

MITEK[®] HARDY FRAME[®] SPECIAL MOMENT FRAME PRODUCT CATALOG



Mitek[®]
HARDY FRAME[®]
Leading in Lateral

09-01-20

MiTek® Hardy Frames manufactures and markets pre-fabricated shear wall systems. We have been the innovative leader in the industry for over 15 years. Our company first introduced the Original Hardy Frame® Panels and Brace Frames in 1996. In 2006, we joined forces with SidePlate Systems, Inc. to launch the Hardy Frame® Special Moment Frame, the first pre-engineered, pre-fabricated Moment Frame in the industry.

The MiTek® Hardy Frame® Moment Frame may be installed in single or multistory structures and uses the new-generation SidePlate® special moment connection to resist lateral forces from earthquakes and wind. This connection was conceived and developed by David Houghton, a licensed structural engineer, to eliminate problems that were exposed in traditional moment connections as a result of the 1994 Northridge earthquake. The outstanding performance of the SidePlate® system is nationally recognized and is the same technology we use in the MiTek® Hardy Frame® Moment Frame to provide high allowable loads in narrow wall sections. Adding to the structural benefits, our Special Moment Frame is designed to arrive at the jobsite completely pre-assembled with no field welding and no special inspection required.

The mission of MiTek® Hardy Frame is to provide cost effective, state-of-the-art, lateral force resisting systems that are easily installed to meet architectural, engineering and code requirements.

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GENERAL INFORMATION

CODE EVALUATIONS:

SidePlate® is a prequalified connection per Chapter 11 of the AISC358-10 and AISC358-16. In addition, SidePlate has been evaluated by IAPMO's Uniform Evaluation Service (UES) jointly with LADBS under the City's Pilot Program to Satisfy Requirements in Los Angeles and California. The report number is: ER-0525

Testing:

SidePlate® connections have been extensively tested and qualified in accordance with AISC and UES criteria. Products in this catalog are designed in accordance with the provisions of Chapter 11 of AISC358-10 and AISC358-16. A calculation package, stamped and signed by a registered design professional of MiTek USA Inc., is provided upon request for building department submittal which includes the complete design of the moment frame conforming to SMF standards.

Product Use:

MiTek® Hardy Frame® products are designed and manufactured for the specific purposes described in this catalog. Any changes to the products or installation procedures must be approved by the designer of record and are the sole responsibility of the designer.

Quality Statement:

MiTek USA Inc. warrants to its customers that its products are free from material defects of manufacture and design, and will perform in substantial accordance with published specifications, if properly used.

MiTek® Hardy Frame® Moment Frames are manufactured from prime quality steel and are supplied with mill finish:

Plate Material:

- ASTM A572 Grade 50: SidePlates, Base Plates, Stiffeners, Splice Plates, and Built-Up Columns
- ASTM A36: Angle and Plate shear transfer connections

Rolled Shapes:

- ASTM A500 Grade B ($F_y=46\text{ksi}$): Beams (Hollow Structural Sections - HSS)

Misc. Materials

- ASTM A193 Grade B7: Anchor bolts at column base plates
- ASTM A36 (min): Welded studs
- ASTM A325: Machine bolts at Splice connection
- No. 2 Douglas Fir Larch or better: Beam and column nailers

MiTek® Hardy Frames reserves the right to change specifications, designs, and models without notice and liability of such changes. The information presented in this catalog supersedes all information published in previous documents and publications. This catalog may not be reproduced in whole or in part without the written permission of MiTek USA Inc.

MOMENT FRAME DESIGN AND CONSTRUCTION STANDARDS

Referenced Documents:

- American Institute of Steel Construction Specification for Structural Steel Buildings, 2010 and 2016 (AISC360-10 and AISC360-16)
- American Institute of Steel Construction Seismic Provisions for Structural Steel Buildings 2010 and 2016 (AISC341-10 and AISC341-16)
- American Institute of Steel Construction, Prequalified Connections for Special and Intermediate Steel Moment Frame for Seismic Application, AISC358-10 and AISC358-16
- American Welding Society D1.1 2015 Structural Welding Code-Steel (AWS D1.1)
- IAPMO's (International Association of Plumbing and Mechanical Officials) Uniform Evaluation Service (UES) Report ER-0525
- California Building Code (CBC)-2013 and 2016
- Los Angeles Building Code-2017
- International Building Code-2012, 2015, and 2018

Frame Design Input:

Frame Modeling Software: SAP2000

Model represents P-Delta effects, fully rigid panel zone & SidePlate® connection stiffness and pinned column bases

Allowable Story Drift, Δ_a : All moment frames were designed using $\Delta_a = 0.025h_{sx}$.

Load Cases: Dead (DL, includes self-weight), Live (LL), Roof Live (LL_r), Snow (S), Earthquake (EQ) and Wind (W)

LRFD Load Combinations:

- 1.4DL
- 1.2DL+1.6LL+0.5(LL_r or S)
- 1.2DL+1.6(LL_r or S)+(0.5LL or 0.5W)
- 1.2DL+1.0W+0.5LL+(0.5LL_r or 0.5S)
- 1.2DL+1.0EQ+0.5LL+0.7S
- 0.9DL+1.0W
- 0.9DL+1.0EQ
- 0.9DL-1.0EQ

Note: EQ includes horizontal and vertical earthquake load components, assuming values of $p=1.0$ and $S_{ds}=1.8$.

Design Factors of Safety:

Stress and vertical beam deflections are limited to 90% of code allowable for all designs. Under 90% limit for stress, stress governs over L/240 and L/360 beam deflection criteria; for actual reported deflections see "Hardy Frame® Special Moment Frame Calculations" design package.

SidePlate® Connection Design:

The SidePlate® connection design used to complete the MiTek® Hardy Frame® Special Moment Frame design is prepared by a registered design professional of MiTek USA Inc. using the SidePlate® Connection Design Software (compliant with the requirements of AISC358-10, AISC358-16, & IAPMO's UES ER-0525). A strong column-weak beam relationship at the SidePlate® connection is achieved for all moment frame designs.

Table 1A Hardy Frame® Special Moment Frame Width Dimensioning ¹

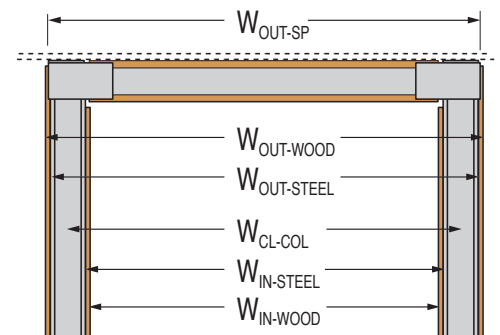
| Model Number | Column ² | Beam ³ | Max. W _{IN} (ft-in) | | Max. W _{CL} (ft-in) | Max. W _{OUT} (ft-in) | | | | |
|---------------|---------------------|-------------------|------------------------------|-----------------------|------------------------------|-------------------------------|---------------------|-----------------------|------------|------------|
| | | | W _{IN-WOOD} | W _{IN-STEEL} | W _{CL-COL} | W _{OUT-STEEL} | W _{OUT-SP} | W _{OUT-WOOD} | | |
| | | | 2x Wood Nailers | Col. Flanges | Col. Centerlines | Col. Flanges | SidePlates | 2x Wood Nailers | | |
| HFMF611-8x | BU6.5x33 | HSS6x4x3/8 | 8' 4" | 8' 7" | 9' 1-1/2" | 9' 8" | 9' 9" | 9' 11" | | |
| HFPIC611-8x | | | | | | | 9' 9-1/2" | | | |
| HFMF811-8x | BU8.5x59 | HSS6x6x5/8 | | | 9' 3-1/2" | 10' 0" | 10' 1" | 10' 3" | | |
| HFPIC811-8x | | | | | | | | 10' 1-1/2" | | |
| HFMF1013-8x | BU10.5x61 | HSS8x6x1/2 | | | 9' 5-1/2" | 10' 4" | 10' 5" | 10' 7" | | |
| HFPIC1013-8x | | | | | | | | 10' 5-1/2" | | |
| HFMF1214-8x | BU12.5x64 | HSS8x6x5/8 | | | 9' 7-1/2" | 10' 8" | 10' 9" | 10' 11" | | |
| HFPIC1214-8x | | | | | | | | 10' 9-1/2" | | |
| HFMF611-10x | BU6.5x33 | HSS6x4x3/8 | | | 10' 4" | 10' 7" | 11' 1-1/2" | 11' 8" | 11' 9" | 11' 11" |
| HFPIC611-10x | | | | | | | | | 11' 9-1/2" | |
| HFMF811-10x | BU8.5x59 | HSS6x6x5/8 | | | | | 11' 3-1/2" | 12' 0" | 12' 1" | 12' 3" |
| HFPIC811-10x | | | | | | | | | | 12' 1-1/2" |
| HFMF1013-10x | BU10.5x61 | HSS8x6x1/2 | 11' 5-1/2" | 12' 4" | | | 12' 5" | 12' 7" | | |
| HFPIC1013-10x | | | | | | | | 12' 5-1/2" | | |
| HFMF1214-10x | BU12.5x64 | HSS8x6x5/8 | 11' 7-1/2" | 12' 8" | | | 12' 9" | 12' 11" | | |
| HFPIC1214-10x | | | | | | | | 12' 9-1/2" | | |
| HFMF1416-10x | BU14.5x66 | HSS10x6x1/2 | 11' 9-1/2" | 13' 0" | | | 13' 1" | 13' 3" | | |
| HFPIC1416-10x | | | | | | | | 13' 1-1/2" | | |
| HFMF611-12x | BU6.5x33 | HSS6x4x3/8 | 12' 4" | 12' 7" | | | 13' 1-1/2" | 13' 8" | 13' 9" | 13' 11" |
| HFPIC611-12x | | | | | | | | | 13' 9-1/2" | |
| HFMF811-12x | BU8.5x59 | HSS6x6x5/8 | | | 13' 3-1/2" | 14' 0" | 14' 1" | 14' 3" | | |
| HFPIC811-12x | | | | | | | | 14' 1-1/2" | | |
| HFMF1013-12x | BU10.5x61 | HSS8x6x1/2 | | | 13' 5-1/2" | 14' 4" | 14' 5" | 14' 7" | | |
| HFPIC1013-12x | | | | | | | | 14' 5-1/2" | | |
| HFMF1214-12x | BU12.5x64 | HSS8x6x5/8 | | | 13' 7-1/2" | 14' 8" | 14' 9" | 14' 11" | | |
| HFPIC1214-12x | | | | | | | | 14' 9-1/2" | | |
| HFMF1416-12x | BU14.5x66 | HSS10x6x1/2 | | | 13' 9-1/2" | 15' 0" | 15' 1" | 15' 3" | | |
| HFPIC1416-12x | | | | | | | | 15' 1-1/2" | | |
| HFMF611-14x | BU6.5x33 | HSS6x4x3/8 | | | 14' 4" | 14' 7" | 15' 1-1/2" | 15' 8" | 15' 9" | 15' 11" |
| HFPIC611-14x | | | | | | | | | 15' 9-1/2" | |
| HFMF811-14x | BU8.5x59 | HSS6x6x5/8 | 15' 3-1/2" | 16' 0" | | | 16' 1" | 16' 3" | | |
| HFPIC811-14x | | | | | | | | 16' 1-1/2" | | |
| HFMF1013-14x | BU10.5x61 | HSS8x6x1/2 | 15' 5-1/2" | 16' 4" | | | 16' 5" | 16' 7" | | |
| HFPIC1013-14x | | | | | | | | 16' 5-1/2" | | |
| HFMF1214-14x | BU12.5x64 | HSS8x6x5/8 | 15' 7-1/2" | 16' 8" | | | 16' 9" | 16' 11" | | |
| HFPIC1214-14x | | | | | | | | 16' 9-1/2" | | |
| HFMF1416-14x | BU14.5x66 | HSS10x6x1/2 | 15' 9-1/2" | 17' 0" | | | 17' 1" | 17' 3" | | |
| HFPIC1416-14x | | | | | | | | 17' 1-1/2" | | |
| HFMF611-16x | BU6.5x33 | HSS6x4x3/8 | 16' 4" | 16' 7" | | | 17' 1-1/2" | 17' 8" | 17' 9" | 17' 11" |
| HFPIC611-16x | | | | | | | | | 17' 9-1/2" | |
| HFMF813-16x | BU8.5x59 | HSS8x6x1/2 | | | 17' 3-1/2" | 18' 0" | 18' 1" | 18' 3" | | |
| HFPIC813-16x | | | | | | | | 18' 1-1/2" | | |
| HFMF1014-16x | BU10.5x61 | HSS8x6x5/8 | | | 17' 5-1/2" | 18' 4" | 18' 5" | 18' 7" | | |
| HFPIC1014-16x | | | | | | | | 18' 5-1/2" | | |

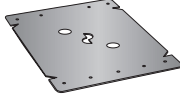
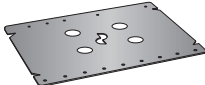
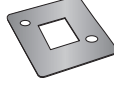
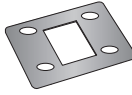
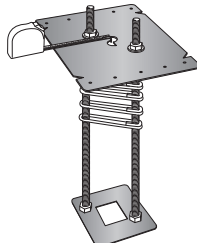
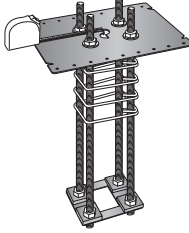
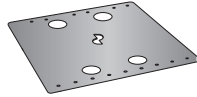
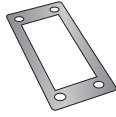
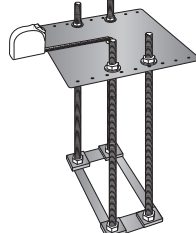
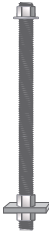
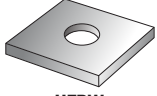

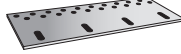

Table 1A Hardy Frame® Special Moment Frame Width Dimensioning ¹

| Model Number | Column ² | Beam ³ | Max. W _{IN} (ft-in) | | Max. W _{CL} (ft-in) | Max. W _{OUT} (ft-in) | | |
|---------------|---------------------|-------------------|------------------------------|-----------------------|------------------------------|-------------------------------|---------------------|-----------------------|
| | | | W _{IN-WOOD} | W _{IN-STEEL} | W _{CL-COL} | W _{OUT-STEEL} | W _{OUT-SP} | W _{OUT-WOOD} |
| | | | 2x Wood Nailers | Col. Flanges | Col. Centerlines | Col. Flanges | SidePlates | 2x Wood Nailers |
| HFMF1216-16x | BU12.5x64 | HSS10x6x1/2 | 16' 4" | 16' 7" | 17' 7-1/2" | 18' 8" | 18' 9" | 18' 11" |
| HFPIC1216-16x | | | | | | | 18' 9-1/2" | |
| HFMF1416-16x | BU14.5x66 | HSS10x6x5/8 | 16' 4" | 16' 7" | 17' 9-1/2" | 19' 0" | 19' 1" | 19' 3" |
| HFPIC1416-16x | | | | | | | 19' 1-1/2" | |
| HFMF813-18x | BU8.5x59 | HSS8x6x1/2 | 18' 4" | 18' 7" | 19' 3-1/2" | 20' 0" | 20' 1" | 20' 3" |
| HFPIC813-18x | | | | | | | 20' 1-1/2" | |
| HFMF1014-18x | BU10.5x61 | HSS8x6x5/8 | 18' 4" | 18' 7" | 19' 5-1/2" | 20' 4" | 20' 5" | 20' 7" |
| HFPIC1014-18x | | | | | | | 20' 5-1/2" | |
| HFMF1216-18x | BU12.5x64 | HSS10x6x1/2 | 18' 4" | 18' 7" | 19' 7-1/2" | 20' 8" | 20' 9" | 20' 11" |
| HFPIC1216-18x | | | | | | | 20' 9-1/2" | |
| HFMF1416-18x | BU14.5x66 | HSS10x6x5/8 | 18' 4" | 18' 7" | 19' 9-1/2" | 21' 0" | 21' 1" | 21' 3" |
| HFPIC1416-18x | | | | | | | 21' 1-1/2" | |
| HFMF813-20x | BU8.5x59 | HSS8x6x1/2 | 20' 4" | 20' 7" | 21' 3-1/2" | 22' 0" | 22' 1" | 22' 3" |
| HFPIC813-20x | | | | | | | 22' 1-1/2" | |
| HFMF1014-20x | BU10.5x61 | HSS8x6x5/8 | 20' 4" | 20' 7" | 21' 5-1/2" | 22' 4" | 22' 5" | 22' 7" |
| HFPIC1014-20x | | | | | | | 22' 5-1/2" | |
| HFMF1216-20x | BU12.5x64 | HSS10x6x1/2 | 20' 4" | 20' 7" | 21' 7-1/2" | 22' 8" | 22' 9" | 22' 11" |
| HFPIC1216-20x | | | | | | | 22' 9-1/2" | |
| HFMF1416-20x | BU14.5x66 | HSS10x6x5/8 | 20' 4" | 20' 7" | 21' 9-1/2" | 23' 0" | 23' 1" | 23' 3" |
| HFPIC1416-20x | | | | | | | 23' 1-1/2" | |
| HFMF813-22x | BU8.5x59 | HSS8x6x1/2 | 22' 4" | 22' 7" | 23' 3-1/2" | 24' 0" | 24' 1" | 24' 3" |
| HFPIC813-22x | | | | | | | 24' 1-1/2" | |
| HFMF1014-22x | BU10.5x61 | HSS8x6x5/8 | 22' 4" | 22' 7" | 23' 5-1/2" | 24' 4" | 24' 5" | 24' 7" |
| HFPIC1014-22x | | | | | | | 24' 5-1/2" | |
| HFMF1216-22x | BU12.5x64 | HSS10x6x1/2 | 22' 4" | 22' 7" | 23' 7-1/2" | 24' 8" | 24' 9" | 24' 11" |
| HFPIC1216-22x | | | | | | | 24' 9-1/2" | |
| HFMF1416-22x | BU14.5x66 | HSS10x6x5/8 | 22' 4" | 22' 7" | 23' 9-1/2" | 25' 0" | 25' 1" | 25' 3" |
| HFPIC1416-22x | | | | | | | 25' 1-1/2" | |
| HFMF813-24x | BU8.5x59 | HSS8x6x1/2 | 24' 4" | 24' 7" | 25' 3-1/2" | 26' 0" | 26' 1" | 26' 3" |
| HFPIC813-24x | | | | | | | 26' 1-1/2" | |
| HFMF1014-24x | BU10.5x61 | HSS8x6x5/8 | 24' 4" | 24' 7" | 25' 5-1/2" | 26' 4" | 26' 5" | 26' 7" |
| HFPIC1014-24x | | | | | | | 26' 5-1/2" | |
| HFMF1216-24x | BU12.5x64 | HSS10x6x1/2 | 24' 4" | 24' 7" | 25' 7-1/2" | 26' 8" | 26' 9" | 26' 11" |
| HFPIC1216-24x | | | | | | | 26' 9-1/2" | |
| HFMF1416-24x | BU14.5x66 | HSS10x6x5/8 | 24' 4" | 24' 7" | 25' 9-1/2" | 27' 0" | 27' 1" | 27' 3" |
| HFPIC1416-24x | | | | | | | 27' 1-1/2" | |

Notes:

- Standard widths assume dimensions per table unless specified otherwise prior to fabrication.
- BU designates Built-Up column, see Column Assembly Depths for section properties.
- HSS designates Hollow Structural Section, see Beam Assembly Depths for section properties.



