

**Xcel Sports Complex**  
Pitzner Parkway & W Racine St  
Jefferson, WI 53549

**Structural Calculations**  
Exterior Wall Resin Panels

**Prepared For**  
OpeningDesign  
Madison, WI



Ntrive Engineering  
280 Shuman Blvd Ste 270  
Naperville, IL 60563  
Ntrive Project No.: N150104  
IL Design Firm No.: 184007218-0003

**Xcel Sports Complex**  
Pitzner Parkway & W Racine St  
Jefferson, WI 53549

**Structural Calculations**  
Exterior Wall Resin Panels

**Table of Contents**

Design Criteria	101
Resin Panel Analysis	201
Appendix A: Resin Panel Specifications	

**Xcel Sports Complex**  
Jefferson, WI

## **Design Criteria**



Ntrive Engineering  
280 Shuman Blvd Ste 270  
Naperville, IL 60563

JOB XCEL SPORTS COMPLEX NO. N150104  
SHEET NO. 101 OF    
CALCULATED BY KZZ DATE 9/15/15  
CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_  
DESCRIPTION GENERAL REQUIREMENT

**PURPOSE:**  
DESIGN EXTERIOR RESIN PANELS SPANNING BETWEEN U-CHANNELS

**CODES:**  
BUILDING CODE - 2011 WISCONSIN BUILDING CODE (REFERENCES 2009 IBC)

**STRUCTURAL LOADS:**

WIND LOAD: PER ASCE 7-05 (COMPONENTS & CLADDING)

$h_{mean} = 31'-0"$

$$q_z = 0.00256 K_z K_{zt} K_d V^2 I = 0.00256 * 1.0 * 1.0 * 0.85 * 90^2 * 1.0 = 17.63 \text{ PSF}$$

$K_z = 1.0$  (TABLE 6-3)

$K_{zt} = 1.0$  (SECTION 6.5.7.2)

$K_d = 0.85$  (TABLE 6-4)

$V = 90 \text{ MPH}$  (FIGURE 6-1)

$I = 1.0$  (TABLE 6-1)

$$p = q_z (G C_p \pm G C_{pi}) = 17.63 \text{ PSF} * (-1.4 \pm 0.18) = -27.6 \text{ PSF}$$

$G C_p = 1.4$  (FIGURE 6-11A)

$G C_{pi} = 0.18$

**Xcel Sports Complex**  
Jefferson, WI

## **Resin Panel Analysis**



Ntrive Engineering  
280 Shuman Blvd Ste 270  
Naperville, IL 60563

JOB XCEL SPORTS COMPLEX NO. N150104  
SHEET NO. 201 OF 1  
CALCULATED BY KZZ DATE 9/15/15  
CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_  
DESCRIPTION RESIN PANEL ANALYSIS

### CHECK RESIN PANELS SPANNING BETWEEN U-CHANNELS:

CHECK STRENGTH (ON A PER FOOT BASIS):

$$p = -27.6 \text{ PSF}$$

$$w = 27.6 \text{ PSF} * 1' = 27.6 \text{ PLF}$$

$$L = 2'-0"$$

$$M = 0.125wL^2 = 0.125 * 27.6 * 2'^2 = 13.8 \text{ FT}*LB = 165.6 \text{ IN}*LB \text{ (PER AISC TABLE 3-22c)}$$

