



**HAMMERHEAD™**  
MARINE COMPOSITE PANELS

# PRODUCT DESCRIPTION

Hammerhead™ Marine Composite Panels are made from continuous glass-fiber reinforced thermoplastic face sheets and polyester foam cores. They are engineered to provide **simplified installation, long-lasting components,** and **overall cost reduction** for boat manufacturers.



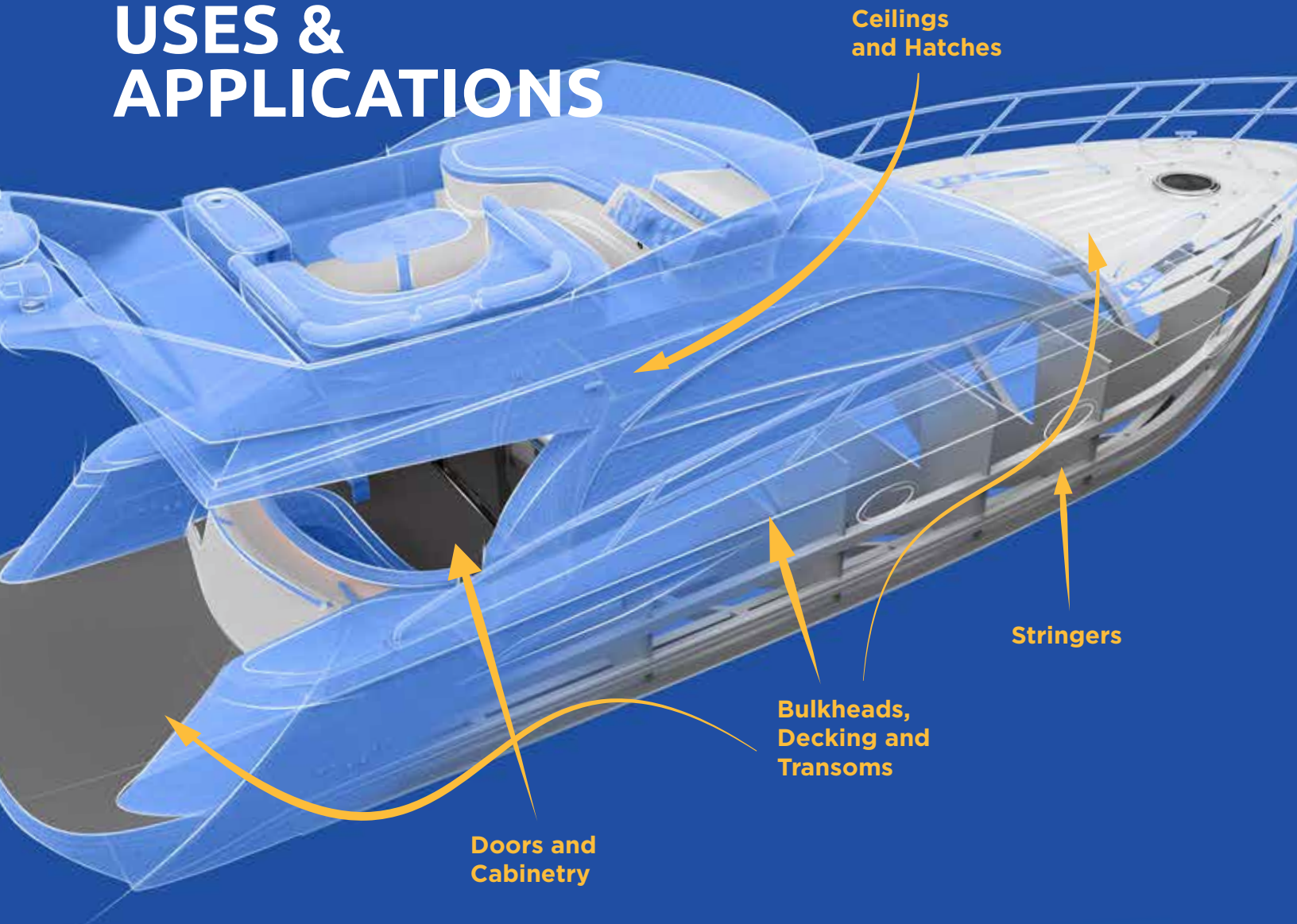
## PERFORMANCE ADVANTAGES

FEATURE	BENEFIT
Exceptional strength-to-weight ratio	Lightweight yet strong structural performance and increased payloads
Resistance to UV light, chemicals, moisture degradation and rot	Resistance to harsh marine conditions
Tough and impact resistant	Durability and long product life
Dimensionally stable	Consistent performance in extreme temperature and humidity fluctuations
Strong adhesive properties	Easy bonding to various materials