| Portal Configuration | | | Picture Configuration | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------------|-------------------|-----------------------|-------------------|-----------------|-------------------|---|---|---------------------------|----------|-------------|--|----------------------------------|---------------|---------------|---------------|---------------|---|--|------------------------|--------------|--------------|--------------|---|-------------------|---|-------------------------|-----------|----------|--------------|--|-------------------------------|----------|----------|-----------|-----------|-----------|
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| Templates ¹ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFMFT6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFMFT8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFMFT10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFMFT12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFMFT14 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bolt Brace ² | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFMFBB6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFMFBB8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFMFBB10-14 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Template Kits ^{3, 4, 5} | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFMFTK6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFMFTK8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFMFTK10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFMFTK12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFMFTK14 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Templates ¹ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFPICT6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFPICT8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFPICT10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFPICT12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFPICT14 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bolt Brace ² | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFPICBB6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFPICBB8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFPICBB10-14 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| HFPICTK12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFPICTK14 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Anchor Bolt Assemblies ⁷ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFAB1-1/8 x 36 HS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFAB3/4 x 36 HS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFAB1-1/8 x 48 HS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFAB3/4 x 48 HS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFAB1-1/8 x 60 HS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFAB3/4 x 60 HS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Plate Washer ⁸ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFPW 3/4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFPW 1-1/8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Steel Angles ⁹ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFMFA3.5x5x26 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFMFA3.5x7x26 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFMFA3.5x7x66 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFMFA3.5x7x76 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Steel Plates ¹⁰ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFMFP8.5x26 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFMFP10.5x26 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFMFP10.5x66 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HFMFP10.5x76 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pro-Series Screws | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| WS3 1/4x3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| WS45 1/4x4-1/2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| WS6 1/4x6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

1. HFMFT and HFPICT Templates install over the top of formboards or by staking in place to assure accurate centerlines between anchors within the column. Half-circle cut-outs are provided for measuring centerlines between columns

2. HFMFBB and HFPICTBB Bolt Braces install with double nuts at embed end of anchors to prevent them from swaying independently during concrete pour

3. Template Kits provide anchorage for two columns

4. HFMFTK6 Template Kits consist of


- 2 - Templates
- 2 - Bolt Braces
- 4 - Anchor Bolts 3/4 in. diameter HS with one hardened Round Washer and three Grade 8 Nuts per anchor
- 10 - #3 Grade 60 Shear Ties

5. HFMFTK8, 10, 12 and 14 Template Kits consist of

- 2 - Templates
- 2 - Bolt Braces
- 8 - Anchor Bolts 3/4 in. diameter HS with one Plate Washer (not applicable to HFMFTK8), one hardened Round Washer and three Grade 8 Nuts per anchor
- 10 - #3 Grade 60 Shear Ties

6. HFPICTK6, 8, 10, 12, and 14 Template Kits consist of

- 2 - Templates
- 2 - Bolt Braces
- 8 - Anchor Bolts 1-1/8 in. diameter HS with one Plate Washer (not applicable to HFPICTK6), one hardened Round Washer and three Grade 8 Nuts per anchor

7. Anchor Bolt Assemblies consist of one High Strength Anchor (HS), one Plate Washer, one Round Washer and three Grade 8 Nuts. High Strength Anchors are ASTM A193, Grade B7 stamped  on both ends

8. HFPW are 1/2 x 3 x 3 ASTM A36 available for 3/4 or 1-1/8 inch diameter Anchor Bolts

9. HF Moment Frame Angles (HFMFA) are bolted to the top or bottom of Moment Frame Header Beams and screw to the face of structural collectors with Pro-Series Screws for shear transfer. Slotted holes are provided for adjustment in and out of the wall line.

10. HF Moment Frames Plates (HFMFP) are bolted to the top or bottom of Moment Frame Header Beams and screw to the bottom or top edge of structural collectors with Pro-Series Screws for shear transfer. Slotted holes are provided for adjustment in and out of the wall line.

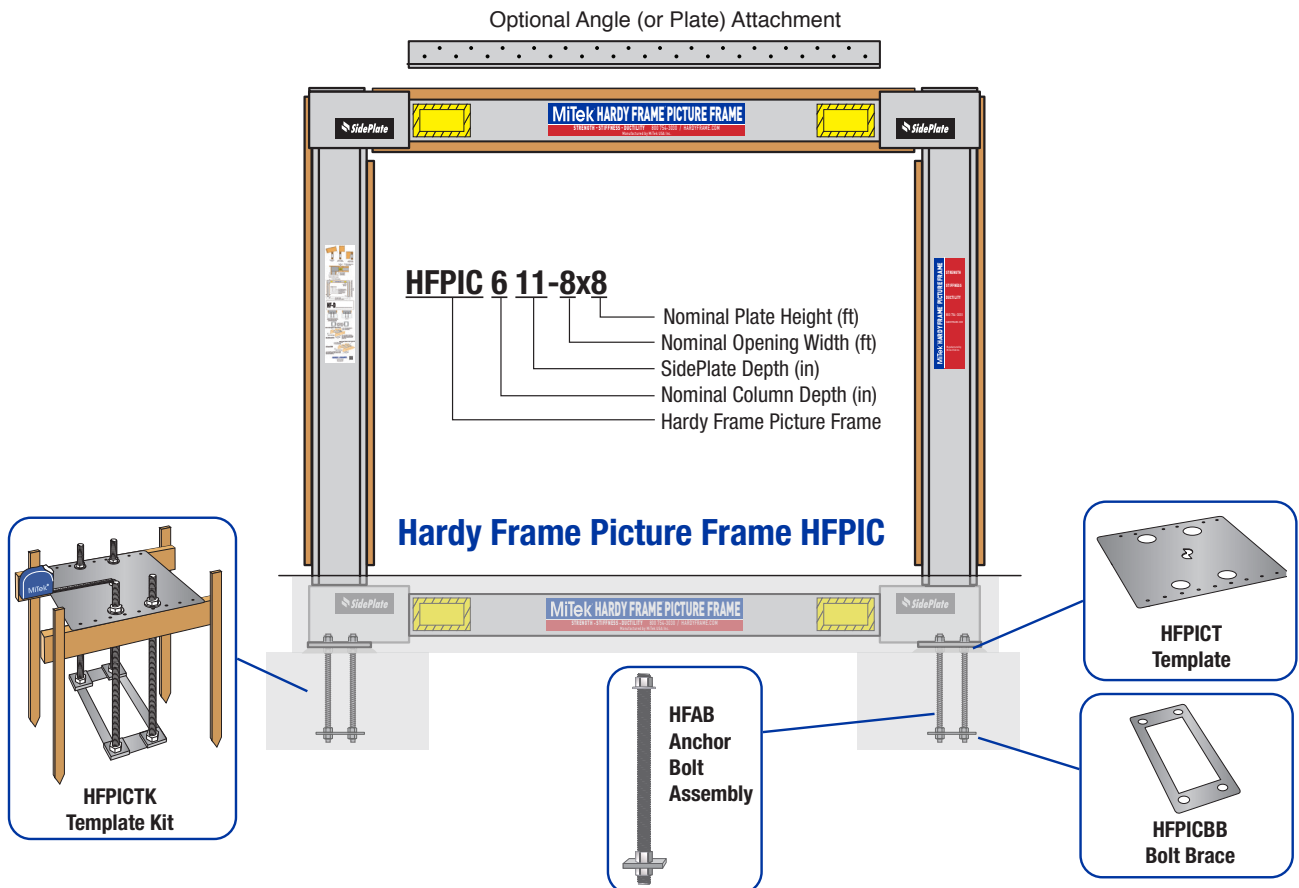
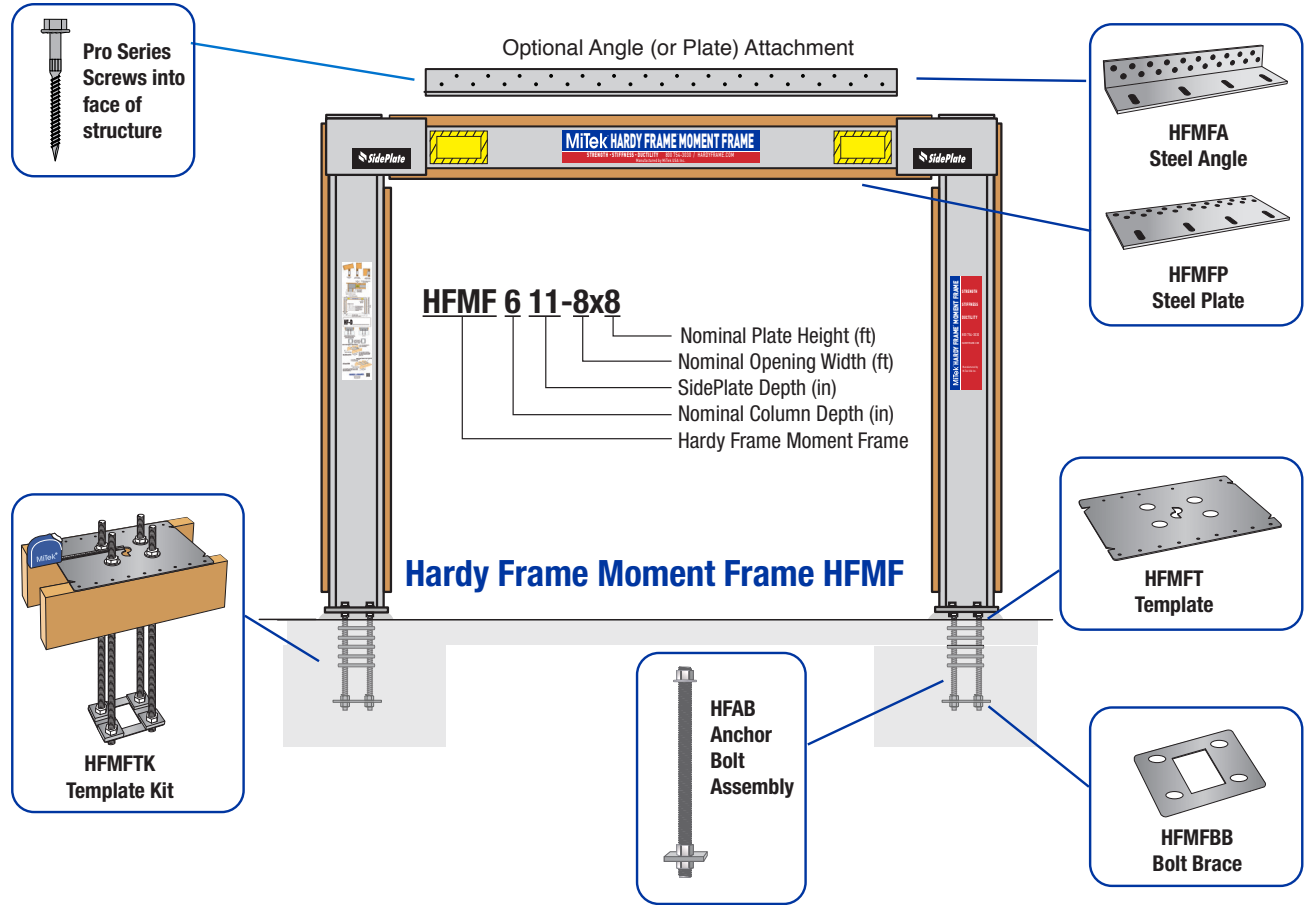
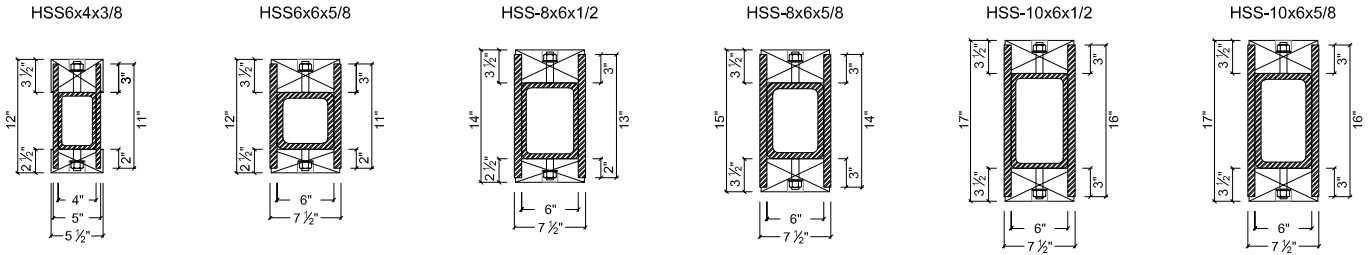


FIGURE 1 BEAM ASSEMBLIES

NAILERS AT HEADER BEAM



ANGLE AT HEADER BEAM

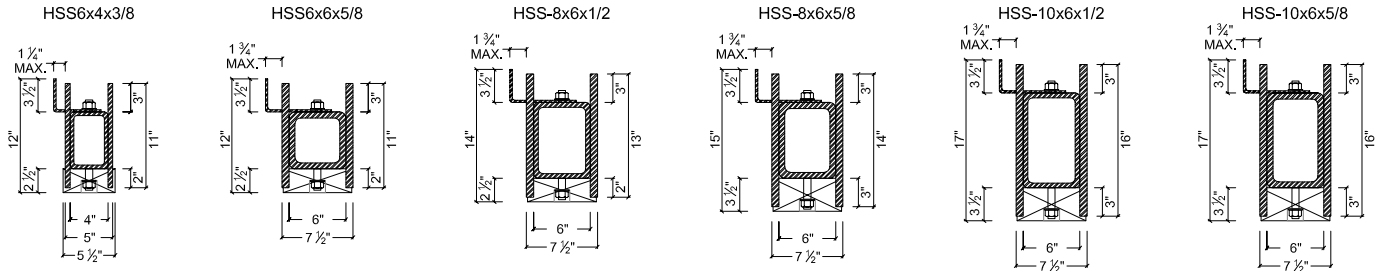
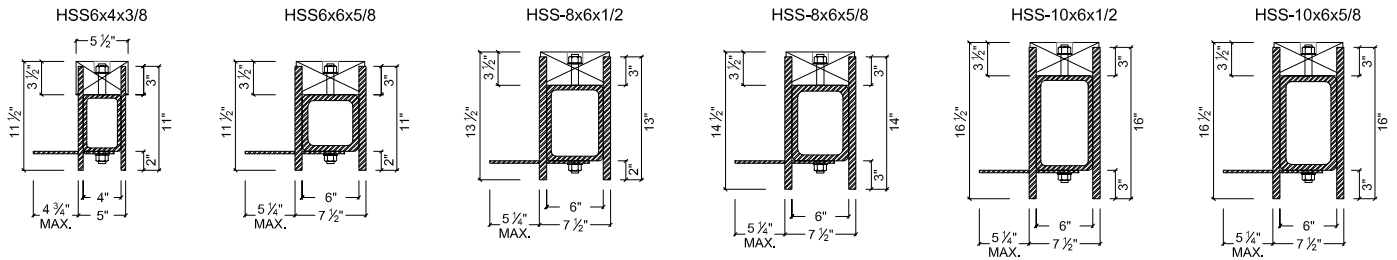
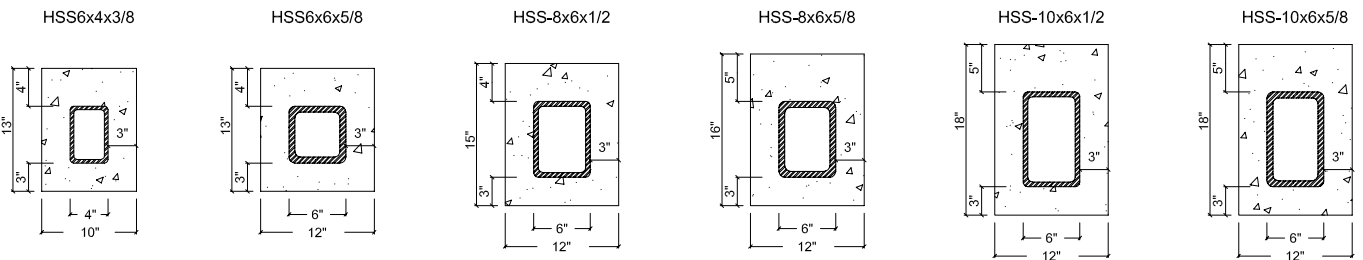


PLATE AT HEADER BEAM



MINIMUM CONCRETE COVERAGE AT FOUNDATION BEAM



MINIMUM CONCRETE COVERAGE AT FOUNDATION BEAM ASSEMBLY

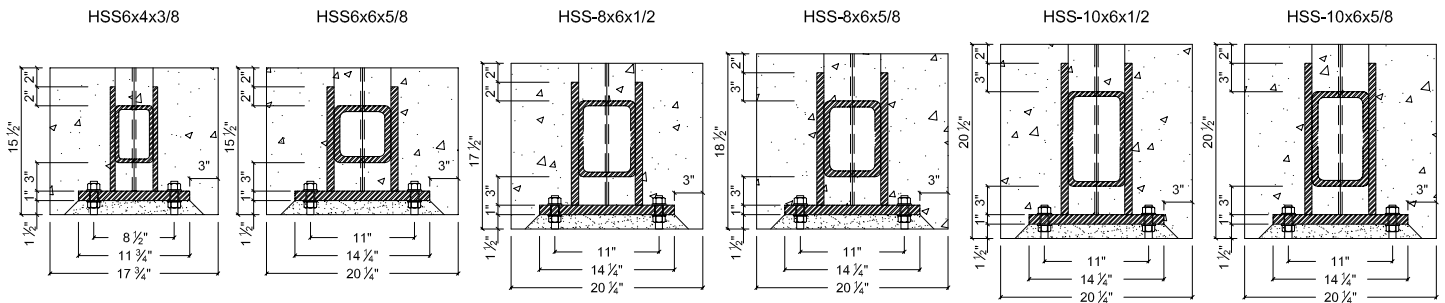
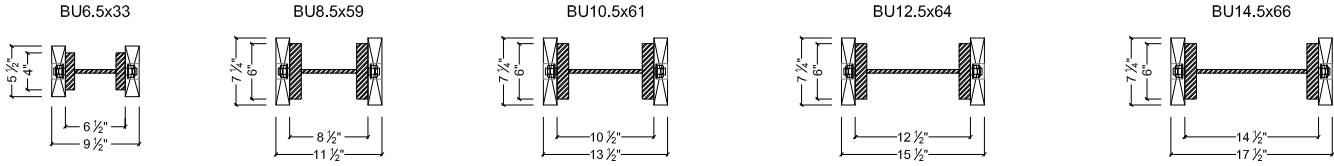
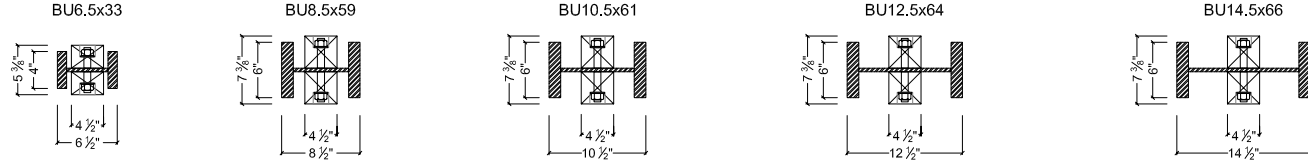