$$S = 1/6bd^2 = 1/6 * 12'' * 0.3125^2 = 0.195 \text{ IN}^3$$

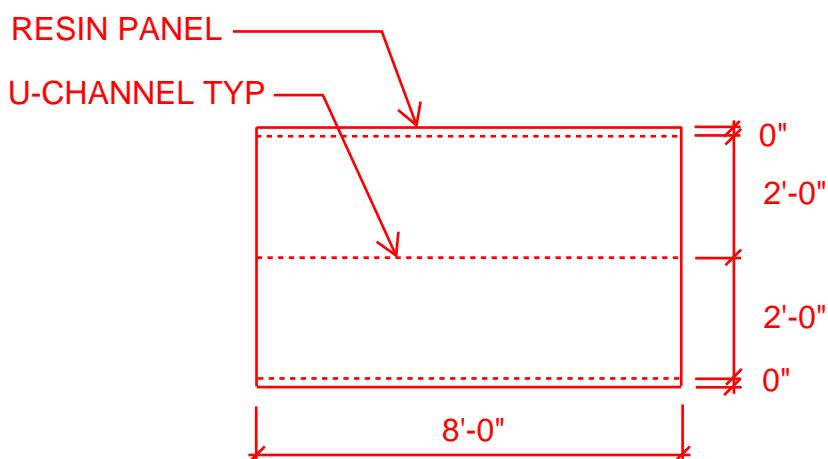
$$fb = M/S = 165.6 \text{ IN}*LB / 0.195 \text{ IN}^3 = 849 \text{ PSI}$$

$$SF = 4$$

FS = 16000 PSI (FLEXURAL STRENGTH OF PANEL; SEE APPENDIX A)

Fb = FS/SF = 16000 PSI / 4 = 4000 PSI > 849 PSI, OK

**PROVIDE 5/16" STONEWOOD EXTERIOR RESIN PANELS TO SPAN 2'-0"**



**Xcel Sports Complex**  
Jefferson, WI

## **Appendix A:** **Resin Panel Specifications**

# Stonewood™ Architectural Panels by Fiberesin

## Exterior Applications Technical Guidelines for Exterior Wall Cladding

### Product Guide Specification in CSI 3-Part Format

This product guide specification is written according to the Construction Specifications Institute (CSI) 3-Part Format, as described in *The Project Resource Manual—CSI Manual of Practice*.

Stonewood Panels are solid phenolic, thermally-fused materials comprised of multiple sheets of kraft fiber paper. These kraft papers can be FSC® certified and contain 16% or more post-industrial, recycled wood fiber content. FSC® certification provides third-party assurance that all wood fibers are from responsible sources. The Stonewood Panel manufacturing facility has been BIFMA level® certified. A 100% post-consumer recycled Stonewood Panel with a Class B fire rating is available. This product is not FSC® certified. To produce Stonewood Panels, Fiberesin impregnates the raw core kraft sheets with phenolic resins. The treated papers are then hot pressed, fusing the layers into a solid panel. Stonewood Panels do not emit formaldehyde, are resistant to burning, and can support significant weight without breaking.

Stonewood Exterior Panels are manufactured with an acrylic surface layer containing additives that protect them from the effects of ultraviolet light. The acrylic layer has been thoroughly tested for UV protection and the panel is ideal for use as an interior wall-covering panel or building cladding.

Stonewood Exterior Panels come in standard thicknesses (5/16", 8 mm, 3/8", 10 mm, 1/2", 13 mm). Custom thicknesses are available. Panels are available in two fire ratings and surface flammability: Class A or Class B per ASTM E84.

The Execution Section of this specification document should be carefully reviewed and edited if necessary by the Architect to meet the requirements of the project and local building codes. Coordinate this section with other specification documents and the drawings, and consult with a Stonewood Panel local representative or Fiberesin customer service, if needed.

## SECTION 074200

### STONEWOOD ARCHITECTURAL PANELS (A SOLID PHENOLIC EXTERIOR WALL CLADDING)

Hereafter referred to as Stonewood Panels

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Stonewood Panels: Solid phenolic panels for exterior wall cladding of commercial and institutional buildings.

##### 1.2 RELATED SECTIONS

- A. Section 05: "Cold-Formed Metal Framing"
- B. Section 07: "Thermal Insulation"
- C. Section 09: "Exterior Sheathing"

##### 1.3 REFERENCES

- A. ASTM D638 - 10 Standard Test Method for Tensile Properties of Plastics.
- B. ASTM D790 - 10 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- C. ASTM E84 - 12 Standard Test Method for Surface Burning Characteristics of Building Materials.