## MANUFACTURING ADVANTAGES

FEATURE	BENEFIT
Ready-to-install	Fewer parts & reduced scrap
Large format	Improved aesthetics with seamless designs
Made via continuous-fiber manufacturing process	Consistent quality in every panel

# USES & APPLICATIONS



## MECHANICAL PERFORMANCE

Superior strength-to-weight ratio

PROPERTY	TEST METHOD	PANEL THICKNESS							
		.50"		.75"		1.00"		1.50"	
Core Density (lb/ft <sup>3</sup> )	ISO 845	5.3	8.4	5.3	8.4	5.3	8.4	5.3	8.4
Flexural Rigidity (lb-in <sup>2</sup> )	ASTM D7249	38,379	39,390	80,699	74,158	147,890	140,081	342,866	363,009
Panel Weight (lb/ft <sup>2</sup> )	Calculated	0.93	1.07	1.03	1.25	1.14	1.42	1.35	1.77
Core Shear Yield (psi)	ASTM C393	60	138	61	139	57	131	52	99
Max Load (lbs)	ASTM C393	246	482	362	704	423	833	558	1,031
Core Shear ULT (psi)	ASTM C393	81	159	81	153	70	138	62	113
Face Bend Stress (psi)	ASTM C393	6,430	12,582	6,355	12,109	5,511	10,860	4,899	8,916

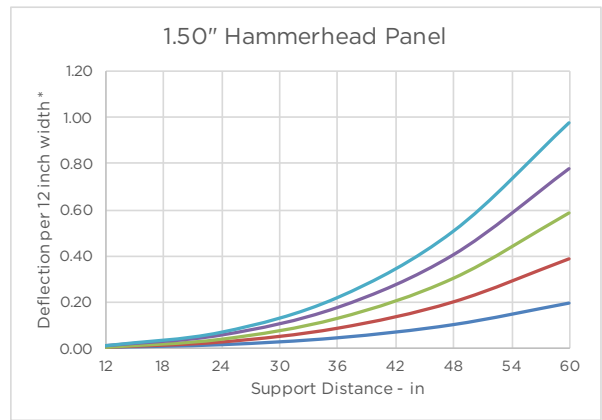
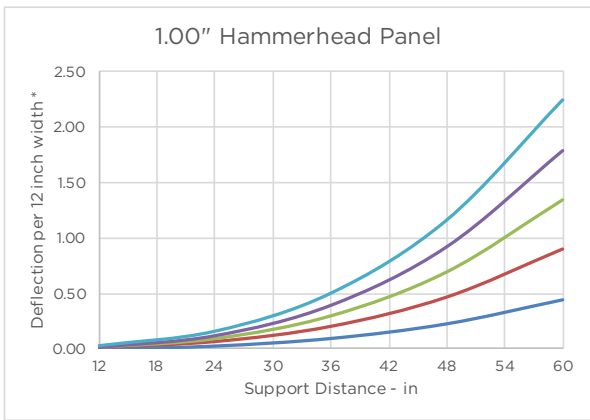
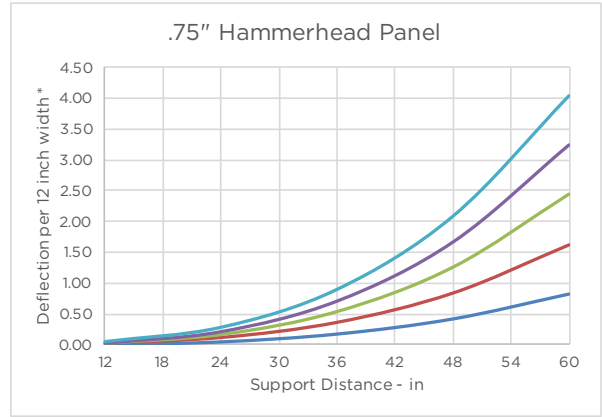
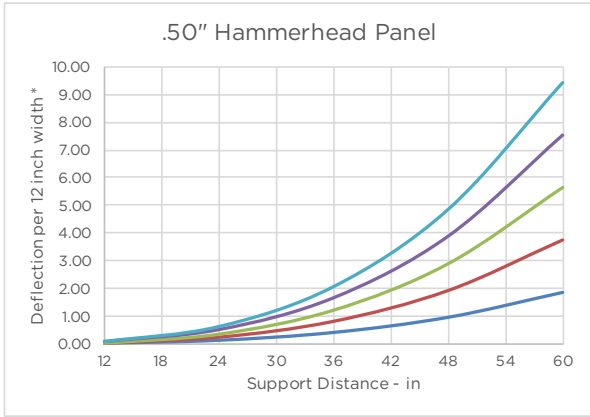
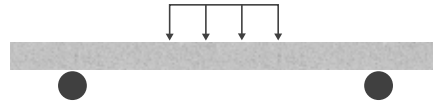
# SUPPORT SPAN DEFLECTION

Meets performance required for marine applications

Predictive deflection in various load cases.

