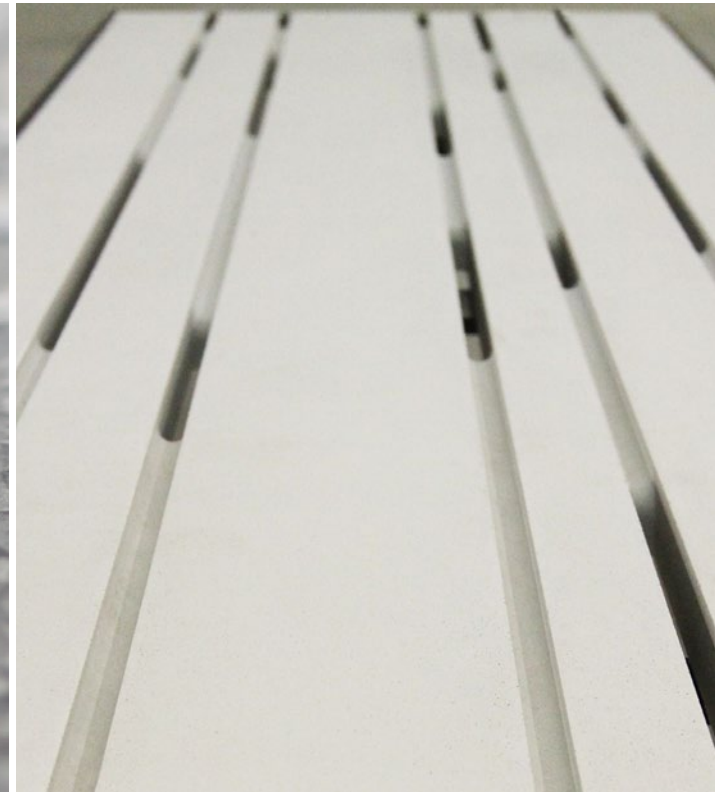


TAKTL[®]



What is TAKTL?

A Company

- Manufacturing – Local, Automated
- Design + Engineering – New Products | Applications
- Ongoing R+D

A Material

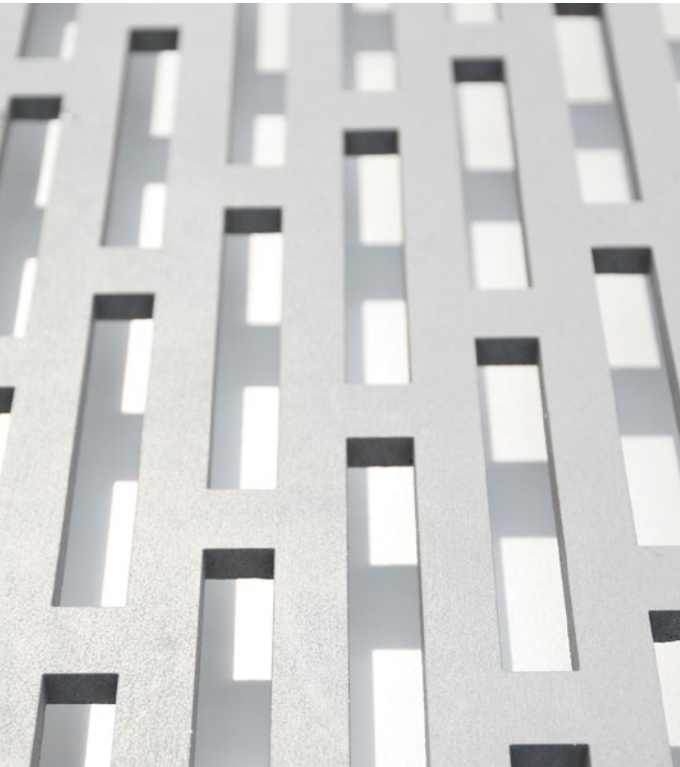
- Advanced Ultra High Performance Concrete (UHPC)



VECTR®

Facade and Wall Panels

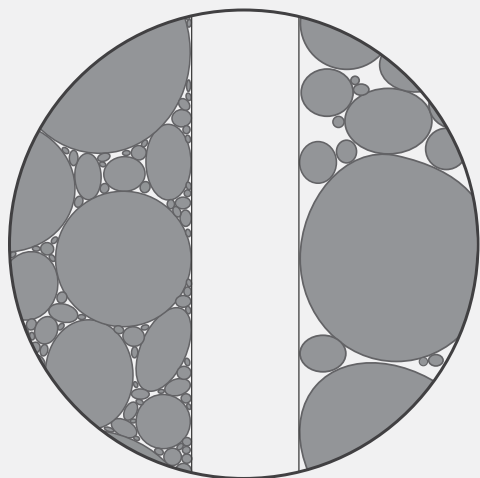
- Exterior, Interior, Transitional
- Standard Colors, Textures, Sizes
- Custom Colors, Textures, Sizes



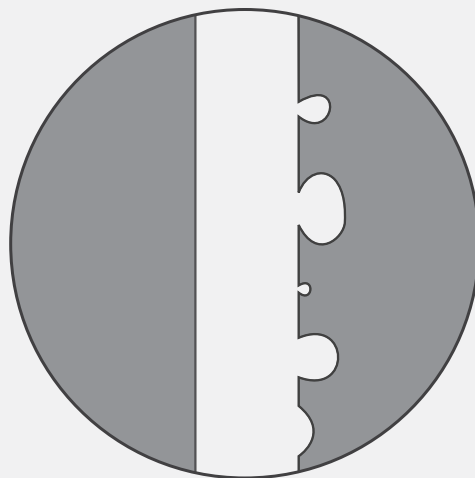
Custom Elements

Engineered Solutions

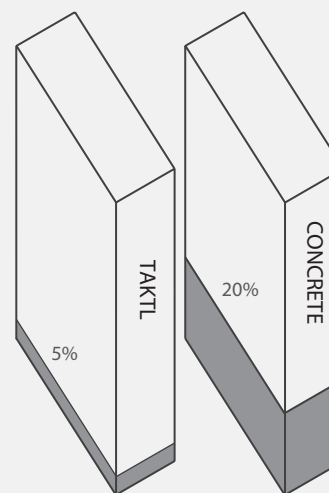
- Articulated Panels
- Fins | Louvres | Sun Shades
- Architectural Profiles
- Corners
- Perforated Panels



