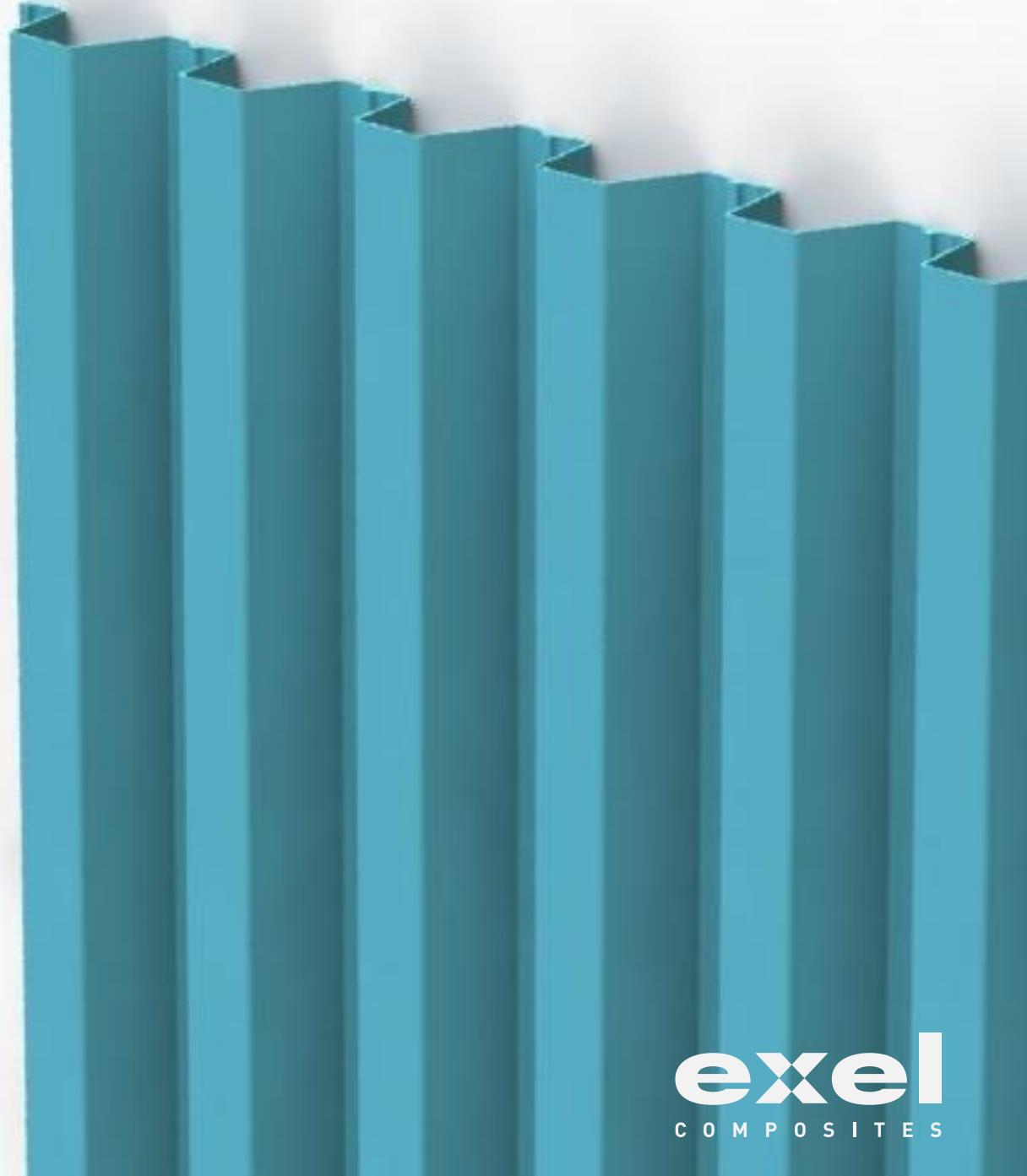


# Exel Composites Sheet piles

Updated September 2024

FOR FORWARD THINKERS



**exel**  
COMPOSITES

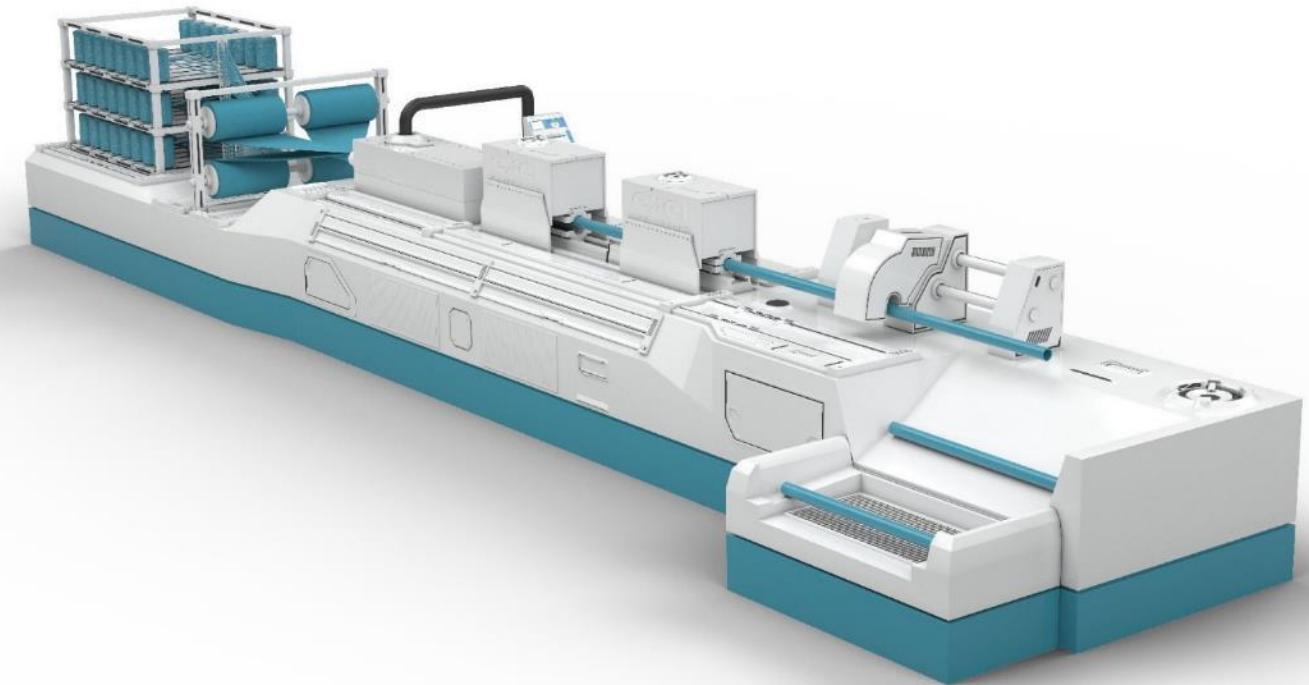
# General

- ◆ Sheet piles are a critical component in civil engineering, serving as versatile barriers and retaining walls that ensure stability in a variety of construction projects. These long, flat sections are driven vertically into the ground, interlocking with each other to form a continuous wall that resists water pressure, soil movement, and other environmental forces.
- ◆ Exel Composites offers multiple profiles and accessories for marine and building & infrastructure applications. Profiles provide superior corrosion resistance, lightweight and strength over the traditional solutions. All FRP-piles can be driven into the ground with traditional machinery.



# Manufacturing process

- ◆ All sheet pile profiles are made with continuous pultrusion technology. In this process, fibers such as glass or carbon are pulled through a resin bath where they are impregnated with a thermosetting resin. These resin-coated fibers are then pulled through a heated die that shapes and cures the material, resulting in strong, lightweight, and highly durable composite profiles.
- ◆ All sheet pile profiles are reinforced with E-glass fiber in form of unidirectional rovings, fabrics and continuous filament mats. All fibers are impregnated with thermoset resin, which can be chosen to fit the project's specific requirements. Most common resins are polyester, vinyl ester and polyurethane.





## Applications

- ◆ **Retaining Walls:** Sheet piles are vital in supporting excavations and earthworks, preventing soil collapse into construction sites.
- ◆ **Flood Protection:** Sheet piles create robust barriers along rivers, coasts, and other bodies of water, safeguarding areas from flooding.
- ◆ **Shoring:** Sheet piles provide temporary support for the sides of deep excavations, ensuring the safety and stability of construction projects.
- ◆ **Containment Systems:** They isolate contaminated areas, preventing the spread of pollutants.
- ◆ **Basement and Underground Structures:** Sheet piles are used to create underground parking lots, basements, and other subterranean spaces by forming a temporary or permanent enclosure.

