

## **What is BIW adhesives?**

BIW adhesives are specialized adhesives used to bond various parts of the car's body together, such as the chassis, panels, and structural components. BIW adhesives play a crucial role in modern automotive manufacturing, contributing to structural integrity, safety, durability, and performance while also helping to meet stringent environmental and weight reduction goals.

### **Typical Applications:**

- Automotive Adhesives
- Structural bonding of drive shaft and chassis
- Sealing heat exchanger tubes
- Bonding interior dashboard and trim
- Gearbox and sump cover gasketing
- Potting and sealing of electronics and LEDs
- Thread locking and retaining bolts, pins, and bearings
- Bonding of sensors

### **Adhesive Key Features:**

Due to the high-temperature resistance demanded by under bonnet applications, the Permabond range has been developed to include high-temperature resistant products, including anaerobic, epoxies, and cyanoacrylates which can withstand temperatures of up to 250 deg C (480 deg F).

Structural products are available with rubber toughening to produce high strength, durable bonds, which are able to withstand the harsh conditions and vibration experienced on many under-maintained roads!

Permabond's potting adhesives for electronics are very popular, due to the slight flexibility of these products. Expansion and contraction of electrical components, sensors, or LEDs in the extremes of temperature need not be cause for concern, as the adhesive will flex and continue to maintain a high strength bond or seal without exerting any stress on these sensitive components.

**Structural Integrity:** BIW adhesives contribute to the overall structural strength of a vehicle. They distribute stress more evenly across joints, enhancing the rigidity and durability of the body.

**Weight Reduction:** Compared to traditional welding methods, adhesives are lighter. This weight reduction improves fuel efficiency and can help meet regulatory standards for emissions and fuel economy.

**Corrosion Resistance:** Adhesives form a barrier that protects joints from moisture and corrosion, extending the lifespan of the vehicle and reducing maintenance costs.

**Vibration Damping:** Adhesives absorb vibrations, reducing noise and enhancing the comfort of the vehicle. This is especially important as automotive manufacturers focus on creating quieter and smoother rides.

**Flexible Design:** Adhesives allow for more flexible design options, facilitating the use of dissimilar materials in the BIW assembly. This is crucial for incorporating materials with different properties for optimal performance and efficiency.

## **Types of BIW adhesives:**

### **1.Urethane Adhesive**

Urethanes are a type of rubber-based adhesive that provide excellent bonding strength and flexibility between metal and plastic surfaces. Urethane adhesives are extremely useful in auto body repair because they can span gaps up to 1/8 inch wide without sagging or running, making them perfect for filling large holes or cracks in your vehicle's bodywork. Additionally, they're resistant to extreme temperatures and weather conditions, making them ideal for outdoor applications.

### **2.Polyurethane Adhesive**

Polyurethane adhesive is much like urethane but with one key difference: you can apply it directly onto wet surfaces without compromising its strength or durability. This makes polyurethane especially useful for emergency repairs in rainy or humid conditions when traditional adhesives won't work properly due to moisture.

### **3.Epoxy Adhesive**

Epoxies are another type of auto body adhesive to know about as you prepare for your project. Strong and durable, these two-part adhesives provide a powerful bond when used on metal and plastic. Unlike urethanes, you must thoroughly mix epoxies before use. They also require more precise application than urethanes due to their short working time (usually about 5 minutes). However, epoxies can provide a stronger bond than urethanes if applied correctly, so they are

great for automotive repairs that need extra strength. Epoxies also provide excellent corrosion resistance that makes them ideal for outdoor applications like underbody repairs, where rust could become an issue over time.

#### 4.Acrylic Adhesive

Acrylics, on the other hand, are one-part adhesives that set quickly (usually within 15 minutes) and are easy to apply with minimal mess or fuss. Once set completely, you can paint over acrylic adhesives, making them great for cosmetic repairs where you want the finished look to blend with the rest of your car's bodywork. Acrylics also offer excellent UV protection against fading or discoloration from direct sunlight exposure.

Automotive adhesives come in many different varieties depending on your needs, and each has its own unique properties that make it ideal for certain applications. To get the best results from your repair job, make sure you use the correct adhesive for your project so that you get a strong bond with lasting durability. Eagle National carries several auto body adhesives and subsequent mixing and application accessories that correspond with various bodywork needs. Whether you're repairing minor dings or major damage, we have an auto body adhesive that can make all the difference in getting your car back into shape.