- D. NEMA Standards Publication LD3-2005. High pressure decorative laminates.
- E. 2012 International Building Code, Chapter 14 Exterior Walls.

#### 1.4 SUBMITTALS

- A. Comply with Section 01330 (01 33 00) - Submittal Procedures.
- B. Product Data: Submit manufacturer's printed product literature and specifications including fabrication and assembly.
- C. Samples: Submit manufacturer's standard 3"x3" samples of panel cladding materials representative of colors and texture.
- D. Manufacturer's Certification: Submit manufacturer's certification that materials comply with specified requirements and are suitable for intended application.
- E. Warranty: Submit manufacturer's standard warranty.
- F. Installation Instructions (descriptive manual)
- G. Shop Drawings: Submit complete sets of fabrication/installation drawings including panel dimensions, thickness, location of joints, method of anchorage, number of anchors, supports, accessories, etc.

#### 1.5 QUALITY ASSURANCE

- A. Manufacturer's Qualifications:
  - 1. Sufficient plant facilities to provide quality and quantity of materials as required without delaying progress of the work.
  - 2. Minimum of 40 years of experience in paper saturation of phenolic resin, and producing phenolic paper laminate.
- B. Fabricator
  - 1. Fabricated by the manufacturer, and/or
  - 2. Contracted by the customer, minimum 5 years of experience in fabrication work of exterior cladding system for the size and complexity of the projects.
  - 3. Approved by the manufacturer.
- C. Installer
  - 1. Proven professional cladding system installer with a minimum of 5 years of documented experience.
  - 2. Approved by the manufacturer.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials in manufacturer's original unopened containers/packages, with labels clearly identifying product name, manufacturer, color/texture, and weight.
- B. Storage:
  - 1. Store materials in clean, dry area in accordance with manufacturer's instructions.
  - 2. Keep package sealed until ready for use.
- C. Handling:
  - 1. Handle materials in accordance with manufacturer's instructions.
  - 2. Protect materials during handling to prevent damage.

#### 1.7 WARRANTY

- A. Limited warranty: Fiberesin warrants that Stonewood Architectural Panels shall be free from material defects for a period of 10 years. Refer to [www.stonewoodpanels.com](http://www.stonewoodpanels.com) for details.

## PART 2 PRODUCTS

### 2.1 MANUFACTURER

- A. Fiberesin Industries, Inc., PO Box 808, Oconomowoc, WI 53066. Phone: (262) 567-4427  
Fax: (262) 567-4814, Web Site: [www.fiberesin.com](http://www.fiberesin.com). Email: info@fiberesin.com.

### 2.2 STONEWOOD EXTERIOR ARCHITECTURAL PANELS

- A. Material: Solid phenolic laminate panel with UV protection  
B. Colors/Patterns: 200+  
C. Finish: #60 Matte  
D. Standard Size: 48"x96"  
E. Panel Thickness: 5/16", 8 mm, 3/8", 10 mm, 1/2", 13 mm (Custom thicknesses available upon request)  
F. Panel Core: Standard black and natural (brown)

### 2.3 MINIMUM MATERIAL PROPERTIES

#### A. NEMA Requirements

Description	Test	NEMA Requirements	0.156"	0.250"	0.500"
Thickness			0.156"	0.250"	0.500"
Resistance to High Temperature	3.6	Slight Effect	No Effect	No Effect	No Effect
Ball Impact Resistance: Inches Drop	3.8	75"	90"+	96"+	96"+
Dimensional Change: Length (Machine Direction) Width (Cross Direction)	3.11	0.3% Maximum 0.7% Maximum	0.25% 0.50%	0.25% 0.50%	0.25% 0.50%
Weight Per Unit Area Lbs/ft <sup>2</sup> Kg/m <sup>2</sup>			1.07 5.2	1.71 8.35	3.42 16.7
Density (PCF)			82	82	82

