

# DURAPLATE

## Working with DuraPlate®

Fabrication Guidelines

**WABASH™**



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# NOTES, CAUTIONS and WARNINGS

This manual contains Notes and Cautions in reference to working with DuraPlate material.



**Notes:** Provide additional information or highlights important tips throughout the manual.



**Cautions:** Provide notification of situations that can cause damage to machinery and tools.

**Warnings:** Provide alerts to situations that can cause personal injury or death.

## WORKING WITH DuraPlate

### Safety and Handling

Wabash National recommends safe working practices at all times. Assuring full compliance with all environmental, health, and safety laws and applicable standards and to avoid jeopardizing the environment or individual safety.

Wear appropriate personal protective equipment:

- Always wear approved eye protection around machinery and when working with DuraPlate, as well as proper ear and foot safety equipment.
- To protect hands and arms from scrapes or cuts, wear heavy abrasion-resistant gloves, as well as cut-resistant arm guards when handling DuraPlate panels.
- Wear proper respiratory protection when working in areas with high concentrations of dust, chips, and/or heat from certain fabricating operations. A half face or full face respirator, or dust mask, is recommended for any use that may cause dust or fumes.
- In situations where there is a possibility of accidental head contact, head protection should be worn. Hard hats can protect from impact as well as penetration or electrical hazards.

When using other tools and equipment in association with DuraPlate, safety is very important. Follow the manufacturer's safety guidelines when performing any function. Use the correct tools and equipment, and use them properly. Additionally, properly maintaining tools and equipment regularly will enhance safety.



**WARNING:** The steel used in DuraPlate is thin and can be very sharp. When manually lifting or maneuvering a standard size DuraPlate sheet, it is advised to use at least two people. Doing so may prevent the possibility of injury, or damaging or scratching the panel.



**WARNING:** Do not attempt to weld DuraPlate material under any circumstances. Attempts to weld the product may result in product delamination, product failure and/or fire. Heat applied to the panel must be carefully considered and applied with caution. DuraPlate products are designed to perform in temperature ranges of -50°F to +190°F.

# INTRODUCTION

These fabrication guidelines have been developed as a resource to help designers, engineers, researchers and fabricators understand DuraPlate panel technology. The contents of this document serve as guidelines to working with DuraPlate in the most efficient and effective manner. It provides data and information to aid in current uses, new technology, as well as research and development.

Wabash first introduced DuraPlate in 1996, for use in semi-trailer sidewalls. Today, our composite materials are used in a wide range of products and markets, with multiple new offerings and materials in development.

Staffed with experts to aid in the integration of DuraPlate composite material in many applications, Wabash has extensive research and development capabilities to provide testing data to support specific customer applications. With a strong belief in protecting the Intellectual Property (IP) of Wabash National Corporation and that of its customers, a mutual nondisclosure agreement (MNDA) is used early in discussions with potential customers.

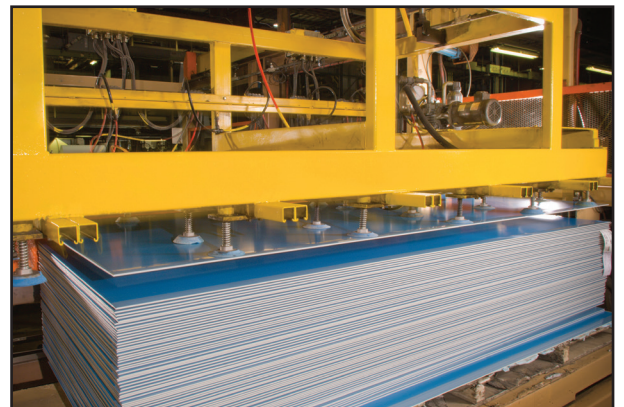
Headquartered in Lafayette, Indiana, Wabash National Corporation (NYSE: WNC) is a diversified manufacturer and North America's leading producer of semi-trailers and liquid transportation systems. Established in 1985, the company specializes in the design and production of dry freight vans, refrigerated vans, platform trailers, intermodal equipment, liquid tank trailers, engineered products, and composite products.

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# PRODUCT DESCRIPTION








DuraPlate is an engineered steel and plastic composite material that has proven performance in the most demanding applications. This composite panel is comprised of two external sheets of high strength galvanized steel that are thermally bonded to each side of a high density polyethylene core.

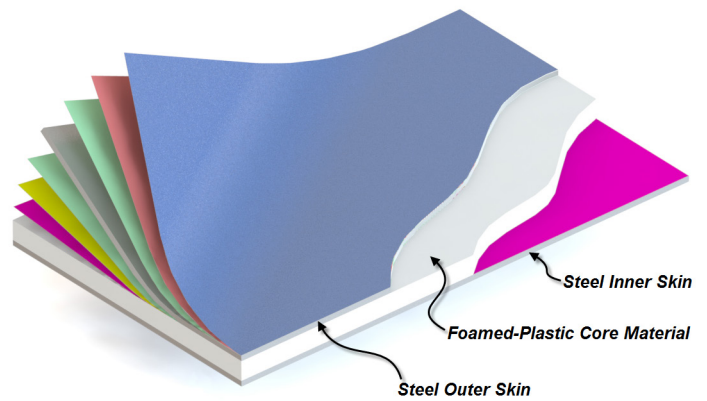
First fabricated in 1996, DuraPlate's original application was for semi-trailers because of its strength and durability. Today, the DuraPlate semi-trailer is the leader in the trucking industry, with more than 500,000 produced in North America. The versatility of DuraPlate has allowed innovation and progression into other markets, and has successfully replaced standard materials for products, including truck bodies, swing and overhead doors, cargo trailers and portable storage units.

DuraPlate is well suited and accommodating to many products and applications because of its excellent strength-to-weight ratio and superior performance.

## DuraPlate Panel Specifications

DuraPlate panels are produced in a continuous process to standard specifications in a dedicated state-of-the-art production facility. The standard weights, measurements and properties of DuraPlate are provided below. Wabash National has the flexibility to provide custom specifications upon request with minimum quantity requirements.