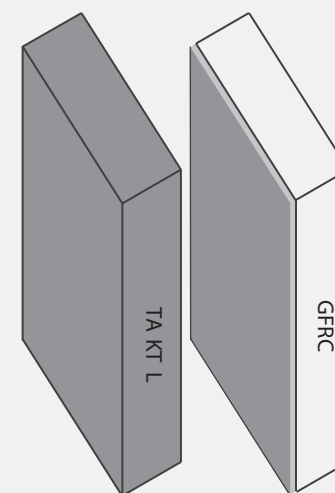
MATRIX DENSITY



SURFACE QUALITY



WATER CONTENT



COLOR INTEGRITY

What is TAKTL?

Material Characteristics

- Extremely Dense Matrix
- Superior Surface Quality
- Low Water Content
- Integral Pigments

About TAKTL

compressive strength



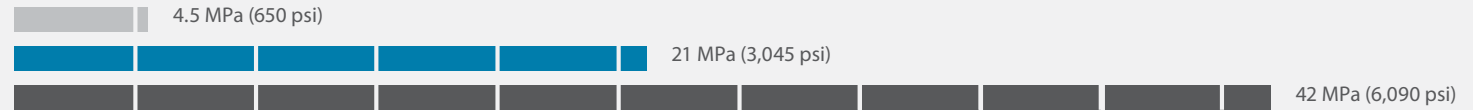
C45/50
TAKTL



flexural strength matrix only



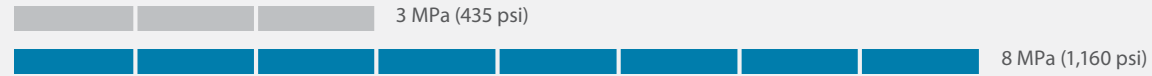
C45/50
TAKTL
VECTR



tensile strength



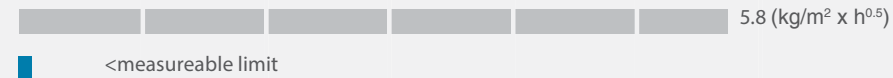
C45/50
TAKTL



water suction



C45/50
TAKTL



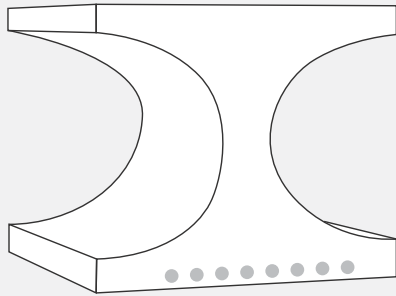
What is TAKTL?