FIGURE 2 COLUMN ASSEMBLIES

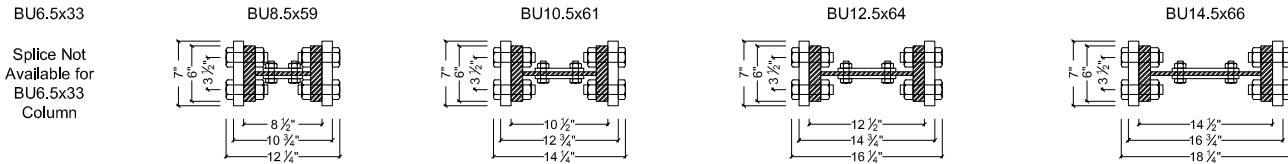
FLANGE NAILERS



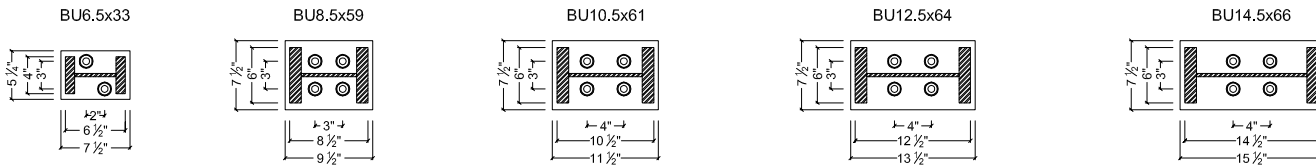
WEB NAILERS



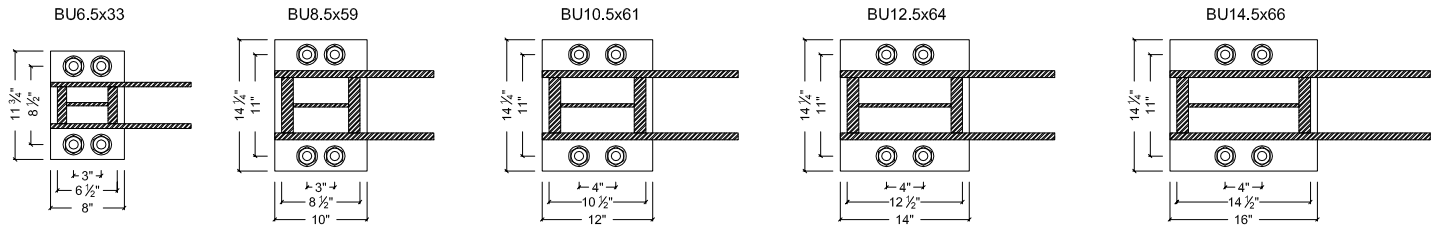
COLUMN SPLICE



HFMF BASE PLATE



HFPIC BASE PLATE



DESIGNING WITH HARDY FRAME® SPECIAL MOMENT FRAMES OVERVIEW

WHEN TO USE A HARDY FRAME® SPECIAL MOMENT FRAME:

- At large openings with narrow wall space and high shear loads
- When different seismic force resisting systems are used in combination, all parallel walls must be designed at the lowest R-Value. Specify a Hardy Frame Special Moment Frame and design at the same $R=6.5$ as design of plywood shear walls.
- NOTE: Standard Hardy Frame Special Moment Frames are listed for opening widths up to 24 feet and wall heights up to 14 feet. When both the width and the height exceed 13 feet, the Frame is over-sized for trucking pre-assembled and must ship as a "Knock-Down" unit, which requires field welding and special inspection to be supplied by others, or with a "Column Splice" to accommodate field bolting.

DESIGN:

- Calculate the design shear load based on an R-Value of 6.5
- Select a Hardy Frame Special Moment Frame based on the required geometry
- Check that the tabulated Allowable Shear meets the design shear load
- If the design shear load exceeds the allowable table value, for both the HFMF and HFPIC models use the Special Moment Frame Design Manager app (<https://builderproducts.mii.com/specialmomentframe/>) to submit custom design requests.
- Calculate the design vertical loads at beam mid-span using ASD load combinations
- Check that design vertical loads do not exceed the tabulated Maximum Vertical Load at Allowable Shear (Pu)
- Calculate the design Column Base Reactions for use in the foundation design. For more information see the Allowable Load tables and the corresponding table notes.

SPECIFICATION:

On the Foundation Plan

- Specify the Hardy Frame Special Moment Frame model number once per Frame with a multi-leader indicating each column
- Indicate the anchorage table and associated anchorage detail Anchorage Table: 2/HFMF-2 HFMF Anchorage at Footing: 4A/HFMF-2 HFPIC Anchorage at Footing: 4B/HFMF-2
- For HFMF specify connection of column base to install at the top of curb, slab, or stem wall (if application): 3/HFMF-2

On the Framing Plan

- Specify the Hardy Frame Special Moment Frame model number once per Frame with a multi-leader indicating each column
- Specify a shear connection from the collector (or "drag") to the Hardy Frame Moment Frame beam assembly. Refer to Typical Installation Details (HFMF-3) for standard connections
- Indicate whether the beam assembly installs beneath the floor framing (2/HFMF-3) or within the floor cavity (3/HFMF-3). Consider out-of-plane stability bracing at the columns (Note: no additional out-of-plane bracing is required at the plastic hinge locations or along the beam span).

SUBMITTAL:

- Include a calculation package for the model number specified (provided by Hardy Frames)
- Include Typical Installation Detail Sheets as "supplemental pages"

ADDITIONAL ITEMS:

- The table values in this catalog for both the HFMF and the HFPIC assume Pinned Base anchorage.
- Fixed Base designs (with conventional grade beam) are available. Use the Special Moment Frame Design Manager app (<http://builderproducts.mii.com/specialmomentframe/>) to submit custom design requests.
 - Allowable shear loads for Seismic applications have been adjusted to an R-Value of 6.5 ($C_d = 4.0$). For conversion of designs at 3.5 ($C_d = 3.0$), multiply by 4.0/3.0.
 - Allowable shear loads for Seismic applications are based on a story drift of 0.025h. To convert shear loads to a story drift of 0.020h multiply by a factor of 0.8.
- When designing lateral resistance for a wall line with varying shear resisting elements the stiffness (drift/allowable shear load) must be proportioned.
- Custom Moment Frame designs are available. Visit the Special Moment Frame Design Manager app (<http://builderproducts.mii.com/specialmomentframe/>) and submit to Hardy Frame to check the required configuration and loading.



PRE-ASSEMBLED 2-STORY MOMENT FRAMES



PRE-ASSEMBLED 2-BAY MOMENT FRAMES



INSTALLING HARDY FRAME PICTURE FRAME



COLUMN SPLICE OPTION



HARDY FRAME PICTURE FRAME INSTALLATION



SPECIAL MOMENT FRAMES IN NEW CONSTRUCTION

DESIGN EXAMPLE – HFMF PINNED BASE

Given: Loading & Geometry

- 8' Nominal Wall Height
- 16' Garage Door Clear Span
- 17" Maximum Column Assembly Depth (including wood nailers at flanges)
- 17" Maximum Header Beam Assembly Depth (including wood nailers at top and bottom beam)
- 7-1/2" Maximum Wall Thickness
- ASD Seismic Design Shear: at $R = 6.5$, $C_d = 4.0$, $V_{DSN} = 15,000$ lbs
- Uniform Gravity Loading on Header: $W_D = 256$ plf, $W_L = 480$ plf
- ASD Overturning Point Load on Header: $Q_E = 7,000$ lbs (excluding Ω_0), $W = 0$ lbs

Check Allowable ASD Shear (V) & Frame Geometry

From Table 1.8 (8' 0-3/4" Nominal Wall Heights), look up 16' 7" in Maximum Span column

Try: HFMF1216-16x8

- Allowable ASD Seismic Shear = 15,540 lbs > 15,000 lbs **OK**
- From Table 1A
 - Column Assembly = BU12.5x64
 - Header Beam = HSS10x6x1/2
- From Figures 1 and 2, Beam and Column Sections
 - BU12.5x64 Column Assembly Depth (with Flange Nailers) = 15-1/2" ≤ 17" **OK**
 - HSS10x6x1/2 Header Beam Assembly Depth (with Nailers at Header Beam) = 17" ≤ 17" **OK**
 - Frame Thickness = 7-1/2" ≤ 7-1/2" Maximum Wall Thickness **OK**

Calculate & Check the Aggregate Additional Vertical Load, P_{DSN}

HFMF1216-16x8:

- From Table 1A – Column Center-to-Center Span, $W_{CL-COL} = 17' 7-1/2" = 17.625$ ft
- From Table 1.8 – Max Vertical Load @ Allowable V, $P_U = 27,500$ lbs
- Equivalent Point Load for Design Dead Load, $D = 256$ plf x 17.625 ft = 4,510 lbs
- Equivalent Point Load for Design Live Load, $L = 480$ plf x 17.625 ft = 8,460 lbs
- ASD Overturning Point Load on Moment Frame Header Beam from Earthquake, $Q_E = 7,000$ lbs (excluding Ω_0)
- ASD Overturning Point Load on Moment Frame Header Beam from Wind, $W = 0$ lbs
- Over-strength Factor for Earthquake Load, $\Omega_0 = 3$

ASD Load Combinations (Note- Example below only shows the critical combinations):

1. $D + L = 4,510$ lbs + 8,460 lbs = 12,970 lbs
2. $D + 0.6W = 4,510$ lbs + 0.6 x 0 lbs = 4,510 lbs
3. $D + 0.75L + 0.75(0.6W) = 4,510$ lbs + 0.75 x 8,460 lbs + 0.75 x (0.6 x 0 lbs) = 10,860 lbs
4. $D + 0.7(\Omega_0 \times Q_E) = 4,510$ lbs + 0.7 x (3 x 7,000 lbs) = 19,210 lbs
5. $D + 0.525(\Omega_0 \times Q_E) + 0.75L = 4,510$ lbs + 0.525 x (3 x 7,000 lbs) + 0.75 x 8,460 lbs = 21,880 lbs

Maximum Design Point Load, $P_{DSN} = 21,880$ lbs < 27,500 lbs **OK**

Use: HFMF1216-16x8

Calculate Resultant ASD Shear at Column Base (ASD Design Shear & Maximum Design Point Load)

HFMF1216-16x8:

- From Table 1.8 – Shear @ Max $P_U = 9,630$ lbs
- Shear Multiplier for Maximum Design Point Load, $V_{mult} = \text{Shear @ Max } P_U / \text{Max } P_U = 9,630 \text{ lbs} / 27,500 \text{ lbs} = 0.35$
- Resultant Shear at Column Base, $V_R = (V_{DSN} / 2) + (P_{DSN} \times V_{mult}) = (15,000 \text{ lbs} / 2) + (21,880 \text{ lbs} \times 0.35) = 15,160$ lbs

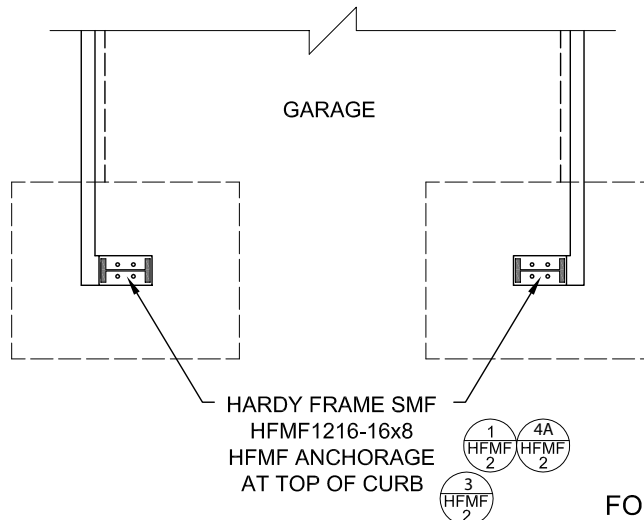
Calculate Resultant ASD Tension and Compression at Column Base (ASD Design Shear & Maximum Design Point Load)

HFMF1216-16x8:

- Tension and Compression from ASD Design Shear = $(V_{DSN} \times H_{MF}) / W_{CL-COL} = (15,000 \text{ lbs} \times 8.06') / 17.625' = 6,860 \text{ lbs}$
- Resultant Compression at Column Base = $[(V_{DSN} \times H_{MF}) / W_{CL-COL}] + (P_{DSN} / 2) = 6,860 \text{ lbs} + (21,880 \text{ lbs} / 2) = 17,800 \text{ lbs}$
- Resultant Tension at Column Base = $[(V_{DSN} \times H_{MF}) / W_{CL-COL}] - [0.6D - 0.7(\Omega_0 \times Q_E)] / 2$
 $= 6,860 \text{ lbs} - [0.6 \times (4,510 \text{ lbs}) - 0.7 \times (3 \times 7,000 \text{ lbs})] / 2 = 12,860 \text{ lbs}$

On the Foundation Plan

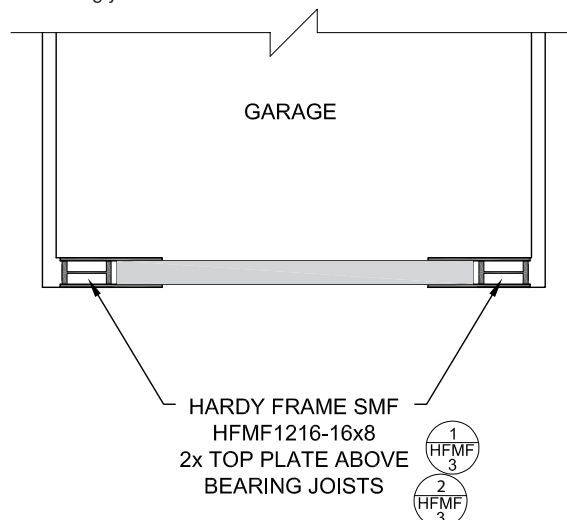
1. Specify the model number once per Frame with a multi-leader indicating each column
 - Model number: HFMF1216-16x8
2. Indicate the anchorage table and the associated anchorage detail for HFMF Anchorage at Footing
 - Anchorage table: 1 / HFMF-2
 - HFMF anchorage detail: 4A / HFMF-2
3. Specify the bottom connection of the column base to install at the top of curb, slab, or stem wall (if applicable)
 - Bottom connection at top of concrete: 3 / HFMF-2



FOUNDATION PLAN

On the Framing Plan

1. Specify the model number once per Frame with a multi-leader indicating each column
 - Model number: HFMF1216-16x8
2. Specify the shear connection from the collector (or "drag") to the Moment Frame Header Beam assembly
 - Top connection to 2x top plate above: 1 / HFMF-3
3. Indicate whether the Header Beam assembly installs beneath the floor framing or within the floor cavity
 - Section at header w/ bearing joists: 2 / HFMF-3



FRAMING PLAN

DESIGN EXAMPLE – HFPICTURE FRAME

Given: Loading & Geometry

- 8' Nominal Wall Height
- 16' Garage Door Clear Span
- 15" Maximum Column Assembly Depth (including wood nailers at column flanges)
- 17" Maximum Header Beam Assembly Depth (including wood nailers at top and bottom beam)
- 7-1/2" Maximum Wall Thickness
- ASD Seismic Design Shear: at $R = 6.5$, $C_d = 4.0$, $V_{DSN} = 15,000$ lbs
- Uniform Gravity Loading on Header: $W_D = 256$ plf, $W_L = 480$ plf
- ASD Overturning Point Load on Header: $Q_E = 7,000$ lbs (excluding Ω_0), $W = 0$ lbs

Check Allowable ASD Shear (V) & Frame Geometry

From Table 1.8 8' 0-3/4" Max Wall Heights & 16' - 7" Max span at inside Column Flanges

Try: HFMF1216-16x8

- Allowable ASD Seismic Shear = 15,540 lbs > 15,000 lbs **Ok**
- From Table 1A
 - Column Assembly = BU12.5x64
- From Figures 1 and 2, Beam and Column Sections
 - BU12.5x64 Column Assembly Depth (with Flange Nailers) = 15-1/2" > 15" **NG**

Try: HFPICT1014-16x8

- Allowable ASD Seismic Shear = 15,380lbs > 15,000 lbs **OK**
- From Table 1A
 - Column Assembly = BU10.5x61
 - Header Beam = HSS8x6x5/8
- From Figures 1 and 2, Beam and Column Sections
 - BU10.5x61 Column Assembly Depth (with Flange Nailers) = 13-1/2" ≤ 15" **OK**
 - HSS8x6x5/8 Header Beam Assembly Depth (with Nailers at Header Beam) = 15" ≤ 17" **OK**
 - Frame Thickness = 7-1/2" ≤ 7-1/2" Maximum Wall Thickness **OK**

Calculate & Check the Aggregate Additional Vertical Load, P_{DSN}

HFPICT1014-16x8:

- From Table 1A – Column Center-to-Center Span, $W_{CL-COL} = 17' 5-1/2" = 17.458$ ft
- From Table 1.8 – Max Vertical Load @ Allowable V, $P_U = 28,140$ lbs
- Equivalent Point Load for Design Dead Load, $D = 256$ plf x 17.458 ft = 4,470 lbs
- Equivalent Point Load for Design Live Load, $L = 480$ plf x 17.458 ft = 8,380 lbs
- ASD Overturning Point Load on Moment Frame Header Beam from Earthquake, $Q_E = 7,000$ lbs (excluding Ω_0)
- ASD Overturning Point Load on Moment Frame Header Beam from Wind, $W = 0$ lbs
- Over-strength Factor for Earthquake Load, $\Omega_0 = 3$

ASD Load Combinations (Note- Example below only shows the critical combinations):

1. $D + L = 4,470$ lbs + 8,380 lbs = 12,850 lbs
2. $D + 0.6W = 4,470$ lbs + 0.6 x 0 lbs = 4,470 lbs
3. $D + 0.75L + 0.75(0.6W) = 4,470$ lbs + 0.75 x 8,380 lbs + 0.75 x (0.6 x 0 lbs) = 10,760 lbs
4. $D + 0.7(Q_0 \times Q_E) = 4,470$ lbs + 0.7 x (3 x 7,000 lbs) = 19,170 lbs
5. $D + 0.525(\Omega_0 \times Q_E) + 0.75L = 4,470$ lbs + 0.525 x (3 x 7,000 lbs) + 0.75 x 8,380 lbs = 21,780 lbs

Maximum Design Point Load, $P_{DSN} = 21,780$ lbs < 28,140 lbs **OK**

Use: HFPICT1014-16x8

Calculate Resultant ASD Shear at Column Base (ASD Design Shear & Maximum Design Point Load)

HFPICT1014-16x8:

- From Table 1.8 – Shear @ Max $P_U = 0$ lbs (Resisted by the Foundation Beam Assembly)
- Shear Multiplier for Maximum Design Point Load, $V_{Mult} = \text{Shear @ Max } P_U / \text{Max } P_U = 0 \text{ lbs} / 28,140 \text{ lbs} = 0.00$
- Resultant Shear at Column Base, $V_R = (V_{DSN} / 2) + (P_{DSN} \times V_{Mult}) = (15,000 \text{ lbs} / 2) + (21,780 \text{ lbs} \times 0.00) = 7,500$ lbs

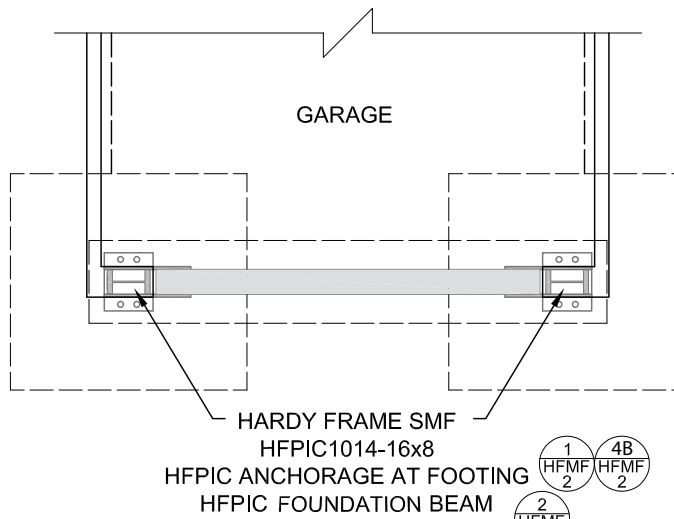
Calculate Resultant ASD Tension and Compression at Column Base (ASD Design Shear & Maximum Design Point Load)

