MAXTERRA®

MgO Non-Combustible Single Layer Structural Floor Panels

Floor Diaphragm Application (Wood Framed Construction):

This document is intended to provide guidance for design of floor diaphragm systems utilizing MAXTERRA® MgO Non-Combustible Single Layer Structural Floor Panels and wood framing. The values and design equations contained herein are based on testing of full-scale assemblies in accordance with ASTM E455.

Design Requirements:

Diaphragm design must comply with the applicable requirements of IBC Chapter 16. The length to width aspect ratio must be no greater than 3:1.

Diaphragm lateral load capacities are applicable when the lateral load is applied parallel (Figure 1) or perpendicular (Figure 2) to the framing members as indicated in Table 1.

Diaphragm classification as flexible or rigid must be determined in accordance with Section 12.3.1 of ASCE 7.

Diaphragm boundary elements must be provided to transfer the design tension and compression forces. Design of the boundary elements must be performed by a Registered Design Professional and is outside of the scope of this document.

Diaphragm sheathing must not be used to splice boundary elements.

TABLE 1 – Diaphragm Capacities

Diaphragm Configuration	Load Direction	Max Support Framing Spacing (inches)	Required Blocking	Max Fastener Spacing (inches)		Shear Strength (lb/ft)		
				Perimeter	Field	Ultimate Shear Strength (S_u)	LRFD Shear Strength (S_{LRFD})	ASD Shear Strength (S_{ASD})
Simple Beam	Parallel to Framing (Figure 1)	24	None	12	6	843	480	301
Simple Beam	Perpendicular to Framing (Figure 2)	24	None	12	6	765	435	273

For SI: 1 inch = 25.4 mm, 1 lb/ft = 14.6 N/m

[1] S_{LRFD} utilizes a resistance factor, ϕ, of 0.57 applied to the ultimate shear strength (S_u)

[2] S_{ASD} utilizes a safety factor, Ω, of 2.8 applied to the ultimate shear strength (S_u)

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Simple beam diaphragm deflection must be calculated as follows:

$$\Delta_{dia} = \left(\frac{5vL^3}{8EAW}\right) + \left(\frac{0.25vL}{Ga}\right)$$

Where:

Δ_{dia} = Total diaphragm deflection (in)

v = Unit shear perpendicular to the direction of the applied load (lb/ft)

L = Diaphragm length perpendicular to the direction of the applied load (feet)

W = Diaphragm width parallel to the direction of the applied load (feet)

A = 5.25in^2 (minimum area of diaphragm chord member)

E = 1,400,000 psi (Modulus of Elasticity of diaphragm chord member)

For load application parallel to joists (See Figure 1):

Ga = 17,343 lb/in (apparent shear modulus)

For load application perpendicular to joists (See Figure 2):

Ga = 8,403 lb/in (apparent shear modulus)

Note: unit conversions have been accounted for in the equation above

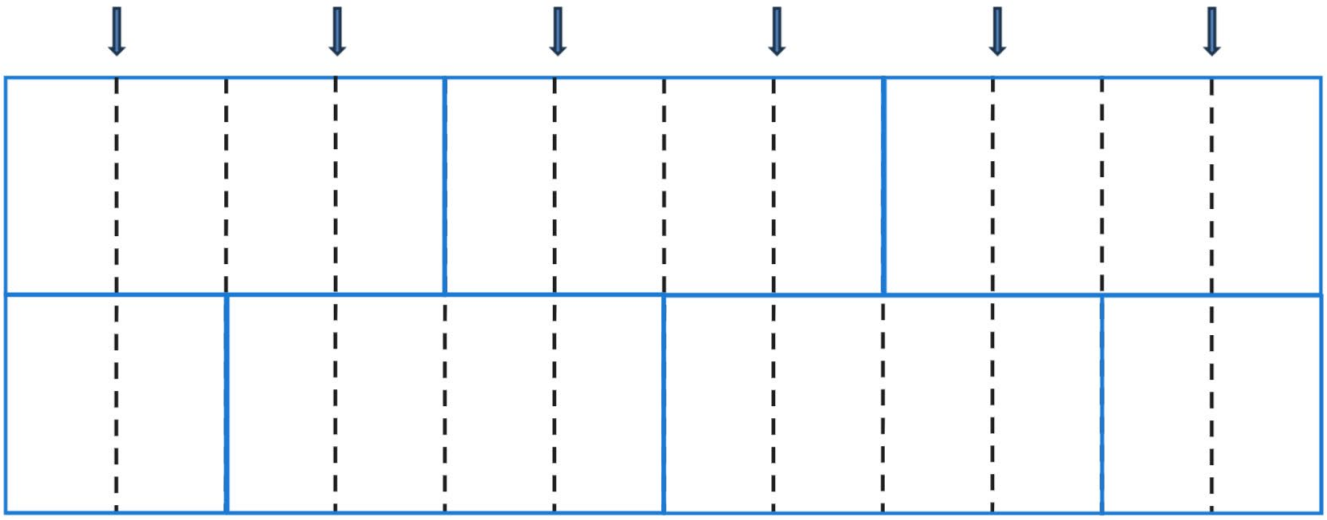

FIGURE 1 – Simple Beam Diaphragm Configuration For Load Applied Parallel To Joists