Performance Characteristics

- Strength
- Stability
- Durability

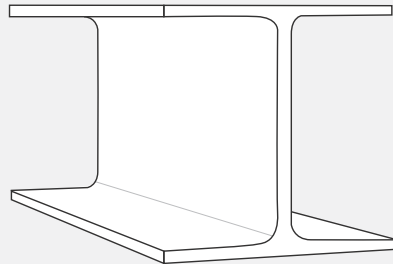
TAKTL®

About Ultra High Performance Concrete



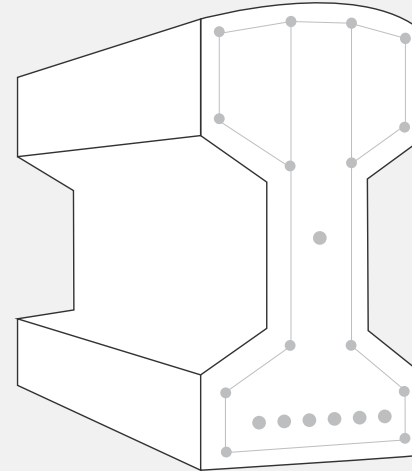
UHPC

14 in, 94 lb/ft
355 mm, 140 kg/m



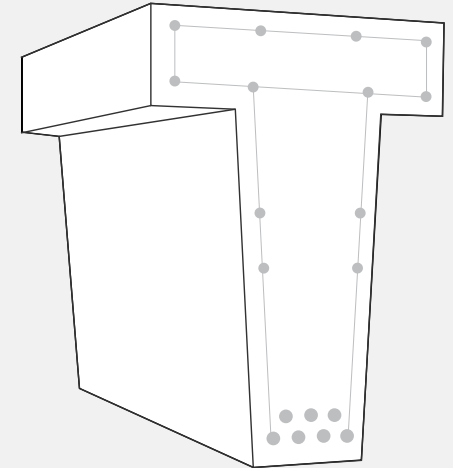
Steel

14 in, 75 lb/ft
355 mm, 110 kg/m



Prestressed Concrete

28 in, 313 lb/ft
710 mm, 465 kg/m



Reinforced Concrete

28 in, 355 lb/ft
710 mm, 530 kg/m

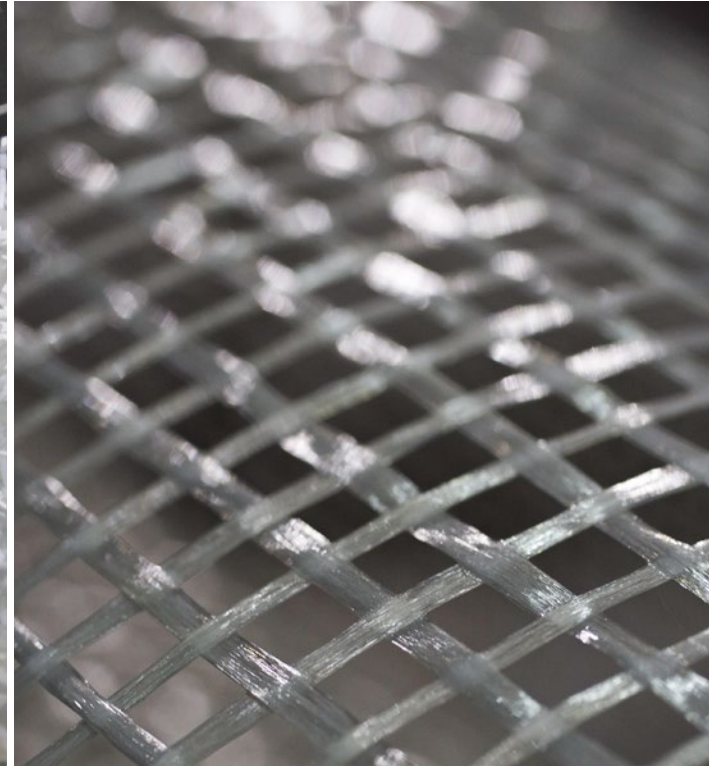
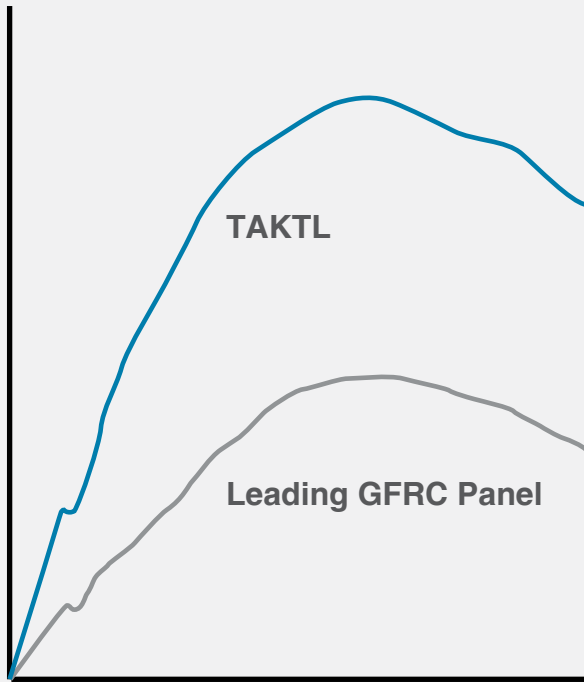
depth, weight

UHPC Advantages

Superior Strength | vs. Stressed and Reinforced Concrete

- Longer Spans
- Thinner Sections
- Less Material (~70%)

