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SURE-BOARD® SERIES 200S STRUCTURAL PANELS

CSI Section:
05160 Metal Framing Systems

1.0 RECOGNITION

Intermat Sure-Board® Series 200S Structural Panels described in this report were evaluated as floor and roof sheathing in compliance with Chapters 15 and 23 of the IBC and Chapters R5 and R8 of the IRC. The structural and non-combustibility properties of the Series 200S Structural Panels were evaluated for compliance with the following codes:

- 2015, 2012, 2009 and 2006 International Building Code® (IBC)
- 2015, 2012, 2009 and 2006 International Residential Code® (IRC)
- IAPMO Uniform ES EC-012
- 2016 and 2013 California Building Code® (CBC) – Supplement attached
- 2016 and 2013 California Residential Code® (CRC) – Supplement attached

2.0 LIMITATIONS

Use of Sure-Board® Series 200S Structural Panels recognized in this report is subject to the following limitations:

2.1 Plans and structural calculations shall be submitted to the building official demonstrating compliance with the provisions of this report and applicable code requirements. Construction documents shall be prepared by a registered design professional when required by the statutes of the jurisdiction where the project will be constructed**.**

2.2 Construction, design and installation of panels shall be in conformance with this report and the manufacturer's published installation guidelines. Where conflicts occur the more restrictive shall prevail.

2.3 Use of Sure-Board® Series 200S Structural Panels in fire-resistance-rated assemblies is outside the scope of this report.

2.4 Use of Sure-Board® Series 200S Structural Panels in sound-rated assemblies is outside the scope of this report.

2.5 The panels are manufactured by INTERMAT and licensed manufacturers at manufacturing facilities located in Costa Mesa, California; City of Industry, California and East Chicago, Indiana.

3.0 PRODUCT USE

Sure-Board® Series 200S Structural Panels are used as noncombustible floor and roof panels for support of vertical gravity loads, resistance to vertical (gravity and wind uplift) loads and horizontal in-plane (wind and seismic) loads in building and other structures of cold-formed steel (CFS) light frame construction. When used to resist horizontal in-plane (wind and seismic) loads, the panels function as the sheathing component of a horizontal diaphragm. The panels are alternatives to floor and roof sheathing complying with IBC Sections 1507 and 2304.7 and IRC Sections R503 and R803. The panels may also be used where an engineered design is submitted in accordance with Section 301.1.3 of the IRC. When used to resist horizontal in-plane loads, the panels are alternatives to wood structural panel sheathing used in diaphragms complying with AISI S213 as referenced in IBC Section 2211.6. The Sure-Board® Series 200S Structural Panels may be used as a component of a fire-resistance-rated assembly in accordance with IBC Section 703.2, based on testing in accordance with ASTME E119 or UL 263. Alternative methods in IBC Section 703.3 are also permitted.

4.0 PRODUCT DESCRIPTION

Sure-Board® Series 200S Structural Panels are a composite panel of light gage sheet steel and noncombustible sheathing bonded by a water-based adhesive. Panels are fastened directly to roof and floor framing members of cold-formed steel light frame construction with self-tapping screws. Panels are suitable for exposure to the exterior during construction but shall be covered by finish flooring or roof coverings upon completion of construction. Panels are available in widths of 48 inches (1219 mm) and standard lengths of 4 and 8 feet (1219 mm and 2438 mm).

4.1 Documented Design Values

4.1.1 Vertical (Gravity) Load Design: Determination of applicable design loads for dead and live gravity loads applied perpendicular to panels shall be in accordance with ASCE 7. Available strength and factored resistance for floor and roof sheathing to safely resist or support vertical design loads shall be determined in accordance with the Table 1 of this report. Values in Table 1 of this report are for use on panels continuous over two or more spans.

4.1.2 Horizontal (Wind and Seismic) Load Design: Values for the in-plane nominal strength of panels are established empirically. Allowable strength values (ASD) used a safety

factor (Ω) of 2.5 for seismic loads and 2.0 for wind or other in-plane loads. Values for factored resistance (LRFD) used a resistance factor (φ) of 0.60 for seismic and 0.65 for wind and all other in-plane loads.

