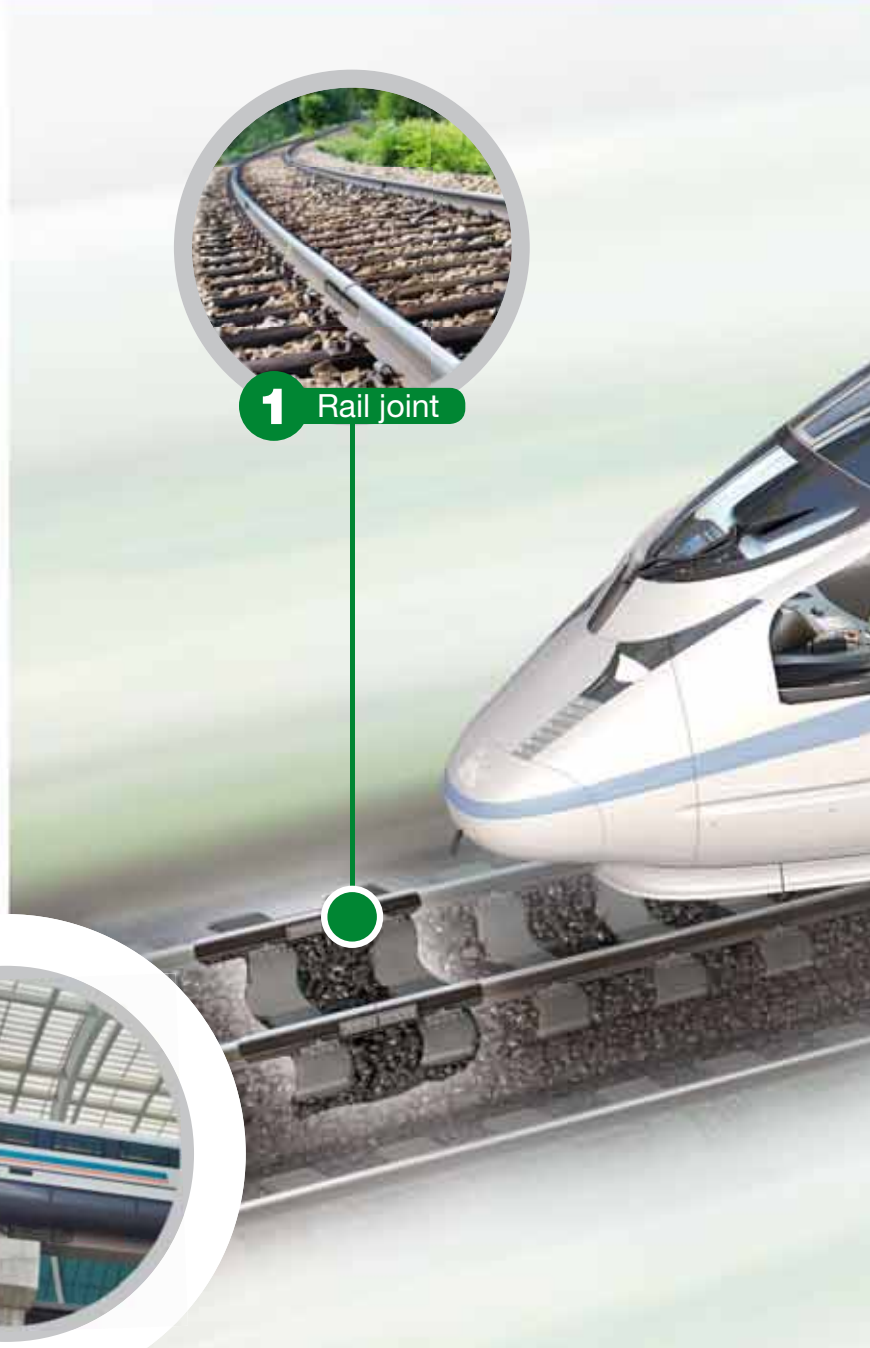
- Bonding sandwich structure panel on Maglev train body
- Bonding aluminum panel to core insulation foam