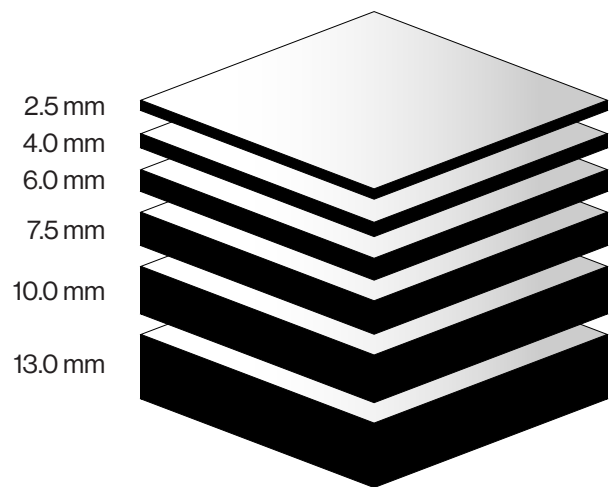
-  Polyester Baked-on Paint
-  Rust Inhibiting Baked-on Primer
-  Zinc Coating: G-90 Hot-Dip
-  80,000-psi Yield Full-Hard Steel
-  Special Proprietary Primer Coating
-  Adhesive Film
-  Foamed-Plastic Core Material



## Standard Specifications

General	Steel Galvanized 80,000 psi yield Polyester baked-on finish
Core	High-density polyethylene
Panel Thickness	2.5 mm (.098 in) 4 mm (.157 in) 6 mm (.236 in) 7.5 mm (.295 in) 10.0 mm (.394 in) 13.0 mm (.511 in)
Widths	48 in 49 in
Length	130 in (standard)

## Panel Thicknesses



# DuraPlate Panel Attributes: 2.5–4.0 mm Thickness

Typical engineering properties for DuraPlate® composite material, using a high-density polyethylene core between two sheets of steel. <sup>(1)</sup>

	2.5 mm (.013")		4.0 mm (.013")		4.0 mm (.016")	
	U.S.	METRIC	U.S.	METRIC	U.S.	METRIC
<b>Thickness</b>	0.098 in	2.5 mm	0.157 in	4.0 mm	0.158 in	4.0 mm
<b>Maximum Width</b>	48 in	1,219 mm	48 in	1,219 mm	49 in	1,245 mm
<b>Maximum Length</b>	130 in	3,302 mm	130 in	3,302 mm	130 in	3,302 mm
<b>Weight <sup>(2)</sup></b>	1.408 lb/ft <sup>2</sup>	6.874 g/m <sup>2</sup>	1.602 lb/ft <sup>2</sup>	7.822 g/m <sup>2</sup>	1.828 lb/ft <sup>2</sup>	8.925 g/m <sup>2</sup>
<b>Stiffness (EI)</b>	1,335 lbf-in <sup>2</sup> /in	1 X 10 <sup>3</sup> MPa-cm <sup>4</sup> /m	4,040 lb-in <sup>2</sup> /in	45.7 X 10 <sup>3</sup> MPa-cm <sup>4</sup> /m	4,718 lb-in <sup>2</sup> /in	53.3 X 10 <sup>3</sup> MPa-cm <sup>4</sup> /m
<b>Tensile Yield of Laminate</b>	80,000 lb/in <sup>2</sup>	551.6 MPa	80,000 lb/in <sup>2</sup>	551.6 MPa	80,000 lb/in <sup>2</sup>	551.6 MPa
<b>Puncture Resistance 0.5 in Diameter Ball</b>	1,238 lbf	5,507 N	1,287 lbf	5,725 N	1,636 lbf	7,277 N
<b>Puncture Resistance 6 in Spade</b>	3,529 lbf	15,698 N	3,004 lbf	13,362 N	3,369 lbf	14,986 N
<b>Coefficient of Thermal Expansion at Low Temperature (ASTM E831-06) <sup>(3)</sup></b>	86.071 µin/in-°F	154.93 µm/m-°C	74.071 µin/in-°F	133.33 µm/m-°C	78.071 µin/in-°F	140.53 µm/m-°C
<b>Coefficient of Thermal Expansion at High Temperature (ASTM E831-06) <sup>(3)</sup></b>	252.218 µin/in-°F	453.99 µm/m-°C	246.218 µin/in-°F	443.19 µm/m-°C	249.218 µin/in-°F	448.59 µm/m-°C
<b>Corrosion (ASTM B117) <sup>(4)</sup></b>	Pass 1,000 hrs		Pass 1,000 hrs		Pass 1,000 hrs	
<b>Acoustical Properties (ASTM E90-04)</b>	26 STC		27 STC		28 STC	
<b>Surface Burning (ASTM E84) <sup>(5)(6)</sup></b>	Class B		Class B		Class B	
<b>R-value (ASTM C177)</b>	.048 Hr-ft <sup>2</sup> -deg F/BTU	.845 x 10 <sup>-2</sup> K- m <sup>2</sup> /W	.087 Hr-ft <sup>2</sup> -deg F/BTU.	1.532 x 10 <sup>-2</sup> K-m <sup>2</sup> /W	.082 Hr-ft <sup>2</sup> -deg F/BTU	1.440 x 10 <sup>-2</sup> K-m <sup>2</sup> /W

- (1) All properties based on 0.013 and .016 in., 80 ksi steel skin material.
- (2) Weights based on 20% foam core.
- (3) Coefficient of Linear Thermal Expansion (CLTE) extrapolated from tests on 6 mm, 7.5 mm, and 13 mm.
- (4) Pass without blisters or creep.
- (5) Class B rating represents Flame Spread Index 26-75; Smoke Developed Index ≤ 450.
- (6) Can achieve a Class A rating by capping off edges of panels to capture core.

# DuraPlate Panel Attributes: 6.0–7.5 mm Thickness

Typical engineering properties for DuraPlate® composite material, using a high-density polyethylene core between two sheets of steel. <sup>(1)</sup>