HFPIC1014-16x8:

- Tension and Compression from ASD Design Shear = $(V_{DSN} \times H_{MF}) / W_{CL-COL} = (15,000 \text{ lbs} \times 8.06') / 17.458' = 6,930 \text{ lbs}$
- Resultant Compression at Column Base = $[(V_{DSN} \times H_{MF}) / W_{CL-COL}] + (P_{DSN} / 2) = 6,930 \text{ lbs} + (21,780 \text{ lbs} / 2) = 17,820 \text{ lbs}$
- Resultant Tension at Column Base = $[(V_{DSN} \times H_{MF}) / W_{CL-COL}] - [0.6D - 0.7(\Omega_o \times Q_E)] / 2$
 $= 6,930 \text{ lbs} - [0.6 \times (4,470 \text{ lbs}) - 0.7 \times (3 \times 7,000 \text{ lbs})] / 2 = 12,940 \text{ lbs}$

On the Foundation Plan

1. Specify the model number once per Frame with a multi-leader indicating each column
 - Model number: HFPIC1014-16x8
2. Indicate the anchorage table and the associated anchorage detail for HFPIC Anchorage at Footing
 - Anchorage table: 1 / HFMF-2
 - HFPIC anchorage detail: 4B / HFMF-2
3. Specify the pre-fabricated HFPIC Foundation Beam assembly with minimum concrete coverage
 - Section at HFPIC Foundation Beam: 2 / HFMF-1



On the Framing Plan

1. Specify the model number once per Frame with a multi-leader indicating each column
 - Model number: HFPIC1014-16x8
2. Specify the shear connection from the collector (or "drag") to the Picture Frame Header Beam assembly
 - Top connection to 2x top plate above: 1 / HFMF-3
3. Indicate whether the Header Beam assembly installs beneath the floor framing or within the floor cavity
 - Section at header w/ bearing joists: 2 / HFMF-3

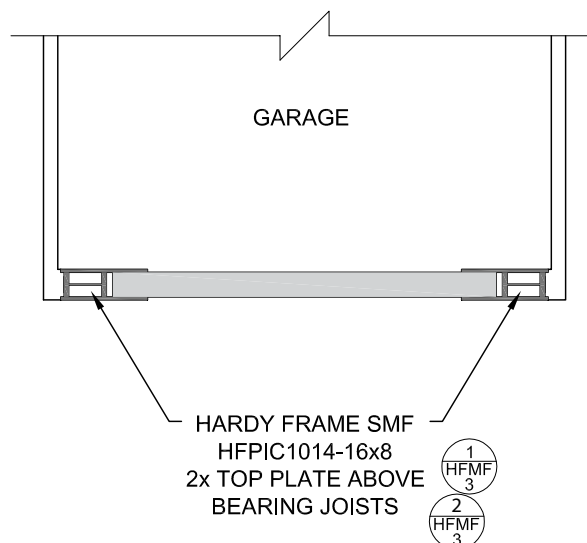


Table 1.8: 8-ft Nominal Wall Height

(net wall height = 8' 0-3/4")

| Model Number | Maximum Span, W _{in-steel} (ft-in) | Allowable In-Plane Shear, V (ASD) | | Max. Vertical Load @ Allowable V, P _u ⁷ (lbs.) | Column Base Reactions (ASD) | | | | Frame Weight (lbs.) |
|---------------|--|---------------------------------------|-----------------------------------|--|-----------------------------|------------------------------------|---|--|---------------------|
| | | Seismic ^{4,5} (R=6.5) (lbs.) | Wind ⁶ (Stress) (lbs.) | | Shear @ Allowable V (lbs.) | Shear @ Max. P _u (lbs.) | Resultant Shear, V _R ⁹ (lbs.) | Uplift @ Allowable V (P _u = 0) ¹⁰ (lbs.) | |
| HFMF611-8x8 | 8' 7" | 3,310 | 1,890 | 7,500 | 1,650 | 1,110 | 2,760 | 2,770 | 729 |
| HFPC611-8x8 | | 6,690 | 3,830 | 15,250 | 3,340 | - | 3,340 | 6,470 | 1,031 |
| HFMF811-8x8 | | 8,710 | 4,970 | 34,000 | 4,350 | 5,530 | 9,880 | 7,160 | 1,335 |
| HFPC811-8x8 | | 15,960 | 9,120 | 32,860 | 7,980 | - | 7,980 | 15,130 | 1,905 |
| HFMF1013-8x8 | | 16,080 | 9,200 | 32,500 | 8,040 | 5,520 | 13,560 | 13,000 | 1,370 |
| HFPC1013-8x8 | | 28,890 | 16,510 | 30,800 | 14,440 | - | 14,440 | 27,430 | 1,970 |
| HFMF1214-8x8 | | 21,220 | 12,090 | 31,250 | 10,610 | 5,830 | 16,440 | 16,850 | 1,517 |
| HFPC1214-8x8 | | 35,980 | 20,560 | 32,400 | 17,990 | - | 17,990 | 33,870 | 2,236 |
| HFMF611-10x8 | 10' 7" | 2,820 | 1,620 | 14,000 | 1,410 | 2,550 | 3,960 | 1,940 | 778 |
| HFPC611-10x8 | | 5,400 | 3,080 | 16,290 | 2,700 | - | 2,700 | 4,270 | 1,129 |
| HFMF811-10x8 | | 7,120 | 4,080 | 28,750 | 3,560 | 5,840 | 9,400 | 4,820 | 1,428 |
| HFPC811-10x8 | | 12,630 | 7,220 | 28,320 | 6,310 | - | 6,310 | 9,850 | 2,091 |
| HFMF1013-10x8 | | 13,230 | 7,590 | 31,770 | 6,620 | 6,730 | 13,350 | 8,830 | 1,463 |
| HFPC1013-10x8 | | 22,700 | 12,970 | 29,690 | 11,350 | - | 11,350 | 17,790 | 2,155 |
| HFMF1214-10x8 | | 17,060 | 9,750 | 30,620 | 8,530 | 7,060 | 15,590 | 11,220 | 1,628 |
| HFPC1214-10x8 | | 27,840 | 15,900 | 33,420 | 13,920 | - | 13,920 | 21,700 | 2,459 |
| HFMF1416-10x8 | 12' 7" | 27,560 | 15,750 | 23,750 | 13,780 | 5,520 | 19,300 | 17,870 | 1,643 |
| HFPC1416-10x8 | | 43,830 | 25,050 | 29,340 | 21,910 | - | 21,910 | 34,300 | 2,486 |
| HFMF611-12x8 | | 2,430 | 1,400 | 14,220 | 1,210 | 3,190 | 4,400 | 1,410 | 828 |
| HFPC611-12x8 | | 4,500 | 2,570 | 13,770 | 2,250 | - | 2,250 | 3,020 | 1,228 |
| HFMF811-12x8 | | 6,020 | 3,470 | 24,690 | 3,010 | 6,020 | 9,030 | 3,460 | 1,521 |
| HFPC811-12x8 | | 10,390 | 5,940 | 24,750 | 5,190 | - | 5,190 | 6,890 | 2,277 |
| HFMF1013-12x8 | | 11,160 | 6,380 | 26,880 | 5,580 | 6,830 | 12,410 | 6,340 | 1,555 |
| HFPC1013-12x8 | | 18,690 | 10,680 | 27,350 | 9,350 | - | 9,350 | 12,470 | 2,340 |
| HFMF1214-12x8 | 14' 7" | 14,220 | 8,160 | 28,750 | 7,110 | 7,900 | 15,010 | 7,980 | 1,740 |
| HFPC1214-12x8 | | 22,570 | 12,890 | 31,060 | 11,280 | - | 11,280 | 15,010 | 2,683 |
| HFMF1416-12x8 | | 22,750 | 13,040 | 25,000 | 11,380 | 6,920 | 18,300 | 12,610 | 1,750 |
| HFPC1416-12x8 | | 35,310 | 20,180 | 30,110 | 17,650 | - | 17,650 | 23,630 | 2,700 |
| HFMF611-14x8 | | 2,130 | 1,220 | 11,170 | 1,070 | 2,950 | 4,020 | 1,080 | 877 |
| HFPC611-14x8 | | 3,830 | 2,190 | 11,590 | 1,910 | - | 1,910 | 2,240 | 1,326 |
| HFMF811-14x8 | | 3,830 | 2,190 | 21,560 | 2,600 | 6,130 | 8,730 | 2,600 | 1,614 |
| HFPC811-14x8 | | 8,790 | 5,020 | 21,890 | 4,390 | - | 4,390 | 5,060 | 2,463 |
| HFMF1013-14x8 | 16' 7" | 9,620 | 5,540 | 24,380 | 4,810 | 7,220 | 12,030 | 4,760 | 1,648 |
| HFPC1013-14x8 | | 15,760 | 9,000 | 25,100 | 7,880 | - | 7,880 | 9,160 | 2,526 |
| HFMF1214-14x8 | | 12,140 | 6,950 | 26,880 | 6,070 | 8,580 | 14,650 | 5,940 | 1,852 |
| HFPC1214-14x8 | | 18,880 | 10,790 | 28,490 | 9,440 | - | 9,440 | 10,950 | 2,907 |
| HFMF1416-14x8 | | 19,470 | 11,060 | 25,000 | 9,730 | 8,030 | 17,760 | 9,430 | 1,858 |
| HFPC1416-14x8 | | 29,330 | 16,760 | 29,150 | 14,670 | - | 14,670 | 17,140 | 2,915 |
| HFMF611-16x8 | | 1,900 | 1,100 | 8,830 | 950 | 2,690 | 3,640 | 940 | 926 |
| HFPC611-16x8 | | 3,340 | 1,910 | 9,020 | 1,680 | - | 1,860 | 850 | 1,424 |
| HFMF813-16x8 | 18' 7" | 7,450 | 4,220 | 23,000 | 3,720 | 7,010 | 1,680 | 1,720 | 1,702 |
| HFPC813-16x8 | | 12,580 | 7,190 | 25,310 | 6,290 | - | 6,290 | 6,530 | 2,659 |
| HFMF1014-16x8 | | 9,620 | 5,480 | 27,190 | 4,810 | 9,070 | 13,880 | 4,210 | 1,909 |
| HFPC1014-16x8 | | 15,380 | 8,790 | 28,140 | 7,690 | - | 7,690 | 7,980 | 3,057 |
| HFMF1216-16x8 | | 15,540 | 8,810 | 27,500 | 7,770 | 9,630 | 17,400 | 6,740 | 1,926 |
| HFPC1216-16x8 | | 23,830 | 13,620 | 29,490 | 11,910 | - | 11,910 | 12,470 | 3,075 |
| HFMF1416-16x8 | | 18,810 | 10,790 | 31,880 | 9,400 | 11,490 | 20,890 | 8,080 | 2,170 |
| HFPC1416-16x8 | | 28,460 | 16,260 | 34,910 | 14,230 | - | 14,230 | 14,760 | 3,540 |
| HFMF813-18x8 | 18' 7" | 6,680 | 3,830 | 22,500 | 3,340 | 7,770 | 11,110 | 2,640 | 1,795 |
| HFPC813-18x8 | | 11,150 | 6,370 | 22,790 | 5,570 | - | 5,570 | 5,190 | 2,844 |
| HFMF1014-18x8 | | 8,540 | 4,880 | 24,690 | 4,270 | 9,290 | 13,560 | 3,350 | 2,020 |
| HFPC1014-18x8 | | 13,520 | 7,730 | 25,580 | 6,760 | - | 6,760 | 6,290 | 3,281 |
| HFMF1216-18x8 | | 13,790 | 7,880 | 25,620 | 6,890 | 10,110 | 17,000 | 5,370 | 2,033 |
| HFPC1216-18x8 | | 20,840 | 11,910 | 27,140 | 10,420 | - | 10,420 | 9,800 | 3,290 |
| HFMF1416-18x8 | | 16,620 | 9,560 | 30,000 | 8,310 | 12,150 | 20,460 | 6,420 | 2,301 |
| HFPC1416-18x8 | | 24,920 | 14,240 | 32,090 | 12,460 | - | 12,460 | 11,620 | 3,801 |

Table 1.8: 8-ft Nominal Wall Height

(net wall height = 8' 0-3/4")

| Model Number | Maximum Span, $W_{in-steel}$ (ft-in) | Allowable In-Plane Shear, V (ASD) | | Max. Vertical Load @ Allowable V, P_u ⁷ (lbs.) | Column Base Reactions (ASD) | | | | Frame Weight (lbs.) |
|---------------|--------------------------------------|---------------------------------------|-----------------------------------|---|-----------------------------|---------------------------|--|---|---------------------|
| | | Seismic ^{4,5} (R=6.5) (lbs.) | Wind ⁶ (Stress) (lbs.) | | Shear @ Allowable V (lbs.) | Shear @ Max. P_u (lbs.) | Resultant Shear, V_R ⁹ (lbs.) | Uplift @ Allowable V ($P_u = 0$) ¹⁰ (lbs.) | |
| HFMF813-20x8 | 20'-7" | 6,070 | 3,470 | 20,310 | 3,030 | 7,830 | 10,860 | 2,180 | 1,887 |
| HFPC813-20x8 | | 9,990 | 5,700 | 20,310 | 4,990 | - | 4,990 | 4,210 | 3,029 |
| HFMF1014-20x8 | | 7,710 | 4,410 | 22,500 | 3,850 | 9,420 | 13,270 | 2,750 | 2,132 |
| HFPC1014-20x8 | | 12,030 | 6,870 | 23,400 | 6,010 | - | 6,010 | 5,080 | 3,504 |
| HFMF1216-20x8 | | 12,250 | 7,040 | 23,750 | 6,130 | 10,420 | 16,550 | 4,330 | 2,141 |
| HFPC1216-20x8 | | 18,420 | 10,530 | 25,040 | 9,210 | - | 9,210 | 7,860 | 3,505 |
| HFMF1416-20x8 | | 14,870 | 8,540 | 28,120 | 7,430 | 12,640 | 20,070 | 5,220 | 2,431 |
| HFPC1416-20x8 | | 22,040 | 12,600 | 29,600 | 11,020 | - | 11,020 | 9,330 | 4,062 |
| HFMF813-22x8 | 22'-7" | 5,580 | 3,200 | 17,190 | 2,790 | 7,330 | 10,120 | 1,830 | 1,980 |
| HFPC813-22x8 | | 9,060 | 5,180 | 17,190 | 4,530 | - | 4,530 | 3,490 | 3,214 |
| HFMF1014-22x8 | | 7,000 | 4,040 | 20,620 | 3,500 | 9,510 | 13,010 | 2,280 | 2,244 |
| HFPC1014-22x8 | | 10,830 | 6,190 | 21,420 | 5,410 | - | 5,410 | 4,190 | 3,728 |
| HFMF1216-22x8 | | 11,160 | 6,380 | 21,880 | 5,580 | 10,570 | 16,150 | 3,610 | 2,248 |
| HFPC1216-22x8 | | 16,580 | 9,480 | 23,040 | 8,290 | - | 8,290 | 6,480 | 3,720 |
| HFMF1416-22x8 | | 13,450 | 7,700 | 25,940 | 6,720 | 12,810 | 19,530 | 4,320 | 2,562 |
| HFPC1416-22x8 | | 19,760 | 11,290 | 27,270 | 9,880 | - | 9,880 | 7,670 | 4,323 |
| HFMF813-24x8 | 24'-7" | 5,140 | 2,930 | 14,530 | 2,570 | 6,790 | 9,360 | 1,550 | 2,072 |
| HFPC813-24x8 | | 8,270 | 4,730 | 14,530 | 4,130 | - | 4,130 | 2,930 | 3,399 |
| HFMF1014-24x8 | | 6,450 | 3,680 | 18,120 | 3,220 | 9,130 | 12,350 | 1,940 | 2,356 |
| HFPC1014-24x8 | | 9,850 | 5,630 | 18,400 | 4,920 | - | 4,920 | 3,510 | 3,951 |
| HFMF1216-24x8 | | 10,180 | 5,810 | 20,310 | 5,090 | 10,720 | 15,810 | 3,030 | 2,356 |
| HFPC1216-24x8 | | 15,010 | 8,580 | 21,340 | 7,500 | - | 7,500 | 5,400 | 3,935 |
| HFMF1416-24x8 | | 12,250 | 7,040 | 24,060 | 6,130 | 12,950 | 19,080 | 3,630 | 2,692 |
| HFPC1416-24x8 | | 17,900 | 10,230 | 25,130 | 8,950 | - | 8,950 | 6,410 | 4,584 |

Notes:

- The values in this table reflect Allowable Stress Design (ASD) and pertain to installation on 2,500 psi. min. concrete or nuts and washers with 5,000 psi. min. non-shrink grout.
- Hardy Frame Special Moment Frames are designed to meet stress and deflection limitations per applicable code requirements (AISC-360, AISC-341, and IBC) using Load and Resistance Factored Design (LRFD).
- The SidePlate proprietary moment connection is prequalified per AISC-358 to meet the requirements for special moment resisting frames. When combined with other lateral force resisting systems, Hardy Frame Special Moment Frames may be proportioned to be consistent with lower seismic design coefficients.
- For Seismic design, allowable shear loads are determined using light-frame design coefficients (R = 6.5, $C_d = 4.0$, $\Omega_0 = 3.0$) and do not exceed code-required inter-story drift limitations ($\Delta_s = 0.025h$). Allowable shear loads may be linearly proportioned based on alternate story drift ratios or deflection coefficients.
- For Seismic designs requiring redundancy factor $\rho = 1.3$, allowable shear loads may be amplified by 1.3 for checking member stresses. Tabulated maximum vertical load at allowable shear (P_u) and column base reactions assume stresses at $\rho = 1.0$.
- For Wind design, allowable shear loads are limited to $h/400$ story drift, including a factor ($Wind_{Drift} / Wind_{Stress} = 0.6$) based on the ratio of Basic Wind Speeds for MRI = 50 yrs. Allowable shear loads may be linearly proportioned based on alternate story drift ratios or Basic Wind Speed factors.
- Maximum vertical load at allowable shear (P_u) is the additional aggregate point load that may be applied at beam mid-span when the Frame is subject to the allowable shear load.
- Column base reactions are determined at the allowable shear load and do not include any over-strength (Ω_0) factor.
- Tabulated resultant shear at the column base assumes the allowable shear load in combination with the maximum vertical load at allowable shear. Design ASD shear reactions from combined lateral and vertical forces may be calculated using the equation below. No resultant shear due to vertical load occurs at Picture Frame configurations as this force is resisted by the bottom beam assembly.

$$V_R = (V_{DSN}/2) + [P_{DSN} \times (Shear @ Max.P_u / Max.P_u)]$$

V_{DSN} = Design shear load (lbs.)
 P_{DSN} = Design aggregate point load at beam mid-span due to ASD load combinations (lbs.)

