



EVALUATION SUBJECT: SIMPSON STRONG-TIE MASB AND MAB CAST-IN-PLACE GROUT FILLED CONCRETE MASONRY UNIT (GFCMU) FOUNDATION ANCHOR STRAPS

REPORT HOLDER:
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CSI Division: 04 00 00 — MASONRY
CSI Section: 04 05 19.16 — Masonry Anchors

1.0 SCOPE OF EVALUATION

1.1 Compliance to the Following Codes & Regulations:

- 2021, 2018, 2015, 2012, and 2009 International Building Code® (IBC)
- 2021, 2018, 2015, 2012, and 2009 International Residential Code® (IRC)

1.2 Evaluated in Accordance with:

- IAPMO Uniform ES EC 002
- TMS 402/ACI 530/ASCE 5
- ASTM E488
- ASTM D7147

1.3 Properties Assessed:

- Structural

2.0 PRODUCT USE

Simpson Strong-Tie MASB and MAB foundation anchor straps described in this report are used to connect light-frame construction foundation plates (wood sill plates), having a 2-inch nominal thickness, to grout-filled concrete masonry unit (GFCMU) foundation walls. The anchor straps are cast-in-place structural connectors that are used to resist sliding forces parallel to the sill (sole) plate that result from the application of the prescribed loads in the IBC and IRC. The foundation anchor straps are used to comply with the anchorage requirements in Sections [1604.8.1](#), [2304.10.5](#), [2308.3](#), and [2308.6.7.3](#) of the 2021 IBC; Sections [1604.8.1](#), [2304.10.4](#), [2308.3](#), and [2308.6.7.3](#) of the 2018 and 2015 IBC; and Sections [1604.8.1](#), [2308.3.3](#), [2308.6](#), and [2308.11.3.1](#) of the 2009 and 2012 IBC. For buildings regulated under the IRC, the foundation anchor straps are permitted under one of the following conditions:

1. Where an engineered design is submitted in accordance with IRC Section [R301.1.3](#).
2. For buildings of conventional light-frame construction, foundation anchor straps may be used to attach sill plates (sole plates) to grout-filled concrete masonry unit foundation walls, provided a satisfactory design is submitted to the building official showing that the specified spacing of the anchor straps provides equivalent anchorage as described in IRC Sections [R403.1.6](#) or Section [R602.11](#).

3.0 PRODUCT DESCRIPTION

3.1 Product Information

3.1.1 MASB Mud sill Anchor: The MASB foundation anchor strap is formed from No. 16 gage [0.0584 inch (1.48 mm)] galvanized sheet steel. The anchor strap has one end that embeds into a GFCMU foundation and another end that extends out and above the embedment line of the concrete masonry unit. The embedded body of the anchor strap is 1¾ inches (44.5 mm) wide and 4½ inches (114 mm) long with a 1-inch (25.4 mm) scoop hook at the end. The upper strap is 1¾ inches (44.5 mm) wide, just over 6½ inches (165 mm) long, and is die-formed into a shape that facilitates installation at the top and over the outer shell of the GFCMU. One-and-one-half inches (38.1 mm) from the embedment line of the strap are slot holes that allow the strap to be field-bent upward for fastening to the sill plate. The strap is split into two legs approximately 3⅛ inches (79 mm) from the outer tip of the strap. Holes are pre-punched along the strap for the nails used to fasten the strap to the sill plate. [Table 1](#) of this report contains the fastener schedule and allowable loads, and [Figure 1](#) of this report illustrates product dimensions and installation graphics.

3.1.2 MAB Mud sill Anchor: The MAB foundation anchor strap is formed from No. 18 gage [0.0468 inch (1.19 mm)] galvanized sheet steel. The anchor strap has one end with a 1-inch (25.4 mm) scoop hook that embeds into a GFCMU foundation and another end that extends out and above the embedment line of the concrete masonry unit. The embedded body of the anchor strap is 6⅝ inches (168 mm) long for the MAB15. The upper strap is 5⅝ inch (15.9 mm) wide, just over 6½ inches (165 mm) long, and is intended to be placed through a pre-drilled ¾-inch-diameter hole centered on the width of a sill plate.

At the embedment line, the strap splits into two legs that allow this portion to be field-bent and wrapped around the sill plate. Holes are pre-punched along the legs for nails used to fasten the strap to the sill plate. [Table 1](#) of this report contains





the fastener schedule and allowable loads, and [Figure 1](#) of this report illustrates product dimensions and installation graphics.