#### B. Mechanical Properties

Property	NEMA Requirements	0.156"	0.250"	0.500"
Flexural Strength ASTM D-790 MD (psi) CD (psi)	18,000 12,000	20,000 16,000	20,000 16,000	20,000 16,000
Flexural Modulus ASTM D-790 MD (psi) CD (psi)	$1.6 \times 10^6$ $1.4 \times 10^6$	$2.0 \times 10^6$ $1.5 \times 10^6$	$2.0 \times 10^6$ $1.5 \times 10^6$	$2.0 \times 10^6$ $1.5 \times 10^6$
Tensile Modulus ASTM D-638 MD (psi) CD (psi)	18,000 12,000	18,000 13,000	18,000 13,000	18,000 13,000

C. Fire Resistance

Fire Resistance	Thickness	Product Type	
		Class A	Class B
Flame Spread Index - ASTM E-84 (BLDG)*	0.250"	0.250"	0.250"
Smoke Developed Values - ASTM E-84 (BLDG)*	15	30	105
Fire Rating* (Standard Product is Class B)	A	B*	

\* Test Method: ASTM E84-13a - Standard Test Method for Surface Burning Characteristics of Building Materials. Also known as NFPA 255, UL 723, and UBC 8-1.

D. Manufacturing Tolerance

Thickness (.156 to .375)	+/- .020
Thickness (above .375 to 1.000)	+/- .030
CNC Shaped size (Length -Width)	+/- .020
Drill Diameter	+/- .003
Drill Depth	+/- .020
CNC Hole to Hole	+/- .020
CNC Hole to Edge (1 Oper)	+/- .020
CNC Hole to Edge (2 Oper)	+/- .030
Routing - (Slots Width and Length)	+/- .015
Routing - (Slots Depth)	+/- .020

2.4. ACCESSORIES (FASTENERS)

- A. Manufactured by approved supplier.
- B. Provide exterior wall cladding system designed to withstand the effects of dead load, live load, and accommodate hygrothermal expansion/contraction of the panel.

**PART 3 EXECUTION**

3.1 MANUFACTURER'S INSTRUCTIONS

- A. Compliance: Comply with manufacturer's/fabricator's/supplier's product data, handling and installation instruction/manual, shop drawings, shipping container/package ticket identification, etc.

3.2. EXAMINATION

- A. Verify correct panels received, including dimension, tolerance, color/texture.
- B. Verify correct attachment system received for the specific project/job.
- C. Verify all the documents, including shop drawings and installation guidelines.
- D. Verify installation conditions are satisfactory to receive work of this Section before the commencement.
- E. Verify substrate installation is complete, flat, and true to plane.

3.3. PREPARATION

- A. Field Measurements: Verify prior to fabrication and installation of the cladding panel.
- B. Protect surrounding areas and surfaces to preclude damage during work of this Section.
- C. Lay out work before beginning installation as necessary for true, plumb, and aligned panel installations.
- D. Verify locations of joints and panel lengths.

### **3.4. INSTALLATION**

- A. Conform to manufacturer's instructions and provisions of shop drawings.
- B. Conform to fastener's instructions for installation of fasteners.
- C. Install to allow hygrothermal expansion/contraction.
- D. Use appropriate techniques/tools to work with the panel.
- E. Do not force to fit, bend, or stretch/compress.
- F. Make cutting and fitting neat, square, and true. Where required, cut, de-burr edges, and clean filings from adjacent surfaces.
- G. Do not install damaged or questionable panels.

### **3.5. FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Provide field services to ensure product installation is in accordance with manufacturer's/fabricator's/supplier's instructions and installation manuals, shop drawings, etc.

### **3.6. ADJUSTING**

- A. Correct identified defects and irregularities.
- B. Replace damaged, soiled, and discolored work.

### **3.7. CLEANING**

- A. Leave installation clean and free from residue and debris from work of this Section.

**END OF SECTION**