	6.0 mm (.016")		7.5 mm (.013")		7.5 mm (.016")	
	U.S.	METRIC	U.S.	METRIC	U.S.	METRIC
<b>Thickness</b>	0.236 in	6.0 mm	0.295 in	7.5 mm	0.295 in	7.5 mm
<b>Maximum Width</b>	49 in	1,245 mm	49 in	1,245 mm	49 in	1,245 mm
<b>Maximum Length</b>	130 in	3,302 mm	130 in	3,302 mm	130 in	3,302 mm
<b>Weight <sup>(2)</sup></b>	2.065 lb/ft <sup>2</sup>	10.082 g/m <sup>2</sup>	2.328 lb/ft <sup>2</sup>	11.366 g/m <sup>2</sup>	3.348 lb/ft <sup>2</sup>	16.346 g/m <sup>2</sup>
<b>Stiffness (EI)</b>	11,712 lb-in <sup>2</sup> /in	132.2 X 10 <sup>3</sup> MPa-cm <sup>4</sup> /m	16,340 lb-in <sup>2</sup> /in	184.4 X 10 <sup>3</sup> MPa-cm <sup>4</sup> /m	19,269 lb-in <sup>2</sup> /in	217.5 X 10 <sup>3</sup> MPa-cm <sup>4</sup> /m
<b>Tensile Yield of Laminate</b>	80,000 lb/in <sup>2</sup>	551.6 MPa	80,000 lb/in <sup>2</sup>	551.6 MPa	80,000 lb/in <sup>2</sup>	551.6 MPa
<b>Puncture Resistance 0.5 in Diameter Ball</b>	1,855 lbf	8,251 N	1,878 lbf	8,353 N	2,175 lbf	9,675 N
<b>Puncture Resistance 6 in Spade</b>	5,500 lbf	24,465 N	4,794 lbf	21323 N	6,237 lbf	27,744 N
<b>Coefficient of Thermal Expansion at Low Temperature (ASTM E831-06) <sup>(3)</sup></b>	68.583 µin/in.°F	123.45 µm/m.°C	62.67 µin/in.°F	112.8 µm/m.°C	61.4667 µin/in.°F	110.64 µm/m.°C
<b>Coefficient of Thermal Expansion at High Temperature (ASTM E831-06) <sup>(3)</sup></b>	244.522 µin/in.°F	440.14 µm/m.°C	239.5 µin/in.°F	431.1 µm/m.°C	241.0 µin/in.°F	433.80 µm/m.°C
<b>Corrosion (ASTM B117) <sup>(4)</sup></b>	Pass 1,000 hrs		Pass 1,000 hrs		Pass 1,000 hrs	
<b>Acoustical Properties (ASTM E90-04)</b>	26 STC		27 STC		27 STC	
<b>Surface Burning (ASTM E84) <sup>(5)</sup></b>	Class B		Class A		Class A	
<b>R-value (ASTM C177)</b>	.137 Hr-ft <sup>2</sup> -deg F/BTU	2.414 x 10 <sup>-2</sup> K-m <sup>2</sup> /W	.163 Hr-ft <sup>2</sup> -deg F/BTU.	2.344 x 10 <sup>-2</sup> K-m <sup>2</sup> /W	.162 Hr-ft <sup>2</sup> -deg F/BTU	2.855 x 10 <sup>-2</sup> K-m <sup>2</sup> /W

(1) All properties based on 0.013 and .016 in., 80 ksi steel skin material.

(2) Weights based on 20% foam core.

(3) Approximate transition temperature for which the Coefficient of Linear Thermal Expansion (CLTE) begins to change significantly: 6 mm = 131°F; 7.5 mm = 113°F; 13 mm = 108°F

(4) Pass without blisters or creep.

(5) Class B rating represents Flame Spread Index 26-75. Smoke Developed Index ≤ 450. Class A rating represents Flame Spread Index ≤ 25.



# DuraPlate Panel Attributes: 10.0–13.0 mm Thickness

Typical engineering properties for DuraPlate® composite material, using a high-density polyethylene core between two sheets of steel. <sup>(1)</sup>

	10.0 mm (.016")		12.9 mm (.013")		13.0 mm (.016")	
	U.S.	METRIC	U.S.	METRIC	U.S.	METRIC
<b>Thickness</b>	0.394 in	10.0 mm	0.510 in	12.9 mm	0.510 in	12.954 mm
<b>Maximum Width</b>	49 in	1,245 mm	49 in	1,245 mm	49 in	1,245 mm
<b>Maximum Length</b>	130 in	3,302 mm	130 in	3,302 mm	130 in	3,302 mm
<b>Weight <sup>(2)</sup></b>	2.818 lb/ft <sup>2</sup>	13.76 kg/m <sup>2</sup>	3.125 lb/ft <sup>2</sup>	15.26 kg/m <sup>2</sup>	3.348 lb/ft <sup>2</sup>	16.35 kg/m <sup>2</sup>
<b>Stiffness (EI)</b>	35,733 lb-in <sup>2</sup> /in	403.3 X 10 <sup>3</sup> MPa-cm <sup>4</sup> /m	56,748 lb-in <sup>2</sup> /in	640 X 10 <sup>3</sup> MPa-cm <sup>4</sup> /m	65,053 lb-in <sup>2</sup> /in	734.2 X 10 <sup>3</sup> MPa-cm <sup>4</sup> /m
<b>Tensile Yield of Laminate</b>	80,000 lb/in <sup>2</sup>	551.6 MPa	80,000 lb/in <sup>2</sup>	551.6 MPa	80,000 lb/in <sup>2</sup>	551.6 MPa
<b>Puncture Resistance 0.5 in Diameter Ball</b>	2464 lbf	10960 N	2,581 lbf	9,675 N	2,752 lbf	12,242 N
<b>Puncture Resistance 6 in Spade</b>	8213 lbf	36533 N	6,226 lbf	23,337 N	8,502 lbf	37,819 N
<b>Coefficient of Thermal Expansion at Low Temperature (ASTM E831-06) <sup>(3)</sup></b>	59.042 µin/in-°F	106.28 µm/m-°C	53.34262 µin/in-°F	96.017 µm/m-°C	56.6167 µin/in-°F	101.91 µm/m-°C
<b>Coefficient of Thermal Expansion at High Temperature (ASTM E831-06) <sup>(3)</sup></b>	235.945 µin/in-°F	424.70 µm/m-°C	233.3134 µin/in-°F	419.96 µm/m-°C	230.889 µin/in-°F	415.6 µm/m-°C
<b>Corrosion (ASTM B117) <sup>(4)</sup></b>	Pass 1,000 hrs		Pass 1,000 hrs		Pass 1,000 hrs	
<b>Acoustical Properties (ASTM E90-04)</b>	27.5 STC		27 STC		28 STC	
<b>Surface Burning (ASTM E84) <sup>(5)</sup></b>	Class A		Class A		Class A	
<b>R-value (ASTM C177)</b>	.191 Hr-ft <sup>2</sup> -deg F/BTU	3.366 x 10 <sup>-2</sup> K-m <sup>2</sup> /W	.217 Hr-ft <sup>2</sup> -deg F/BTU.	3.824 x 10 <sup>-2</sup> K-m <sup>2</sup> /W	.219 Hr-ft <sup>2</sup> -deg F/BTU	3.859 x 10 <sup>-2</sup> K-m <sup>2</sup> /W

(1) All properties based on 0.013 and .016 in., 80 ksi steel skin material.