Deflection is dependent on support span distance.

**Simply supported beam deflection for Hammerhead™ panels with 5.3 lb/ft<sup>3</sup> core density**



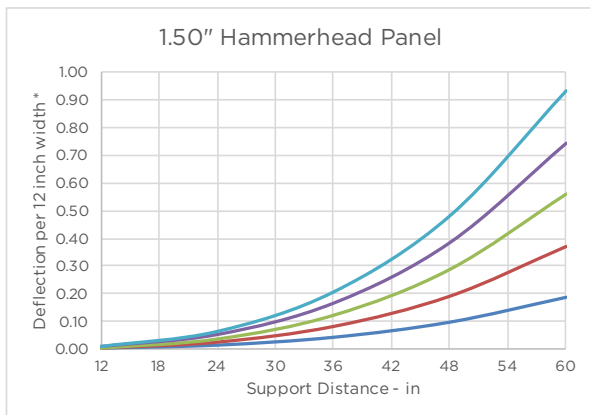
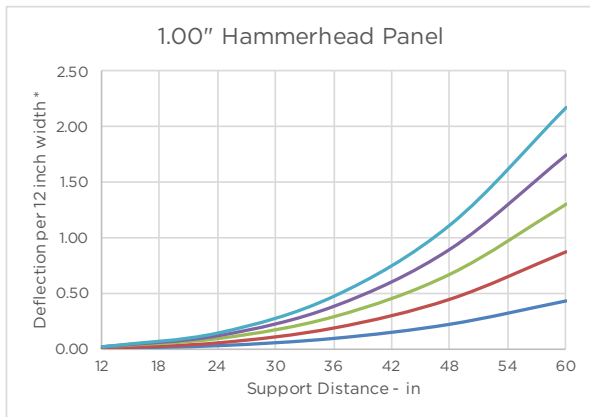
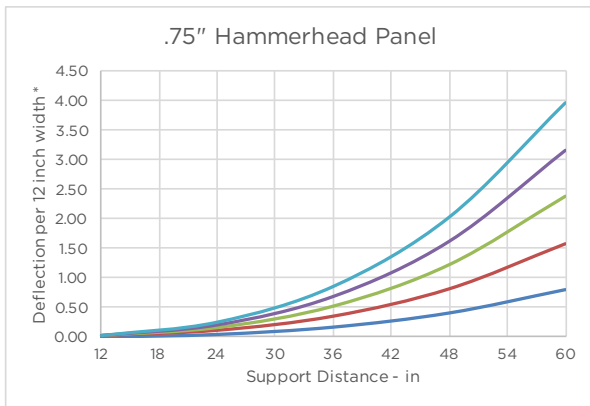
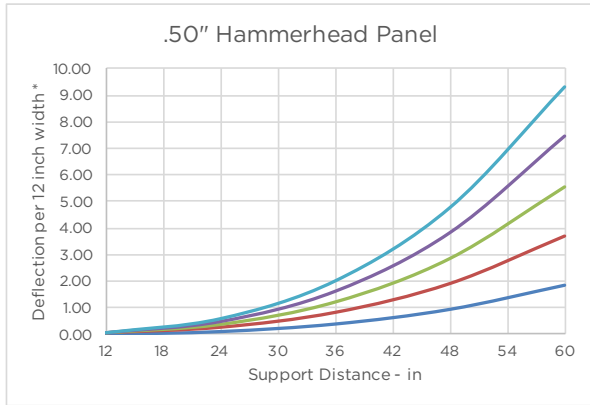
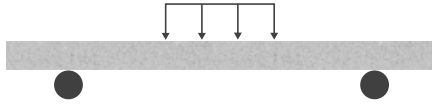
**LOAD CASE**

- 50lb
- 100lb
- 150lb
- 200lb
- 250lb

\* To calculate deflection for different panel widths, use the following formula: Deflection = Chart value \* [12 / panel width].  
 Example: Deflection for 24 inch panel = Chart value \* [12 / 24]



