

TAKTIL<sup>®</sup>



### What is TAKTL?

#### **A Company**

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

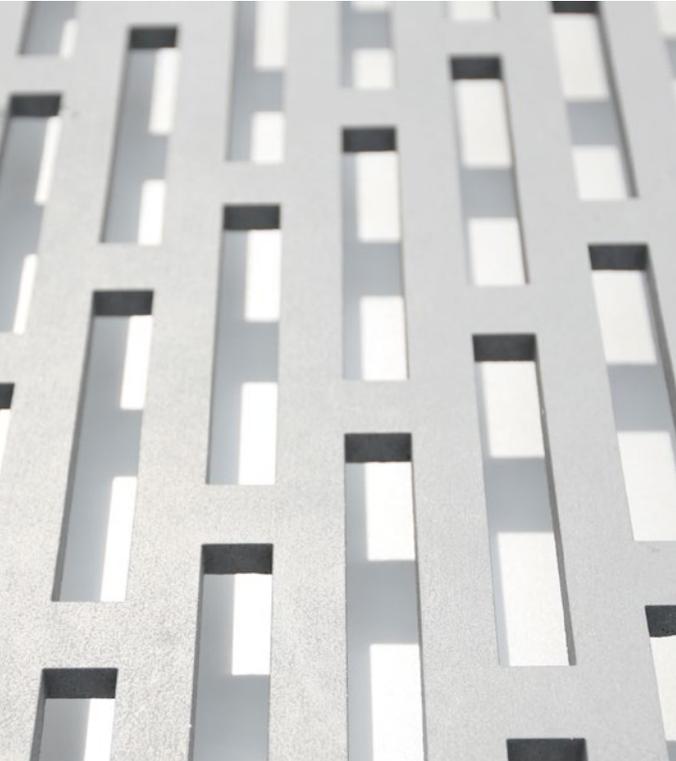
#### **A Material**

- Advanced Ultra High Performance Concrete (UHPC)



**VECTR®** Facade and Wall Panels

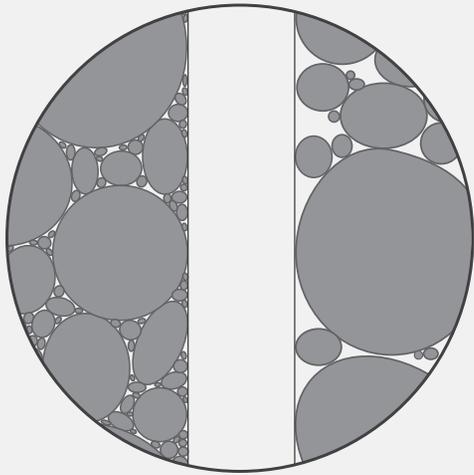
- Exterior, Interior, Transitional
- Standard Colors, Textures, Sizes
- Custom Colors, Textures, Sizes



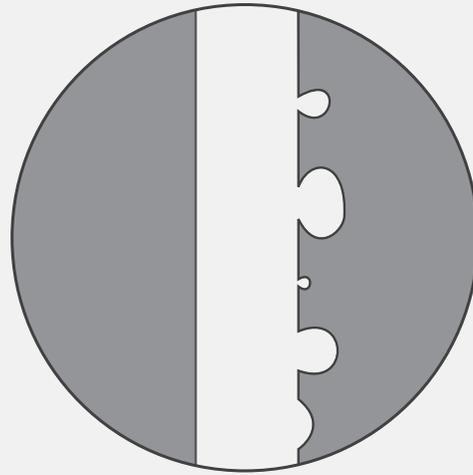
## Custom Elements

### Engineered Solutions

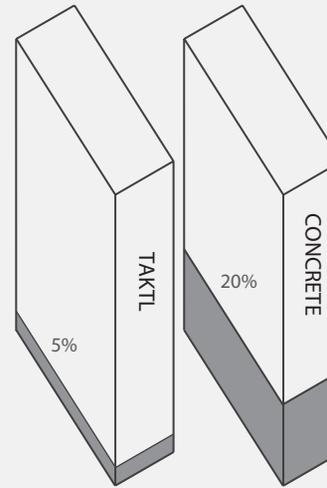
- Articulated Panels
- Fins | Louvres | Sun Shades
- Architectural Profiles
- Corners
- Perforated Panels