(2) Weights based on 20% foamed core.

(3) Approximate transition temperature for which the Coefficient of Linear Thermal Expansion (CLTE) begins to change significantly: 6 mm = 131°F; 7.5 mm = 113°F; 13 mm = 108°F

(4) Pass without blisters or creep.

(5) Class B rating represents Flame Spread Index 26-75. Smoke Developed Index ≤ 450. Class A rating represents Flame Spread Index ≤ 25.

## Finishes and Coatings

DuraPlate finishes and coatings offer excellent aesthetics and performance.

Standard galvanized coating for panel skins is G40 (interior) and G90 (exterior), depending on application and placement of the panel.

The coating process begins with the cleaning of the metal surface to remove any mill-related contaminants. Further treatments are applied to improve paint adherence and product performance. The surface is then primed and the finish coat is applied via a roll-coating process for superior coverage.

The polyester coil coatings offer durability and are highly resistant to surface marking, marring and staining. The coating is resistant to humidity, as well as to salts and corrosives. The polyester coating also offers superior surface hardness while retaining flexibility. The surface is also enhanced to resist any chalking or fading due to UV exposure. Surface contaminants may be easily cleaned with mild solutions or conventional detergents.

Standard DuraPlate panels are white and have an superior-quality finish. Paint needed to match our standard white coil coated polyester paint can be purchased from Custom Aerosol ([www.custom-aerosol.com](http://www.custom-aerosol.com)) using paint code ADS 3HW76160 to match PPG coil coated paint code #3HW76160.

**Note:** The coil coated paint dry film thickness is 1.0-1.25 mils thick so sometimes matching may be difficult because of the higher dry film thickness one gets when spray painting with a wet paint. A flattener may be needed to get the same gloss level.

For more information on the technical properties of standard PPG Truform Coating, go to [www.ppg.com](http://www.ppg.com).

## STANDARD STEEL COATINGS

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G40 interior

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G90 exterior

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## Product Tolerances

Wabash National has built a solid reputation by producing high-quality products. DuraPlate products are manufactured utilizing state-of-the-art equipment in a continuous panel process, resulting in nominal variation to production tolerances. Disclaimer: These are typical tolerances. See final print for your product tolerances.

### Thickness:

The tolerance for thickness, regardless of core depth, is  $\pm .020$ ".

### Length:

The length tolerance of a finished panel is  $\pm 0.125$ ".

### Width:

Width tolerance of a panel is  $+0.25$ " /  $-0$ " for logistics edge. For shiplap seam panels, width tolerance is  $\pm .062$ ".

### Squareness:

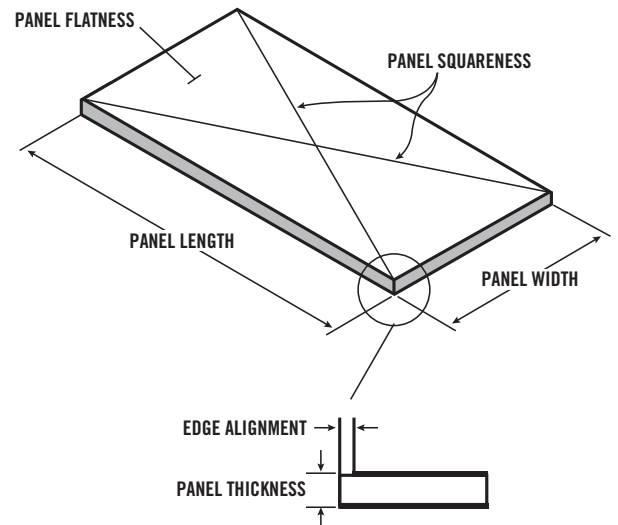
Diagonal measurements on the face of the panel may not differ by more than  $0.1875$ ".

### Skin Alignment:

Tolerance for a finished panel is  $-0.0625$ ",  $+0.03125$ ".

### Flatness:

Camber or lateral bow is  $0.016$ " per  $8'$ .  
and transverse bow is  $0$ "  $\pm 0.125$ " in  $49'$ .



## Shipping and Packaging

Standard packaging is designed to protect the panels during material movement and shipment. DuraPlate products are custom packaged based on the nature of the contents and the destination of the order.

Fork lifts used in transporting products must be capable of safely carrying the load. The approximate maximum weight of a load is 5,000 lbs. It is recommended that pallets should be approached with a forklift from the long axis. Caution should always be taken not to misjudge the center point of the lift. Heavy contact between the lift and the pallet may result in damage to the edges of the product. This is especially true for shiplap products, in which the steel edges are susceptible to bending and deforming. If it is necessary to load or unload a pallet from the narrow edge of the pallet, the load should be placed on a firm, flat surface as soon as possible and the forklift then repositioned to pick up the load from the long edge as soon as possible.

DuraPlate products pass a quality inspection prior to leaving the manufacturing facility. Most domestic shipments are placed on a flatbed or in a conventional van trailer. International shipments are either loaded into containers at the DuraPlate manufacturing site or shipped to a designated location for loading into containers. All necessary international paperwork accompanies the shipment.

Wabash Composites has carefully screened various carriers and can provide preferred shippers. Packaging and shipping charges may accompany an order, based on order quantity as well as any specialized packaging requirements.



**Note:** Products are subject to damage if not handled properly by shippers or customer staff.

# CUTTING AND MACHINING

## Shearing

Shearing of DuraPlate panels is best accomplished by using a hydraulic bow-tie shear. Although a mechanical shear may be used, the hydraulic unit provides a smoother, cleaner cut. The higher impact speed of the mechanical shear tends to tear or break the DuraPlate product, whereas the slower impact speed of a hydraulic shear is less aggressive, providing a better cut.

Use of a shear tends to wipe the galvanized coating from the steel and smear it onto the cut edge. This aids in corrosion prevention. When shearing less than 1" from a panel, a wrap-around effect, in which the short section being removed folds over the shear blade, is likely to occur. For these instances, a saw, router or water jet is recommended.

Proper blade gap is important when shearing DuraPlate. On non-composite metal materials, the blade gap would typically be set up to 10% of the thickness of the material; however, this rule of thumb does not hold true for DuraPlate. Since the core offers virtually no resistance to the shear, the clearance used within the manufacturing process is 0.001"-0.002". The center of the blade is set at 0.001" and the ends at 0.002". Although these clearances work well with DuraPlate, they should not be used on steel alone. Setting blade clearances based on the width of the panel rather than the combined width of the steel skins will result in wrapping the lower skin over the lower shear. Gibs should be set at the manufacturer's recommendations.