#### **Advantages:**

Biw adhesives, commonly used in automotive Body in White (BIW) assembly, offer several advantages. They provide increased structural integrity, reduce weight compared to traditional welding methods, and contribute to improved vehicle fuel efficiency. Additionally, adhesives can enhance corrosion resistance, dampen vibrations, and allow for more flexible design options. The application of adhesives in BIW also often results in a smoother surface finish and can simplify the joining of dissimilar materials.

1. Abrasion Resistant.
2. Creep and Fatigue Resistant.
3. Dimensionally Stable.
4. Flexibilized and Toughened.
5. Hardness.
6. High Elongation.
7. Low Shrinkage.
8. Low Stress.
9. Cosmetic Improvements. Automotive adhesives provide aesthetic improvements over welds and mechanical fasteners because they're entirely hidden between two substrates.
- 10.Light weighting.

- 11.Stress Distribution.
- 12.Rigidity.
- 13.No Metal Distortion.
- 14.Less Corrosion.
- 15.Rapid Assembly.
- 16.Cost Reduction.

### **Disadvantages:**

Some disadvantages of using biw adhesives (Body in White adhesives) in automotive manufacturing include potential challenges related to repairability, higher initial costs compared to traditional welding methods, and concerns about the long-term durability of adhesive bonds in certain conditions. Additionally, the application process may require careful control to ensure proper bonding and structural integrity.

### **How BIW adhesives Works?**

Body in White (BIW) adhesives work by creating a strong bond between two or more surfaces within the vehicle's body structure. The process typically involves the following steps:

**Surface Preparation:** Before applying the adhesive, surfaces must be thoroughly cleaned and prepared. This often includes removing any contaminants, such as oil, dirt, or rust, to ensure optimal adhesion.

**Application:** The adhesive is applied to the surfaces either manually or through automated systems. The application method can vary depending on the specific adhesive used and the manufacturing process.

**Joining:** The parts to be joined are brought together, allowing the adhesive to create a bond between them. This can be done using fixtures or clamps to maintain the proper alignment and pressure during the curing process.

**Curing:** Curing is the process during which the adhesive hardens and reaches its full strength. This can occur through various mechanisms, such as chemical reactions, heat, or a combination of both. The curing time and conditions depend on the type of adhesive being used.

**Bond Formation:** As the adhesive cures, it forms a strong bond between the joined surfaces. This bond contributes to the structural integrity of the body, distributing loads and stresses more evenly across the components.

**Post-Curing Inspection:** After the adhesive has cured, the joined components undergo inspections to ensure the quality of the bond. This may involve various tests and checks to confirm that the adhesive has properly adhered and meets the required specifications .

The effectiveness of BIW adhesives lies in their ability to provide a durable and reliable bond between materials, enhancing the overall strength and performance of the vehicle's body structure. This method of joining materials offers advantages such as weight reduction, improved structural integrity, and flexibility in design, making it a widely adopted practice in modern automotive manufacturing.

### **How do BIW adhesives impact vehicle safety?**

Body in White (BIW) adhesives play a significant role in enhancing vehicle safety through various mechanisms. Here's how they impact safety:

**Structural Integrity:** BIW adhesives contribute to the overall structural integrity of the vehicle by creating strong bonds between different components. This enhances the rigidity of the body structure, which is crucial for withstanding and distributing impact forces in the event of a collision.

**Crashworthiness:** Adhesives help improve the crashworthiness of vehicles. By effectively distributing impact forces, they contribute to energy absorption during a collision. This can result in controlled deformation of the vehicle structure, reducing the risk of injury to occupants.

**Weight Reduction:** Adhesives enable the use of lightweight materials and dissimilar material combinations. This weight reduction not only improves fuel efficiency but also influences the vehicle's kinetic energy during a crash, potentially reducing the severity of the impact.

**Vibration Absorption:** BIW adhesives dampen vibrations and reduce noise, contributing to a more comfortable driving experience. This is particularly important for safety, as excessive vibrations and noise can impact driver concentration and vehicle control.

**Corrosion Resistance:** Adhesives form a protective barrier against moisture and corrosion. This helps maintain the structural integrity of the vehicle over time, preventing weaknesses that could compromise safety in the long run.

**Improved Joining of Materials:** Adhesives enable the bonding of dissimilar materials with different properties. This allows for strategic placement of materials to optimize safety features, such as reinforced areas for impact absorption and deformation.

**Enhanced Design Flexibility:** The flexibility provided by adhesives in terms of design and material choices allows for the incorporation of safety features without sacrificing structural integrity. This flexibility can lead to innovative safety designs and features.

**Reduced Welding Distortion:** Compared to welding, adhesives can reduce distortion in the assembly process. This is important for maintaining the accuracy of safety-critical components and ensuring that safety systems, such as airbags, function as intended.