Determination of applicable design loads shall be in accordance with ASCE 7. Allowable strength or factored resistance for horizontal diaphragms to safely resist or support horizontal design loads shall be determined in accordance with Table 2 of this report for panels constructed with the magnesium-oxide Magnum Boards or fiber-cement boards noted in Section 4.4.1.2 of this report. Allowable strength values in Table 2 of this report shall not be further increased for loads of short-term duration such as wind or seismic. The diaphragm length and width shall be limited by one of the following: engineering mechanics; applied loads; shear capacity of the diaphragm; and diaphragm deflection limited by the requirements of ASCE 7 in Sections 12.8.6 entitled, "Story Drift Determination"; or Section 12.12 entitled, "Drift and Deformation".

Supporting framing members directly connected to the panels shall be designed to limit deflection to no more than L/360 for total combination of loads applied. For horizontal diaphragms, the registered design professional shall verify that the framing members at boundaries of the diaphragm have sufficient capacity to develop the required strength of the diaphragm including but not limited to prevention of compression failure in the rim track.

4.1.3 Vertical Wind Uplift Design: Determination of applicable design loads for wind uplift loads applied perpendicular to panels shall be in accordance with ASCE 7. Allowable strengths, corresponding to joist spacings and screw placement to safely resist vertical wind uplift design loads shall be determined in accordance with the Table 3 of this report.

4.1.4 IRC: Floors and Roofs constructed in accordance with this report may be used in lieu of provisions in IRC Sections R505 and R804, respectively. Steel framing shall be designed to resist all applicable loading conditions.

4.2 Installation

Panels shall be placed with the long dimension perpendicular to framing members and with the steel side face in direct contact with the framing. Panels installed as floor or roof panels shall be continuous over two spans. Joint spacing between panels shall be 0 inch to 1/8 inch (0 to 3.2 mm). Maximum spacing of framing members that support panels shall not exceed 24 inches (610 mm) on center.

Panel edges that are parallel to framing members shall be fastened to either main framing members or blocking of the same gage as the framing member i.e. joist or rafter. Panel edges that are parallel to framing members shall be attached with a separate row of fasteners for each panel edge.

Panel edges that are perpendicular to framing members shall be attached to either a framing member, blocking or to the extended steel sheet backing tab provided on the composite panel in the row below. When panel edges that are perpendicular to the framing members are attached to the backing tab, a single row of fasteners is sufficient for fastening of both panel edges.

For diaphragm construction, spacing of fasteners shall be in accordance with Table 2 of this report for panel edges and at 6 inches (152 mm) on center for connection to other framing members in the field. For wind uplift, spacing of fasteners shall be in accordance with Table 3 of this report. Fasteners attaching panels are installed in one operation through the panels into the framing. Fasteners shall be located at least 3/8 inch (9.5 mm) from the panel edges and driven flush with the surface of the noncombustible sheathing. Length of screw fasteners shall be sufficient to penetrate at least three exposed threads into framing members.

4.3 Special Inspections: Periodic special inspections for wind or seismic resistance corresponding to the applicable type (wood or cold-formed steel) of light-framed construction shall be provided when the panels are components of a wind-force-resisting system or seismic-force-resisting system located in areas set forth in Chapter 1705 of the IBC. Inspection requirements shall comply with IBC Section 1705.

4.4 Material Information

4.4.1 Sure-Board® Series 200S Structural Panels: Sure-Board® Series 200S Structural Panels are composite products consisting of steel sheet laminated to noncombustible boards with an adhesive.

4.4.1.1 Panel Sheet Steel: Sheet steel are No. 22 gage (0.027 inch / 0.686 mm) minimum base-metal thickness complying with ASTM A653 CS, Grade 33 minimum, and ASTM A1003/A1003M. The sheets are provided with a G40 hot-dipped galvanized coating conforming to ASTM A924.

4.4.1.2 Panel Noncombustible Boards: Noncombustible sheathing consists of either a fiber-cement board or a magnesium-oxide board, as shown in Table 4 of this report.

4.4.1.3 Panel Adhesive: The adhesive used to bond the sheet steel to the noncombustible sheathing is a synthetic-resin-latex, water-based adhesive in compliance with ASTM C916-79, Type II and NFPA-90A. Adhesive is used in the manufacture of the Sure-Board® Series 200S Structural Panels under an approved quality control program.