There are other precautionary factors to consider. Any panel movement or shifting during fabrication may cause damage to the panel. Use of lower pressure pneumatic hold downs, or a plywood shim between the hold down and the panel, may prevent damage. When changing or rotating blades, it is important to thoroughly clean both the blades and the machine before reinstalling. With such tight clearances, any debris will prevent obtaining proper blade clearance. Also, care should be taken to avoid any damage to the surface of the panels by ensuring that the work area, shear bed, and conveyors are clean and free of cutting debris.

## Sawing

Certain applications, such as lower volume production, out-of-position cuts, or cuts removing less than 1" will best be served by use of a saw.

A reciprocating saw may be used for rough cuts. Finish cutting using a reciprocating saw is not recommended. A sabre saw must have a high quality metal blade. Cuts started from an edge require no special preparation. However, for cuts starting inside the perimeter, a starter hole should be drilled.

Maintaining a sharp blade will produce a clean cut at the edges. A 40-tooth carbide tip blade is recommended.

If painted, the surface coat may chip when a saw is used. To minimize this chipping, tape applied along the edges to be cut is recommended. The taped edge will minimize chipping and reduce the potential for scratches caused by the saw.

Use of a saw will wipe some of the galvanized coating onto the cut edge to aid in preventing corrosion. Wabash Composites recommends using a Milwaukee metal cutting saw Model #6370-20 with #48-40-4515 (or 4520) 42-tooth metal cutting blade for best results.



### **SHEARING DuraPlate: BLADE CLEARANCE**

**Center Blade set at 0.001"**

**Center Blade ends at 0.002"**

**\* Use these settings only when shearing DuraPlate, not on steel only.**



**CAUTION:** Excessive pressure on the panel will result in marring the finish or denting the panel.



## Punching

Certain applications may require the panels to be punched. Punching offers a cost effective method for creating holes, considering equipment availability. Additional attributes of punching include speed, reduction in scratches caused by drill shavings, and the ability to create a variety of shaped holes. Specific tooling is required to ensure a quality punch is created. It is recommended to use a TiN coating on the punch tip to reduce wear and galling. A hollow or concave tip has proven to aid and guide the punch through the material. Use of a concave tip will also increase tooling life.

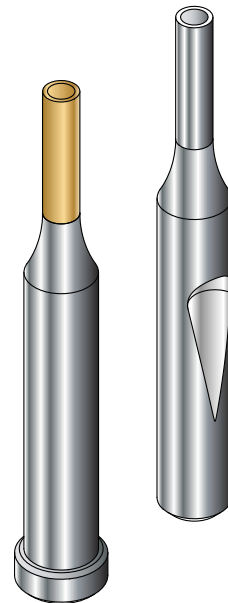
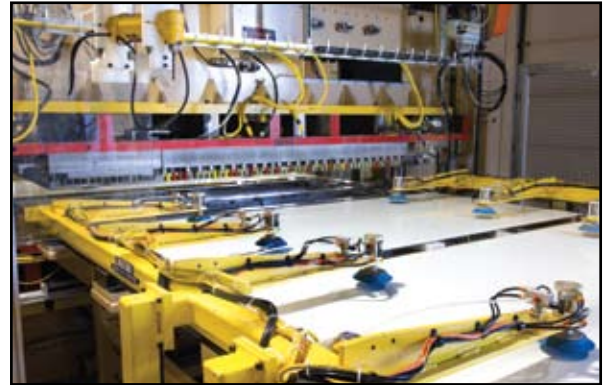
To ensure proper cutting of the lower steel skin, care must be taken to ensure the dies remain sharp and tolerances are kept tight. As the punch contacts the upper steel skin, the plastic core deforms under pressure and creates a hydraulic force on the lower skin, forcing the lower skin through the die. This is unique to composite materials. As such, the dies must be maintained in good condition or hole quality will suffer. It should also be noted that the top cutting surface of the die should be flush with the die holder to prevent any markings on the paint. Alignment of the punch to the die is also critical; otherwise, distortion of the hole may be created. While a close punch to die clearance is crucial, the punch or die may chip if they come in contact. The chipped die will cause more hanging chads and additional side loading of the punch. With proper alignment and sharp dies, chads and burrs are kept to a minimum.

Stripping force is also an important consideration. Failure to ensure the die is clear will result in poor punch quality. The punch must enter the die to a sufficient depth to ensure the slug is clear of the die before the next panel is punched. A slight depression, or dimple, occurs where the punch contacts the upper steel skin. This conical shape increases the friction between the sides of the punch and the metal, thereby raising the amount of force necessary to strip or pull the metal. After the punch is retracted, the plastic relaxes back into the plastic core around the hole area, resulting in a hole slightly smaller than the diameter of the punch.

The occurrence when the diameter of the hole shrinks slightly after punching is referred to as "spring back." In some cases, the shrinkage will increase the force required to insert rivets, bolts or screws. To prevent this, a larger hole may be punched. Other options are to double cycle punch the product after the spring back is complete, or to drill out the punched hole.

The unique composition of DuraPlate allows the user to ignore certain standard punching rules. For example, the rule of thumb that a hole cannot be punched when its diameter is less than the thickness of material does not apply. This is true because the core provides minimal resistance to the punch. Further, the rule that 10% part thickness equals punch clearance to die clearance is not applicable.

Avoid any panel movement or shifting during fabrication. Too much pressure on the panel will result in marring the finish or denting the panel. Pneumatic hold downs set to the proper pressure or a plywood shim will minimize potential damage to the panel.





## Drilling

Drilling of DuraPlate is an option that is frequently used to create or enlarge holes.

Coated drill bits have proven to perform better than standard jobber bits. Most standard bits have a black coating that is cheap to apply, but is also porous. This results in buildup on the bit causing it to overheat. The recommended bit for DuraPlate applications has a tip coating that resists buildup.

Areas of concern while drilling DuraPlate should be noted. Negative results may occur if drill bit is dull or spindle RPM is too high. The recommended drill bit has a sharper point angle. The standard drill bit used is a R5 bit, sharpened to 118°.