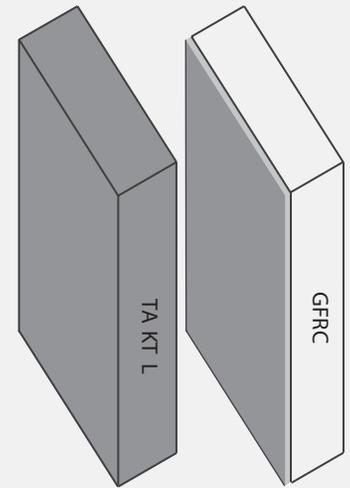
MATRIX DENSITY



SURFACE QUALITY



WATER CONTENT



COLOR INTEGRITY

## What is TAKTL?

### Material Characteristics

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

# About TAKTL

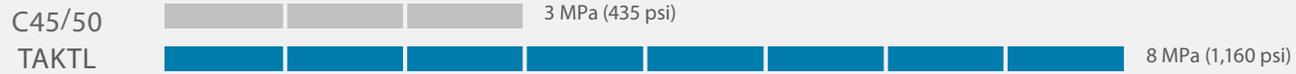
## compressive strength



## flexural strength matrix only



## tensile strength



## water suction

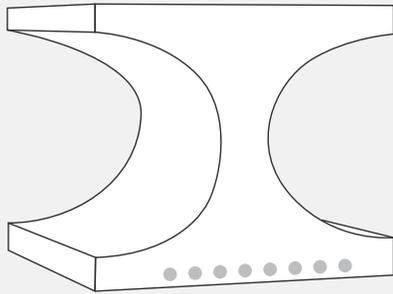


## What is TAKTL?

### Performance Characteristics

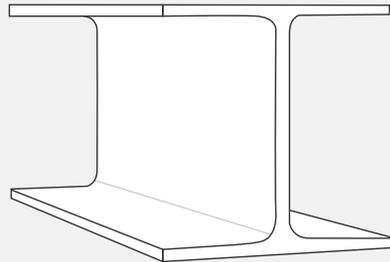