Material Comparisons



VECTR vs GFRC Panels

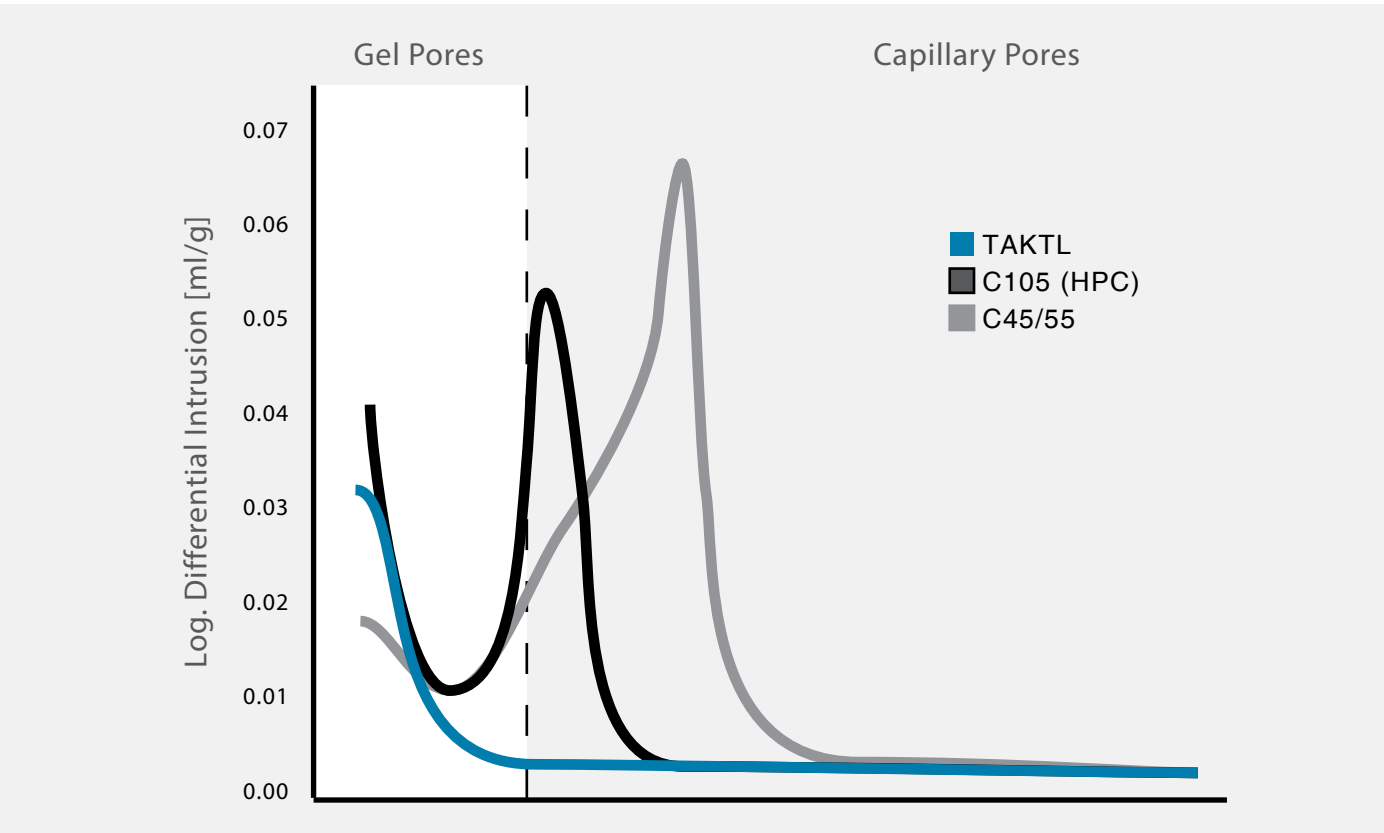
Flexural Strength

- VECTR Panels: 5,075-6,525 lbs/in² (35-45 MPa)
- Leading GFRC Panels: 3,190-4,060 lbs/in² (22-28 MPa)

Linear Elastic Range

- 1,740 lbs/in² (12 MPa)
- 725 lbs/in² (5 MPa)

Material Comparisons



TAKTL vs Concrete

Pore Size Distribution

- Gel Pores: No Water Transport
- Capillary Pores: Water Transport



Local Raw Materials



TAKTL Composition (92% within 500 miles of Pittsburgh)





Automated Manufacturing

Modular | Scalable | Resource Efficient

Control: Raw Materials to Finished Product

- Quality
- Energy Consumption
- Air | Water Emissions
- Waste
- Cost



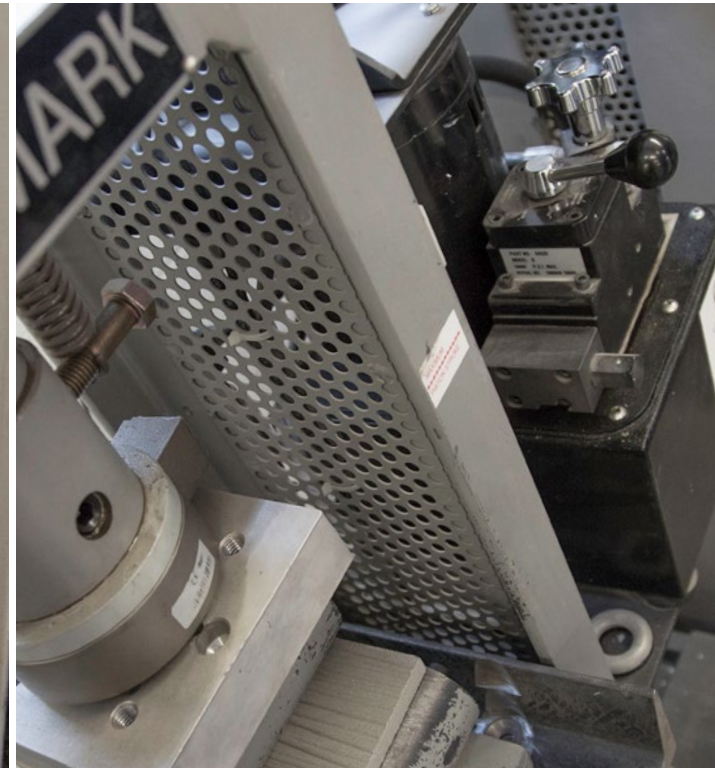
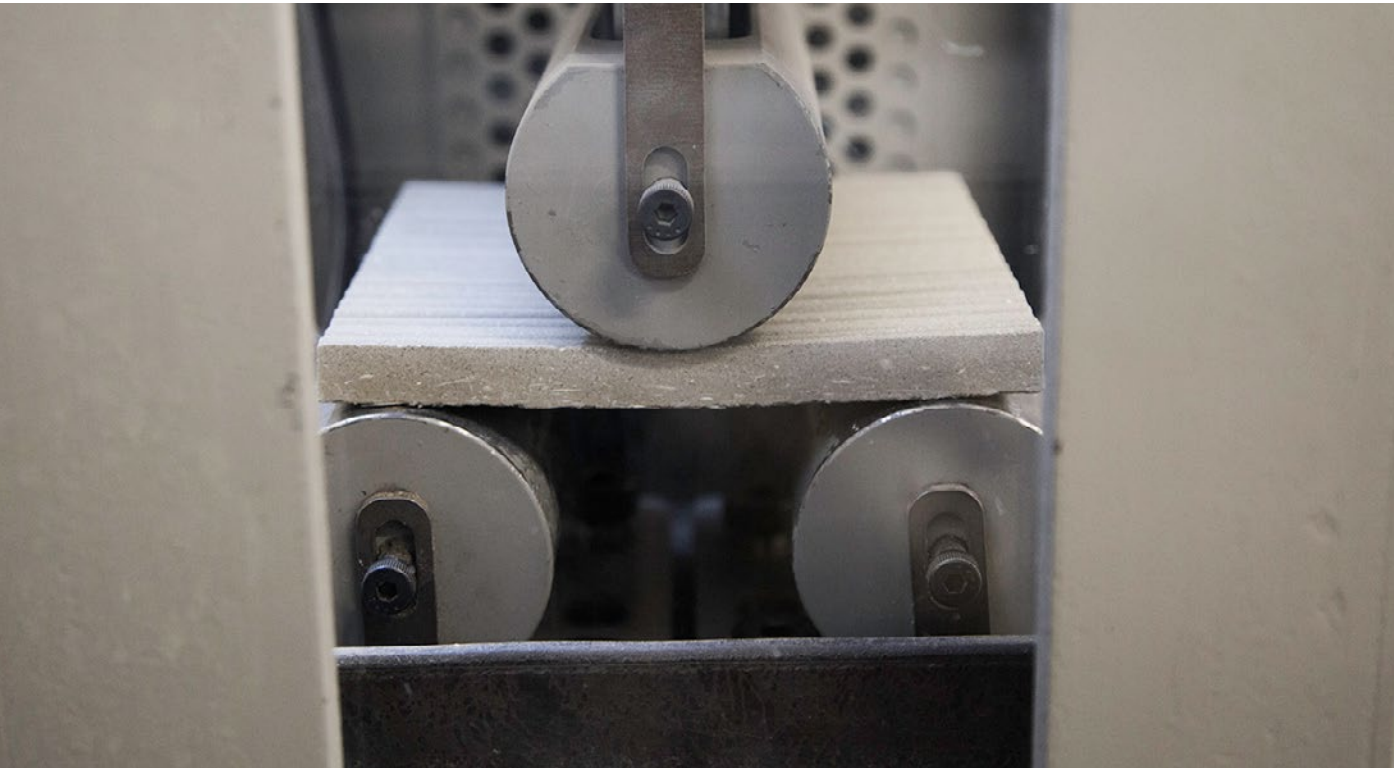
Mold Development