### Araldite® adhesive solutions

Araldite® 420 A/B  
Araldite® 2015



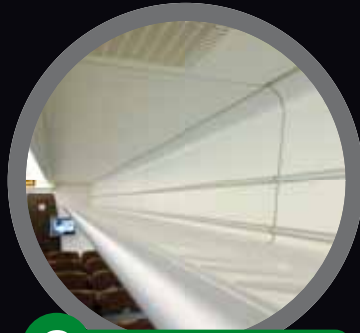
1 Rail joint







**2** Outer/inner door



**3** Luggage carrier



**4** Air pipeline



**7** Driving cabin



**8** Window



**9** Table/chair



**10** Kitchen

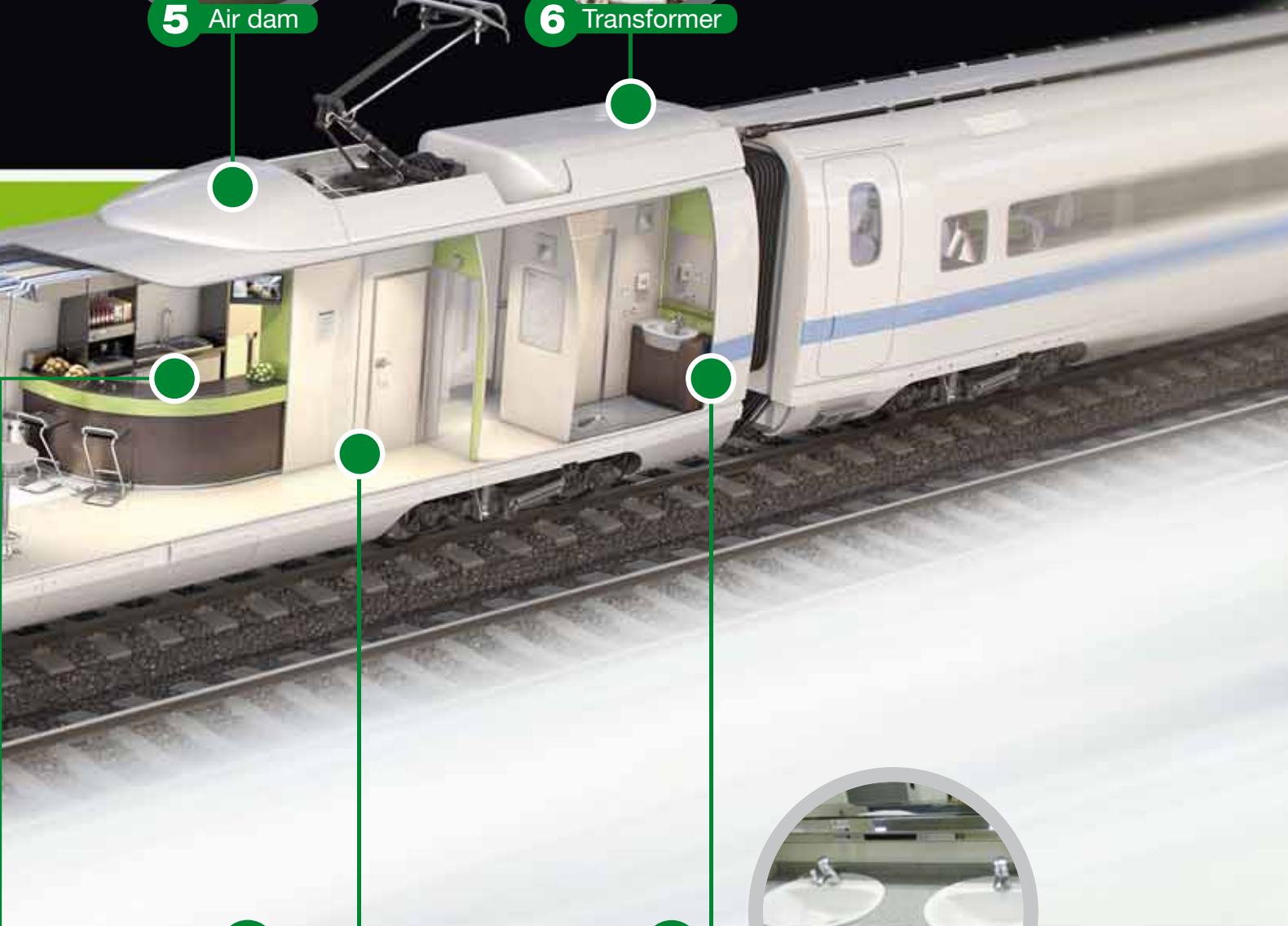




**5** Air dam



**6** Transformer



**10** Kitchen



**11** Sandwich panels



**12** Toilet



**13** Sinks

# Reliable and comprehensive bonding solutions for rolling stock

## Sandwich panel laminating

## Sandwich panel

AW 2105 / XD 4419-1	XD 4495 / XB 5304	AW 146 / HV 957	420 A/B	AV 4854 / HV 4854	2013	2015
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<b>Chemical type</b>	EP	PUR	EP	EP	EP	EP	EP
<b>Fast curing</b>	-	-	-	-	-	-	-
<b>Gap filling</b>	-	-	-	-	Yes	Yes	Yes