**Simply supported beam deflection for Hammerhead™ panels with 8.4 lb/in<sup>3</sup> core density**



**LOAD CASE**

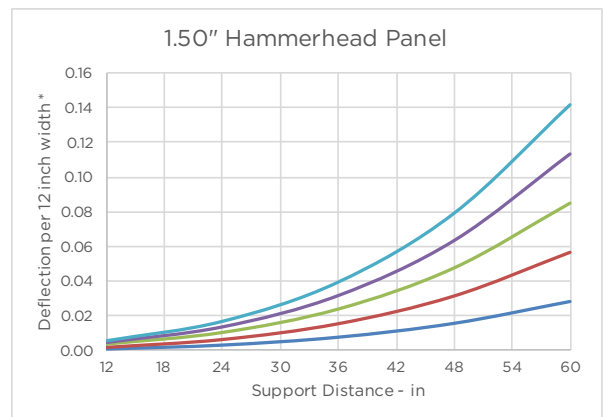
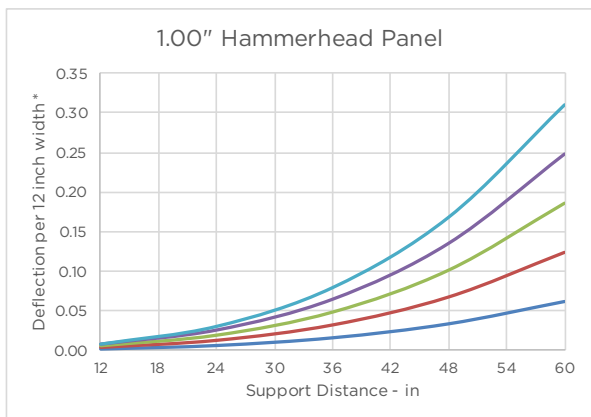
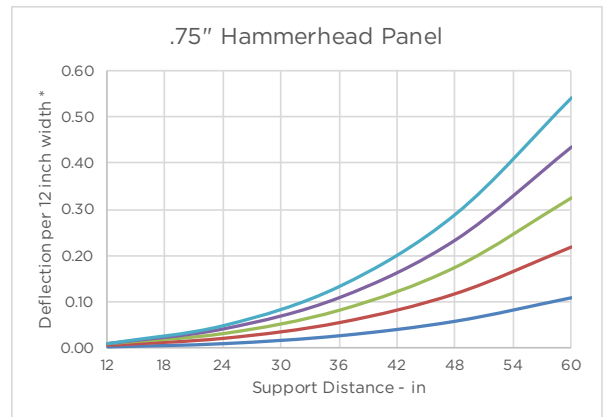
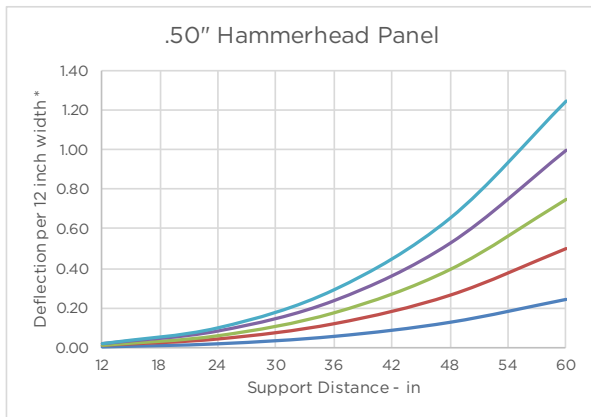
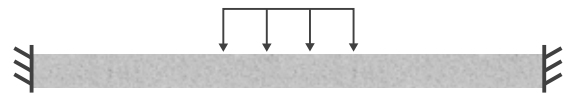
— 50lb — 100lb — 150lb — 200lb — 250lb

\* To calculate deflection for different panel widths, use the following formula: Deflection = Chart value \* [12 / panel width].  
 Example: Deflection for 24 inch panel = Chart value \* [12 / 24]