- Strength
- Stability
- Durability

# About Ultra High Performance Concrete



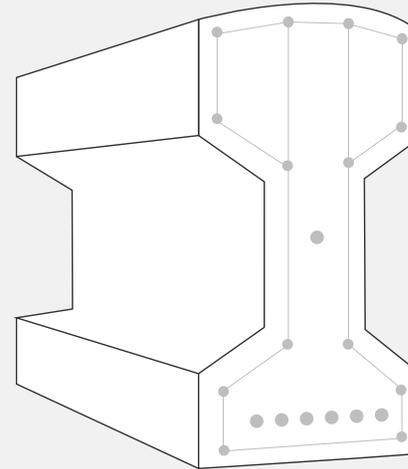
UHPC

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



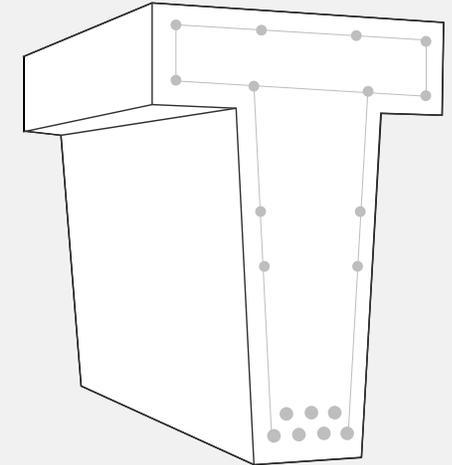
Steel

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



Prestressed Concrete

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



Reinforced Concrete

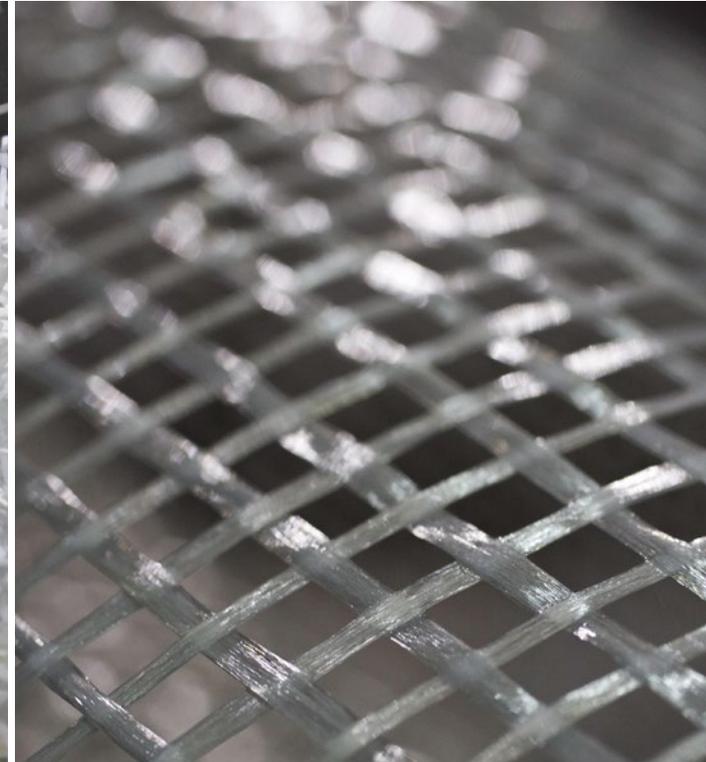
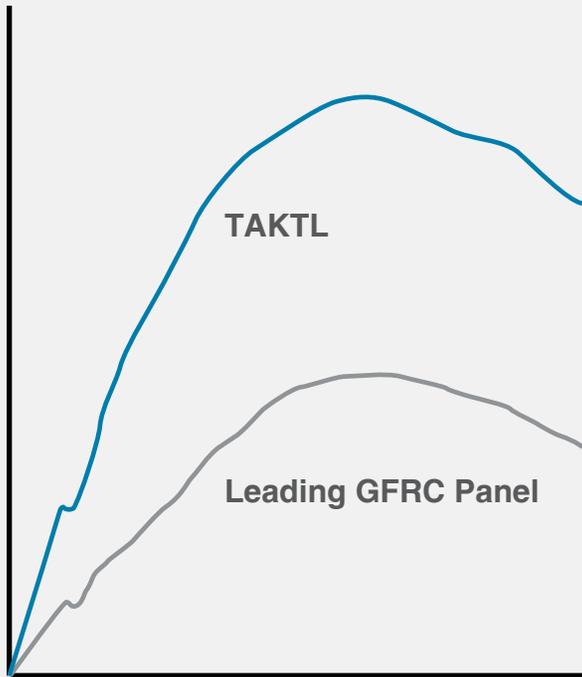
28 in, 355 lb/ft  
710 mm, 530 kg/m