In-house Mold Design + Manufacturing

- Rapid Prototyping
- 3- and 5-Axis Routers

Tested Materials and Construction Methods

- Structural and Finish Quality
- Resource Efficient
- Cost Effective: Materials, Cycle Time, Life



Performance Testing

Complete In-house Testing Facility

- Strength: Compressive, Flexural
- Weathering: Xenon Arc Weathering Chamber
- Anchor Pullout

Independent Testing and Quality Certifications

- US and Canada: Architectural Testing Laboratories (ATI)
- Europe: Institute for Facade and Fastening Technology (IFBT)



Quality Management

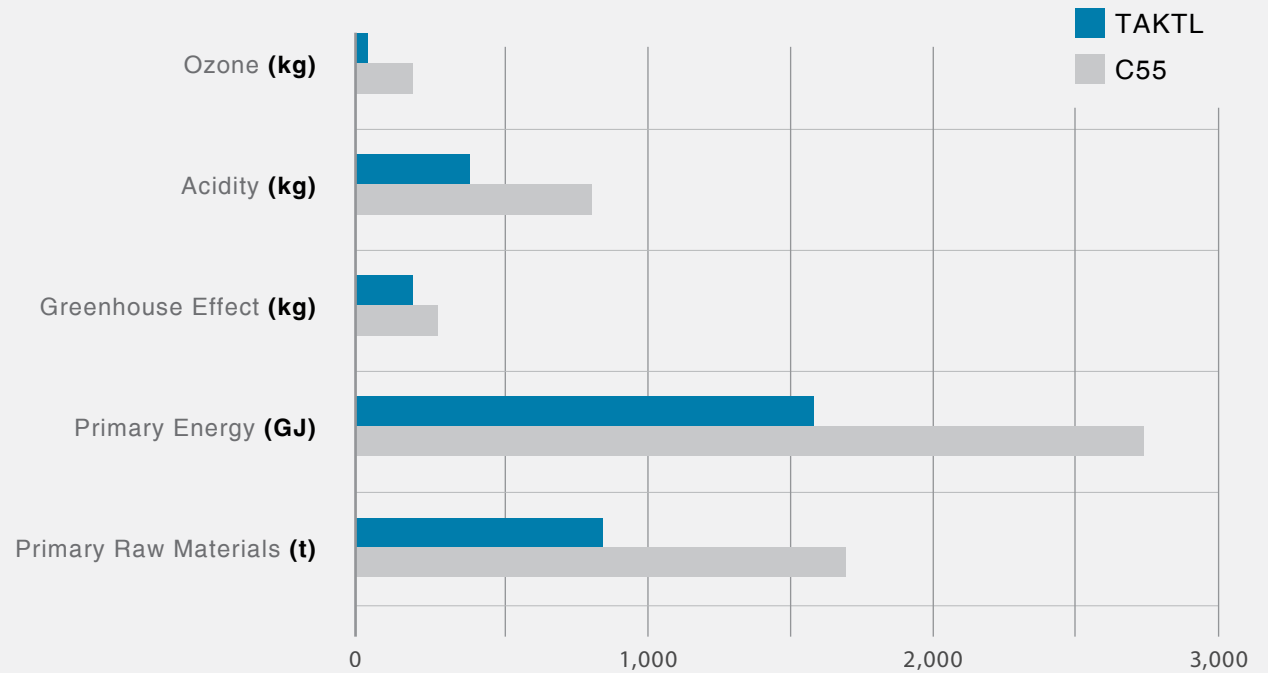
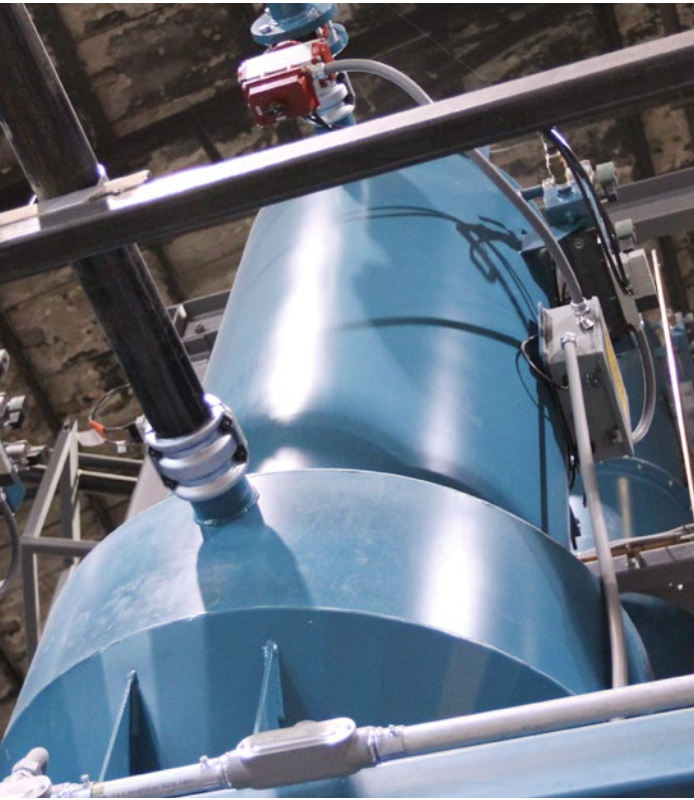
Certified Quality Systems