# Applications

- ◆ **Noise Barriers:** In urban construction, sheet piles can be employed as sound barriers to reduce noise pollution from highways, railways, and construction sites.
- ◆ **Foundation Support:** For buildings on unstable or soft soil, sheet piles can be driven to provide additional support and prevent differential settlement.
- ◆ **Slope Stabilization:** On sloped terrains, sheet piles can be installed to stabilize embankments and prevent landslides or soil erosion.
- ◆ **Coffer dams for Bridge Construction:** Sheet piles form cofferdams to allow dry construction of bridge piers and other structures in areas with a high water level or near rivers.
- ◆ **Cut-off Walls for Groundwater Control:** In areas where groundwater poses a challenge, sheet piles can be used as barriers to limit water flow and prevent seepage into excavation zones or contaminated areas.





## Applications Marine Construction

- ◆ **Bulkheads and Sea Walls:** Sheet piles can protect marina facilities from waves, erosion, and tidal forces. These structures help maintain the shoreline, preventing soil from being washed away and providing a durable barrier against water.
- ◆ **Piers and Docks:** Sheet piles form the foundation for piers and docks, offering a stable platform for boats to moor. The interlocking design ensures strength and durability, which are critical for withstanding the weight and movement associated with maritime activities.
- ◆ **Breakwaters:** In marina designs, sheet piles are employed to create breakwaters that reduce the impact of waves entering the marina, ensuring calmer waters for docking and maneuvering boats.

## Applications Marine Construction

- ◆ **Harbor Construction and Expansion:** Sheet piles are essential in creating new harbors or extending existing marina facilities. They are driven into the seabed to form retaining walls or barriers, shaping the marina's layout and protecting it from tidal and wave forces.
- ◆ **Erosion Control:** By stabilizing the shoreline and preventing soil erosion, sheet piles contribute to the long-term sustainability of marina environments. This is particularly important in areas exposed to strong currents and wave action.
- ◆ **Waterfront Development:** Beyond marinas, sheet piles are instrumental in the development of other waterfront structures, including promenades, waterfront parks, and coastal defenses. Their ability to create strong, durable barriers makes them ideal for shaping and protecting diverse coastal landscapes.



# FRP sheet pile advantages

## Advanced Materials for Enhanced Performance:

In modern engineering, Fiber Reinforced Polymer (FRP) composites offer significant advantages over traditional steel and PVC in specific applications. Overall, whether using traditional steel, advanced FRP composites, or considering the limitations of PVC, sheet piles are a cornerstone of modern construction. They offer unmatched stability, durability, and protection in a wide range of projects, particularly in demanding marine and coastal environments.

**Corrosion Resistance:** FRP composites excel in harsh environments like marine settings, where both steel and PVC are prone to degradation. Unlike steel, which can rust, or PVC, which can deteriorate under UV exposure and temperature fluctuations, FRP remains resilient and long-lasting.

**Aesthetic and Surface Finish:** FRP can be produced with various surface finishes and colors, offering greater aesthetic flexibility than both steel, which often needs protective coatings, and PVC, which may degrade in appearance over time.