depth, weight

## UHPC Advantages

### Superior Strength | vs. Stressed and Reinforced Concrete

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



### VECTR vs GFRC Panels

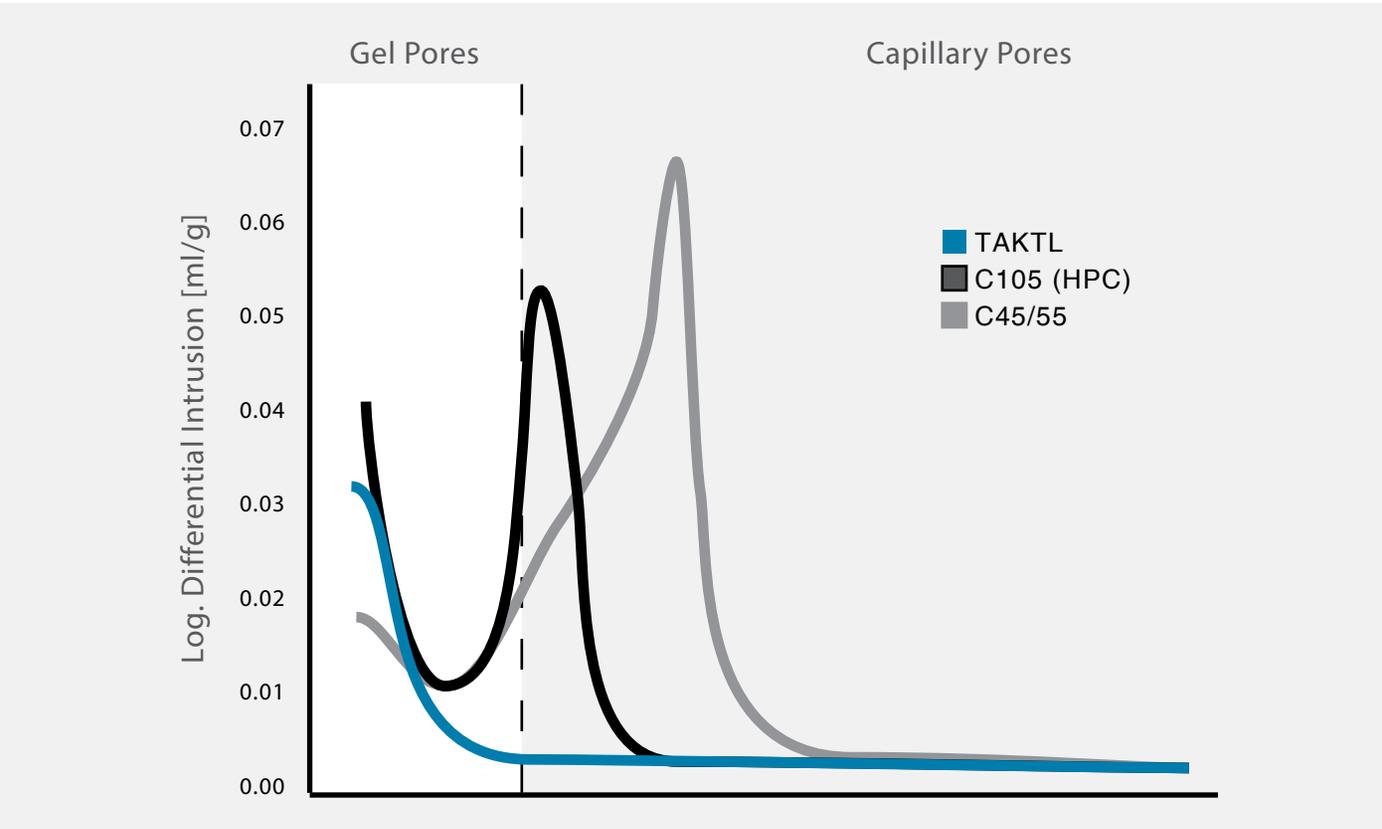
#### Flexural Strength

- VECTR Panels: 5,075-6,525 lbs/in<sup>2</sup> (35-45 MPa)
- Leading GFRC Panels: 3,190-4,060 lbs/in<sup>2</sup> (22-28 MPa)

#### Linear Elastic Range

- 1,740 lbs/in<sup>2</sup> (12 MPa)
- 725 lbs/in<sup>2</sup> (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)