- Conforming to ICC-ES AC10 Requirements
- ATI Certified Manufacturing Process
- ASTM C1186-08 Grade IV (highest)



ASTM C1185	Flexural Strength
ASTM C1185	Density
ASTM C1185	Dimensions + Tolerances
ASTM C1185	Moisture Movement
ASTM C1185	Water Absorption
ASTM C1185	Moisture Content
ASTM C1185	Water Tightness
ASTM C1185	Frost Resistance
ASTM C1185	Warm Water Resistance
ASTM C1185	Heat/Rain Resistance
ASTM E488	Anchor Pullout Tensile/Shear Strength
ASTM E84	Surface Burning Characteristics
ASTM C531	Coefficient of Thermal Expansion
ASTM G155	Accelerated Weathering Color Change
ASTM D2244	Accelerated Weathering Color Change

Environmental Management



Do More – With Less

Efficient: Ultra-High Strength = Less Material

Local: Raw Materials and Manufacturing

Durable: Extreme Matrix Density and Strength Extend Panel Life

TAKTL[®]

→ Raw materials → Manufacturing → Service Life → After Life



Green Design Institute (Carnegie Mellon University) – Consultative Oversight

VECTR Panel Basics



TAKTL®

VECTR Material Characteristics



Density	136.7 lb/ft ³ (2,190 kg/m ³)
Nominal Weight	5.7 lb/ft ² (29.3 kg/m ²)
Thickness Tolerance	± 0.05" (1.3 mm)
Flexural Strength	6,176-6,895 psi (42.5-47.5 MPa)
Compressive Strength (matrix only)	18,332 psi (126 MPa)
Tensile Strength (matrix only)	1,305 psi (9 MPa)
Coefficient of Thermal Expansion	6.41 E-06 in/in/°F (11.538 E-06 m/m/°C)
Freeze/Thaw Resistance	PASS (97-100% Strength Retention)
Fire Resistance Classification	Non-Combustible