For best hole quality, drill pressure should be regulated and constant. Drill RPM should be set at 2500 RPM. Excessive speed and/or pressure can also result in overheating the core and reduced bit life. Controlled feed rate and pressure will produce a clean hole and reduce burrs. This may be regulated by use of an air pressure regulator valve, flow control valve and/or shock absorber.

In cases where an automatic feed drilling machine is used, care should be taken to reduce the impact the drill bit makes as it comes in contact with the DuraPlate and to control the feed rate. Excessive feed rates as well as a moderately hard impact with the drill bit to the DuraPlate could result in poor quality, including holes out of specification, hole distortion, burrs left around the hole and/or chipped drill bits. To control impact and speed of the drill box as it moves towards the DuraPlate, it is recommended to use a pneumatic flow control valve and an adjustable shock absorber on the drill.

Care should be taken to minimize drill shavings buildup on the drill bit. The shavings on the bit will scratch the paint of the DuraPlate if allowed to gather. Shavings should be removed as they accumulate. One method used with success for manual drilling has been to wrap the upper half of the bit with tape, preventing the material from adhering to the grooves, thereby keeping the drill bit free of shavings.

The drill bit chuck should never come into contact with the DuraPlate surface because it will damage the finish. Furthermore, in a stacked drilling process, the materials should be clamped tightly together to avoid shaving accumulation between the objects being drilled. Failure to do this will result in marred surfaces, poor quality of the drilled hole, and holes drilled outside of specifications. Unlike punching, there is no deformation of the surface around the hole inherent to the process. The hole can be drilled to size for the rivet, bolt or screw, since there is no spring back with drilled holes.

## DRILLING INFORMATION

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**Bit: R5 sharpened to 118°**

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**Drill Speed: 2500 RPM**

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## Routing

Routing offers a high-speed process to mark the DuraPlate for drilling or sawing, or to cut a panel. The router may also be used to score a panel for bending or forming. In this instance, scoring a panel refers to cutting the surface steel from one surface side of the panel and the majority of the core, creating a groove. It is recommended that a minimum of 1/32" of core is left for strength and stability, and the remaining steel skin kept intact. This also aids in keeping the bend radius constant and smooth. Possible routing tool: Amana #45749 from Tools Today.

Application will determine the bit speed, depth and type of bit selected. The desired dimensions and geometry of the formed radius will determine the width and depth of the cut.

## Water Jet

A water jet cutter is an effective tool to cut DuraPlate. Water jet applications use a jet of water at high velocity and pressure. Additives, such as garnet, can assist in this process.

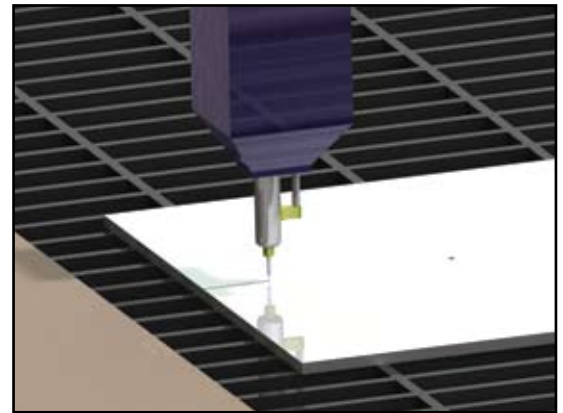
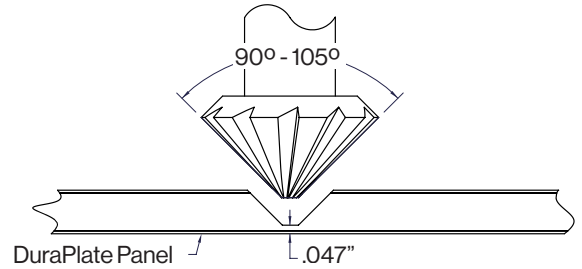
Cuts started from an edge require no special preparation. However, for cuts starting inside the perimeter, a water jet starter hole should be drilled.

The following parameters have produced good results and are intended to serve as a starting point, noting that different water jets may respond to different parameters.

Cutting speed is 45" per minute on 13.0 mm DuraPlate and 50" per minute on 6 mm panels. Use 60,000 lbs of pressure for either thickness. The water jet uses 3/4 lbs per minute to accomplish the cuts. A skimmer may be required to remove floating core material that builds up on the surface. Pump obstruction may result if the buildup is not removed.

The kerf of the cut is -.065" for 13.0 mm and 6.0 mm. The edge is ~90° to the DuraPlate surface. The steel does not roll as found with shearing or punching, consequently, no wiping of the galvanized coating occurs. Therefore, it is recommended that edges not be left exposed.

The painted surface of the panel adjacent to the cut is abraded -.018" on both sides of the cut.



### **SPEED FOR CUTTING DuraPlate**

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**13.0 mm = 45" per min**

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**6.0 mm = 50" per min**

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# ASSEMBLING

## Shiplap Joints

Shiplap joints have exposed edges of steel 1" wider than the core. These steel edges may be joined by overlapping, by varying the inside and outside panel skins. For some applications, one shiplap edge may be sheared off so that there is one flush edge (e.g., for the start of a wall assembly).

The shiplap may or may not have an offset. With an offset along the length of a panel, when joined to the opposite shiplap, a smoother surface is created.

## Logistic Joints

The flush edge with logistics panel allows for two panels to come close to each other without touching. Designed for use primarily within the transportation industry, logistic panels are used in conjunction with logistic strips. An inner and outer logistic strip joins adjacent panels. Through the use of logistic strips, panels are held secure and fixed, and cargo can be held free from movement with cargo tie-downs.

An offset may or may not be produced along the length of the panel to provide a smooth, flat surface.

## Rivet Fasteners

Riveting panels is a popular method to assemble components. This method is well established and cost-effective with predictable results. Rivets can be aluminum buck rivets or pull rivets.

When selecting the type of rivet, surface material should be taken into consideration. Both solid and tubular rivets are commonly used as well as blind rivet applications for interior surfaces. Rivet patterns are either punched or drilled as the situation requires. 3/16" or 1/4" holes are considered standard, although variations are available based on the project. Two rows of 1/4" rivets on 1 1/2" centers is standard practice in semi-trailer manufacturing.