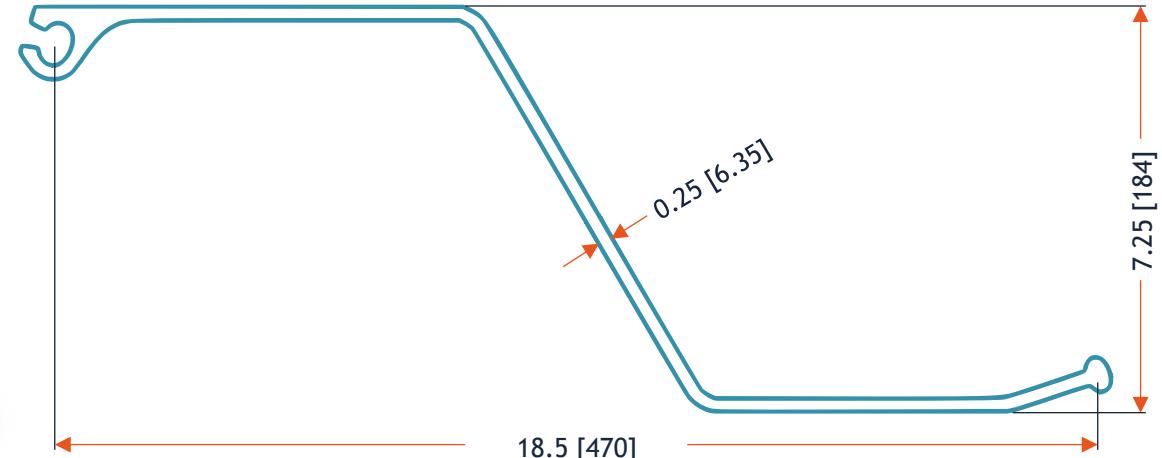
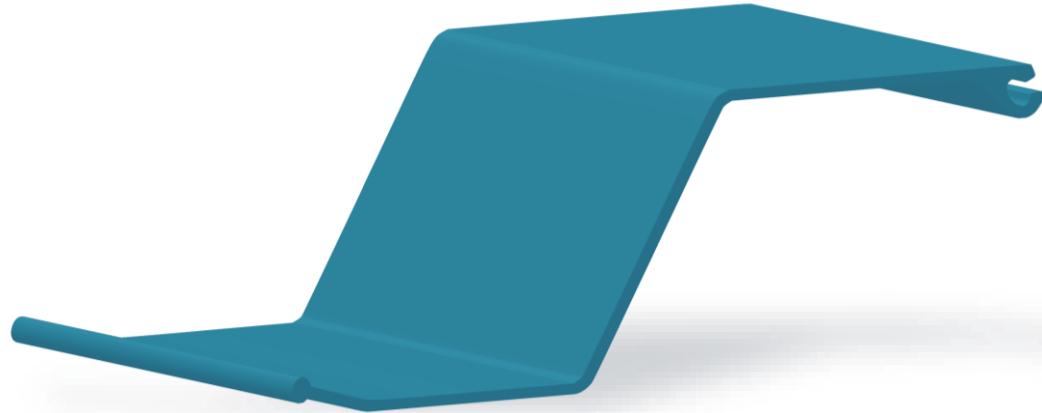
**Thermal and Environmental Stability:** FRP composites maintain their structural integrity in extreme temperatures and under constant exposure to harsh environmental conditions, outperforming both steel and PVC in long-term durability.

**Lightweight & Durable:** FRP's lower weight compared to steel simplifies handling and installation, reducing labor costs and logistical challenges. Compared to PVC, FRP offers superior strength and impact resistance, making it a more reliable option for demanding applications.

**Sustainability:** FRP's long service life, up to 75 years, contributes to sustainability, making it an eco-friendly alternative. Compared to steel, which requires frequent maintenance, and PVC, which can contribute to environmental waste, FRP offers a more sustainable solution over its lifecycle.

**Customizability & Flexibility:** FRP can be engineered to meet precise structural requirements, offering both strength and adaptability. This customization surpasses what is typically achievable with PVC, providing tailored solutions for complex construction needs.

# Exel 7.25" sheet pile



## Section properties

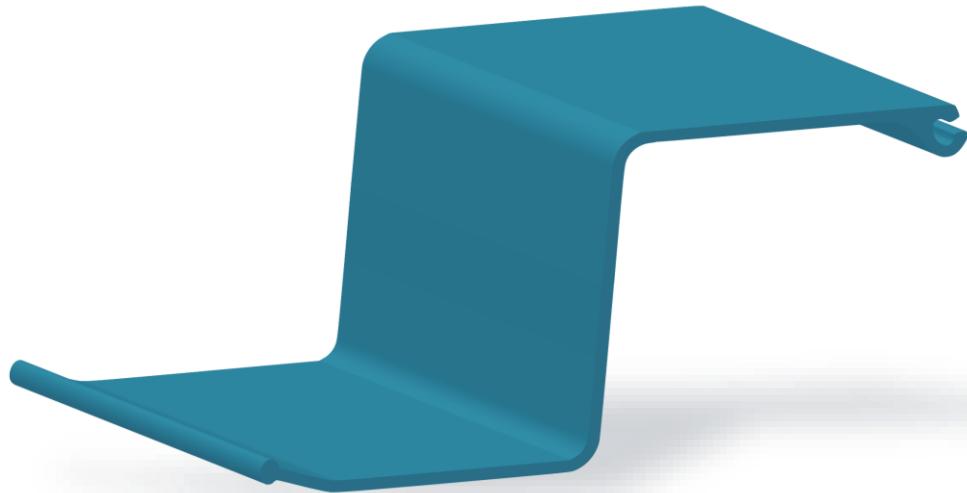
Property	Imperial	Metric	Units
Height	7.25	184	in/mm
Width	18.5	470	in/mm
Wall thickness	0.25	6.35	in/mm
Cross sectional area	6.7	43	in <sup>2</sup> /cm <sup>2</sup>
Weight	5.5	8.2	lb/ft kg/m
Moment of Inertia	39.0	5328	in <sup>4</sup> /ft cm <sup>4</sup> /m
Section Modulus	10.8	579	in <sup>3</sup> /ft cm <sup>3</sup> /m
Color	Standard dark grey, other colors available		
Interlocking angle	$\pm 10^\circ$		

