

TALBOT CONSTRUCTION
HOUMA, LA
WIND LOAD CALCULATION
August 12, 2020

DOOR WIND LOAD CALCULATIONS

This structure has been designed in accordance with the requirements of the American Society of Civil Engineers MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES ASCE 7. The following wind load requirements were employed in the design of the structure:

- Wind Load Requirements employed in the Design of the Structure
 - Ultimate Wind Speed: $V_{ULT} = 152$ MPH
 - Wind Borne Debris: YES
 - Basic Wind Speed: $V_{ASD} = 118$ MPH
 - Building Category II, Enclosed
 - Wind Exposure B

Door wind load calculations based on individual structural panels secured at top and bottom with rollers and pins with the door in the closed position whenever high winds are expected. Door wind load calculations meet ASCE 7 “Minimum Design Loads for Buildings and Other Structures” for building mean roof height under 20 ft.

Calculations are limited to FOLDTITE SYSTEMS, INC., FOLD-TITE STACKER System Door Series CSA-5.0 Plus designed for:

Byron E. Talbot Contractors, Inc.: 80 ft 8 in X 13 ft 8 in
Fold-Tite Drawing # BET_FT8014QT
See Attached

To be installed:
194 Aviation Rd.
Houma, LA 70363

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WIND LOAD PRESSURE

Ultimate Wind Speed $V_{ULT} = 152$ MPH

Velocity pressure exposure coefficient exposure B (ASCE 7 Table 6-5)

$$K_Z = 0.70$$

Topographic Factor (ASCE 7 Eq. 6-1, Figure 6-2, no hill or escarpment)

$$K_{ZT} = 1.0$$

Directionality Factor (ASCE Eq. 6-1, Table 6.6)

$$K_D = 0.85$$

Importance Factor $I = 1.00$

Velocity pressure (ASCE 7 Eq. 6-13)

$$Q_Z = 0.00256 \cdot K_Z \cdot K_{ZT} \cdot K_D \cdot V^2 \cdot I$$

$$Q_Z = 35.2 \text{ lb} \cdot \text{ft}/\text{ft}^2$$

External pressure coefficient (ASCE 7 Figure 6-5A)

$$\text{Positive: } 0.7, \text{ Negative: } -0.8 \quad G_{CP} = -0.8$$

Internal pressure coefficient enclosed (ASCE 7 Table 6-7)

$$\text{Positive: } 0.18, \text{ Negative: } -0.18 \quad G_{CPI} = 0.18$$

DESIGN WIND PRESSURE (MAX.)

Components and cladding, mean building height under 60 ft

$$P = -Q_Z \cdot (G_{CP} - G_{CPI})$$

$$P = 34.5 \text{ lb} \cdot \text{ft}/\text{ft}^2$$

ASD WIND LOAD FACTOR

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$$P_{ASD} = 0.6 \cdot P$$

$$P_{ASD} = 20.7 \text{ lb} \cdot \text{ft}/\text{ft}^2$$

CRITICAL STRUCTURAL CONDITION

The critical structural condition for the door is the bending of the vertical members on the sides of the individual door panels. The critical panels are the center panels.

Panel Clear Span Height

$$H = 13 \text{ ft } 6 \text{ in}$$

$$H = 162 \text{ in}$$

Panel Width

$$W = 4 \text{ ft } 11.98 \text{ in}$$

$$W = 59.98 \text{ in}$$

Load on Vertical Edge Members

$$L = P_{ASD} \cdot W/2$$

$$L = 52.2 \text{ lb} \cdot \text{ft}/\text{ft}$$

$$L = 4.35 \text{ lb} \cdot \text{ft}/\text{in}$$

Moment on Vertical Edge Member

$$M_{MAX} = L \cdot H \cdot H/8$$

$$M_{MAX} = 14,271 \text{ lb} \cdot \text{in}$$

Edge Member Properties

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The edge member is an aluminum extrusion from KEYMARK CORPORATION, die number T-S55472, Aluminum Alloy 6063 T-5 for FOLDTITE SYSTEMS #CSA-5.0 VERTICAL. The member has the following properties according to the KEYMARK CORPORATION. (See Attached)

$$I_x = 3.460 \text{ in}^4$$

$$I_y = 0.318 \text{ in}^4$$

$$S_x = 1.375 \text{ in}^3$$

$$S_y = 0.213 \text{ in}^3$$

Aluminum Properties Alloy 6063 T-5

$$F_{YALLOWABLE} = 13,300 \text{ lb} / \text{in}^2$$

Moment Allowable

$$M_{ALLOWABLE} = S_x \cdot F_y$$

$$M_{ALLOWABLE} = 18,290 \text{ lb} \cdot \text{in}$$

THEREFORE, THE MEMBER IS ADEQUATE

HANGER BOLTS AND LOCK PINS

Loading on Hangers

Door Width (DW)

$$DW = 80 \text{ ft } 8.1 \text{ in}$$

Door Height (DH)

$$DH = 13 \text{ ft } 8.01 \text{ in}$$

Hanger Spacing (HS)

$$HS = 10 \text{ ft } 0 \text{ in}$$

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Lock Pin Spacing (LPS)

$$\text{LPS} = 10 \text{ ft } 0 \text{ in}$$

Drop Pin Spacing (DPS)

$$\text{DPS} = 4 \text{ ft } 11.98 \text{ in}$$

Number of Pins = 16

Door Weight (DW)

$$\text{DW} = 1.99 \text{ lb/in}$$

Wind Loading (P)

$$P = 20.7 \text{ lb} \cdot \text{ft}/\text{ft}^2$$

Dead Load / Hanger (DLH)

$$\text{DLH} = 240.8 \text{ lb} \cdot \text{ft}$$

Wind Load at Verticals (WLV)

$$\text{WLV} = 1425.7 \text{ lb} \cdot \text{ft}$$

HANGER BOLTS, LOCK PINS LOADING & SIZE

Load capacity of threaded hanger rods/bolts, based on an allowable bolt stress (ABS) of 60,000 lb•ft/in² Grade 5

$$\text{Bolt Length} = 7.00 \text{ in, Bolt Diameter} = 5/8 \text{ in}$$

$$\text{Bolt Area} = 0.20 \text{ in}^2, \text{ Max Allowable Load} = 12,200 \text{ lb} \cdot \text{ft}$$

Bolt Stresses for Applied Loads

$$\text{Axial Tension Stress (ATS)} = \text{DLH}/\text{BA}$$

$$\text{ATS} = 1204 \text{ lb}/\text{in}^2$$

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$$\text{Shear Stress (SS)} = \text{WLV/BA}$$

$$\text{SS} = 7,128.5 \text{ lb/in}^2$$

Combined Stress

$$\text{CS} = \text{ATS/ABS} + \text{SS/ABS} \leq 1.0$$

$$\text{CS} = .140$$

THEREFORE, THE HANGER BOLTS ARE ADEQUATE

LOCK PINS

Load capacity of drop lock pins, based on an allowable pin stress (APS) of 60,000 lb • ft/in²

$$\text{Pin Diameter} = \frac{1}{2} \text{ in}$$

$$\text{Pin} = 0.196 \text{ in}^2$$

Pin Stress for Applied Load

$$\text{SS} = 3,637 \text{ lb/in}^2$$

THEREFORE, THE DROP PINS ARE ADEQUATE

THEREFORE, THE DOOR DESIGN IS ADEQUATE