- Tabulated uplift at allowable shear assumes no resisting vertical load or Frame self-weight. Design ASD uplift reactions including the effect of vertical load may be calculated using the following equations:

$$Uplift \ w/ \ Seismic \ HD \ Forces = [(V_{DSN} \times H_{MF}) / W_{CL-COL}] - [(0.6D - 0.7\Omega_0 Q_E) / 2]$$

$$Uplift \ w/ \ Wind \ HD \ Forces = [(V_{DSN} \times H_{MF}) / W_{CL-COL}] - [(0.6D - 0.6W) / 2]$$

V_{DSN} = Design shear load (lbs.)
 H_{MF} = Moment Frame height (ft.)
 W_{CL-COL} = Column center-to-center span (ft.)
D = Design aggregate point load at beam mid-span due to dead load only (lbs.)
 Q_E = Design aggregate point load at beam mid-span due to seismic hold down forces (lbs.)
W = Design aggregate point load at beam mid-span due to wind hold down forces (lbs.)

Table 1.10: 10-ft Nominal Wall Height

[net wall height = 10' 0-3/4"]

| Model Number | Maximum Span, $W_{in-steel}$ (ft-in) | Allowable In-Plane Shear, V (ASD) | | Max. Vertical Load @ Allowable V, P_u (lbs.) | Column Base Reactions (ASD) | | | | Frame Weight (lbs.) |
|----------------|--------------------------------------|---------------------------------------|-----------------------------------|--|-----------------------------|---------------------------|-------------------------------|--|---------------------|
| | | Seismic ^{4,5} (R=6.5) (lbs.) | Wind ⁶ (Stress) (lbs.) | | Shear @ Allowable V (lbs.) | Shear @ Max. P_u (lbs.) | Resultant Shear, V_R (lbs.) | Uplift @ Allowable $V (P_u = 0)$ (lbs) | |
| HFMF611-8x10 | 8' 7" | 2,250 | 1,290 | 5,000 | 1,130 | 540 | 1,670 | 2,370 | 861 |
| HFPC611-8x10 | | 5,090 | 2,910 | 12,000 | 2,540 | - | 2,540 | 6,030 | 1,163 |
| HFMF811-8x10 | | 6,120 | 3,530 | 34,000 | 3,060 | 4,220 | 7,280 | 6,350 | 1,571 |
| HFPC811-8x10 | | 12,600 | 7,200 | 35,250 | 6,300 | - | 6,300 | 14,650 | 2,141 |
| HFMF1013-8x10 | | 11,270 | 6,420 | 30,000 | 5,640 | 3,870 | 9,510 | 11,490 | 1,614 |
| HFPC1013-8x10 | | 22,800 | 13,030 | 35,750 | 11,400 | - | 11,400 | 26,470 | 2,214 |
| HFMF1214-8x10 | | 15,100 | 8,630 | 34,000 | 7,550 | 4,860 | 12,410 | 15,120 | 1,773 |
| HFPC1214-8x10 | | 28,810 | 16,460 | 32,430 | 14,400 | - | 14,400 | 33,110 | 2,492 |
| HFMF611-10x10 | 10' 7" | 1,960 | 1,110 | 12,000 | 980 | 1,670 | 2,650 | 1,700 | 910 |
| HFPC611-10x10 | | 4,180 | 2,390 | 15,920 | 2,090 | - | 2,090 | 4,050 | 1,261 |
| HFMF811-10x10 | | 5,140 | 2,960 | 32,500 | 2,570 | 5,060 | 7,630 | 4,390 | 1,664 |
| HFPC811-10x10 | | 10,080 | 5,760 | 30,240 | 5,040 | - | 5,040 | 9,650 | 2,327 |
| HFMF1013-10x10 | | 9,520 | 5,450 | 36,250 | 4,760 | 5,870 | 10,630 | 8,010 | 1,707 |
| HFPC1013-10x10 | | 18,230 | 10,410 | 32,660 | 9,110 | - | 9,110 | 17,460 | 2,399 |
| HFMF1214-10x10 | | 12,470 | 7,130 | 36,880 | 6,230 | 6,550 | 12,780 | 10,340 | 1,884 |
| HFPC1214-10x10 | | 22,690 | 12,970 | 35,550 | 11,340 | - | 11,340 | 21,590 | 2,715 |
| HFMF1416-10x10 | 19,910 | 11,340 | 33,750 | 9,950 | 6,040 | 15,990 | 16,290 | 1,907 | |
| HFPC1416-10x10 | 35,630 | 20,360 | 32,680 | 17,820 | - | 17,820 | 33,930 | 2,750 | |
| HFMF611-12x10 | 12' 7" | 1,710 | 990 | 13,120 | 860 | 2,230 | 3,090 | 1,260 | 960 |
| HFPC611-12x10 | | 3,520 | 2,020 | 13,120 | 1,750 | - | 1,760 | 2,900 | 1,360 |
| HFMF811-12x10 | | 4,440 | 2,540 | 26,880 | 2,220 | 5,050 | 7,270 | 3,220 | 1,757 |
| HFPC811-12x10 | | 8,370 | 4,780 | 26,000 | 4,180 | - | 4,180 | 6,800 | 2,513 |
| HFMF1013-12x10 | | 8,100 | 4,640 | 31,250 | 4,050 | 6,100 | 10,150 | 5,800 | 1,799 |
| HFPC1013-12x10 | | 15,080 | 8,620 | 29,230 | 7,540 | - | 7,540 | 12,300 | 2,584 |
| HFMF1214-12x10 | | 10,500 | 6,000 | 32,500 | 5,250 | 6,900 | 12,150 | 7,430 | 1,996 |
| HFPC1214-12x10 | | 18,510 | 10,580 | 32,400 | 9,250 | - | 9,250 | 15,020 | 2,939 |
| HFMF1416-12x10 | 16,620 | 9,560 | 31,250 | 8,310 | 6,680 | 14,990 | 11,620 | 2,014 | |
| HFPC1416-12x10 | 28,980 | 16,560 | 32,010 | 14,490 | - | 14,490 | 23,600 | 2,964 | |
| HFMF611-14x10 | 14' 7" | 1,540 | 890 | 10,160 | 770 | 2,050 | 2,820 | 980 | 1,009 |
| HFPC611-14x10 | | 3,040 | 1,740 | 10,780 | 1,520 | - | 1,520 | 2,170 | 1,458 |
| HFMF811-14x10 | | 3,860 | 2,210 | 22,810 | 1,930 | 5,020 | 6,950 | 2,430 | 1,850 |
| HFPC811-14x10 | | 7,130 | 4,070 | 22,760 | 3,560 | - | 3,560 | 5,040 | 2,699 |
| HFMF1013-14x10 | | 7,120 | 4,040 | 26,880 | 3,560 | 6,140 | 9,700 | 4,440 | 1,892 |
| HFPC1013-14x10 | | 12,830 | 7,330 | 26,350 | 6,410 | - | 6,410 | 9,110 | 2,770 |
| HFMF1214-14x10 | | 9,030 | 5,160 | 29,380 | 4,510 | 7,270 | 11,780 | 5,570 | 2,108 |
| HFPC1214-14x10 | | 15,570 | 8,900 | 29,400 | 7,780 | - | 7,780 | 11,030 | 3,163 |
| HFMF1416-14x10 | 14,330 | 8,160 | 29,380 | 7,160 | 7,310 | 14,470 | 8,750 | 2,122 | |
| HFPC1416-14x10 | 24,300 | 13,890 | 30,310 | 12,150 | - | 12,150 | 17,280 | 3,179 | |
| HFMF611-16x10 | 16' 7" | 1,390 | 790 | 8,120 | 700 | 1,890 | 2,590 | 780 | 1,058 |
| HFPC611-16x10 | | 2,680 | 1,530 | 8,440 | 1,340 | - | 1,340 | 1,690 | 1,556 |
| HFMF813-16x10 | | 5,370 | 3,050 | 23,500 | 2,680 | 5,470 | 8,150 | 2,990 | 1,938 |
| HFPC813-16x10 | | 10,130 | 5,790 | 25,000 | 5,060 | - | 5,060 | 6,430 | 2,895 |
| HFMF1014-16x10 | | 7,120 | 4,040 | 29,690 | 3,560 | 7,630 | 11,190 | 3,930 | 2,153 |
| HFPC1014-16x10 | | 12,560 | 7,180 | 29,400 | 6,280 | - | 6,280 | 7,960 | 3,301 |
| HFMF1216-16x10 | | 11,390 | 6,470 | 31,250 | 5,690 | 8,430 | 14,120 | 6,230 | 2,182 |
| HFPC1216-16x10 | | 19,640 | 11,220 | 30,880 | 9,820 | - | 9,820 | 12,510 | 3,331 |
| HFMF1416-16x10 | 14,000 | 8,030 | 35,620 | 7,000 | 9,930 | 16,930 | 7,590 | 2,434 | |
| HFPC1416-16x10 | 23,580 | 13,470 | 36,240 | 11,790 | - | 11,790 | 14,880 | 3,804 | |
| HFMF813-18x10 | 18' 7" | 4,880 | 2,780 | 22,810 | 2,440 | 6,030 | 8,470 | 2,440 | 2,031 |
| HFPC813-18x10 | | 9,010 | 5,150 | 24,080 | 4,500 | - | 4,500 | 5,120 | 3,080 |
| HFMF1014-18x10 | | 6,350 | 3,630 | 26,560 | 3,170 | 7,720 | 10,890 | 3,140 | 2,264 |
| HFPC1014-18x10 | | 11,090 | 6,330 | 26,600 | 5,540 | - | 5,540 | 6,300 | 3,525 |
| HFMF1216-18x10 | | 10,180 | 5,810 | 28,120 | 5,090 | 8,560 | 13,650 | 5,000 | 2,289 |
| HFPC1216-18x10 | | 17,180 | 9,820 | 28,210 | 8,590 | - | 8,590 | 9,830 | 3,546 |
| HFMF1416-18x10 | | 12,470 | 7,130 | 32,500 | 6,230 | 10,200 | 16,430 | 6,080 | 2,565 |
| HFPC1416-18x10 | | 20,740 | 11,850 | 33,120 | 10,370 | - | 10,370 | 11,770 | 4,065 |

Table 1.10: 10-ft Nominal Wall Height

[net wall height = 10' 0-3/4"]

| Model Number | Maximum Span, W _{in-Steel} (ft-in) | Allowable In-Plane Shear, V (ASD) | | Max. Vertical Load @ Allowable V, P _u ⁷ (lbs.) | Column Base Reactions (ASD) ⁸ | | | | Frame Weight (lbs.) |
|-----------------|---|-----------------------------------|------------------------|--|--|------------------------------------|---|--|---------------------|
| | | Seismic 4,5 (R=6.5) (lbs.) | Wind 6 (Stress) (lbs.) | | Shear @ Allowable V (lbs.) | Shear @ Max. P _u (lbs.) | Resultant Shear, V _R ⁹ (lbs.) | "Uplift @ Allowable V (P _u = 0)" ¹⁰ (lbs.) | |
| HFMF813-20x10 | 20'-7" | 4,440 | 2,540 | 18,910 | 2,220 | 5,600 | 7,820 | 2,010 | 2,123 |
| HFPIC813-20x10 | | 8,110 | 4,640 | 19,790 | 4,050 | - | 4,050 | 4,180 | 3,265 |
| HFMF1014-20x10 | | 5,740 | 3,290 | 24,060 | 2,870 | 7,800 | 10,670 | 2,580 | 2,376 |
| HFPIC1014-20x10 | | 9,920 | 5,670 | 24,160 | 4,960 | - | 4,960 | 5,120 | 3,748 |
| HFMF1216-20x10 | | 9,200 | 5,250 | 25,940 | 4,600 | 8,810 | 13,410 | 4,100 | 2,397 |
| HFPIC1216-20x10 | | 15,320 | 8,760 | 25,900 | 7,660 | - | 7,660 | 7,950 | 3,761 |
| HFMF1416-20x10 | | 11,270 | 6,420 | 30,000 | 5,640 | 10,470 | 16,110 | 4,990 | 2,695 |
| HFPIC1416-20x10 | | 18,370 | 10,490 | 30,480 | 9,180 | - | 9,180 | 9,460 | 4,326 |
| HFMF813-22x10 | 22'-7" | 4,110 | 2,340 | 15,940 | 2,050 | 5,230 | 7,280 | 1,700 | 2,216 |
| HFPIC813-22x10 | | 7,380 | 4,220 | 16,570 | 3,690 | - | 3,690 | 3,480 | 3,450 |
| HFMF1014-22x10 | | 5,250 | 3,000 | 20,310 | 2,630 | 7,270 | 9,900 | 2,160 | 2,488 |
| HFPIC1014-22x10 | | 8,960 | 5,120 | 20,910 | 4,480 | - | 4,480 | 4,220 | 3,972 |
| HFMF1216-22x10 | | 8,310 | 4,790 | 23,750 | 4,150 | 8,890 | 13,040 | 3,390 | 2,504 |
| HFPIC1216-22x10 | | 13,790 | 7,880 | 23,800 | 6,890 | - | 6,890 | 6,550 | 3,976 |
| HFMF1416-22x10 | | 10,180 | 5,810 | 27,810 | 5,090 | 10,680 | 15,770 | 4,120 | 2,826 |
| HFPIC1416-22x10 | | 16,530 | 9,450 | 28,020 | 8,260 | - | 8,260 | 7,800 | 4,587 |
| HFMF813-24x10 | 24'-7" | 3,810 | 2,180 | 13,590 | 1,900 | 4,900 | 6,800 | 1,450 | 2,308 |
| HFPIC813-24x10 | | 6,760 | 3,860 | 14,030 | 3,380 | - | 3,380 | 2,930 | 3,635 |
| HFMF1014-24x10 | | 4,880 | 2,780 | 17,190 | 2,440 | 6,730 | 9,170 | 1,850 | 2,600 |
| HFPIC1014-24x10 | | 8,170 | 4,670 | 17,610 | 4,080 | - | 4,080 | 3,550 | 4,195 |
| HFMF1216-24x10 | | 7,660 | 4,370 | 21,880 | 3,830 | 8,960 | 12,790 | 2,880 | 2,612 |
| HFPIC1216-24x10 | | 12,530 | 7,160 | 21,910 | 6,260 | - | 6,260 | 5,490 | 4,191 |
| HFMF1416-24x10 | | 9,310 | 5,340 | 25,620 | 4,650 | 10,740 | 15,390 | 3,480 | 2,956 |
| HFPIC1416-24x10 | | 14,990 | 8,570 | 25,810 | 7,490 | - | 7,490 | 6,520 | 4,848 |

- Notes:**
- The values in this table reflect Allowable Stress Design (ASD) and pertain to installation on 2,500 psi. min. concrete or nuts and washers with 5,000 psi. min. non-shrink grout.
 - Hardy Frame Special Moment Frames are designed to meet stress and deflection limitations per applicable code requirements (AISC-360, AISC-341, and IBC) using Load and Resistance Factored Design (LRFD).
 - The SidePlate proprietary moment connection is prequalified per AISC-358 to meet the requirements for special moment resisting frames. When combined with other lateral force resisting systems, Hardy Frame Special Moment Frames may be proportioned to be consistent with lower seismic design coefficients.
 - For Seismic design, allowable shear loads are determined using light-frame design coefficients (R = 6.5, C_d = 4.0, Ω₀ = 3.0) and do not exceed code-required inter-story drift limitations (Δ_s = 0.025h). Allowable shear loads may be linearly proportioned based on alternate story drift ratios or deflection coefficients.
 - For Seismic designs requiring redundancy factor ρ = 1.3, allowable shear loads may be amplified by 1.3 for checking member stresses. Tabulated maximum vertical load at allowable shear (P_u) and column base reactions assume stresses at ρ = 1.0.
 - For Wind design, allowable shear loads are limited to h/400 story drift, including a factor (Wind_{Drift} / Wind_{Stress} = 0.6) based on the ratio of Basic Wind Speeds for MRI = 50 yrs. Allowable shear loads may be linearly proportioned based on alternate story drift ratios or Basic Wind Speed factors.
 - Maximum vertical load at allowable shear (P_u) is the additional aggregate point load that may be applied at beam mid-span when the Frame is subject to the allowable shear load.
 - Column base reactions are determined at the allowable shear load and do not include any over-strength (Ω₀) factor.
 - Tabulated resultant shear at the column base assumes the allowable shear load in combination with the maximum vertical load at allowable shear. Design ASD shear reactions from combined lateral and vertical forces may be calculated using the equation below. No resultant shear due to vertical load occurs at Picture Frame configurations as this force is resisted by the bottom beam assembly.

$$V_R = (V_{DSN}/2) + [P_{DSN} \times (\text{Shear @ Max. } P_u / \text{Max. } P_u)]$$

V_{DSN} = Design shear load (lbs.)
P_{DSN} = Design aggregate point load at beam mid-span due to ASD load combinations (lbs.)

- Tabulated uplift at allowable shear assumes no resisting vertical load or Frame self-weight. Design ASD uplift reactions including the effect of vertical load may be calculated using the following equations:

$$\text{Uplift w/ Seismic HD Forces} = [(V_{DSN} \times H_{MF}) / W_{CL-COL}] - [(0.6D - 0.7\Omega_0 Q_E) / 2]$$

$$\text{Uplift w/ Wind HD Forces} = [(V_{DSN} \times H_{MF}) / W_{CL-COL}] - [(0.6D - 0.6W) / 2]$$

V_{DSN} = Design shear load (lbs.)
H_{MF} = Moment Frame height (ft.)
W_{CL-COL} = Column center-to-center span (ft.)
D = Design aggregate point load at beam mid-span due to dead load only (lbs.)
Q_E = Design aggregate point load at beam mid-span due to seismic hold down forces (lbs.)
W = Design aggregate point load at beam mid-span due to wind hold down forces (lbs.)