## Material properties

Property*	Imperial	Metric	Units	Test method
Tensile Modulus (axial)	4.1	28	msi/GPa	ASTM D3039
Tensile Strength (axial)	66.3	457	ksi/MPa	ASTM D3039
Tensile Modulus (transverse)	0.4	2.8	msi/GPa	ASTM D3039
Tensile Strength (transverse)	4.8	33	ksi/MPa	ASTM D3039
Flexural Modulus (axial)	4.1	28	msi/GPa	ASTM D790
Flexural strength (axial)	72.6	501	ksi/MPa	ASTM D790
Compression Strength (axial)	60	414	ksi/MPa	ASTM D6641
Compression Strength (transverse)	24	166	ksi/MPa	ASTM D6641
Shear Strength	5.0	35	ksi/MPa	ASTM D2344

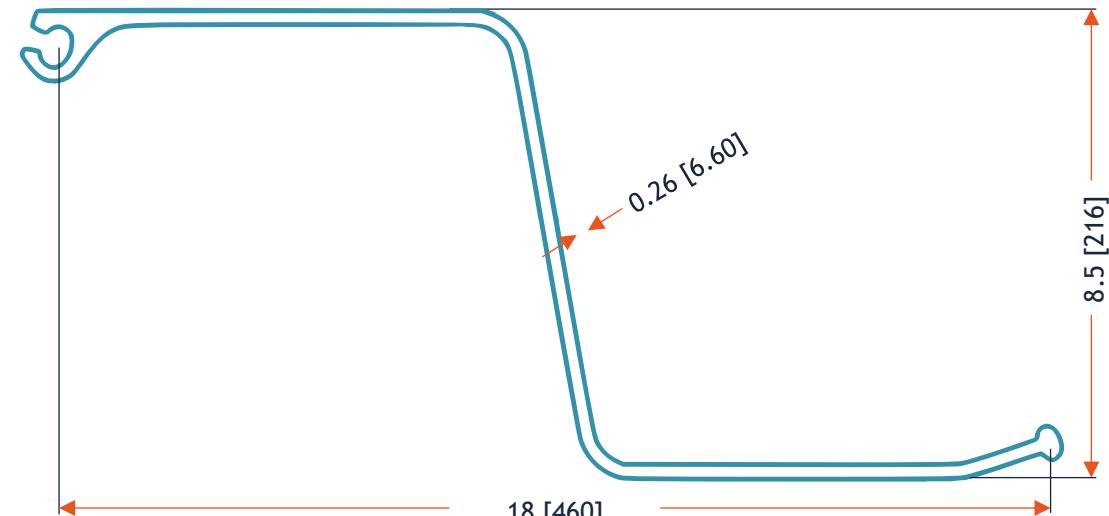
\*Material data preliminary

# Exel 8.5" sheet pile



## Section properties

Property	Imperial	Metric	Units
Height	8.5	216	in/mm
Width	18	457	in/mm
Wall thickness	0.26	6.6	in/mm
Cross sectional area	7.3	47	in <sup>2</sup> /cm <sup>2</sup>
Weight	6.2	9.2	lb/ft kg/m
Moment of Inertia	62.8	8575	in <sup>4</sup> /ft cm <sup>4</sup> /m
Section Modulus	14.8	794	in <sup>3</sup> /ft cm <sup>3</sup> /m
Color	Standard dark grey, other colors available		
Interlocking angle	$\pm 10^\circ$		

