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DryJoist Structural Drainage System - Engineering Specifications

Product Summary

DryJoist is an extruded aluminum structural joist alternative. The system consists of a series of interlocking tongue and groove panels that, when assembled together, form a larger uninterrupted structural platform for installing traditional decking/flooring materials. These materials include, but are not limited to, natural hardwoods, plywood and wood/plastic composites. This larger uninterrupted structural platform provides a 2" deep water collection/diversion feature on the top side and a paint finished bead board ceiling on the bottom side.

The DryJoist system is commonly used for dry below deck applications on single and multifamily residential projects, and non-residential decks and balconies; and low-slope roof applications. When installed correctly, DryJoist is guaranteed not to leak.

Basic Dimensions

DryJoist is a two inch tall extruded profile with a minimum wall thickness of 0.70". The panels are available in both 8" and 4" widths and lengths up to 24 feet. 50 foot unpainted panels are available for roof applications as a special order.

IBC Requirements

DryJoist meets or exceeds the specifications and guidelines for aluminum structures as recommended by AA ADM 1 and required by the 2006 International Building Code.

Building Code Requirements – 2006 International Building Code:

CHAPTER 16 – STRUCTURAL DESIGN

SECTION 1604 GENERAL DESIGN REQUIREMENTS

1604.3.5 Aluminum. The deflection of aluminum structural members shall not exceed that permitted by AA ADM1.

CHAPTER 20 – ALUMINUM

SECTION 2002 MATERIALS

2002.1 General. Aluminum used for structural purposes in buildings and structures shall comply with AA ASM 35 and AA ADM 1. The nominal loads shall be the minimum design loads required by Chapter 16.

AA ASM 35

Aluminum Sheet Metal Work in Building Construction (Fourth Edition):

SCOPE: These specifications shall apply to the proper use of aluminum in roofing, flashing and other sheet metal work in building construction. They are not intended to cover the details or specifications of proprietary or pre-formed sheet metal systems or products, such as horizontal siding, fascia and soffit systems, curtain wall systems, corrugated or ribbed roofing and siding, etc. (NOT APPLICABLE TO DRYJOIST AS THE SYSTEM IS STRUCTURAL)

AA ADM 1

Aluminum Design Manual: Part 1-A Aluminum Structures, Allowable Stress Design; and Part 1-B - Aluminum Structures, Load and Resistance Factor Design of Buildings and Similar Type Structures

SCOPE: The Aluminum Design Manual includes aluminum structural design specifications and accompanying commentary, a supplemental design guide, material properties, section properties, design aid tables and graphs, illustrative design examples and guidelines for aluminum sheet metal work in building construction. (DRYJOIST MEETS OR EXCEEDS THE SPECIFICATIONS AND GUIDELINES FOR ALUMINUM STRUCTURES AS RECOMMENDED BY AA ADM 1 AND REQUIRED BY THE 2006 INTERNATIONAL BUILDING CODE.

Calculated Load and Deflection

The DryJoist span charts published below have been calculated using the following DryJoist and aluminum specifications:

| | |
|------------------------------------|--------------------------------|
| DryJoist modulus of elasticity: | 10,000,000 lbs/in ² |
| DryJoist second moment of inertia: | 0.8076 in ⁴ |
| DryJoist density: | 0.09754 lbs/in ³ |
| DryJoist width: | 8" |

DryJoist Span Charts

Single Span - Pinned at both ends

| DryJoist Span | Total Load TL lbs/ft ² | | |
|------------------|-----------------------------------|--------|--------|
| | l/180 | l/240 | l/360 |
| 4 | 560.84 | 420.63 | 280.42 |
| 5 | 287.15 | 215.36 | 143.58 |
| 6 | 166.17 | 124.63 | 83.09 |
| 7 | 104.65 | 78.48 | 52.32 |
| 8 | 70.11 | 52.58 | 35.05 |
| 9 | 49.24 | 36.93 | 24.62 |
| 10 | 35.89 | 26.92 | 17.95 |

Double span - Pinned at both ends and center

| DryJoist Span | Total Load TL lbs/ft ² | | |
|------------------|-----------------------------------|----------|--------|
| | l/180 | l/240 | l/360 |
| 4 | 1,348.30 | 1,011.23 | 674.15 |
| 5 | 690.33 | 517.75 | 345.17 |
| 6 | 399.50 | 299.62 | 199.75 |
| 7 | 251.58 | 188.68 | 125.79 |
| 8 | 168.54 | 126.40 | 84.27 |
| 9 | 118.37 | 88.78 | 59.18 |
| 10 | 86.29 | 64.72 | 43.15 |

Shear Strength

Because the yield strength of aluminum (the fastener hole in the aluminum) is less than half the shear strength of the screw fastener, the aluminum shear strength is used to establish DryJoist shear values.

Known Values:

minimum fastener width (diameter) is 0.211" (on steel beams this value is 0.25")

minimum aluminum thickness at attachment point is 0.140"

minimum aluminum yield strength is 36,000 psi.

Calculated Value

(0.140")(0.211")(36Kpsi) then gives us a minimum yield value of 1063 lbs.

With a 2x safety factor, we establish the shear load value for DryJoist of 530 lbs per fastening point (630 lbs for steel beam construction).

Example:

A second story residential DryJoist deck measuring 12' x 16' will require about eighty-six 2" long #12 screws fastening into a standard wood frame structure. For this deck, the total shear value for the installed DryJoist is 45,580 lbs.

Wind Lift

The tested pull-out value of a 2" long #12 DryJoist screw is 350lbs (min). Using the example given above, a 12' x 16' deck will require about 86 fasteners distributed about the deck with a total minimum holding strength of 30,100lbs total or 156 lbs/ft². A maximum wind burst of 150mph equates* to 14,930lbs total or 78 lbs/ft².

*Lift Force (lbs/ft²) = 0.0027 * Wind Speed (mph²)