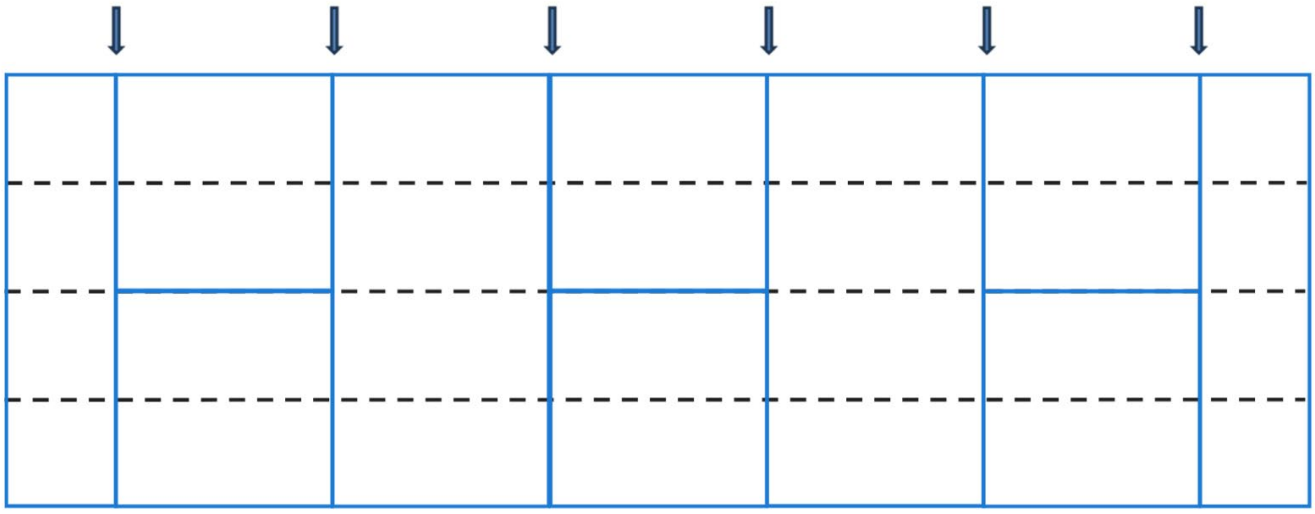

FIGURE 2 – Simple Beam Diaphragm Configuration For Load Applied Perpendicular To Joists

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General Installation Requirements:

Floor framing must be supported on a foundation that is uniform and level. Additional framing must be provided under partitions running parallel to the framing members and around all openings that interrupt one or more framing members.

Web stiffeners must be provided at reaction points and / or at locations of concentrated loads as specified in the approved plans, if applicable. End blocking must be provided where ends of joists are not otherwise restrained from rotation.

The MAXTERRA® MgO Non-Combustible Single Layer Structural Floor Panels must be installed with the smooth side up (printed side facing down). The panels must be fitted together such that the tongue and groove features are fully interlocked with one another. The joists must be spaced no greater than 24-inches (610 mm) on center. Square edges (edges without tongue and groove) must be located over framing members. MAXTERRA® MgO Non-Combustible Single Layer Structural Floor Panels edges that are not supported by the tongue and groove profile must be supported by blocking.

When blocking is required at the abutting edges of the panels, it must be centered under the panel joints. All blocking or bridging for the framing must be installed prior to installation of the MAXTERRA® MgO Non-Combustible Single Layer Structural Floor Panels.

The sheathing must be cut as needed to the proper length and width in accordance with the installation instructions. All cut-outs located at panel ends and edges that exceed 6 inches in any direction must be supported by framing.

MAXTERRA® MgO Non-Combustible Single Layer Structural Floor Panels must be oriented with the tongue and groove edge installed perpendicular to the joists with the sheathing joints staggered 4 ft (1.22m) as shown in Figure 1 and Figure 2.

Sheathing used at the ends of diaphragm assemblies resisting lateral loads perpendicular to framing (Figure 2) must have a minimum width of 24-inches (609.6 mm)

Trusses:

Floor framing must be provided at a maximum spacing of 24-inches (610 mm) on center. The framing must be a minimum nominal 2-by-4 lumber with a minimum specific gravity of 0.42. Framing members must be fastened to the supporting walls or structure in accordance with the approved plans.

Fastening:

Panels must be attached using 0.131-inch x 3-inch (3.3 mm x 76.2 mm) galvanized ring shank nails with a minimum head diameter of 0.281-inch (7.1 mm) diameter round head and a minimum bending yield strength of 100,000 psi. Fasteners must be installed 6-inches (152.4 mm) on center around the perimeter and 12-inches (304.8 mm) on center in the field. Fasteners must be installed with a minimum ½-inch (12.7 mm) edge distance, and fasteners must not be installed within 2-inches (50.8 mm) of a panel corner.

For additional product information, please visit www.nexgenbp.com/resources.

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