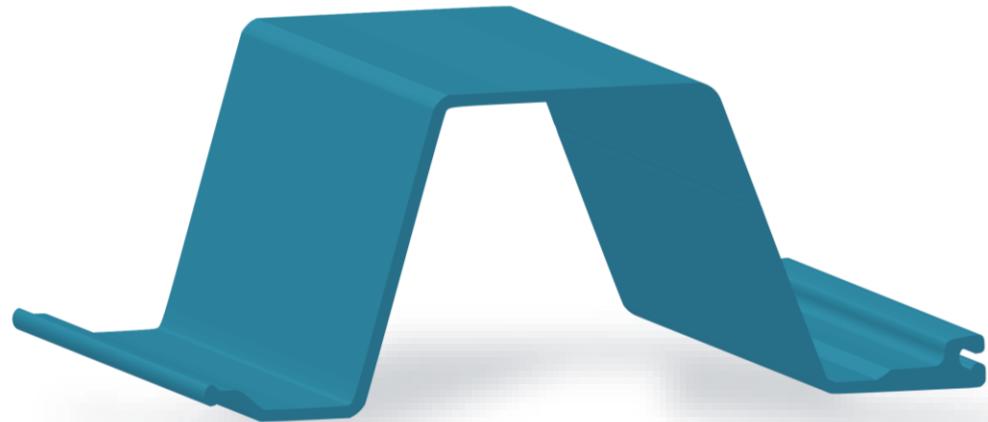


## Material properties

Property*	Imperial	Metric	Units	Test method
Tensile Modulus (axial)	4.1	28	msi/GPa	ASTM D3039
Tensile Strength (axial)	66.3	457	ksi/MPa	ASTM D3039
Tensile Modulus (transverse)	0.4	2.8	msi/GPa	ASTM D3039
Tensile Strength (transverse)	4.8	33	ksi/MPa	ASTM D3039
Flexural Modulus (axial)	4.1	28	msi/GPa	ASTM D790
Flexural strength (axial)	72.6	501	ksi/MPa	ASTM D790
Compression Strength (axial)	60	414	ksi/MPa	ASTM D6641
Compression Strength (transverse)	24	166	ksi/MPa	ASTM D6641
Shear Strength	5.0	35	ksi/MPa	ASTM D2344

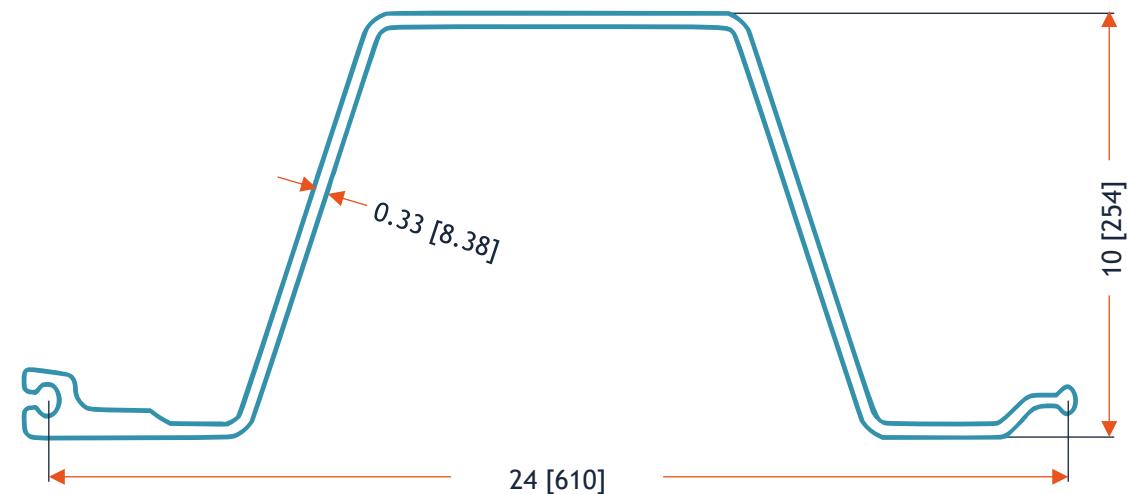
\*Material data preliminary

# Exel 10" sheet pile



## Section properties

Property	Imperial	Metric	Units
Height	10	254	in/mm
Width	24	610	in/mm
Wall thickness	0.33	8.38	in/mm
Cross sectional area	14.3	92	in <sup>2</sup> /cm <sup>2</sup>
Weight	10.5	15.6	lb/ft kg/m
Moment of Inertia	101.6	13871	in <sup>4</sup> /ft cm <sup>4</sup> /m
Section Modulus	20.3	1092	in <sup>3</sup> /ft cm <sup>3</sup> /m
Color	Standard dark grey, other colors available		
Interlocking angle	$\pm 10^\circ$		