### Bonding materials

Metal	●	●	●	●	●	●	●
Plastics	○	●	○	○	○	○	○
Glass	-	○	-	-	-	-	-
Ceramics	○	-	●	○	●	○	○
Wood	-	●	○	●	●	○	●
SMC	○	●	●	●	●	●	●
GRP	○	●	●	●	●	●	●
CFRP	●	●	●	●	●	●	●

### Key properties

Viscosity (25°C)	15 Pa.s	10 Pa.s	30-45 Pa.s	35-45 Pa.s	Thixotropy	Thixotropic	Thixotropic
Colour	Blue	Beige	Pale yellow	Dark green	White	Grey	Neutral
Chemical resistance	○	●	○	-	●	●	●
Heat resistance	○	●	○	-	○	○	●
Water resistance	○	○	○	○	●	○	●
Resistance impact	●	●	○	-	●	●	●

### Benefits and applications

<b>Benefits</b>	Long pot life Good environmental resistance Can cure at ambient or elevated temperatures	Long pot life Good environmental resistance Can cure at ambient or elevated temperatures	High shear and peel strength Tough and good resistance to dynamic loading	Very high shear & peel strength Extremely tough and resilient Good moisture resistance	Water proofing Good environmental resistance	Suitable for vertical applications Low shrinkage Good environmental and chemical resistance	Toughened paste Ideal for GRP, SMC and dissimilar substrates Low shrinkage
<b>Applications</b>	Panel laminating	Panel laminating	Panel laminating Panel fringe sealing	Panel laminating Metal parts assembly	Panel assembly FRP parts bonding Metal parts bonding SMC parts bonding	Panel assembly Rail joint bonding	Panel assembly FRP parts bonding Metal parts bonding SMC parts bonding Panel fringe sealing

EP = Epoxy; PUR = Polyurethane; MMA = Methacrylate

● is excellent; ● is good; ○ is moderate

# Araldite®

assembly

## Parts bonding, sealing and assembly

2021	Agomet® P79 A/B	AV 138 M-1 / HV 998	2011	2012	2014-1	2015 Black FR	2027
MMA	EP	EP	EP	EP	EP	EP	PUR
Yes	-		-	Yes	-	-	Yes
Yes	Yes	Yes	-	-	Yes	Yes	Yes
●	●	●	●	●	●	●	◐
◐	○	○	○	◐	○	○	◐
-	-	○	-	-	-	-	○
-	-	○	◐	◐	○	○	○
-	○	○	○	○	○	◐	○
◐	◐	○	◐	◐	◐	◐	●
◐	◐	○	◐	◐	◐	◐	◐
●	◐	○	◐	◐	●	◐	◐
45 Pa.s	100-140 Pa.s	Thixotropic	30-45 Pa.s	25-35 Pa.s	Thixotropic	Thixotropic	Thixotropic
Pale yellow	Blue grey	Grey	Pale yellow	Pale yellow	Grey	Black	Beige
○	-	●	○	-	●	◐	◐
●	◐	●	○	-	◐	◐	○
○	◐	●	○	-	●	◐	○
◐	◐	◐	○	○	◐	◐	○
Rapid curing High peel strength Suitable for service at up to 100°C	Good shear strength Good thermal & moisture resistance Flow behavior	Low volatile loss Excellent chemical resistance High temperature resistance	Long working life Low shrinkage Good resistance to dynamic loading	Fast curing Low shrinkage Tough & resilient	Low shrinkage Very resistant to water & a variety of chemicals Non Sagging up to 5mm thickness	Toughened paste Ideal for GRP, SMC and dissimilar substrates Low shrinkage	Bond well to most thermoplastics Short assembly time Excellent gap fill & SMC bonding capability
Panel assembly FRP parts bonding Metal parts bonding	Panel assembly Panel fringe sealing Metal parts bonding SMC parts bonding	Rail joint bonding	Metal parts bonding	SMC parts bonding Metal parts bonding	Rail joint bonding	Metal parts bonding SMC parts bonding	SMC parts bonding



## We see a better world

We focus on developing products and solutions to solve new challenges, such as global demand for alternative energy. We enable our customers to be active in green technologies and introduce new eco-friendly processes as well as alternative materials to help reduce carbon footprint and preserve resources. By leveraging our core competencies, which include synthesis and formulation, testing and analysis, process manufacturing technology and technical service, we can develop sustainable products that benefit our customers, consumers and planet as a whole.

### Huntsman Advanced Materials

We are a leading global supplier of synthetic and formulated polymer systems for customers requiring high-performance materials which outperform the properties, functionality and durability of traditional materials. Over 2200 associates at 13 locations worldwide, work to fulfill this promise day by day.

More than 9000 companies around the world use Huntsman Advanced Materials technologies in key markets such as adhesives and inks, aerospace, automotive, coatings, construction, electronics, medical, marine, power transmission and distribution, sports equipment and wind power generation.

### For more information

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