**SUPPORT SPAN DEFLECTION** (continued)

**Fixed end beam deflection for Hammerhead™ panels with 5.3 lb/ft<sup>3</sup> core density**

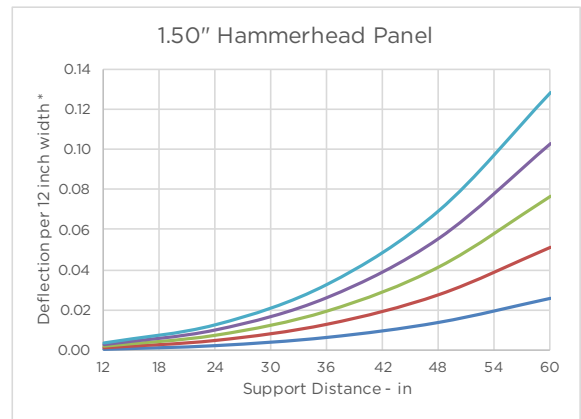
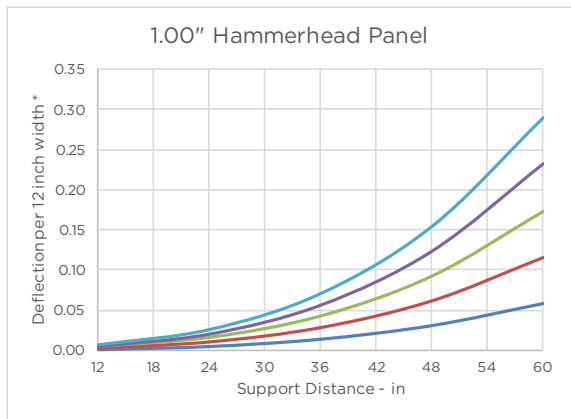
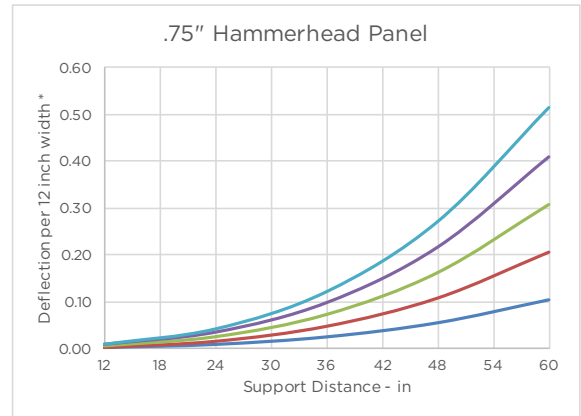
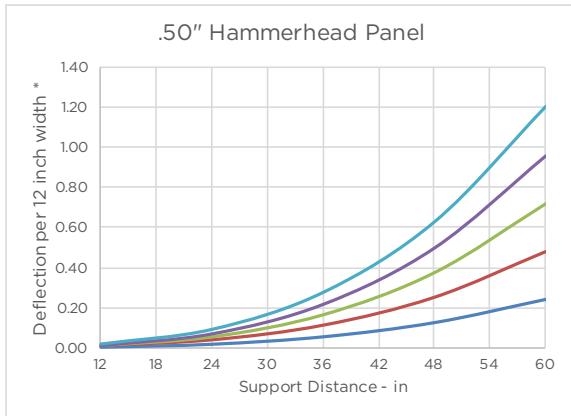
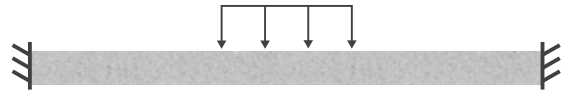


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**Fixed end beam deflection for Hammerhead™ panels with 8.4 lb/ft<sup>3</sup> core density**