## Bolts and Nut Fasteners

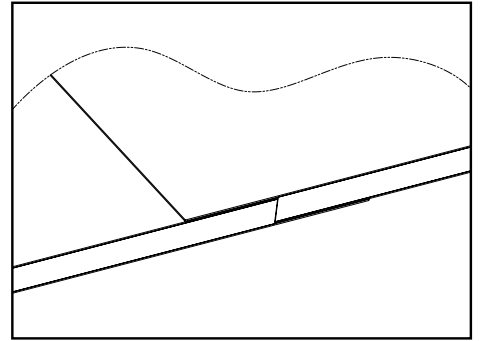
This method is tested, cost-effective and predictable. Bolts are usually used to mount the panel to the frame in an application. Rivets and bonding are more commonly used when joining panels together.

As with rivets, holes are punched or drilled and are prepared to accept standard bolts. Choice of bolts is based on requirements.

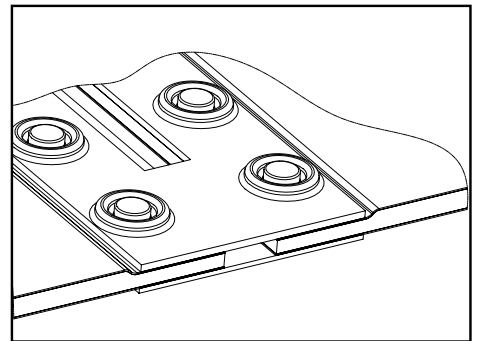
## Screw Fasteners

Use of screws for assembly has advantages not found in either rivets or bolt and nut applications. The core material acts as a lock nut to aid in stabilizing and holding the screw in place. This prevents slippage due to vibration, expansion through heat, or contraction through cold of the metal skin or the screw.

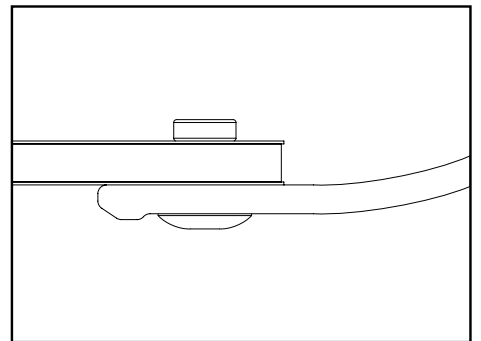
Self-starting screws, such as sheet metal screws, may be used for fastening. Allen, hex and torque screws are commonly used in fastening panels, with final selection based on requirements.



**Bonded Shiplap Joint**



**Logistic Joint**



**Fastened Joint**



## Adhesive Bonding

Bonding through the use of adhesive materials is a common method to adhere and fasten panels. Bonding is most commonly used in shiplap panel applications.

Adhesives have been researched to determine those that have the best adhesive factors, while permitting the skins to expand and contract in response to external heat and cooling cycles without deforming. The flexibility, wearability and strength of the bond are critical to all applications. (Suggested adhesives: Methacrylate adhesives such as Sika 3100 Series or LORD Maxlok T6.) Test first to ensure adhesive works for your application.

All surfaces should be cleaned prior to application of the adhesive or bonding agent. Wiping down surfaces with an alcohol rag typically is sufficient when using the recommended adhesives. Adhesive should be applied accordingly to the manufacturer's recommendation. Using a clamping fixture or placing a heavy object on the bonded joint area to hold the pieces in place is recommended. Uniform clamping pressure is a must for a good bond. Care should also be taken to protect the panels from any marring or damage. Cardboard or other cushion material may be used between the heavy object or clamps and the panel surfaces.

## Caulking

Caulking and sealing applications are most commonly utilized to provide a weatherproof seam.

A sealing application is used behind riveted or bolted seams, along a frame or base rail, or when joining dissimilar metals, as a barrier or spacer. Sealing applications are often in the form of a foam tape or gasket.

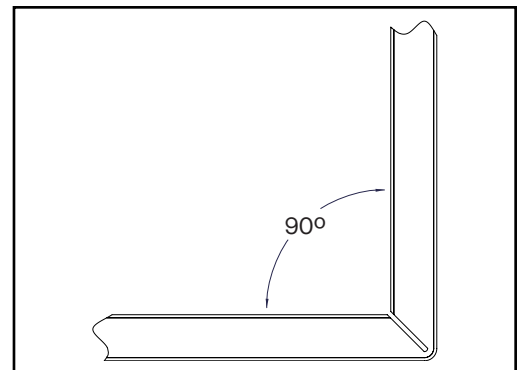
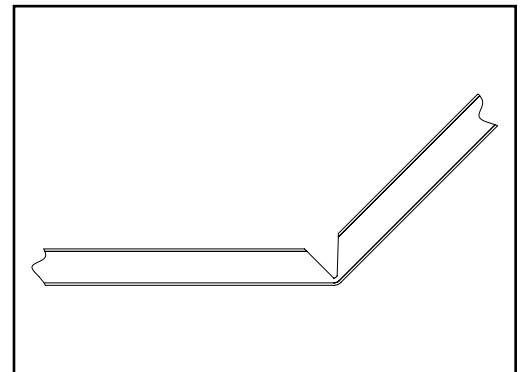
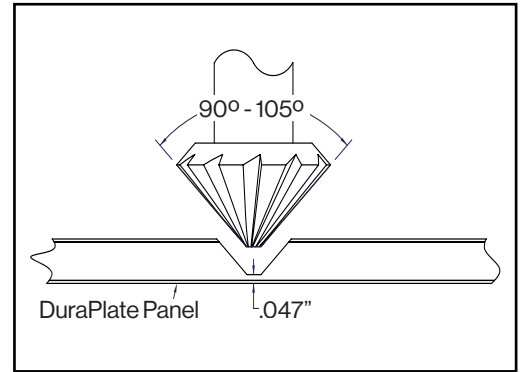


# FORMING

DuraPlate panels may be bent or folded based on application and need, but specific methods are required. Using a router or water jet cutter, one skin and core material may be removed, leaving the opposite skin intact. It is essential that the cutter leave a minimum 1/32" of core material adhering to the remaining skin to provide strength. The desired dimensions and geometry of the formed radius will determine the width and depth of the cut. A broader cut of skin and core will produce a larger radius bend. Narrow cuts will result in tighter corners.

The skin may be either manually or mechanically bent to the shape chosen. If done manually, a wooden block or baffle may be utilized to protect the surface if light hammering is necessary to finish the fold. If a mechanical press is used, care should be taken to ensure there is pressure sufficient to complete the fold or bend without exerting too much pressure.

It must be noted that once bent or formed, the skin will tend to hold a memory of the shape. It may be re-straightened back into visual alignment, but the surface may be damaged in the process. Also, repeated bending of the metal may result in skin failure.