Table 1.12: 12-ft Nominal Wall Height

(net wall height = 12' 0-3/4")

| Model Number | Maximum Span, W _{in-Steel} (ft-in) | Allowable In-Plane Shear, V (ASD) | | Max. Vertical Load @ Allowable V, P _u ⁷ (lbs.) | Column Base Reactions (ASD) ⁸ | | | | Frame Weight (lbs.) |
|----------------|--|---|-----------------------------------|--|--|------------------------------------|---|--|---------------------|
| | | Seismic ^{4,5} (R = 6.5) (lbs.) | Wind ⁶ (Stress) (lbs.) | | Shear @ Allowable V (lbs.) | Shear @ Max. P _u (lbs.) | Resultant Shear, V _R ⁹ (lbs.) | Uplift @ Allowable V (P _u = 0) ¹⁰ (lbs.) | |
| HFMF811-8x12 | 8'-7" | 4,600 | 2,630 | 34,000 | 2,300 | 3,370 | 5,670 | 5,760 | 1,807 |
| HFPC811-8x12 | | 10,180 | 5,810 | 35,250 | 5,090 | - | 5,090 | 14,030 | 2,377 |
| HFMF1013-8x12 | | 8,310 | 4,730 | 28,000 | 4,150 | 2,880 | 7,030 | 10,230 | 1,858 |
| HFPC1013-8x12 | | 18,380 | 10,500 | 35,750 | 9,190 | - | 9,190 | 25,210 | 2,458 |
| HFMF1214-8x12 | | 11,270 | 6,470 | 34,000 | 5,640 | 3,890 | 9,530 | 13,640 | 2,029 |
| HFPC1214-8x12 | | 23,620 | 13,490 | 32,380 | 11,810 | - | 11,810 | 32,050 | 2,748 |
| HFMF811-10x12 | 10'-7" | 3,920 | 2,240 | 32,500 | 1,960 | 4,060 | 6,020 | 4,040 | 1,900 |
| HFPC811-10x12 | | 8,250 | 4,710 | 32,500 | 4,120 | - | 4,120 | 9,360 | 2,563 |
| HFMF1013-10x12 | | 7,120 | 4,080 | 42,500 | 3,560 | 5,510 | 9,070 | 7,230 | 1,951 |
| HFPC1013-10x12 | | 14,940 | 8,540 | 35,750 | 7,470 | - | 7,470 | 16,910 | 2,643 |
| HFMF1214-10x12 | | 9,460 | 5,390 | 43,120 | 4,730 | 6,160 | 10,890 | 9,470 | 2,140 |
| HFPC1214-10x12 | | 18,800 | 10,740 | 38,470 | 9,400 | - | 9,400 | 21,120 | 2,971 |
| HFMF1416-10x12 | 12'-7" | 14,980 | 8,540 | 42,500 | 7,490 | 6,110 | 13,600 | 14,790 | 2,171 |
| HFPC1416-10x12 | | 29,640 | 16,940 | 36,770 | 14,820 | - | 14,820 | 33,240 | 3,014 |
| HFMF811-12x12 | | 3,390 | 1,950 | 27,500 | 1,690 | 4,160 | 5,850 | 2,970 | 1,993 |
| HFPC811-12x12 | | 6,900 | 3,940 | 27,420 | 3,450 | - | 3,450 | 6,640 | 2,749 |
| HFMF1013-12x12 | | 6,190 | 3,540 | 35,000 | 3,090 | 5,490 | 8,580 | 5,350 | 2,043 |
| HFPC1013-12x12 | | 12,460 | 7,130 | 31,420 | 6,230 | - | 6,230 | 12,020 | 2,828 |
| HFMF1214-12x12 | 14'-7" | 8,100 | 4,640 | 36,250 | 4,050 | 6,220 | 10,270 | 6,920 | 2,252 |
| HFPC1214-12x12 | | 15,450 | 8,830 | 34,160 | 7,720 | - | 7,720 | 14,810 | 3,195 |
| HFMF1416-12x12 | | 12,810 | 7,310 | 37,500 | 6,400 | 6,470 | 12,870 | 10,810 | 2,278 |
| HFPC1416-12x12 | | 24,300 | 13,890 | 34,370 | 12,150 | - | 12,150 | 23,300 | 3,228 |
| HFMF811-14x12 | | 2,990 | 1,710 | 21,250 | 1,490 | 3,780 | 5,270 | 2,270 | 2,086 |
| HFPC811-14x12 | | 5,910 | 3,380 | 22,650 | 2,950 | - | 2,950 | 4,950 | 2,935 |
| HFMF1013-14x12 | 16'-7" | 5,470 | 3,120 | 29,380 | 2,730 | 5,410 | 8,140 | 4,120 | 2,136 |
| HFPC1013-14x12 | | 10,660 | 6,090 | 27,840 | 5,330 | - | 5,330 | 8,950 | 3,014 |
| HFMF1214-14x12 | | 7,000 | 4,040 | 31,880 | 3,500 | 6,390 | 9,890 | 5,220 | 2,364 |
| HFPC1214-14x12 | | 13,080 | 7,470 | 30,570 | 6,540 | - | 6,540 | 10,930 | 3,419 |
| HFMF1416-14x12 | | 11,160 | 6,380 | 33,120 | 5,580 | 6,670 | 12,250 | 8,230 | 2,386 |
| HFPC1416-14x12 | | 20,450 | 11,690 | 31,930 | 10,220 | - | 10,220 | 17,130 | 3,443 |
| HFMF813-16x12 | 18'-7" | 4,060 | 2,330 | 21,000 | 2,030 | 3,910 | 5,940 | 2,730 | 2,174 |
| HFPC813-16x12 | | 8,320 | 4,760 | 26,220 | 4,160 | - | 4,160 | 6,240 | 3,131 |
| HFMF1014-16x12 | | 5,470 | 3,120 | 32,190 | 2,730 | 6,670 | 9,400 | 3,650 | 2,397 |
| HFPC1014-16x12 | | 10,480 | 5,990 | 30,880 | 5,240 | - | 5,240 | 7,840 | 3,545 |
| HFMF1216-16x12 | | 8,750 | 4,970 | 35,000 | 4,380 | 7,600 | 11,980 | 5,780 | 2,438 |
| HFPC1216-16x12 | | 16,410 | 9,380 | 32,680 | 8,200 | - | 8,200 | 12,310 | 3,587 |
| HFMF1416-16x12 | 20'-7" | 10,830 | 6,200 | 39,380 | 5,410 | 8,880 | 14,290 | 7,090 | 2,698 |
| HFPC1416-16x12 | | 19,960 | 11,400 | 37,790 | 9,980 | - | 9,980 | 14,840 | 4,068 |
| HFMF813-18x12 | | 3,720 | 2,120 | 21,090 | 1,860 | 4,470 | 6,330 | 2,240 | 2,267 |
| HFPC813-18x12 | | 7,450 | 4,260 | 22,710 | 3,720 | - | 3,720 | 5,010 | 3,316 |
| HFMF1014-18x12 | | 4,930 | 2,810 | 27,500 | 2,460 | 6,460 | 8,920 | 2,950 | 2,508 |
| HFPC1014-18x12 | | 9,290 | 5,310 | 27,700 | 4,640 | - | 4,640 | 6,240 | 3,769 |
| HFMF1216-18x12 | 20'-7" | 7,870 | 4,500 | 31,250 | 3,930 | 7,680 | 11,610 | 4,670 | 2,545 |
| HFPC1216-18x12 | | 14,490 | 8,280 | 29,550 | 7,240 | - | 7,240 | 9,770 | 3,802 |
| HFMF1416-18x12 | | 9,730 | 5,580 | 35,620 | 4,870 | 9,060 | 13,930 | 5,730 | 2,829 |
| HFPC1416-18x12 | | 17,500 | 10,000 | 34,460 | 8,750 | - | 8,750 | 11,690 | 4,329 |
| HFMF813-20x12 | | 3,430 | 1,950 | 17,660 | 1,710 | 4,210 | 5,920 | 1,870 | 2,359 |
| HFPC813-20x12 | | 6,740 | 3,850 | 18,730 | 3,370 | - | 3,370 | 4,100 | 3,501 |
| HFMF1014-20x12 | 20'-7" | 4,480 | 2,580 | 22,810 | 2,240 | 5,980 | 8,220 | 2,430 | 2,620 |
| HFPC1014-20x12 | | 8,350 | 4,770 | 23,910 | 4,170 | - | 4,170 | 5,080 | 3,992 |
| HFMF1216-20x12 | | 7,120 | 4,080 | 28,120 | 3,560 | 7,720 | 11,280 | 3,830 | 2,653 |
| HFPC1216-20x12 | | 12,940 | 7,400 | 26,930 | 6,470 | - | 6,470 | 7,920 | 4,017 |
| HFMF1416-20x12 | | 8,870 | 5,060 | 32,190 | 4,430 | 9,120 | 13,550 | 4,740 | 2,959 |
| HFPC1416-20x12 | | 15,610 | 8,930 | 31,450 | 7,810 | - | 7,810 | 9,480 | 4,590 |

Table 1.12: 12-ft Nominal Wall Height

(net wall height = 12' 0-3/4")

| Model Number | Maximum Span, $W_{in-Steel}$ (ft-in) | Allowable In-Plane Shear, V (ASD) | | Max. Vertical Load @ Allowable V, P_u (lbs.) | Column Base Reactions (ASD) ⁸ | | | | Frame Weight (lbs.) |
|----------------|--------------------------------------|--|-----------------------------------|--|--|---------------------------|--|---|---------------------|
| | | Seismic ^{4, 5} (R = 6.5) (lbs.) | Wind ⁶ (Stress) (lbs.) | | Shear @ Allowable V (lbs.) | Shear @ Max. P_u (lbs.) | Resultant Shear, V_R ⁹ (lbs.) | Uplift @ Allowable V ($P_u = 0$) ¹⁰ (lbs.) | |
| HFMF813-22x12 | 22'-7" | 3,180 | 1,800 | 15,000 | 1,590 | 3,970 | 5,560 | 1,590 | 2,452 |
| HFPI813-22x12 | | 6,150 | 3,510 | 15,730 | 3,070 | - | 3,070 | 3,420 | 3,686 |
| HFMF1014-22x12 | | 4,160 | 2,370 | 19,220 | 2,080 | 5,580 | 7,660 | 2,060 | 2,732 |
| HFPI1014-22x12 | | 7,560 | 4,320 | 20,000 | 3,780 | - | 3,780 | 4,210 | 4,216 |
| HFMF1216-22x12 | | 6,560 | 3,750 | 25,620 | 3,280 | 7,780 | 11,060 | 3,230 | 2,760 |
| HFPI1216-22x12 | | 11,690 | 6,680 | 24,630 | 5,840 | - | 5,840 | 6,550 | 4,232 |
| HFMF1416-22x12 | | 8,050 | 4,590 | 29,380 | 4,020 | 9,180 | 13,200 | 3,940 | 3,090 |
| HFPI1416-22x12 | | 14,070 | 8,040 | 28,860 | 7,030 | - | 7,030 | 7,820 | 4,851 |
| HFMF813-24x12 | 24'-7" | 2,950 | 1,700 | 12,810 | 1,470 | 3,730 | 5,200 | 1,360 | 2,544 |
| HFPI813-24x12 | | 5,650 | 3,230 | 13,340 | 2,820 | - | 2,820 | 2,900 | 3,871 |
| HFMF1014-24x12 | | 3,830 | 2,180 | 16,410 | 1,910 | 5,220 | 7,130 | 1,750 | 2,844 |
| HFPI1014-24x12 | | 6,910 | 3,950 | 16,890 | 3,450 | - | 3,450 | 3,540 | 4,439 |
| HFMF1216-24x12 | | 6,020 | 3,450 | 23,440 | 3,010 | 7,790 | 10,800 | 2,740 | 2,868 |
| HFPI1216-24x12 | | 10,640 | 6,080 | 22,630 | 5,320 | - | 5,320 | 5,490 | 4,447 |
| HFMF1416-24x12 | | 7,380 | 4,220 | 27,190 | 3,690 | 9,280 | 12,970 | 3,330 | 3,220 |
| HFPI1416-24x12 | | 12,770 | 7,290 | 26,560 | 6,380 | - | 6,380 | 6,550 | 5,112 |

Notes:

- The values in this table reflect Allowable Stress Design (ASD) and pertain to installation on 2,500 psi. min. concrete or nuts and washers with 5,000 psi. min. non-shrink grout.
- Hardy Frame Special Moment Frames are designed to meet stress and deflection limitations per applicable code requirements (AISC-360, AISC-341, and IBC) using Load and Resistance Factored Design (LRFD).
- The SidePlate proprietary moment connection is prequalified per AISC-358 to meet the requirements for special moment resisting frames. When combined with other lateral force resisting systems, Hardy Frame Special Moment Frames may be proportioned to be consistent with lower seismic design coefficients.
- For Seismic design, allowable shear loads are determined using light-frame design coefficients (R = 6.5, $C_d = 4.0$, $\Omega_0 = 3.0$) and do not exceed code-required inter-story drift limitations ($\Delta_s = 0.025h$). Allowable shear loads may be linearly proportioned based on alternate story drift ratios or deflection coefficients.
- For Seismic designs requiring redundancy factor $\rho = 1.3$, allowable shear loads may be amplified by 1.3 for checking member stresses. Tabulated maximum vertical load at allowable shear (P_u) and column base reactions assume stresses at $\rho = 1.0$.
- For Wind design, allowable shear loads are limited to $h/400$ story drift, including a factor ($Wind_{Drift} / Wind_{Stress} = 0.6$) based on the ratio of Basic Wind Speeds for MRI = 50 yrs. Allowable shear loads may be linearly proportioned based on alternate story drift ratios or Basic Wind Speed factors.
- Maximum vertical load at allowable shear (P_u) is the additional aggregate point load that may be applied at beam mid-span when the Frame is subject to the allowable shear load.
- Column base reactions are determined at the allowable shear load and do not include any over-strength (Ω_0) factor.
- Tabulated resultant shear at the column base assumes the allowable shear load in combination with the maximum vertical load at allowable shear. Design ASD shear reactions from combined lateral and vertical forces may be calculated using the equation below. No resultant shear due to vertical load occurs at Picture Frame configurations as this force is resisted by the bottom beam assembly.

$$V_R = (V_{DSN}/2) + [P_{DSN} \times (Shear @ Max.P_u / Max.P_u)]$$

V_{DSN} = Design shear load (lbs.)

P_{DSN} = Design aggregate point load at beam mid-span due to ASD load combinations (lbs.)

- Tabulated uplift at allowable shear assumes no resisting vertical load or Frame self-weight. Design ASD uplift reactions including the effect of vertical load may be calculated using the following equations:

$$Uplift w/ Seismic HD Forces = [(V_{DSN} \times H_{MF}) / W_{CL-COL}] - [(0.6D - 0.7\Omega_0 Q_E) / 2]$$

$$Uplift w/ Wind HD Forces = [(V_{DSN} \times H_{MF}) / W_{CL-COL}] - [(0.6D - 0.6W) / 2]$$

V_{DSN} = Design shear load (lbs.)

H_{MF} = Moment Frame height (ft.)

W_{CL-COL} = Column center-to-center span (ft.)

D = Design aggregate point load at beam mid-span due to dead load only (lbs.)

Q_E = Design aggregate point load at beam mid-span due to seismic hold down forces (lbs.)

W = Design aggregate point load at beam mid-span due to wind hold down forces (lbs.)

Table 1.14: 14-ft Nominal Wall Height

(net wall height = 14' 0-3/4")

| Model Number | Maximum Span, W _{in} Steel (ft-in) | Allowable In-Plane Shear, V (ASD) | | Max. Vertical Load @ Allowable V _u ⁷ (lbs.) | Column Base Reactions (ASD) ⁸ | | | | Frame Weight (lbs.) |
|----------------|--|---|-----------------------------------|---|--|------------------------------------|---|--|---------------------|
| | | Seismic ^{4,5} (R = 6.5) (lbs.) | Wind ⁶ (Stress) (lbs.) | | Shear @ Allowable V (lbs.) | Shear @ Max. P _u (lbs.) | Resultant Shear, V _R ⁹ (lbs.) | Uplift @ Allowable V (P _u = 0) ¹⁰ (lbs.) | |
| HFMF811-8x14 | 8'-7" | 3,550 | 2,040 | 34,000 | 1,770 | 2,770 | 4,540 | 5,210 | 2,043 |
| HFPC811-8x14 | | 8,390 | 4,800 | 35,250 | 4,190 | - | 4,190 | 13,370 | 2,613 |
| HFMF1013-8x14 | | 6,400 | 3,660 | 27,500 | 3,200 | 2,320 | 5,520 | 9,230 | 2,102 |
| HFPC1013-8x14 | | 15,120 | 8,640 | 35,750 | 7,560 | - | 7,560 | 23,950 | 2,702 |
| HFMF1214-8x14 | | 8,750 | 5,030 | 34,000 | 4,380 | 3,220 | 7,600 | 12,410 | 2,285 |
| HFPC1214-8x14 | 10'-7" | 19,610 | 11,210 | 32,390 | 9,800 | - | 9,800 | 30,680 | 3,004 |
| HFMF811-10x14 | | 3,060 | 1,760 | 31,560 | 1,530 | 3,270 | 4,800 | 3,700 | 2,136 |
| HFPC811-10x14 | | 6,890 | 3,930 | 31,560 | 3,440 | - | 3,440 | 9,030 | 2,799 |
| HFMF1013-10x14 | | 5,580 | 3,200 | 41,250 | 2,790 | 4,410 | 7,200 | 6,640 | 2,195 |
| HFPC1013-10x14 | | 12,440 | 7,110 | 35,750 | 6,220 | - | 6,220 | 16,260 | 2,887 |
| HFMF1214-10x14 | | 7,450 | 4,280 | 49,380 | 3,720 | 5,860 | 9,580 | 8,730 | 2,396 |
| HFPC1214-10x14 | | 15,830 | 9,050 | 41,730 | 7,910 | - | 7,910 | 20,510 | 3,227 |
| HFMF1416-10x14 | | 11,700 | 6,660 | 40,000 | 5,850 | 4,770 | 10,620 | 13,540 | 2,435 |
| HFPC1416-10x14 | | 24,930 | 14,250 | 38,720 | 12,460 | - | 12,460 | 32,190 | 3,278 |
| HFMF811-12x14 | | 12'-7" | 2,710 | 1,550 | 25,620 | 1,350 | 3,220 | 4,570 | 2,780 |
| HFPC811-12x14 | 5,810 | | 3,320 | 26,900 | 2,900 | - | 2,900 | 6,470 | 2,985 |
| HFMF1013-12x14 | 4,880 | | 2,790 | 35,310 | 2,440 | 4,590 | 7,030 | 4,940 | 2,287 |
| HFPC1013-12x14 | 10,490 | | 5,990 | 33,800 | 5,240 | - | 5,240 | 11,670 | 3,072 |
| HFMF1214-12x14 | 6,450 | | 3,680 | 40,000 | 3,220 | 5,720 | 8,940 | 6,460 | 2,508 |
| HFPC1214-12x14 | 13,140 | | 7,510 | 36,050 | 6,570 | - | 6,570 | 14,520 | 3,451 |
| HFMF1416-12x14 | 10,180 | | 5,810 | 43,120 | 5,090 | 6,190 | 11,280 | 10,060 | 2,542 |
| HFPC1416-12x14 | 20,630 | | 11,790 | 35,900 | 10,310 | - | 10,310 | 22,770 | 3,492 |
| HFMF811-14x14 | 14'-7" | 2,410 | 1,370 | 20,000 | 1,200 | 2,960 | 4,160 | 2,150 | 2,322 |
| HFPC811-14x14 | | 5,010 | 2,860 | 21,630 | 2,500 | - | 2,500 | 4,850 | 3,171 |
| HFMF1013-14x14 | | 4,350 | 2,480 | 30,940 | 2,170 | 4,740 | 6,910 | 3,840 | 2,380 |
| HFPC1013-14x14 | | 9,030 | 5,160 | 29,410 | 4,510 | - | 4,510 | 8,740 | 3,258 |
| HFMF1214-14x14 | | 5,630 | 3,230 | 34,380 | 2,810 | 5,760 | 8,570 | 4,920 | 2,620 |
| HFPC1214-14x14 | | 11,180 | 6,390 | 31,860 | 5,590 | - | 5,590 | 10,770 | 3,675 |
| HFMF1416-14x14 | | 8,870 | 5,060 | 37,500 | 4,430 | 6,300 | 10,730 | 7,660 | 2,650 |
| HFPC1416-14x14 | 17,500 | 10,000 | 33,250 | 8,750 | - | 8,750 | 16,870 | 3,707 | |
| HFMF813-16x14 | 16'-7" | 3,180 | 1,800 | 19,000 | 1,590 | 2,910 | 4,500 | 2,500 | 2,410 |
| HFPC813-16x14 | | 6,970 | 3,980 | 25,650 | 3,480 | - | 3,480 | 6,030 | 3,367 |
| HFMF1014-16x14 | | 4,350 | 2,480 | 31,560 | 2,170 | 5,430 | 7,600 | 3,400 | 2,641 |
| HFPC1014-16x14 | | 8,890 | 5,090 | 31,900 | 4,450 | - | 4,450 | 7,670 | 3,789 |
| HFMF1216-16x14 | | 6,890 | 3,950 | 38,750 | 3,440 | 6,980 | 10,420 | 5,330 | 2,694 |
| HFPC1216-16x14 | | 13,980 | 7,980 | 32,660 | 6,990 | - | 6,990 | 12,080 | 3,843 |
| HFMF1416-16x14 | | 8,710 | 4,970 | 43,120 | 4,350 | 8,100 | 12,450 | 6,670 | 2,962 |
| HFPC1416-16x14 | 17,060 | 9,750 | 38,910 | 8,530 | - | 8,530 | 14,600 | 4,332 | |
| HFMF813-18x14 | 18'-7" | 2,940 | 1,680 | 19,690 | 1,470 | 3,450 | 4,920 | 2,070 | 2,503 |
| HFPC813-18x14 | | 6,270 | 3,580 | 21,570 | 3,130 | - | 3,130 | 4,870 | 3,552 |
| HFMF1014-18x14 | | 3,970 | 2,270 | 25,940 | 1,980 | 5,070 | 7,050 | 2,780 | 2,752 |
| HFPC1014-18x14 | | 7,920 | 4,530 | 27,860 | 3,960 | - | 3,960 | 6,130 | 4,013 |
| HFMF1216-18x14 | | 6,300 | 3,620 | 33,750 | 3,150 | 6,900 | 10,050 | 4,380 | 2,801 |
| HFPC1216-18x14 | | 12,370 | 7,070 | 30,970 | 6,180 | - | 6,180 | 9,600 | 4,058 |
| HFMF1416-18x14 | | 7,870 | 4,500 | 38,120 | 3,930 | 8,100 | 12,030 | 5,420 | 3,093 |
| HFPC1416-18x14 | 15,060 | 8,610 | 35,820 | 7,530 | - | 7,530 | 11,590 | 4,593 | |
| HFMF813-20x14 | 20'-7" | 2,710 | 1,550 | 16,560 | 1,350 | 3,270 | 4,620 | 1,740 | 2,595 |
| HFPC813-20x14 | | 5,690 | 3,250 | 17,820 | 2,840 | - | 2,840 | 4,000 | 3,737 |
| HFMF1014-20x14 | | 3,640 | 2,070 | 21,560 | 1,820 | 4,720 | 6,540 | 2,310 | 2,864 |
| HFPC1014-20x14 | | 7,140 | 4,080 | 22,910 | 3,570 | - | 3,570 | 5,010 | 4,236 |
| HFMF1216-20x14 | | 5,740 | 3,290 | 30,000 | 2,870 | 6,870 | 9,740 | 3,620 | 2,909 |
| HFPC1216-20x14 | | 11,110 | 6,350 | 28,020 | 5,550 | - | 5,550 | 7,820 | 4,273 |
| HFMF1416-20x14 | | 7,120 | 4,080 | 34,380 | 3,560 | 8,150 | 11,710 | 4,450 | 3,223 |
| HFPC1416-20x14 | 13,450 | 7,680 | 32,570 | 6,720 | - | 6,720 | 9,390 | 4,854 | |