3.2 Material Information

3.2.1 Connector Steel: The foundation anchor straps described in this report conform to IBC Section [2103.4](#) and IRC Section [R606.2.13](#) and are manufactured from galvanized steel complying with [ASTM A653](#), SS, Grade 33, with a minimum yield strength (F_y) of 33,000 psi (227 MPa) and a minimum ultimate tensile strength (F_u) of 45,000 psi (310 MPa), and a tensile elongation greater than 14 percent. The foundation anchor straps have a minimum G90 zinc coating specification in accordance with [ASTM A653](#). The anchors are also available with a G185 zinc coating, denoted by model numbers ending with Z. Model numbers in this report do not list the Z ending, but the information shown applies. The recommendations of the treated lumber manufacturer or Simpson Strong-Tie Company, Inc. should be sought on the minimum corrosion resistance and connection capacities of connectors used with the specific preservative- or fire-retardant-treated lumber.

3.2.2 Wood: Wood members used with the connectors shall be either sawn lumber or, when approved by the building official, engineered lumber. Sawn lumber shall have a minimum specific gravity of 0.50 and a maximum moisture content of 19 percent. Engineered lumber shall have a minimum equivalent specific gravity of 0.50 and a maximum moisture content of 16 percent. Nominal 2-inch-thick wood sill (sole) plates shall comply with Sections [2304.3.1](#) and [2304.12.1.2](#) of the 2021, 2018, and 2015 IBC ([2304.11.2.2](#) of the 2012, and 2009 IBC) or Sections [R404.3](#) and [R602.3.4](#) of the IRC.

3.2.2.1 Preservative-treated and Fire-retardant-treated Wood: Fasteners used in contact with preservative-treated or fire-retardant-treated lumber shall comply with Section [2304.10.6](#) of the 2021, Section [2304.10.5](#) of the 2018, and 2015 IBC ([2304.9.5](#) of the 2012 and 2009 IBC), Section [R317.3](#) of the 2021, 2018, 2015, 2012, and 2009 IRC, as applicable. The treated wood manufacturer or report holder shall be contacted for recommendations on minimum corrosion resistance and connection capacities of fasteners used with the specific proprietary preservative-treated or fire-retardant-treated lumber.

3.2.3 Fasteners: Nails fastened into wood shall comply with [ASTM F1667](#) including Supplement 1, as referenced in Section [2303.6](#) of the IBC. The following table provides the minimum dimensions and bending yield strength (F_{yb}) for the fasteners used with foundation anchor straps described in this report.

FASTENER	SHANK DIAMETER (inches)	FASTENER LENGTH (inches)	F_{yb} (psi)
10d x 1½ Common	0.148	1½	90,000

For SI: 1 inch = 25.4 mm, 1 psi = 6.895 kPa

3.2.4 Grout-Filled Concrete Masonry Units (GFCMU): The net area compressive strength of masonry, f'_m , at 28 days shall be a minimum of 1,500 psi (10.3 MPa). Either the unit strength method or prism test method in Article 1.4 of TMS 602 shall be observed for determining the compressive strength. The concrete masonry cell shall be fully grouted and the GFCMUs shall be constructed from the following materials:

3.2.4.1 Concrete Masonry Units (CMU): Concrete masonry units shall be lightweight, medium weight, or normal weight conforming to [ASTM C90](#).

3.2.4.2 Grout: Grout shall comply with Section [2103.3](#) of the 2021, 2018, and 2015 IBC (Section [2103.13](#) of the 2012 IBC and [2103.12](#) of the 2009 IBC), or Section [R606.2.12](#) of the 2021 and 2018 IRC or [R606.2.11](#) of the 2015 IRC (Section [R609.1.1](#) of the 2012 and 2009 IRC), as applicable. The grout shall have a minimum compressive strength, when tested in accordance with [ASTM C1019](#), equal to its specified strength, but not less than 2,000 psi (13.8 MPa).

3.2.4.3 Mortar: Mortar shall be minimum Type M, S, or N in compliance with 2021, 2018, and 2015 IBC Section [2103.2.1](#) (Section [2103.9](#) of the 2012 IBC, Section [2103.8](#) of the 2009 IBC), or Section [R606.2.8](#) of the 2021 and 2018 IRC or Section [R606.2.7](#) of the 2015 IRC ([R607.1](#) of the 2012 and 2009 IRC), as applicable.

4.0 DESIGN AND INSTALLATION

4.1 Design

The allowable loads shown in [Table 1](#) of this report are based on Allowable Stress Design (ASD) and include the load duration factor, C_D , corresponding with the applicable loads in accordance with the ANSI/AWC NDS, where applicable. The allowable loads are shown for standard installation in the F1 (parallel to sill plate) load direction for loading conditions corresponding to Wind and Seismic Design Categories A and B.