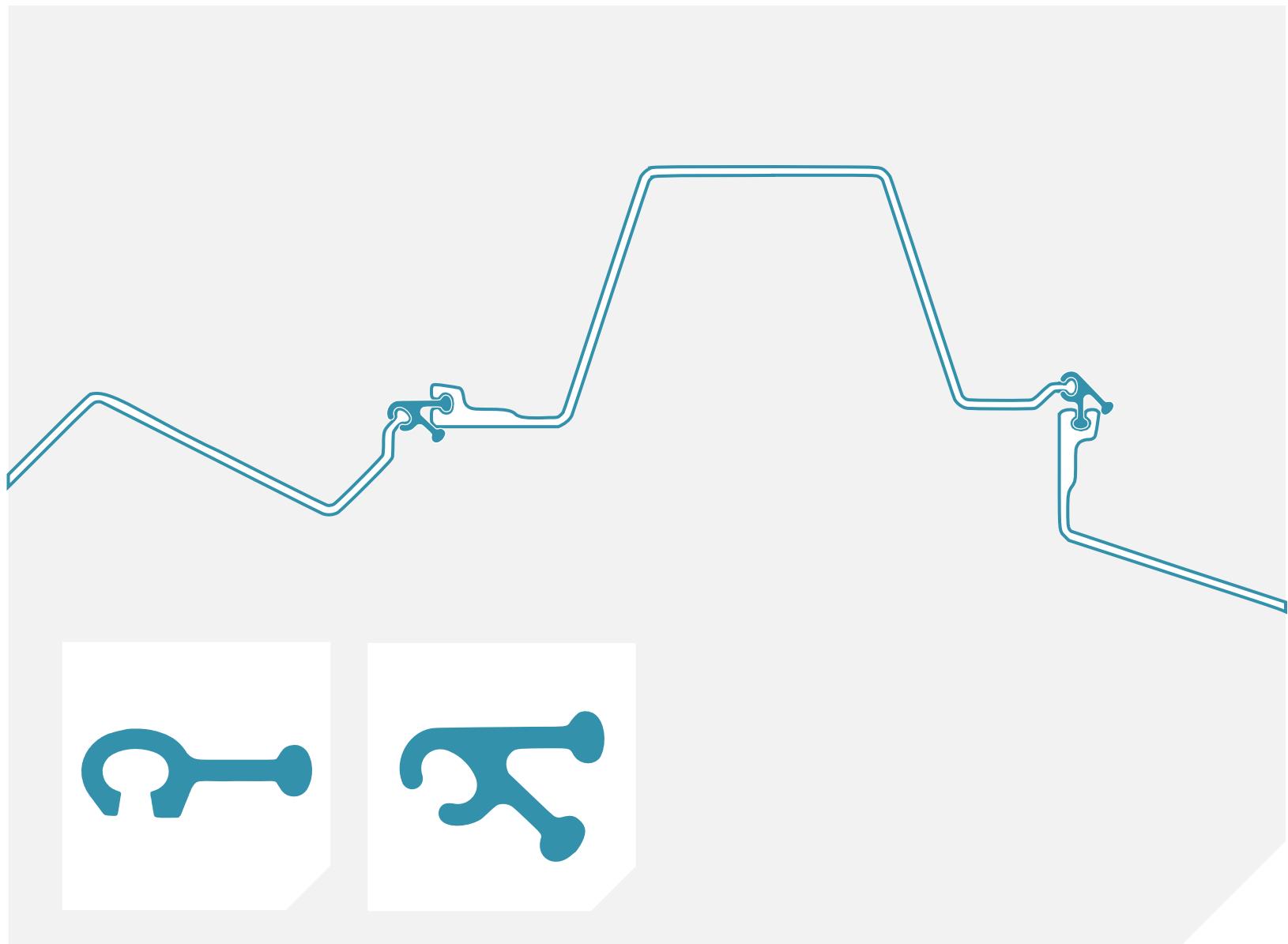
## Material properties

Property*	Imperial	Metric	Units	Test method
Tensile Modulus (axial)	4.1	28	msi/GPa	ASTM D3039
Tensile Strength (axial)	66.3	457	ksi/MPa	ASTM D3039
Tensile Modulus (transverse)	0.4	2.8	msi/GPa	ASTM D3039
Tensile Strength (transverse)	4.8	33	ksi/MPa	ASTM D3039
Flexural Modulus (axial)	4.1	28	msi/GPa	ASTM D790
Flexural strength (axial)	72.6	501	ksi/MPa	ASTM D790
Compression Strength (axial)	60	414	ksi/MPa	ASTM D6641
Compression Strength (transverse)	24	166	ksi/MPa	ASTM D6641
Shear Strength	5.0	35	ksi/MPa	ASTM D2344