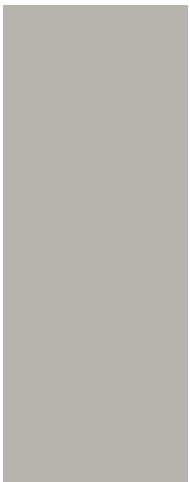
Standard Colors



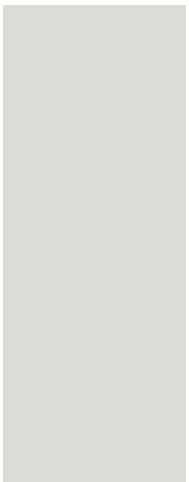
Graphite



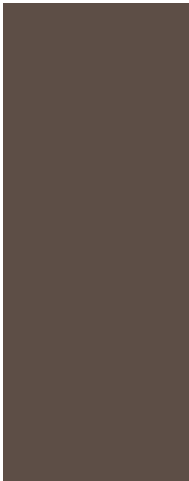
Titanium



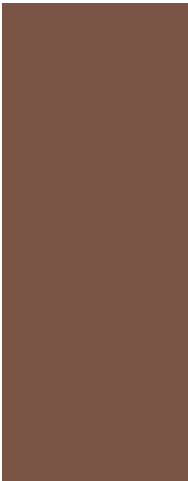
Platinum



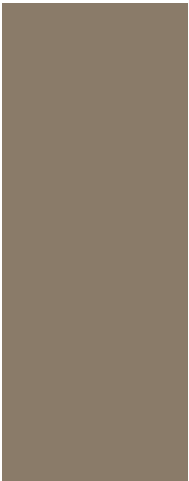
White



Root



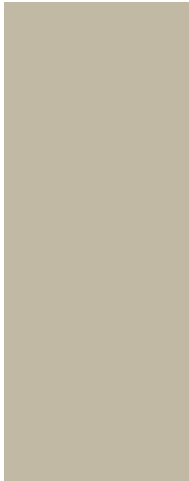
Terracotta



Flax



Dune

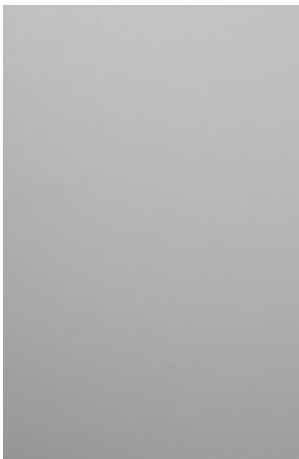


Bone

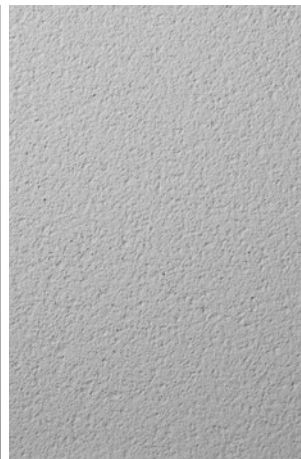
Standard Textures



Flat Textures



Smooth



Rough I



Rough II



Rough III

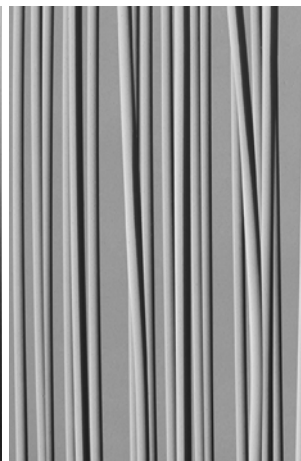
Raised Textures



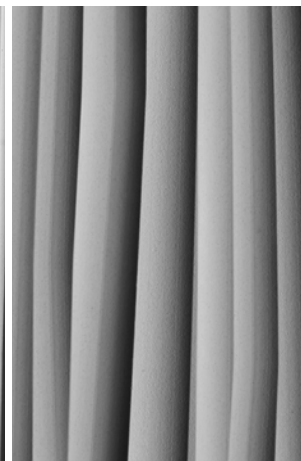
Crinkle



Grass



Reeds



Arbos I & II

Media-Blasted Surfaces



Specialty Aggregate Surfaces



Standard Aggregate Surfaces



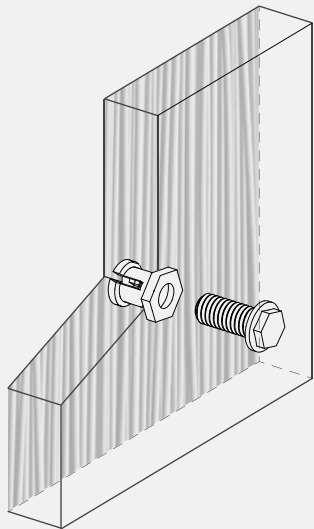
SPA01



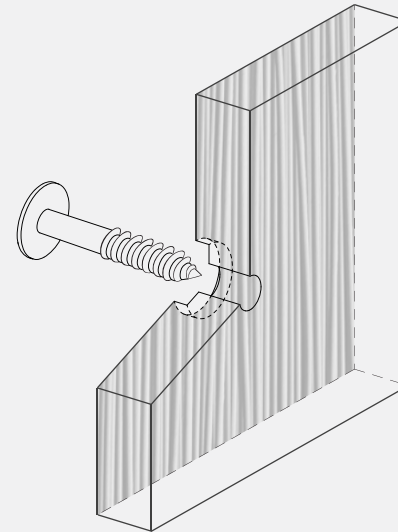
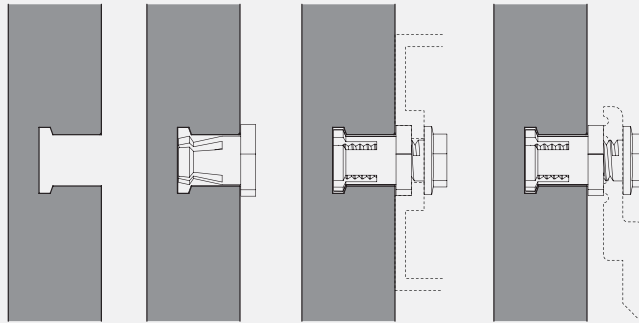
SPA02