-  Sand
-  Cement
-  Water
-  Silica Fume
-  Alkali-resistant Fibers
-  Other



## Automated Manufacturing

Modular | Scalable | Resource Efficient

Control: Raw Materials to Finished Product

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



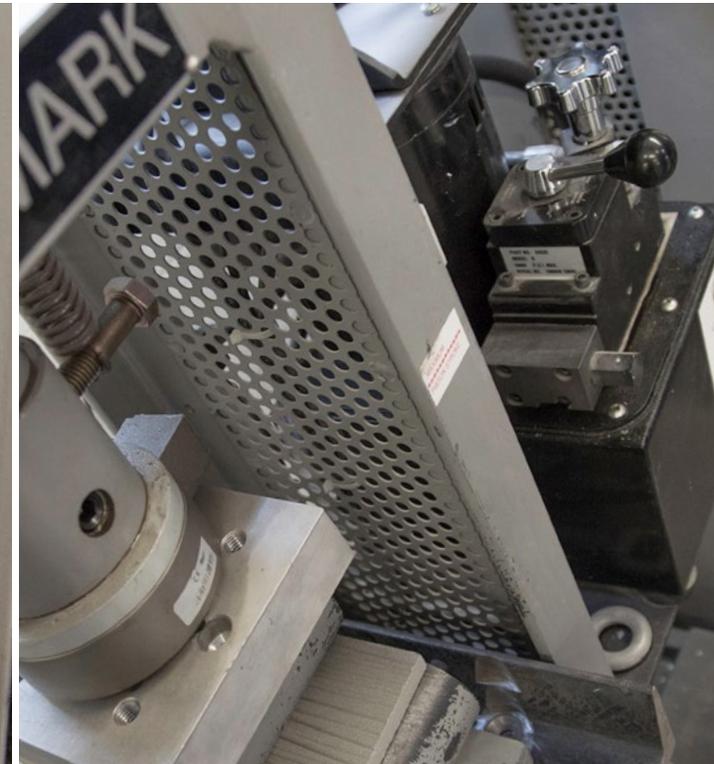
## Mold Development

### 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

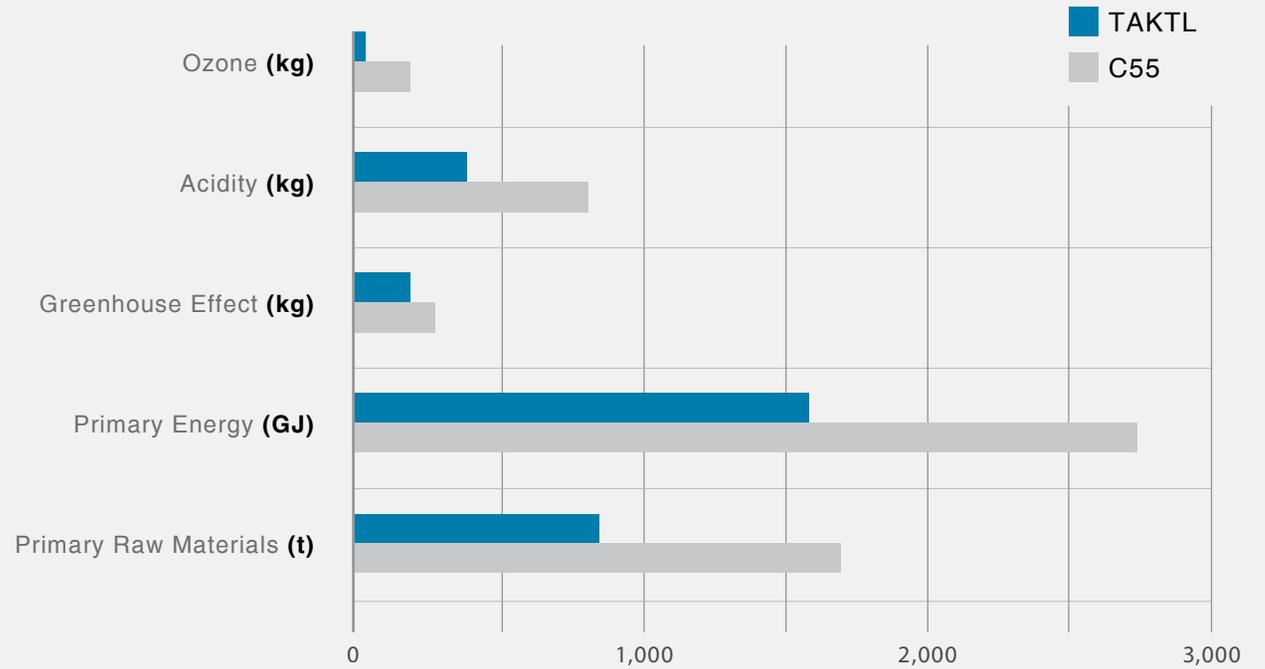
### Certified Quality Systems

- 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



Green Design Institute (Carnegie Mellon University) – Consultative Oversight

## VECTR Panel Basics



TAKTL®

## VECTR Material Characteristics



Density	136.7 lb/ft <sup>3</sup> (2,190 kg/m <sup>3</sup> )
Nominal Weight	5.7 lb/ft <sup>2</sup> (29.3 kg/m <sup>2</sup> )
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