**LOAD CASE**

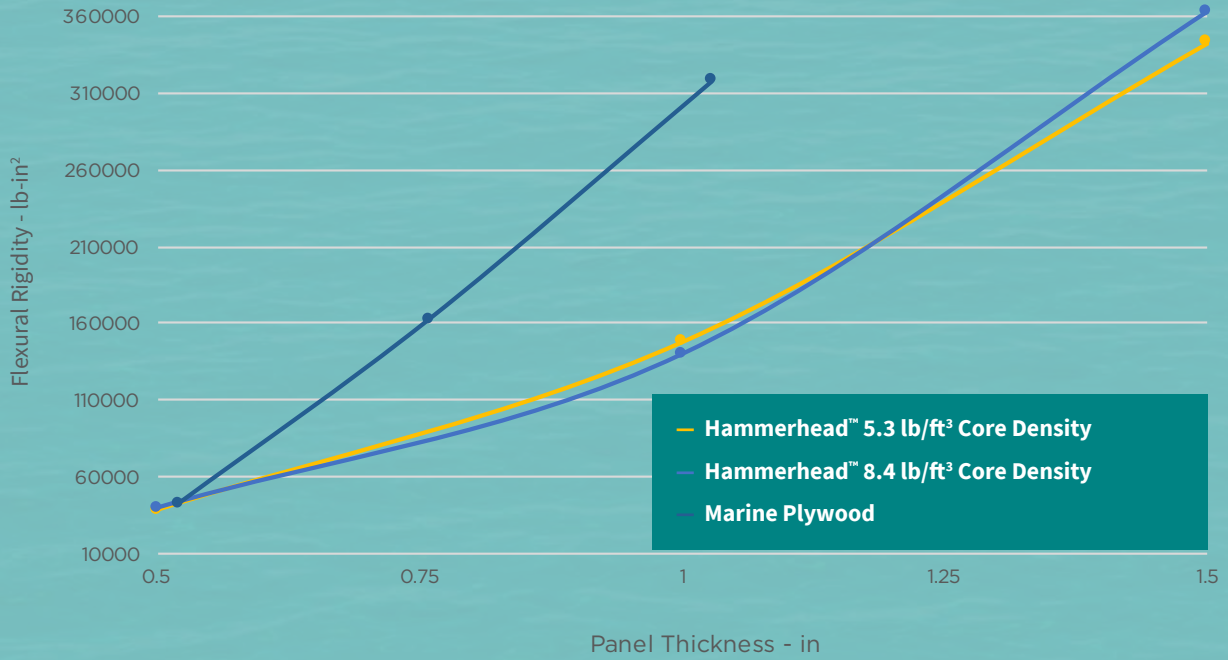
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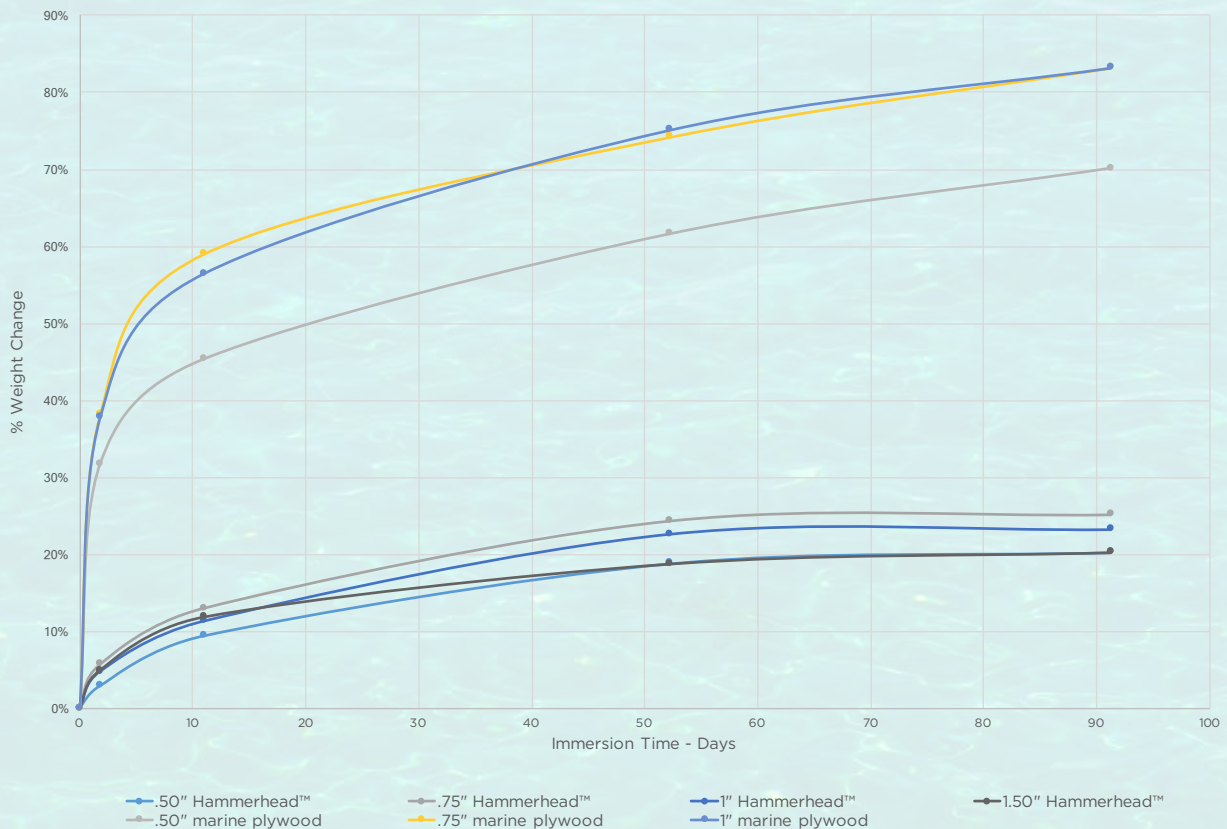
# FLEXURAL RIGIDITY COMPARISON BENDING RESISTANCE VS. MARINE PLYWOOD