Table 1.14: 14-ft Nominal Wall Height

(net wall height = 14' 0-3/4")

| Model Number | Maximum Span, W_{in} Steel (ft-in) | Allowable In-Plane Shear, V (ASD) | | Max. w Vertical Load @ Allowable V, P_u ⁷ (lbs.) | Column Base Reactions (ASD) ⁸ | | | | Frame Weight (lbs.) |
|-----------------|---|--|---|---|--|---------------------------|--|---|---------------------|
| | | Seismic ^{4, 5} (R = 6.5) (lbs.) | Wind ⁶ (Stress) (lbs.) | | Shear @ Allowable V (lbs.) | Shear @ Max. P_u (lbs.) | Resultant Shear, V_R ⁹ (lbs.) | Uplift @ Allowable V ($P_u = 0$) ¹⁰ (lbs.) | |
| HFMF813-22x14 | 22'-7" | 2,550 | 1,460 | 14,060 | 1,270 | 3,090 | 4,360 | 1,490 | 2,688 |
| HFPIC813-22x14 | | 5,210 | 2,980 | 15,000 | 2,600 | - | 2,600 | 3,350 | 3,922 |
| HFMF1014-22x14 | | 3,340 | 1,920 | 18,280 | 1,670 | 4,430 | 6,100 | 1,940 | 2,976 |
| HFPIC1014-22x14 | | 6,480 | 3,710 | 19,210 | 3,240 | - | 3,240 | 4,160 | 4,460 |
| HFMF1216-22x14 | | 5,300 | 3,020 | 26,880 | 2,650 | 6,810 | 9,460 | 3,060 | 3,016 |
| HFPIC1216-22x14 | | 10,060 | 5,750 | 25,530 | 5,030 | - | 5,030 | 6,480 | 4,488 |
| HFMF1416-22x14 | | 6,560 | 3,750 | 31,250 | 3,280 | 8,180 | 11,460 | 3,760 | 3,354 |
| HFPIC1416-22x14 | | 12,160 | 6,950 | 29,760 | 6,080 | - | 6,080 | 7,780 | 5,115 |
| HFMF813-24x14 | 24'-7" | 2,380 | 1,370 | 12,030 | 1,190 | 2,910 | 4,100 | 1,280 | 2,780 |
| HFPIC813-24x14 | | 4,810 | 2,750 | 12,740 | 2,400 | - | 2,400 | 2,840 | 4,107 |
| HFMF1014-24x14 | | 3,130 | 1,790 | 15,620 | 1,560 | 4,160 | 5,720 | 1,670 | 3,088 |
| HFPIC1014-24x14 | | 5,940 | 3,390 | 16,250 | 2,970 | - | 2,970 | 3,510 | 4,683 |
| HFMF1216-24x14 | | 4,900 | 2,790 | 24,060 | 2,450 | 6,690 | 9,140 | 2,610 | 3,124 |
| HFPIC1216-24x14 | | 9,170 | 5,240 | 23,380 | 4,590 | - | 4,590 | 5,450 | 4,703 |
| HFMF1416-24x14 | | 6,020 | 3,450 | 28,750 | 3,010 | 8,240 | 11,250 | 3,190 | 3,484 |
| HFPIC1416-24x14 | | 11,060 | 6,320 | 27,310 | 5,530 | - | 5,530 | 6,530 | 5,376 |

Notes:

- The values in this table reflect Allowable Stress Design (ASD) and pertain to installation on 2,500 psi. min. concrete or nuts and washers with 5,000 psi. min. non-shrink grout.
- Hardy Frame Special Moment Frames are designed to meet stress and deflection limitations per applicable code requirements (AISC-360, AISC-341, and IBC) using Load and Resistance Factored Design (LRFD).
- The SidePlate proprietary moment connection is prequalified per AISC-358 to meet the requirements for special moment resisting frames. When combined with other lateral force resisting systems, Hardy Frame Special Moment Frames may be proportioned to be consistent with lower seismic design coefficients.
- For Seismic design, allowable shear loads are determined using light-frame design coefficients (R = 6.5, $C_d = 4.0$, $\Omega_0 = 3.0$) and do not exceed code-required inter-story drift limitations ($\Delta_s = 0.025h$). Allowable shear loads may be linearly proportioned based on alternate story drift ratios or deflection coefficients.
- For Seismic designs requiring redundancy factor $\rho = 1.3$, allowable shear loads may be amplified by 1.3 for checking member stresses. Tabulated maximum vertical load at allowable shear (P_u) and column base reactions assume stresses at $\rho = 1.0$.
- For Wind design, allowable shear loads are limited to $h/400$ story drift, including a factor ($Wind_{Drift} / Wind_{Stress} = 0.6$) based on the ratio of Basic Wind Speeds for MRI = 50 yrs. Allowable shear loads may be linearly proportioned based on alternate story drift ratios or Basic Wind Speed factors.
- Maximum vertical load at allowable shear (P_u) is the additional aggregate point load that may be applied at beam mid-span when the Frame is subject to the allowable shear load.
- Column base reactions are determined at the allowable shear load and do not include any over-strength (Ω_0) factor.
- Tabulated resultant shear at the column base assumes the allowable shear load in combination with the maximum vertical load at allowable shear. Design ASD shear reactions from combined lateral and vertical forces may be calculated using the equation below. No resultant shear due to vertical load occurs at Picture Frame configurations as this force is resisted by the bottom beam assembly.

$$V_R = (V_{DSN}/2) + [P_{DSN} \times (Shear @ Max.P_u / Max.P_u)]$$

V_{DSN} = Design shear load (lbs.)

P_{DSN} = Design aggregate point load at beam mid-span due to ASD load combinations (lbs.)

- Tabulated uplift at allowable shear assumes no resisting vertical load or Frame self-weight. Design ASD uplift reactions including the effect of vertical load may be calculated using the following equations:

$$Uplift \ w/ \ Seismic \ HD \ Forces = [(V_{DSN} \times H_{MF}) / W_{CL-COL}] - [(0.6D - 0.7\Omega_0 Q_E) / 2]$$

$$Uplift \ w/ \ Wind \ HD \ Forces = [(V_{DSN} \times H_{MF}) / W_{CL-COL}] - [(0.6D - 0.6W) / 2]$$

V_{DSN} = Design shear load (lbs.)

H_{MF} = Moment Frame height (ft.)

W_{CL-COL} = Column center-to-center span (ft.)

D = Design aggregate point load at beam mid-span due to dead load only (lbs.)

Q_E = Design aggregate point load at beam mid-span due to seismic hold down forces (lbs.)

W = Design aggregate point load at beam mid-span due to wind hold down forces (lbs.)

INSTALLER

HOW TO QUOTE A HARDY FRAME[®] MOMENT FRAME:

Locate the model number call-out on Foundation and Framing plans.

Note: One Moment Frame consists of two columns and a header beam (Picture Frame includes an additional foundation beam). Be careful not to double the count by confusing Moment Frame columns with individual Hardy Frame[®] Panels.

Call your material supplier with the following information for a job quote:

- Job name and location
- Quantity and model number
- Chosen delivery option: Pre-assembled, column splice or knock-down (KD)
- Project accessibility for trucks to deliver
- Jobsite access for installing the Frame

Check minimum edge distance requirements at top of concrete to determine wood framing requirements.

Check job conditions for accessibility and placement of pre-assembled Frames with a forklift or crane.

ORDERING A HARDY FRAME[®] MOMENT FRAME:

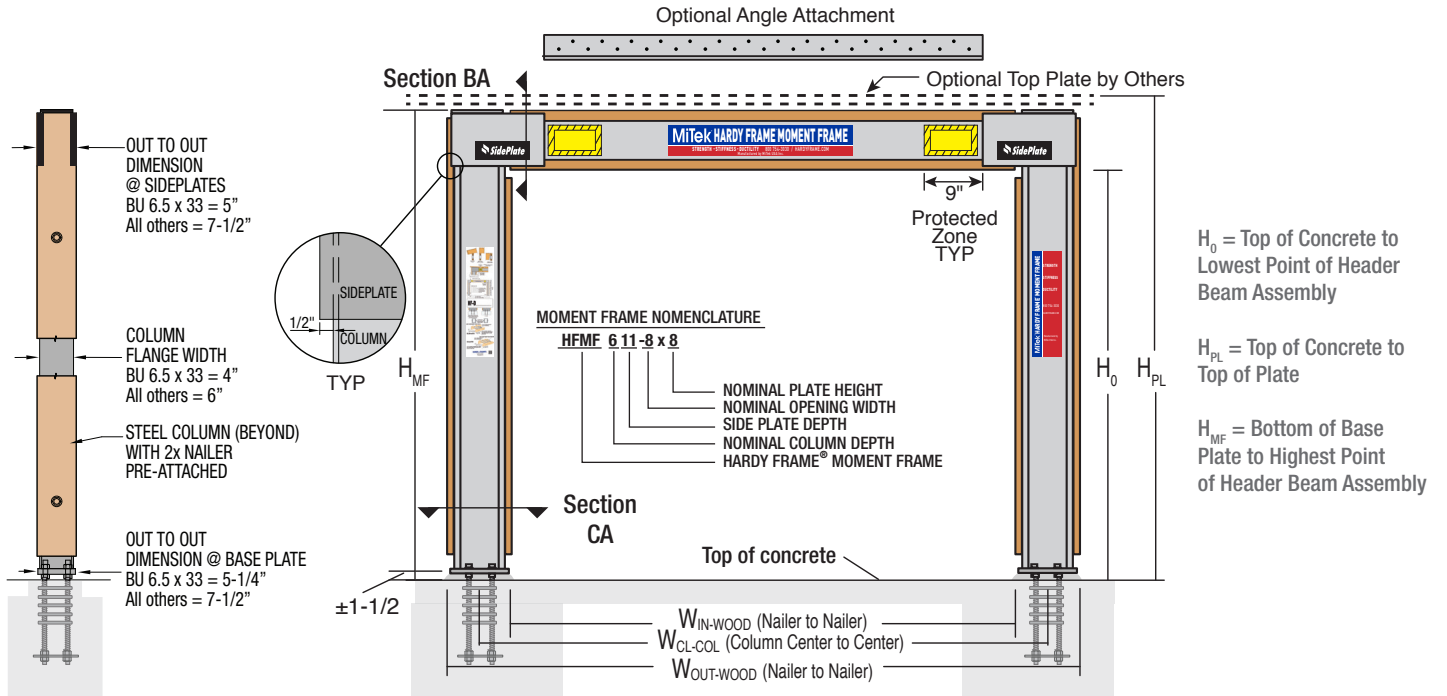
- Prior to fabrication a "Dimension Sheet" will be provided indicating standard inside and outside widths and heights as well as standard anchor lengths. This is a working document that allows the contractor to adjust dimensions, request changes to wood nailer sizes or customize nailer applications.
- Template Kits are provided when purchasing Moment Frames. Standard kits are in stock and can ship within one to two business days to expedite pouring concrete.
- Lead times for delivery of Moment Frames vary depending on job location, quantities and plant schedule.

INSTALLING TEMPLATE KITS AND HOLD DOWN ANCHORS:

- Assemble the Kit as shown in Hardy Frame Typical Installation Details and the illustrations provided on the Template and Template Kit box labels.
- Locate one Template Kit assembly at each of the column locations.
- Be sure to place the Templates so that the slotted holes are oriented perpendicular to the Moment Frame.
- Measure the slot to slot distance to be the same as the " W_{CL-COL} " (column center to center) dimension for the Frame being ordered.
- Set the top of all hold down bolts at 4-1/4 inches (minimum) to 6 inches (maximum) above top of concrete. Be sure that the embed end is extending the required distance into the footing below (l_p).
- Pour concrete and check that the assembly did not move out of alignment prior to the concrete hardening.

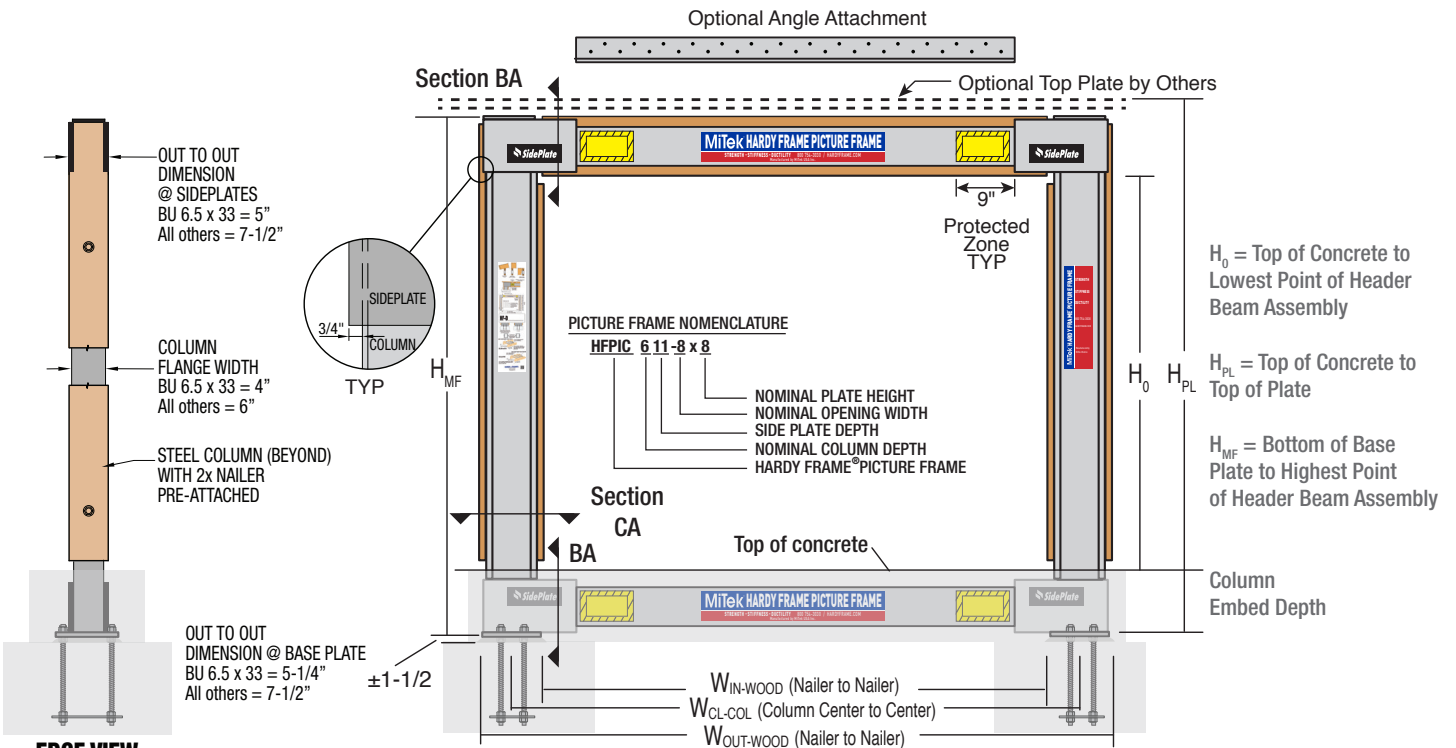
INSTALLING THE HARDY FRAME[®] MOMENT FRAME:

- Install one nut below one washer on all hold down anchors. Set the top of washer at approximately 1-1/2 inches above top of concrete.
- Unload the Moment Frame by lifting with forks or a crane at the header.
- Install the Moment Frame on the hold downs so that the base plates seat firmly on the washers and nuts below.
- Install one washer in contact with the base plate and one nut above it on all hold down bolts.
- Level the Frame and make minor height adjustments by raising or lowering the double nut connection at the base plates, then secure the connection until all nuts are "snug-tight". For installations on nuts and washers with high strength non-shrink grout, third party inspection may be required.
- Install wood framing above as occurs and make connections per details to transfer shear loads. If the specified connection will be concealed when framing is installed above, be sure to get inspections while still visible.