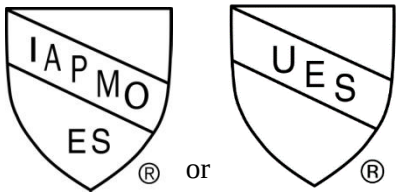
4.4.2 Fasteners: Fasteners used to connect the Sure-Board® Series 200S Structural Panels to steel framing members ranging from 33 mils (0.83 mm/No. 20 nominal gage) to 118 mils (2.99 mm/No. 10 gage) thickness shall be self-drilling/self-tapping pilot point bugle head screws that are manufactured from steel wire conforming to ASTM A548,

Grade 1013 to 1022. Screws shall be minimum 0.138-inch diameter (3.5 mm) (No. 6 gage) by 1⅝ inch (41 mm) minimum length and have bugle heads with a minimum 0.3145-inch (8 mm) head diameter. All Screws shall have winged drill points that are at least ⅜ inch (9.5 mm) in length and comply with applicable provisions of SAE J78 and ASTM C954. For horizontal diaphragms, the screw sizes are limited to No. 8 (0.164 inch/4.2 mm diameter) and No. 10 (0.190 inch/4.9 mm diameter).

4.4.3 Framing Support Members: Framing members shall be galvanized cold-formed steel having a minimum thickness designation of 33 mils (0.83 mm/No. 20 nominal gage) and a maximum thickness designation of 118 mils (2.99 mm/No. 10 nominal gage). Flange width of framing members shall be at least 1⅝ inches (41 mm). Framing steel shall be Grade 33, Type H, conforming to ASTM A1003/A1003M or Structural Grade 50, Type H, conforming to ASTM A653/A653 M and ASTM A1003/A1003M. The steel has a minimum G60 galvanized coating designation conforming to ASTM A653. For horizontal diaphragms, the framing member thicknesses are limited to minimum 33 mils (0.83 mm/No. 20 nominal gage) and maximum 118 mils (3.00 mm/No. 10 nominal gage). Where the thickness of a framing member is greater than 97 mils (2.46 mm/No. 12 nominal gage), a No. 10 (0.190 inch/4.9 mm diameter) screw shall be used.

5.0 IDENTIFICATION

Sure-Board® Series 200S Structural Panels are identified by a label located on the top right and bottom left corners of the metal facing. This permanent label notes the INTERMAT company name, product name, IAPMO UES Mark of Conformity and this evaluation report number (ER-185). The sheathing board exposed face has identification indicating the sheathing type (James Hardie Backer Board 500, Plycem, Armoroc, or Magnum Board). Either Mark of Conformity may be used as shown below:



IAPMO UES ER-185

6.0 SUBSTANTIATING DATA

Data in accordance with the IAPMO-UES Evaluation Criteria for Composite Steel Sheet and Noncombustible Sheathing Panels (EC 012-2016), Adopted January 2016 and an IAPMO Uniform ES approved quality control manual. Test results are from laboratories in compliance with ISO/IEC 17025.

7.0 STATEMENT OF RECOGNITION

This evaluation report describes the results of research carried out by IAPMO Uniform Evaluation Service on Sure-Board® Series 200S Structural Panels to assess conformance to the codes and standards shown in Section 1.0 of this report and serves as documentation of the product certification. The Sure-Board® Series 200S Structural Panels are produced at locations noted in Section 2.5 of this report under a quality control program with periodic inspections under the supervision of IAPMO UES.

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For additional information about this evaluation report please visit www.uniform-es.org or email at us info@uniform-es.org

TABLE 1
NOMINAL AND DESIGN VERTICAL (GRAVITY) LOAD STRENGTHS FOR SURE-BOARD® SERIES 200S STRUCTURAL PANELS -- FLOOR AND ROOF SHEATHING CONTINUOUS OVER TWO OR MORE SPANS

Span Rating, (inches) (o.c).	Nominal Strength (psf)	Allowable Strength (ASD) (psf)	Factored Resistance (LRFD) (psf)	Allowable Concentrated Load, LBF
24 maximum	435	215	260	2,000

For SI: 1 inch = 25.4 mm, 1 psf = 47.88 Pa, 1 lbf = 4.448 N

Notes
1. Maximum allowable strength for panels supported at 24 inches on center is 100 PSF for a deflection limit of L/360.
2. Panels are capable of supporting an allowable concentrated load of 2,000 lbs. within the deflection limit of L/360 on properly designed and constructed framing members.
3. Series 200S panels installed for floors shall include minimum No. 20 gage (0.033 inch) thick steel sheets. Series 200S panels installed for roofs shall include minimum No. 22 gage (0.027 inch) thick steel sheets.