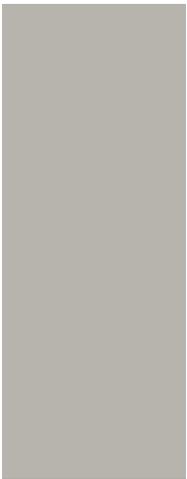
Standard Colors



Graphite



Titanium



Platinum



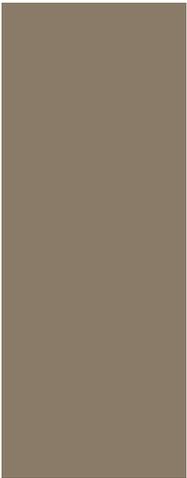
White



Root



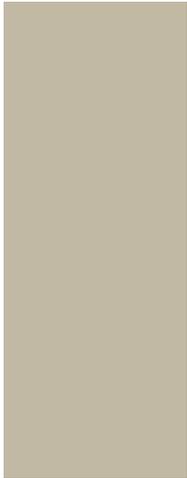
Terracotta



Flax



Dune



Bone

# Standard Textures



## Flat Textures



Smooth



Rough I



Rough II

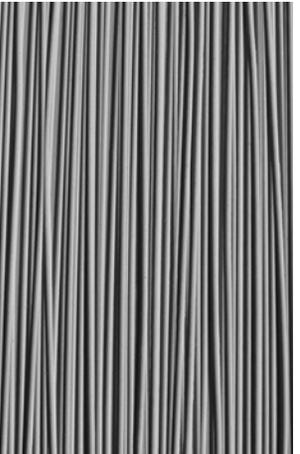


Rough III

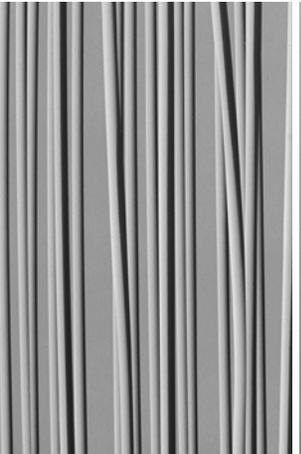
## Raised Textures



Crinkle



Grass



Reeds



Arbos I & II

Media-Blasted Surfaces



# Specialty Aggregate Surfaces



Standard Aggregate Surfaces



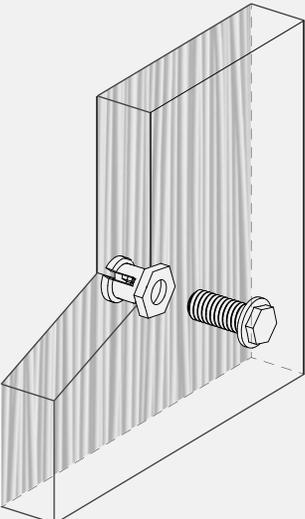
SPA01



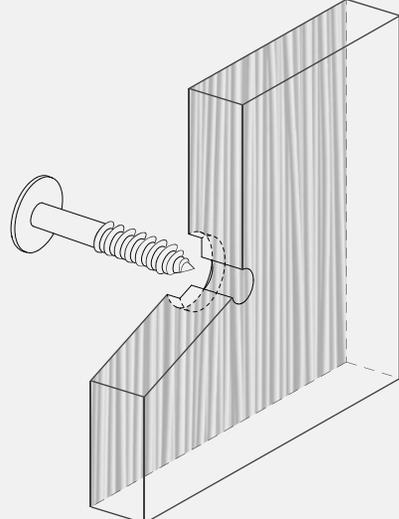
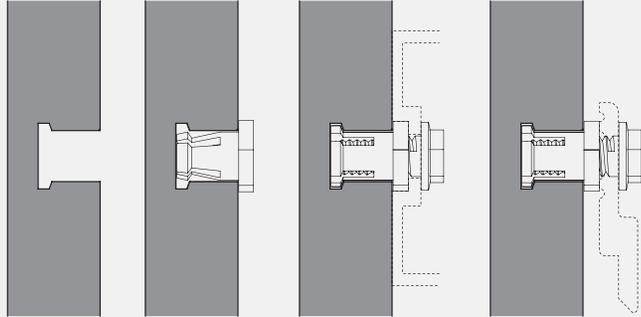
SPA02