Hammerhead™ panels are three times lighter than marine plywood



## MOISTURE ABSORPTION

% weight change due to water absorption for selected composites and marine plywood





# INSTALLATION INSTRUCTIONS

## CUTTING & DRILLING

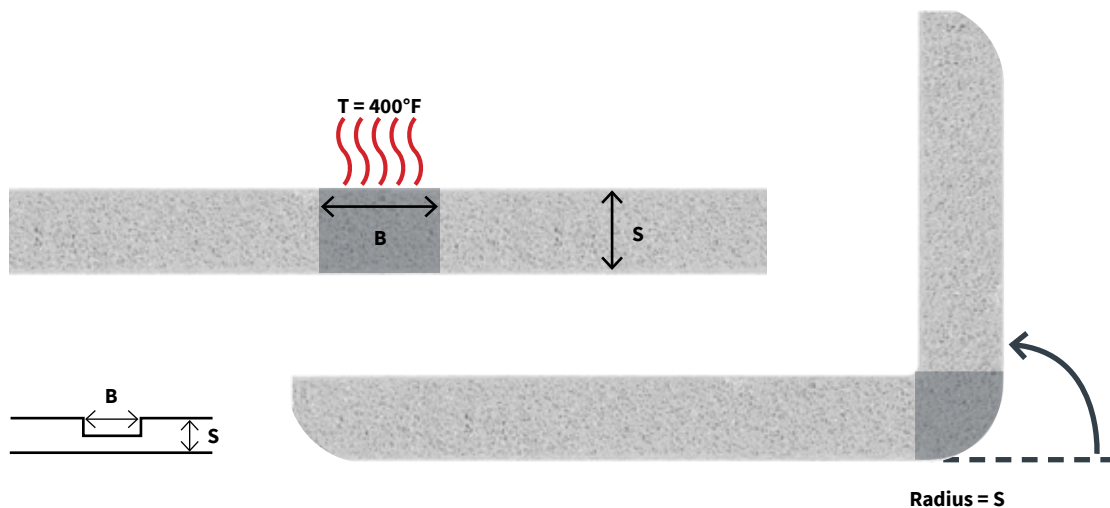
**Recommended blade:** Industrial fine cut-off saw blade, 10" x 80 teeth 38° ATB grind with 5/8" bore, PTFE coating

**Recommended router bits:** 3/8" diameter, 4 flute TiAlN (titanium aluminum nitride) coated carbide bit

## FORMING

Apply localized 400° F heat at a length proportional to the panel thickness (see equation below) and bend to shape. Panel will set when cooled.

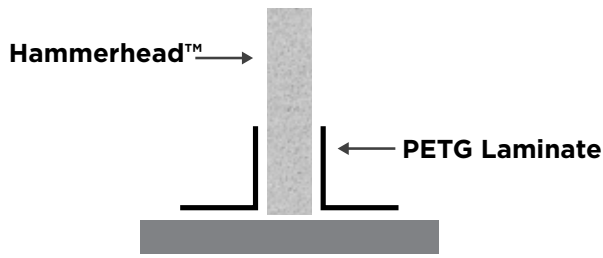
$$\text{Heat Length} = \frac{\pi}{2 * \text{Thickness}}$$



## FINISHING

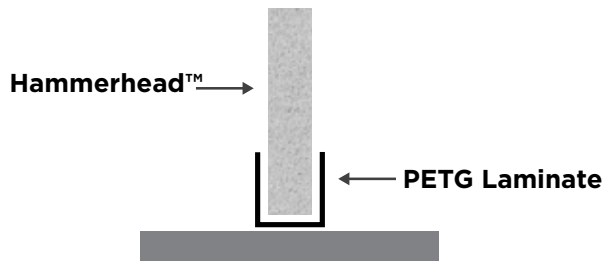
Gel coat finish is possible with minimal surface preparation.  
Contact Avient for more information.