TABLE 2
NOMINAL SHEAR STRENGTH FOR BLOCKED HORIZONTAL DIAPHRAGMS, LBS/FT SURE-BOARD® SERIES 200S STRUCTURAL PANELS[1,2]

Screw Spacing, inches		Nominal	Allowable Strength, (ASD)		Factored Resistance, (LFRD)	
Panel Edge	Field	Strength, (R_n)	Seismic	Wind/All Others	Seismic	Wind/All Others
2	6	2,770	1,110	1,380	1,660	1,800
3	6	2,730	1,090	1,360	1,640	1,770
4	6	1,980	790	990	1,190	1,290
6	6	1,320	530	660	790	860

For SI: 1 inch = 25.4 mm, 1 lbf/ft = 14.5939 N/m

[1] Support and blocking of panels shall be in accordance with Section 4.2, Paragraph 3 of this report.
[2] The equation Eq. (1) shall be used to estimate the mid-span deflection of Sure-Board's MgO and fiber-cement simple span diaphragms:

$$\Delta_D = \omega_1^4 \frac{5vL^3}{8E_sA_cb} + \omega_2\omega_3\frac{vL}{Gt} + \omega_2^{\left(\frac{5}{4}\right)}\omega_3\left(\frac{v}{2\frac{\beta}{\beta_f}}\right)^2 + \frac{\sum_{i=1}^{n}\left(\Delta_{c_i}X_i\right)}{2b} \qquad \text{Eq. (1)}$$

Where,
Δ_D = mid-span diaphragm deflection, in. (mm)
v = diaphragm shear, lb/in. (N/mm)
L = width of the diaphragm (perpendicular to load direction), in. (mm)
E_s = modulus of elasticity of steel, 29,500,000 psi (203,400 MPa)
A_c = gross cross-sectional area of the chord members, in. (mm)
b = depth of the diaphragm (parallel to load direction), in. (mm)
G = shear modulus of steel, 11,300,000 psi (77,910 Mpa)
t = design thickness of the sheet steel in structural panel, in. (mm)
t_{joist} = joist design thickness, in. (mm)
$\boldsymbol{\beta}$ = basic sheathing inelastic deflection parameter, lb/in$^{3/2}$ (N/mm$^{3/2}$) (62.5 lb/in$^{3/2}$ for MgO; 49.4 lb/in$^{3/2}$ for HB500; 70.9 lb/in$^{3/2}$ for Plycem and Armoroc)
β_f = pin connection deformation factor
= 0.8(d_8/d)
d_8 = diameter of a No. 8 fastener, in. (mm)
d = diameter of fastener, in. (mm)
Δ_{ci} = deformation attribute to the ith chord splice, in. (mm)
X_i = distance from the ith chord splice to the nearest support, in. (mm)
n = number of chord splices
ω_1 = adjustment factor for aspect ratios greater than 2:1
= 0 for $L/b \leq 2.0$
= 1 – 2/(L/b)) when $L/b > 2.0$
ω_2 = adjustment factor for fastener spacing greater than 6 in. (152 mm)
= s/6, where s = actual spacing of fasteners
ω_3 = adjustment factor for framing design thickness different from 0.0346 in. (0.8788 mm)
= 0.0346/t_{joist} (0.8788/t_{joist})

TABLE 3
ALLOWABLE WIND UPLIFT LOADS FOR
SURE-BOARD® SERIES 200S STRUCTURAL PANELS[1,2]