Custom Aggregate Surfaces

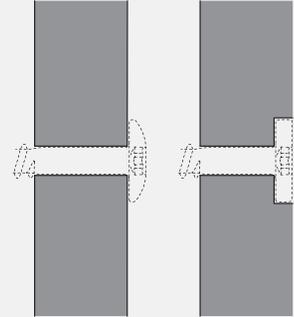


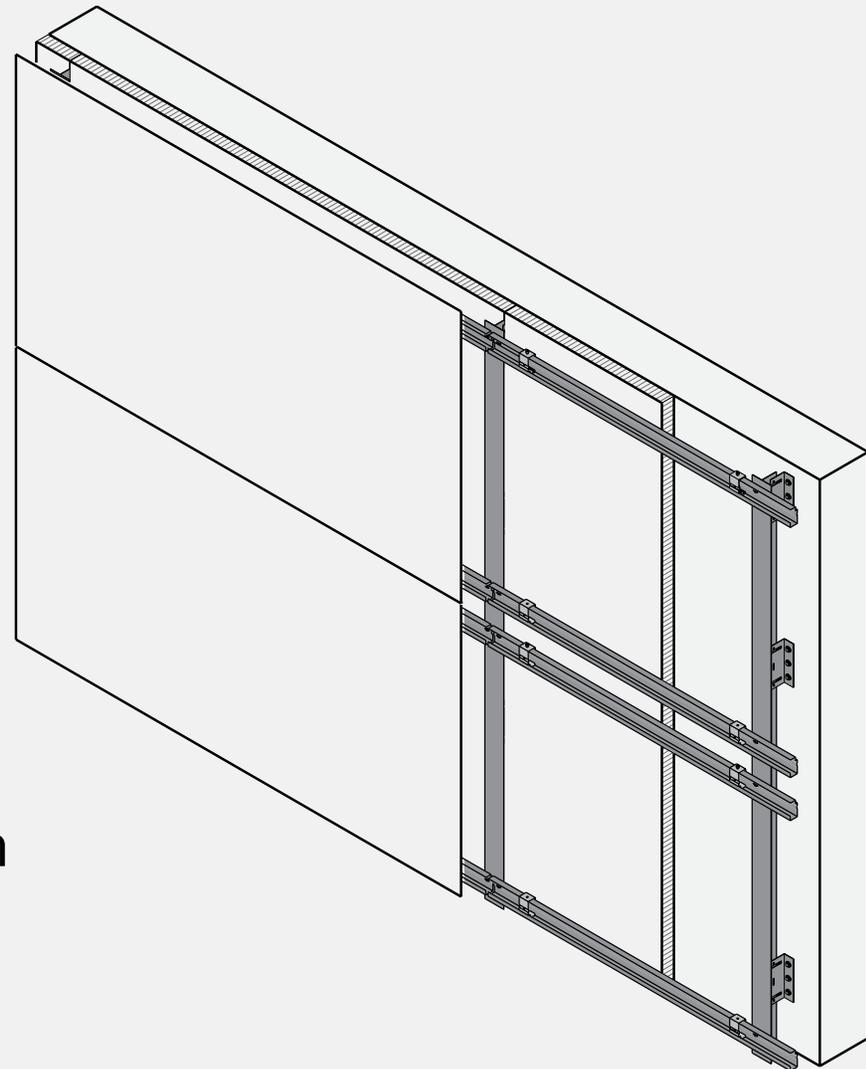


Undercut Anchor



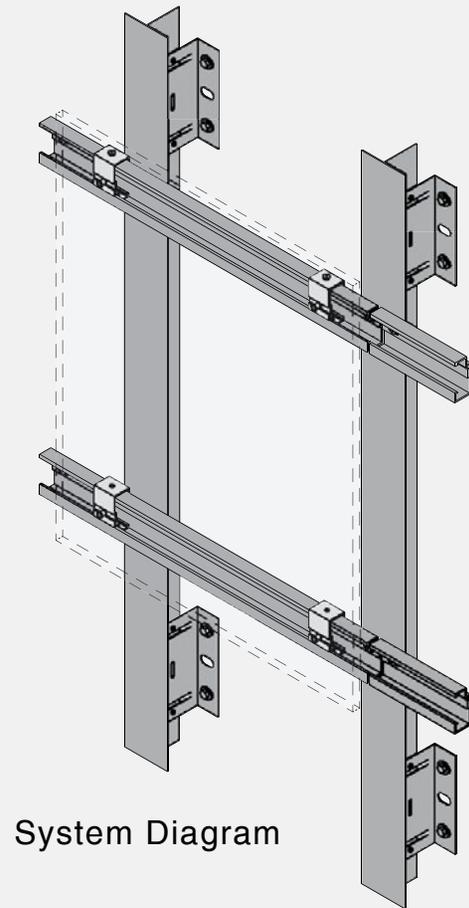
Face Fastener with or without Counterbore