# CLEANING

DuraPlate panels have an automotive-quality finish that resists corrosion and is designed to maintain its appearance for many years in normal conditions. Routine washing is required to clean dirt, debris and harmful irritants. Cleaning panels regularly will restore the panels to original appearance and enhance longevity.

The recommended cleaning process is power washing. A pressure washer should be utilized for large areas of panel surface. However, smaller cleaning applications or smaller panels may be washed by hand. Do not use organic or corrosive cleaning agents, as they may cause damage to the finish coating. A mild detergent formula, similar to those used in washing cars, is recommended. Pressure washing should not exceed 2,000 psi. Care should be taken if decals and graphics are present to avoid edges from lifting or curling. As with any finish, use of abrasive cleaning pads will result in marring the finish and should be avoided. If a brush or cleaning pad is required, a soft bristle brush is recommended. Spray perpendicular to the panel at 8" or greater from the panel. Keep wand in motion. Heat can build up and delaminate steel skin from core.

# PANEL REPAIR

Panels may become damaged, regardless of strength and durability. The scope and extent of the damage determines the repair process. Common repairs include fillers, self-adhesive patches or full panel replacement.

If the skin is torn, but the surface has not suffered any visible delamination, removal of burrs and application of automotive body filler will suffice. Follow the filler manufacturer's recommendations and then touch up the painted surface. If the delamination has progressed beyond a minor repair, it may be necessary to cut out the affected portion of the panel and replace it with self-adhesive patches. This is not a structural repair but will prevent further delamination. If the damage is extensive, a full panel replacement may be required.

**For more information regarding how to repair DuraPlate, please contact Wabash Composites.**

**866-877-5062**

[duraplate@wabashnational.com](mailto:duraplate@wabashnational.com)

[wabashnational.com](http://wabashnational.com)

# Material Safety Data Sheet: DuraPlate

## Section I

## Product Identification

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Manufacturer:	Wabash National Corporation 3000 E. Main St. Lafayette, IN 47905 866-877-5062
Emergency Phone Number:	765-771-5300 To be used only in the event of chemical emergencies involving a spill, leak, fire or exposure accidents.
Trade Name:	DuraPlate
Synonyms:	Polyethylene / Steel Laminated Panel

## Section II

## Material Identification and Information

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Ingredients: (CAS #)	Percent (%) (By wt.) <sup>1</sup>	Occupational Exp. Limits (OSHA) (mg/m <sup>3</sup> )
Polyethylene: (9002-88-4)	37 – 69	10.0 Total <sup>2</sup> 5.0 Resp. <sup>2</sup>
Galvanized Steel:	63 – 31	15.0 Total <sup>2</sup>

## Section III

## Physical Properties

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Appearance and Odor:	Composite sheet material, odorless	
Melting Point:	Polyethylene Steel	110-130o C (230-266o F) 427-482o C (800-900o F)
Sp. Gravity:	Polyethylene Steel	0.7 g/cc 7.9 g/cc
Solubility:	Insoluble in water	

# Material Safety Data Sheet: DuraPlate

## Section IV

## Reactivity Data

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Auto Ignition:	260-410o C (500-770o F) depending on polyethylene blend
Extinguishing Media:	Water, foam, CO2, dry chemical powder
Special Fire Fighting Procedure:	Toxic gases may form upon combustion. Respiratory protection is recommended.
Thermal Decomposition:	May produce carbon monoxide, carbon dioxide, organic vapors

## Section V

## Fire and Explosion Data

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Stability:	Stable
Incompatibility:	None known
Decomposition Products:	Reference: "Thermal decomposition," Section IV
Conditions to Avoid:	None known

## Section VI

## Health Hazard Data

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These products are not considered to be a health hazard in the form in which they are sold (sheet, panel). However, if these products are abraded, melted, welded, cut or processed in any manner that causes release of fumes or dusts, hazardous levels of fumes or dusts may be generated from these materials or constituents of these materials.

### Effects of Overexposure:

Acute:	Physical irritation of the eyes may result from overexposure to high concentrations of dust or chips from certain fabricating operations.
Chronic:	Repeated long-term inhalation of high concentrations of respirable dust may cause inflammation of the upper and lower respiratory tract.
Special Precautions:	Avoid prolonged inhalation of high dust concentrations and ingestion of material. Wash hands before eating, drinking or smoking. Wear proper eye and respiratory protection when working in areas of high dust concentrations.
Emergency and First Aid Procedures:	For dust contact with eyes, wash immediately under water for at least 15 minutes. For dust inhalation exposure, remove to fresh air. Contact a physician.

# Material Safety Data Sheet: DuraPlate

## Section VII

## Storage, Handling and Disposal Data

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Waste Disposal:

Care must be taken when using or disposing of material debris to prevent environmental contamination. Dispose of the debris in accordance with the Clean Air Act, the Clean Water Act, the Resource Conservation and Recovery Act and all state or local laws/regulations regarding disposal.

Storage and Handling Precautions:

Store in a flat, dry area.  
Handle carefully to avoid scratching product finish. Caution should be taken to avoid sharp edges.

## Section VIII

## Personal Protection Data

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Primary Routes of Entry:

Inhalation and ingestion of dust concentrations.

Respiratory Protection:

An approved NIOSH/MSHA respirator must be used when engineering controls cannot be implemented to control dust concentrations. Reference OSHA 1910.134 for specific requirements.

Ventilation:

Local exhaust. Reference OSHA 1910.94 for specific requirements.

Eye:

Eye protection must be worn when working in dust concentrations and during sawing or other operations that might cause flying debris. Reference OSHA 1910.133 for specific requirements.

Protective Glove:

Gloves should be used to prevent cuts or scrapes.

- 1 Concentration of ingredients depends upon the thickness of the material.
- 2 These products are not considered to be a health hazard in the form in which they are sold (sheet, panel). However, if these products are abraded, melted, welded, cut or processed in any manner that causes release of fumes or dusts, hazardous levels of fumes or dust may be generated from these materials or constituents of these materials. Dust from these materials is regulated as particulate, N.O.S.

# NOTES

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# DURAPLATE

***Thank you for your consideration of DuraPlate for your application.***

The Wabash National team is ready to discuss your specific composite requirements and address any fabrication questions you may have.

## WABASH™

[onewabash.com](http://onewabash.com)

[duraplate@wabashnational.com](mailto:duraplate@wabashnational.com)

**866-877-5062**

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