Custom Aggregate Surfaces

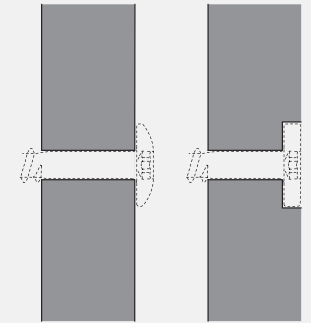




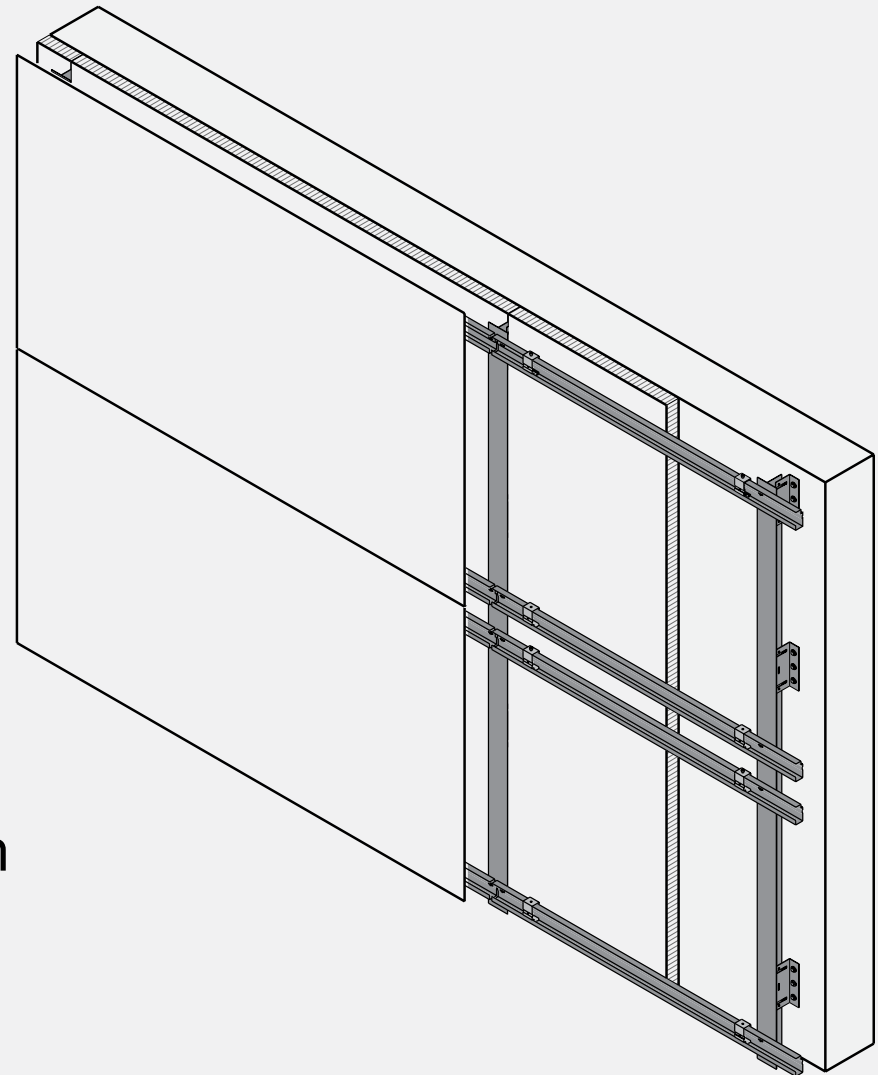
Undercut Anchor



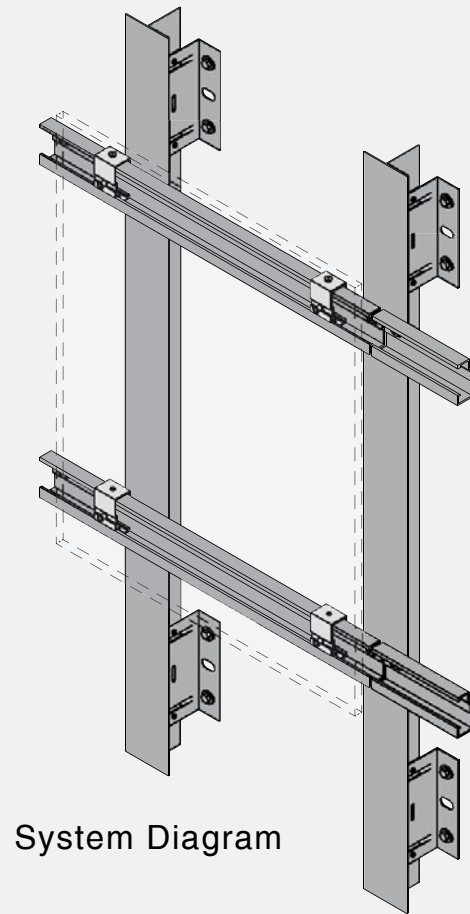
Face Fastener
with or without
Counterbore



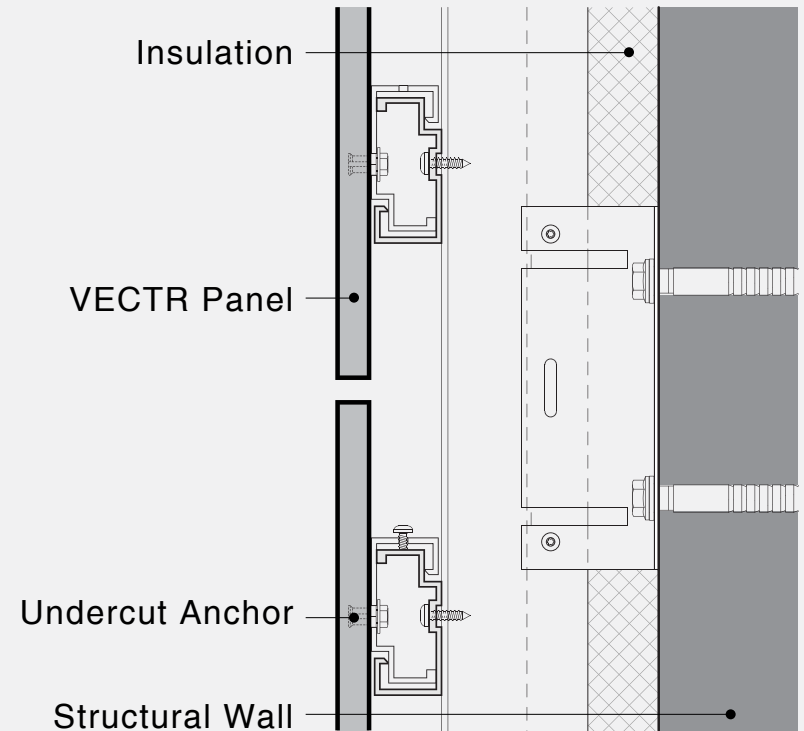
Ventilated Rain-screen with
Undercut Anchors



VECTR Applications | Ventilated Rain-screen with Undercut Anchors



System Diagram



TAKTL®