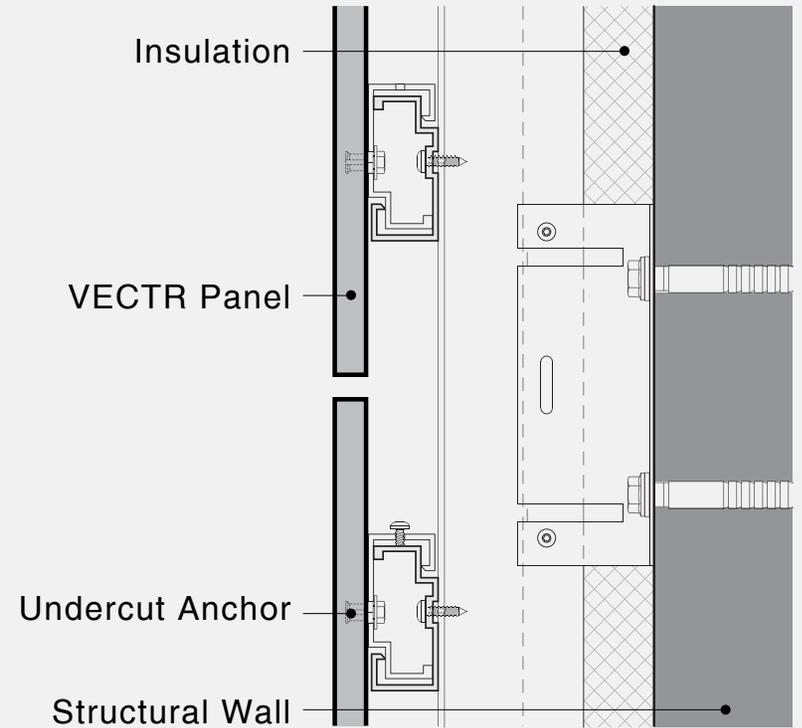


Ventilated Rain-screen with Undercut Anchors

# VECTR Applications | Ventilated Rain-screen with Undercut Anchors



System Diagram



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