Tabulated allowable loads apply to foundation anchor straps connected to wood used under dry conditions and where sustained temperatures are 100° F (37.8° C) or less. When foundation anchor straps are nailed to wood that will experience sustained exposure to temperature exceeding 100° F (37.8° C), the allowable loads based on wood connection strength shown in [Table 1](#), if governing, shall be adjusted by the temperature factor, C_t , specified in the



ANSI/AWC NDS. When foundation anchor straps are nailed to sawn lumber having a moisture content greater than 19 percent (16 percent for engineered wood products), or where wet service is expected, the allowable loads shall be adjusted by the wet service factor, C_M , specified in the ANSI/AWC NDS.

IBC Section [1613.1](#) contains an exception that permits detached one- and two-family dwellings assigned to Seismic Design Category (SDC) A, B, or C to be exempt from the seismic design provisions of IBC Section [1613](#). When this exception is approved by the building official, the allowable wind (or SDC A and B) loads assigned to the anchor straps in [Table 1](#) of this report may be used.

4.2 Installation

Installation of the Simpson Strong-Tie foundation anchor straps shall be installed in accordance with this evaluation report and the manufacturer's published installation instructions. In the event of a conflict between this report and the manufacturer's published installation instructions, the most restrictive requirements govern. For buildings regulated under the IRC and conventional light-frame construction regulated under IBC Section [2308](#), the MASB and MAB foundation anchor straps may be used to attach sill plates (sole plates) to grout-filled concrete masonry unit foundation walls, provided a satisfactory design is submitted to the building official showing that the specified spacing of the anchor straps provides equivalent anchorage as described in Section R403.1.6 or Section R602.11 of the IRC, or Section [2308.3.1](#) of the 2021, 2018, and 2015 IBC, or [2308.6](#) of the 2012 or 2009 IBC, as applicable.

4.3 Special Inspection

4.3.1 Special inspection shall be conducted where required in accordance with Sections [1705.4](#) of the 2021, 2018, 2015, and 2012 IBC and Section [1704.5](#) of the 2009 IBC. A statement of special inspection shall be prepared and submitted to the building official in accordance with Section [1704.3](#) of the 2021, 2018, 2015, and 2012 IBC and Section [1705](#) of the 2009 IBC.

4.3.2 Periodic special inspection shall be conducted when the MASB or MAB foundation anchor straps are components within: 1) the main wind-force-resisting system of structures constructed in areas listed in 2021 IBC Section [1705.12](#), 2018 and 2015 IBC Section [1705.11](#), 2012 IBC Section [1705.10](#), or 2009 IBC Section [1706.1](#); or 2) the main seismic-force-resisting system of structures constructed in areas listed in 2021 IBC Section [1705.13](#), 2018 and 2015 IBC Section [1705.12](#), 2012 IBC Section [1705.11](#), or 2009 IBC Section [1707.1](#). Special inspection requirements do not apply to structures or portions thereof, that qualify for an exception under 2021 IBC Sections [1704.2](#), 1705.12, and 1705.13;

2018 and 2015 IBC Sections [1704.2](#), 1705.11, and 1705.12; 2012 IBC Sections [1704.2](#), 1705.10, and 1705.11 or 2009 IBC Sections [1704.1](#), 1706.2, or 1707.1.

4.3.3 For installations under the IRC, special inspection is not normally required. However, when an engineered design is submitted or required according to IRC Section R301.1.3, periodic special inspection requirements and exemptions are as stated in Section 4.3.2 of this report, as applicable, for installations under the IRC since the design is required to satisfy the IBC.

5.0 LIMITATIONS

Simpson Strong-Tie foundation anchor straps described in this report comply with, or are suitable alternatives to, what is specified in those codes listed in Section [1.0](#) of this report subject to the following limitations:

5.1 The foundation anchor straps shall be manufactured, identified, and installed in accordance with this report and the manufacturer's published installation instructions. A copy of the instructions shall be available at the job site during installation. In the event of a conflict between this report and the manufacturer's published installation instructions, the more restrictive requirements shall govern.

5.2 The MASB and MAB foundation anchor straps described in this report are limited to use in resisting loads parallel to the sill plates.

5.3 Calculations, drawings, and design details showing compliance with this report shall be submitted to the building official. The calculations, drawings, and design details shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

5.4 Adjustment factors noted in Section [4.1](#) of this report and the applicable codes shall be considered where applicable.

5.5 Connected wood members and fasteners shall comply, respectively, with Sections [3.2.2](#) and [3.2.3](#) of this report.