CFS Specifications				Allowable Wind Uplift, (ASD) (psf)				Allowable Wind Uplift, (ASD) (psf)			
				24 (inch) (o.c), Joist Spacing				16 (inch) (o.c) Joist Spacing			
				Screw Size				Screw Size			
Designated Thickness, mils	Design Thickness, in.	F_y ksi	F_u ksi	No. 6	No. 8	No. 10	No. 12	No. 6	No. 8	No. 10	No. 12
33	0.0346	33	45	30.5	36.2	41.9	47.6	45.8	54.3	62.9	71.5
43	0.0451	33	45	39.5	47.2	54.6	62.1	59.3	70.7	81.9	93.2
54	0.0566	50	65	63.5	63.5	79.4	79.4	95.3	95.3	119.1	119.1
68	0.0713	50	65	63.5	63.5	79.4	79.4	95.3	95.3	119.1	119.1
97	0.1017	50	65	63.5	63.5	79.4	79.4	95.3	95.3	119.1	119.1
118	0.1242	50	65	63.5	63.5	79.4	79.4	95.3	95.3	119.1	119.1

For SI: 1 inch = 25.4 mm, 1 lbf = 4.448 N, 1 psf = 47.88 Pa, 1 psi = 6.89 kPa

[1] Allowable wind uplift based on screw spacings of 6 inches on center maximum at all panel edges and 12 inches on center maximum in the field/interior of the panels.

[2] If field/interior spacing is reduced from 12 inches on center, wind uplift may be proportionally increased.

TABLE 4
PANEL NONCOMBUSTIBLE BOARDS[1]

Board Name	**Minimum board thickness (inches)**	**Surface Burning Characteristics[2]**		**Description**
		Flame Spread Index	**Smoke-developed index**	
James Hardie Backer Board 500	0.42	0	5	Cellulose fiber-reinforced fiber-cement board
Plycem	0.55	0	5	
Armoroc	0.625, 0.75	0	5	
Magnum Board	0.50	5	5	Magnesium oxide-board reinforced with fiberglass mesh on both faces

For SI: 1 inch = 25.4 mm

[1] Tested in accordance with ASTM E136 in accordance with Section 703.5 of the IBC.

[2] Tested in accordance with ASTM E84.

CALIFORNIA SUPPLEMENT

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SURE-BOARD® SERIES 200S STRUCTURAL PANELS

CSI Section:
05160-Metal Framing Systems

1.0 SCOPE OF EVALUATION

1.1 Compliance with the following codes:
- 2016 and 2013 California Building Code® (CBC)
- 2016 and 2013 California Residential Code® (CRC)

1.2 Evaluated in Accordance With:
- EC-012-2016, adopted January 2016

1.3 Properties Evaluated:
- Structural

ADDITIONAL REQUIREMENTS

2.0 USES

Uses are as set forth in Section 3.0 of ER-185. Additionally, the structural panels comply with or are alternatives to systems described in Sections 1507, 2304.7, and 2211 of the California Building Code (CBC) and Sections R503 and R803 of the California Residential Code® (CRC).

3.0 DESCRIPTION

The description of the panels and other components is as set forth in Section 4.0 of ER-185.

4.0 DESIGN AND INSTALLATION

4.1 Vertical (Gravity) Load Design: Design for vertical loads shall be as set forth in Section 4.1 of ER-185.

4.2 Horizontal (Wind and Seismic) Load Design: Design for horizontal loads shall be as set forth in Section 4.2 of ER-185. For applications regulated by DSA or OSHPD, horizontal diaphragm span-width ratios shall comply with CBC Section 1604A.3.7.

4.3 Installation: Installation requirements shall be as set forth in Section 4.2 of ER-185.

4.4 Special Inspection: Special inspections shall be provided as set forth in Section 4.3 of ER-185.

5.0 LIMITATIONS

Use of the Sure-Board® Series 200S Structural Panels, recognized in this report is subject to the following limitations:

5.1 The limitations in Section 2.0 of ER-185 shall apply.

5.2 For applications regulated by DSA or OSHPD, structural calculations shall comply with CBC Section 1603A.3.

6.0 SUBSTANTIATING DATA

Data in accordance with the IAPMO-UES Evaluation Criteria for Composite Steel Sheet and Noncombustible Sheathing Panels (EC 012-2016), Adopted January 2016 and an IAPMO-UES approved quality control manual.

For additional information about this evaluation report please visit www.uniform-es.org or email us at info@uniform-es.org