\*Material data preliminary

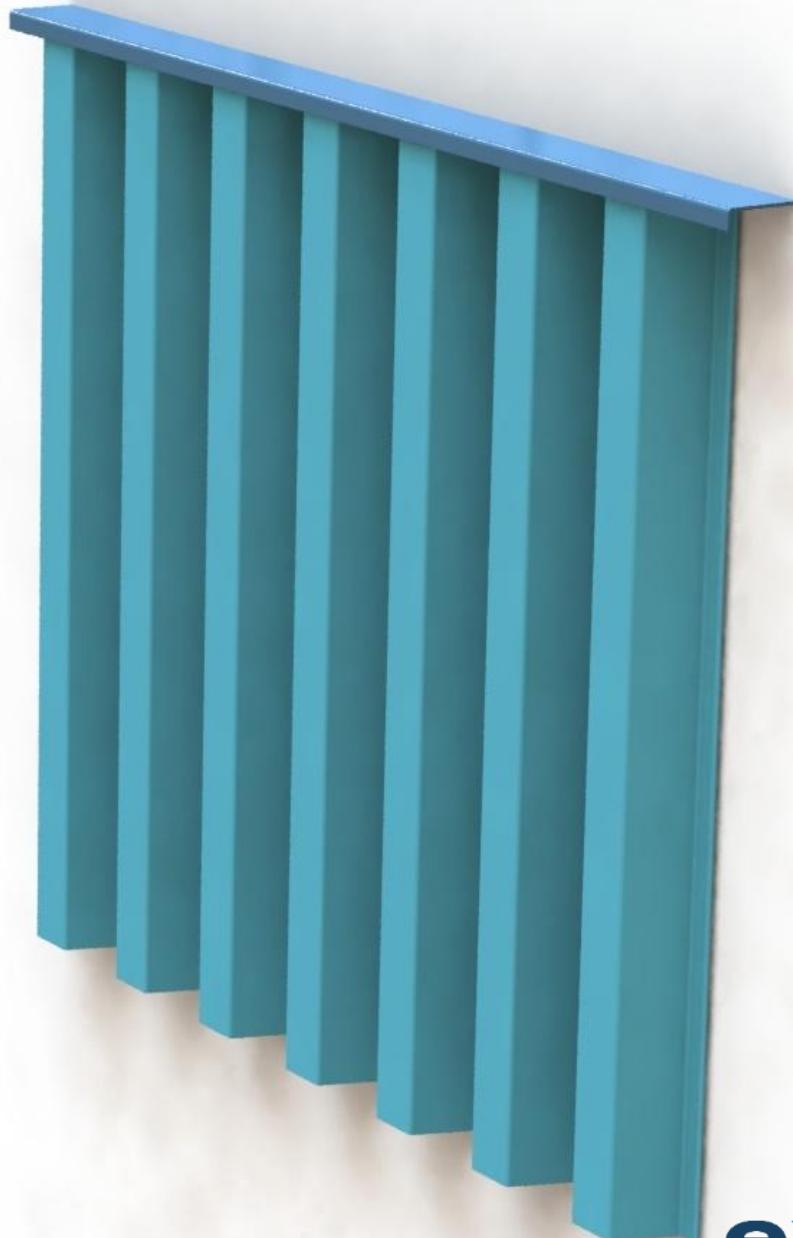
## Corner connectors

- ◆ Connector profiles for wall turns.
- ◆ 90° and 45° / 90° connectors available.
- ◆ Interlocking feature allows  $\pm 10^\circ$  adjustments.
- ◆ Materials used are E-glass/vinylester.
- ◆ Standard color dark grey.
- ◆ Lengths customizable.



## Top caps

- ◆ Top caps to cover sheet pile cut ends.
- ◆ Profiles are painted for additional UV-protection.
- ◆ Smaller size for 7.25" & 8.5" sheet piles, bigger one for 10" sheet pile.
- ◆ Material is E-glass/vinylester.
- ◆ Standard color dark grey, visible surfaces painted.
- ◆ Storage length 20' (6.1m).



# Logistics information

**Exel Composites has production facilities in Europe, USA (KY) and Asia.**

**Typical lead times:**

- Stocked products like connectors and top caps:
  - 5 - 7 days to ship from PO confirmation depending on availability.
- Made To Order (sheet piles):
  - 6 - 8 weeks. To be confirmed at the placement of order.

**For inquiries, please contact:**  
[sales.us@exelcomposites.com](mailto:sales.us@exelcomposites.com)