5.6 The use of foundation anchor straps with chemically treated preservative wood is outside of the scope of this report and subject to the approval of the building official. Section [3.2.2.1](#) of this report provides additional information. Use of fasteners with preservative-or-fire-retardant-treated lumber shall be in accordance with Sections [3.2.2.1](#) and [3.2.3](#) of this report.

5.7 Special inspection shall be provided in accordance with Section [4.3](#) of this report.



5.8 Recognition of MASB and MAB in this report is limited to use in Seismic Design Categories (SDC) A, B, and C for detached one- and two-family dwellings, and SDC A and B for all other structures.

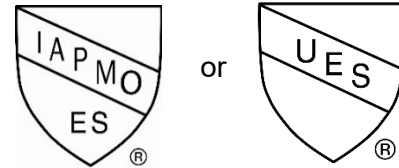
5.9 MASB and MAB foundation anchor straps described in this report are manufactured in Stockton, California; Riverside, California; McKinney, Texas; Columbus, Ohio; Maple Ridge, British Columbia; and Inver Grove, Minnesota.

6.0 SUBSTANTIATING DATA

- Data in accordance with IAPMO UES Evaluation Criteria for the Testing and Analysis of Joist Hangers and Miscellaneous Connectors (EC 002-2021).
- Data in accordance with TMS 402/ACI 530/ASCE 5.
- Test reports in accordance with [ASTM E488](#).
- Test reports in accordance with ASTM D7147 testing.
- Test reports are from laboratories in compliance with [ISO/IEC 17025](#).

7.0 IDENTIFICATION

A label shall be affixed on at least one of the following: product, packaging, installation instructions, or descriptive literature. The label shall include the company name or trademark, model number, and the Evaluation Report Number (ER-417) to identify the products recognized in this report. A die-stamp label may also substitute for the label. Either IAPMO Uniform ES Mark of Conformity may also be used as shown below:



IAPMO UES ER -417

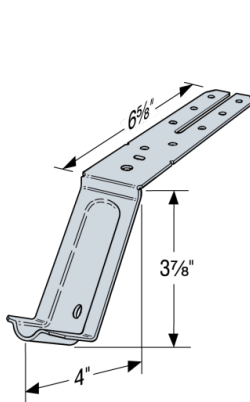
For additional information about this evaluation report please visit www.uniform-es.org or email at info@uniform-es.org

TABLE 1 -- ALLOWABLE LOADS FOR MASB AND MAB MUDSILL ANCHORS CAST IN GFCMU

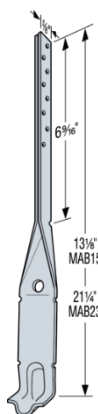
MODEL NO.	SILL SIZES	FASTENERS		WIND AND SDC A & B ALLOWABLE LOADS (lbs) (160) PARALLEL TO PLATE (F1)
		SIDES	TOP	
STANDARD INSTALLATION - TWO LEGS OVER SILL PLATE				
MASB	2x4 or 2x6	2-10dx1.5	6-10dx1.5	860
MAB15	2x4 or 2x6	2-10dx1.5	4-10dx1.5	670

For SI: 1 inch = 25.4 mm, 1 pound = 4.45 N, 1 psi = 10.3 MPa.

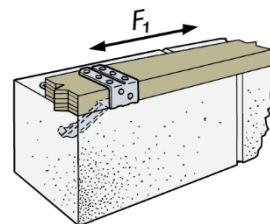
1. The allowable loads are based on allowable stress design (ASD) and include the load duration factor C_D (with $C_D = 1.6$), corresponding with wind/earthquake loading in accordance with the ANSI/AWC NDS. No further increase is allowed.
2. The minimum GFCMU strength, f_m shall be 1,500 psi.
3. A 1/3 stress increase is allowed for designs following the 2009 Codes.
4. In accordance with Section 1613 of the 2021, 2018, 2015, and 2012 IBC, detached one- and two-family dwellings in SDC C may use the "Wind and SDC A and B" allowable loads.
5. Loads apply to DF and SP wood species.
6. Nails: 10d x 1.5 inch = 0.148-inch dia. x 1.5-inch long.



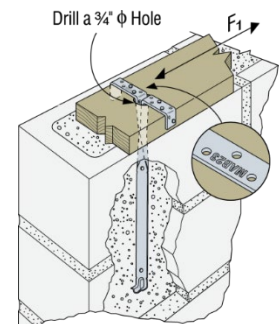
MASB



MAB



Typical MASB Installation



Typical MAB Installation

FIGURE 1 – MASB and MAB Foundation Anchor Straps