# TAB TESTING OF VARIOUS INSTALLATION METHODS



**L-Bracket Installation**

BOTTOM PANEL	LEG LENGTH	BREAK STRENGTH (LBS)
PETG Skins with Plywood Core	1 in 1.5 in 2 in	2400 2820 2748
Hammerhead™ with 5.3 lb/ft <sup>3</sup> Core Density	2 in	665
Hammerhead™ with 8.4 lb/ft <sup>3</sup> Core Density	2 in	1084
Marine Plywood	2 in	770
Glass/Epoxy with Plywood Core	2 in	1055
Glass/Polyester with Balsa Core	2 in	919



**U-Channel Installation**

BOTTOM PANEL	LEG LENGTH	BREAK STRENGTH (LBS)
PETG Skins with Plywood Core	2 in	2375
Marine Plywood	2 in	770
Glass/Polyester with Balsa Core	2 in	797

Mixed Conditions			
BOTTOM PANEL	LEG LENGTH	BREAK STRENGTH (LBS)	
GLASS/EPOXY TAB MATERIAL	Hammerhead™ with 5.3 lb/ft <sup>3</sup> Core Density	2 in	420
	Hammerhead™ with 8.4 lb/ft <sup>3</sup> Core Density	2 in	332
	Marine Plywood	2 in	984
	Glass/Polyester with Balsa Core	2 in	1298
NO TAB	Hammerhead™ with 5.3 lb/ft <sup>3</sup> Core Density - ITW Plexus MA420 Adhesive	NA	501
	Hammerhead™ with 8.4 lb/ft <sup>3</sup> Core Density - ITW Plexus MA420 Adhesive	NA	1156
	Hammerhead™ with 8.4 lb/ft <sup>3</sup> Core Density - Crestomer 1152PA Adhesive	NA	1530
	Hammerhead™ with 8.4 lb/in <sup>3</sup> Core Density - Crestomer M1-30 Adhesive	NA	1471

ITW Plexus MA420 adhesive was used in all tab testing installations except where noted.













# ADHESIVE SELECTION

ADHESIVE DESCRIPTION	ADHESIVE GRADE	MANUFACTURER	AVERAGE BOND STRENGTH (PSI)	STANDARD DEVIATION	FAILURE MODE
<b>BEST ADHESION</b>					
2k Urethane	7542 <sup>1</sup>	Lord	2281	184	Substrate Cohesive
2k Acrylic	SA1-705 GRY <sup>1</sup>	AccraLock	2211	78	Substrate
2k Acrylic	Plexus MA420	ITW	2171	262	Substrate
2k Acrylic	SA10-05 Blk <sup>1</sup>	AccraLock	2102	138	Substrate
2k Urethane	7545 <sup>1</sup>	Lord	2047	68	Cohesive
2k Acrylic	SA1-705 GRY 1:2	AccraLock	1966	68	Substrate
2k Acrylic	Scotchweld 8010	3M	1907	61	Adhesive
Cyanoacrylate	Gorilla Glue	Gorilla Glue	1885	432	Cohesive
2k Acrylic	Crestabond PP-04	Scott Bader	1873	281	Substrate
2k Acrylic	SA10-05 Blk 10:2	AccraLock	1779	127	Cohesive
2k Urethane	7542 <sup>2</sup>	Lord	1716	190	Cohesive Adhesive
2k Urethane	7545 <sup>2</sup>	Lord	1535	98	Adhesive
2k Methacrylate	Polyfuse	Icon Containment	1610	98	Adhesive
<b>INTERMEDIATE ADHESION</b>					
2k Acrylic	FA10-05 Blk C010817	AccraLock	724	58	Cohesive
2k Acrylic	FA10-05 Blk <sup>1</sup>	AccraLock	722	44	Cohesive
2k Epoxy	Loctite Epoxy Instant Mix	Loctite	508	81	Adhesive
2k Epoxy	Gorilla Glue Epoxy	Gorilla Glue	341	198	Adhesive
<b>NOT RECOMMENDED</b>					
2k Epoxy	Loctite Epoxy Marine	Loctite	0	0	No bond

Brands identified are owned by the manufacturers of the adhesive products.

<sup>1</sup> surface sanded with 220 grit scuff prep    <sup>2</sup> surface primed with 459T

# FASTENER SELECTION

FASTENER TYPE	BENEFITS	CONSIDERATIONS		
Through-Bolting	Best mechanical locking system	Need back side access to panel		
Screw-In Anchor	Highest pullout strength	Requires pilot hole		
Cup Washer	Spreads compressive load	Requires relief hole; For substructure and hard point attachment		
Wide Grip (Bulb-Style) Rivet	Ease of use—no installation torque limitations	For lower load attachments		
Sheet Metal or Wood Screw	Readily available, low cost	Penetrate both skins for improved pullout		
Shoulder Washer	Limits compressive load	Requires relief hole; For substructure and hard point attachment		

For more information on installation, adhesives, and fasteners for specific applications, please contact Avient.

To learn more about Avient’s advanced composite solutions, contact Avient at +1.844.4AVIENT  
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