HARDY FRAME MOMENT FRAME (HFMF)

Section BA = See Beam Assembly Depths for Section Properties
Section CA = See Column Assembly Depths for Section Properties

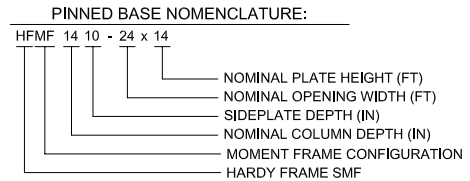
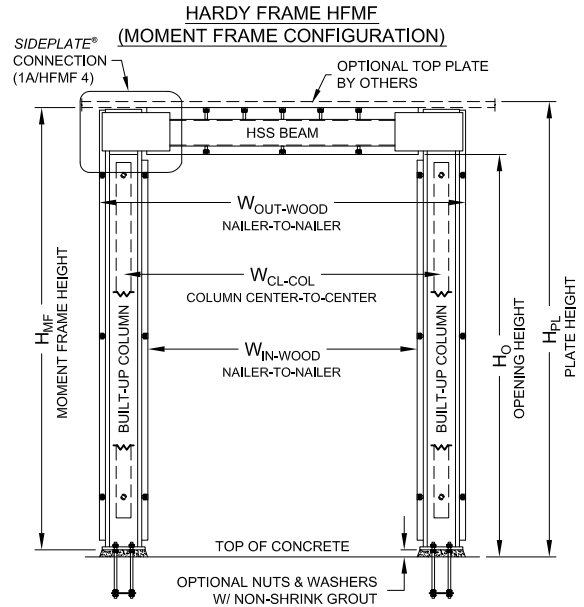


HARDY FRAME PICTURE FRAME (HFPIF)

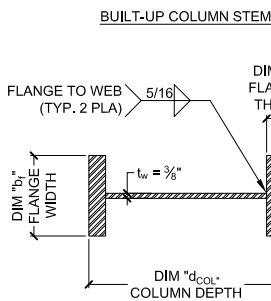
Section BA = See Beam Assembly Depths for Section Properties
Section CA = See Column Assembly Depths for Section Properties

| FRAME CONFIGURATIONS AND GEOMETRY | | | | | | |
|-----------------------------------|-----------|-------------|---------------------------|---------------------------|----------------------|-----------------|
| MODEL NUMBER | BU COLUMN | HSS BEAM | W _{CL-COL} (min) | W _{CL-COL} (max) | H _O (max) | H _{PL} |
| HFMF611 | BU6.5x33 | HSS6x4x3/8 | 8'-2 1/2" | 17'-1 1/2" | 8'-11 1/4" | 10'-0 3/4" |
| HFPIC611 | BU6.5x33 | HSS6x4x3/8 | 8'-2 1/2" | 17'-1 1/2" | 8'-11 1/4" | 10'-0 3/4" |
| HFMF811 | BU8.5x59 | HSS6x6x5/8 | 8'-4 1/2" | 15'-3 1/2" | 12'-11 1/4" | 14'-0 3/4" |
| HFPIC811 | BU8.5x59 | HSS6x6x5/8 | 8'-4 1/2" | 15'-3 1/2" | 12'-11 1/4" | 14'-0 3/4" |
| HFMF813 | BU8.5x59 | HSS8x6x1/2 | 15'-4 1/2" | 25'-3 1/2" | 12'-9 1/4" | 14'-0 3/4" |
| HFPIC813 | BU8.5x59 | HSS8x6x1/2 | 15'-4 1/2" | 25'-3 1/2" | 12'-9 1/4" | 14'-0 3/4" |
| HFMF1013 | BU10.5x61 | HSS8x6x1/2 | 8'-6 1/2" | 15'-5 1/2" | 12'-9 1/4" | 14'-0 3/4" |
| HFPIC1013 | BU10.5x61 | HSS8x6x1/2 | 8'-6 1/2" | 15'-5 1/2" | 12'-9 1/4" | 14'-0 3/4" |
| HFMF1014 | BU10.5x61 | HSS8x6x5/8 | 15'-6 1/2" | 25'-5 1/2" | 12'-8 1/4" | 14'-0 3/4" |
| HFPIC1014 | BU10.5x61 | HSS8x6x5/8 | 15'-6 1/2" | 25'-5 1/2" | 12'-8 1/4" | 14'-0 3/4" |
| HFMF1214 | BU12.5x64 | HSS8x6x5/8 | 8'-8 1/2" | 15'-7 1/2" | 12'-8 1/4" | 14'-0 3/4" |
| HFPIC1214 | BU12.5x64 | HSS8x6x5/8 | 8'-8 1/2" | 15'-7 1/2" | 12'-8 1/4" | 14'-0 3/4" |
| HFMF1216 | BU12.5x64 | HSS10x6x1/2 | 15'-8 1/2" | 25'-7 1/2" | 12'-6 1/4" | 14'-0 3/4" |
| HFPIC1216 | BU12.5x64 | HSS10x6x1/2 | 15'-8 1/2" | 25'-7 1/2" | 12'-6 1/4" | 14'-0 3/4" |
| HFMF1416 | BU14.5x66 | HSS10x6x1/2 | 9'-10 1/2" | 15'-9 1/2" | 12'-6 1/4" | 14'-0 3/4" |
| HFPIC1416 | BU14.5x66 | HSS10x6x1/2 | 9'-10 1/2" | 15'-9 1/2" | 12'-6 1/4" | 14'-0 3/4" |
| HFMF1416 | BU14.5x66 | HSS10x6x5/8 | 15'-10 1/2" | 25'-9 1/2" | 12'-6 1/4" | 14'-0 3/4" |
| HFPIC1416 | BU14.5x66 | HSS10x6x5/8 | 15'-10 1/2" | 25'-9 1/2" | 12'-6 1/4" | 14'-0 3/4" |

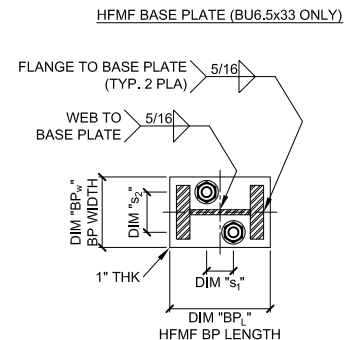
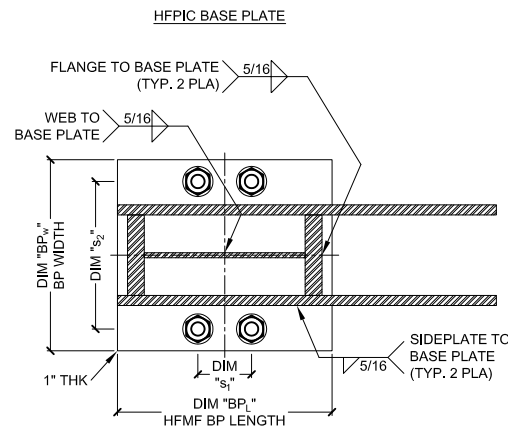
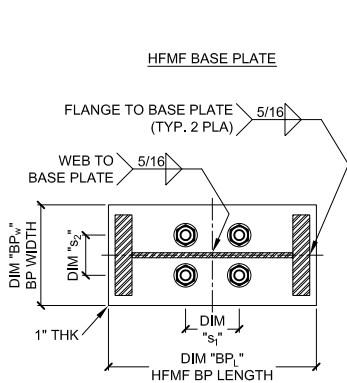
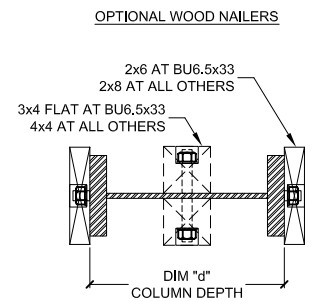
- NOTES:
- FINAL FRAME DIMENSIONS MAY BE ADJUSTED TO FIELD-SPECIFIC CONDITIONS. ANY CHANGE EXCEEDING THE NOMINAL HEIGHT OR SPAN FOR THE MODEL NUMBER SPECIFIED REQUIRES REVIEW AND APPROVAL BY THE ENGINEER OF RECORD PRIOR TO FRAME FABRICATION.
 - CUSTOM DESIGNS AVAILABLE FOR FRAMES EXCEEDING THE OVERALL LIMITATIONS OF THE MINIMUM AND MAXIMUM DIMENSIONS SHOWN ABOVE.
 - BU DESIGNATES BUILT-UP COLUMN, REFER TO 1/HFMF2 FOR COLUMN SECTION PROPERTIES.
 - LATERAL BEAM BRACING NOT REQUIRED FOR ANY MODEL AT THE SPANS SHOWN ABOVE.
 - W_{IN-WOOD} AND W_{OUT-WOOD} ASSUMED MIN 2x NAILER ATTACHED ON STEEL COLUMN FLANGES.



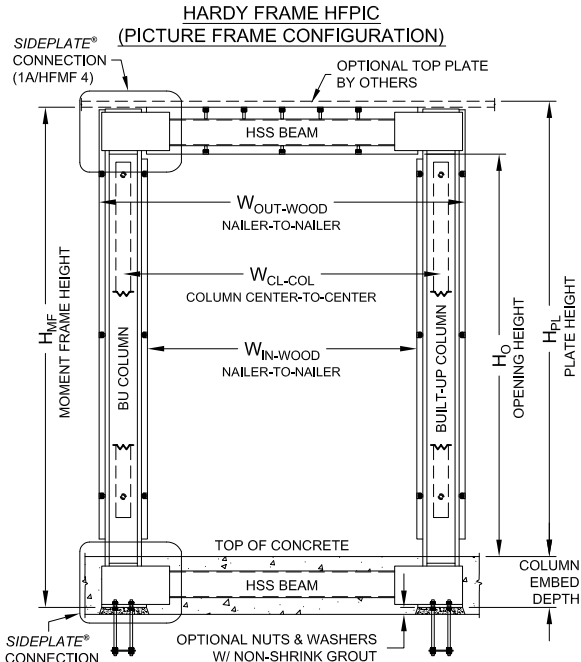
FRAME CONFIGURATIONS AND GEOMETRY



| COLUMN & BASE PLATE SECTION PROPERTIES | | | | | | | | |
|--|------------|------------------|----------------|----------------|-----------------|-----------------|----------------|----------------|
| COLUMN SECTION | FRAME TYPE | d _{COL} | b _f | t _f | BP _L | BP _W | s ₁ | s ₂ |
| BU6.5x33 | HFMF | 6 1/2" | 4" | 1" | 7 1/2" | 5 1/4" | 2" | 3" |
| | HFPIC | | | | 8" | 11 1/4" | 3" | 8 1/2" |
| BU8.5x59 | HFMF | 8 1/2" | 6" | 1 1/4" | 9 1/2" | 7 1/2" | 3" | 3" |
| | HFPIC | | | | 10" | 14 1/4" | 3" | 11" |
| BU10.5x61 | HFMF | 10 1/2" | 6" | 1 1/4" | 11 1/2" | 7 1/2" | 4" | 3" |
| | HFPIC | | | | 12" | 14 1/4" | 4" | 11" |
| BU12.5x64 | HFMF | 12 1/2" | 6" | 1 1/4" | 13 1/2" | 7 1/2" | 4" | 3" |
| | HFPIC | | | | 14" | 14 1/4" | 4" | 11" |
| BU14.5x66 | HFMF | 14 1/2" | 6" | 1 1/4" | 15 1/2" | 7 1/2" | 4" | 3" |
| | HFPIC | | | | 16" | 14 1/4" | 4" | 11" |



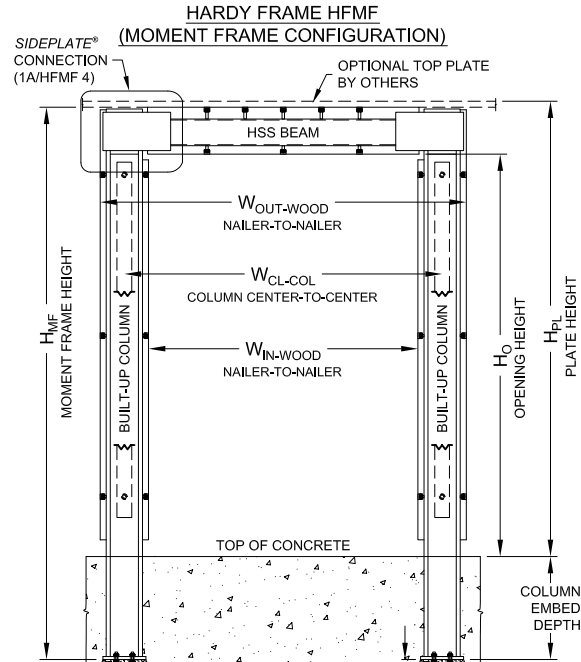
COLUMN & BASE PLATE SECTIONS



PICTURE FRAME NOMENCLATURE:

HFPI C 14 10 - 24 x 14

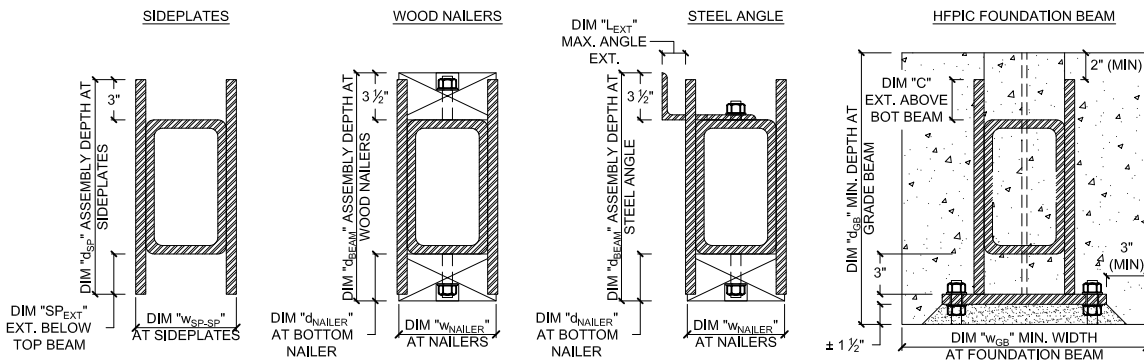
- NOMINAL PLATE HEIGHT (FT)
- NOMINAL OPENING WIDTH (FT)
- SIDEPLATE DEPTH (IN)
- NOMINAL COLUMN DEPTH (IN)
- PICTURE FRAME CONFIGURATION
- HARDY FRAME SMF



FIXED BASE NOMENCLATURE:

HFMF 14 10 - 24 x 14 FB

- FIXED BASE
- NOMINAL PLATE HEIGHT (FT)
- NOMINAL OPENING WIDTH (FT)
- SIDEPLATE DEPTH (IN)
- NOMINAL COLUMN DEPTH (IN)
- MOMENT FRAME CONFIGURATION
- HARDY FRAME SMF



| HEADER BEAM & FOUNDATION BEAM SECTION PROPERTIES | | | | | | | | | | | |
|--|------------|-----------------|--------------------|-------------------|-----------------------------|---------------------|---------------------|----------------------------|------------------|-----------------|-----------------|
| BEAM SECTION | FRAME TYPE | d _{SP} | w _{SP-SP} | SP _{EXT} | d _{BEAM} w/ NAILER | w _{NAILER} | d _{NAILER} | d _{BEAM} w/ ANGLE | L _{EXT} | d _{GB} | w _{GB} |
| HSS6x4x3/8 | HFMF | 11" | 5" | 2" | 12" | 5 1/2" | 2 1/2" | 12" | 1 1/4" | N/A | N/A |
| | HFPI C | | | | | | | | | 15 1/2" | 17 3/4" |
| HSS6x6x5/8 | HFMF | 11" | 7 1/2" | 2" | 12" | 7 1/4" | 2 1/2" | 12" | 1 3/4" | N/A | N/A |
| | HFPI C | | | | | | | | | 15 1/2" | 20 1/4" |
| HSS8x6x1/2 | HFMF | 13" | 7 1/2" | 2" | 14" | 7 1/4" | 2 1/2" | 14" | 1 3/4" | N/A | N/A |
| | HFPI C | | | | | | | | | 17 1/2" | 20 1/4" |
| HSS8x6x5/8 | HFMF | 14" | 7 1/2" | 3" | 15" | 7 1/4" | 3 1/2" | 15" | 1 3/4" | N/A | N/A |
| | HFPI C | | | | | | | | | 18 1/2" | 20 1/4" |
| HSS10x6x1/2 | HFMF | 16" | 7 1/2" | 3" | 17" | 7 1/4" | 3 1/2" | 17" | 1 3/4" | N/A | N/A |
| | HFPI C | | | | | | | | | 20 1/2" | 20 1/4" |
| HSS10x6x5/8 | HFMF | 16" | 7 1/2" | 3" | 17" | 7 1/4" | 3 1/2" | 17" | 1 3/4" | N/A | N/A |
| | HFPI C | | | | | | | | | 20 1/2" | 20 1/4" |

HEADER BEAM & FOUNDATION BEAM SECTIONS

HF HARDY FRAME

MiTek USA, Inc.
1732 PALMA DRIVE, SUITE 200
VENTURA, CA 93003
800 754-3030 / www.hardyframe.com

HARDY FRAME® SPECIAL MOMENT FRAME

TYPICAL INSTALLATION DETAILS

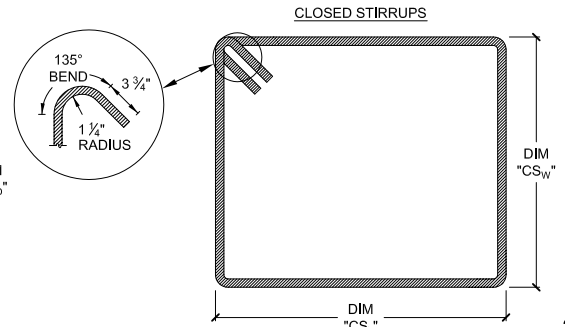
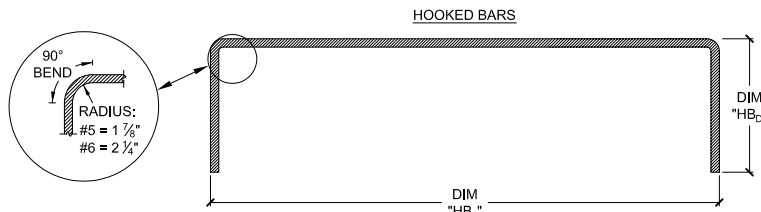
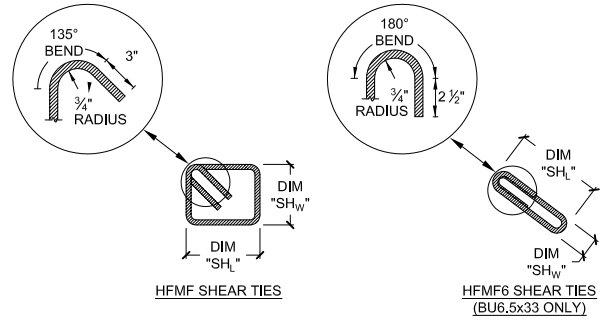
FRAME GEOMETRY & CONFIGURATIONS

REVISIONS DATE

DATE:
08-01-18

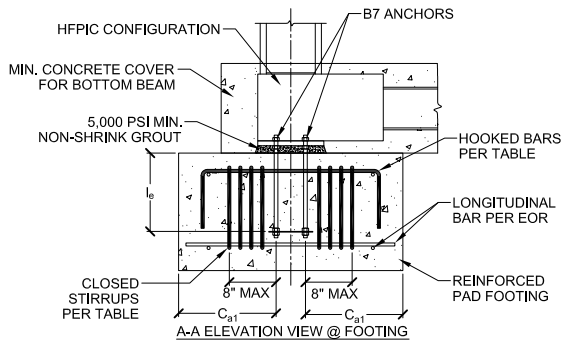
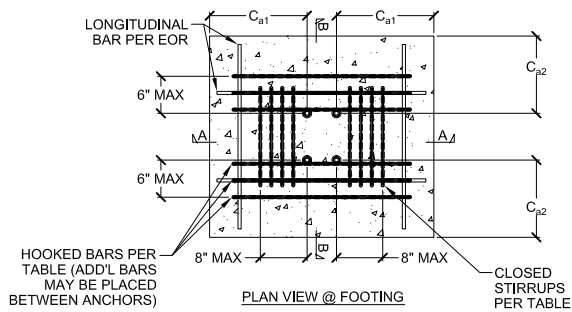
HFMF
1

| REINFORCEMENT PARAMETERS | | | | | | | |
|--------------------------|------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| COLUMN SECTION | FRAME TYPE | SHEAR TIES | | CLOSED STIRRUPS | | HOOKED BARS | |
| | | SH _L | SH _W | CS _L | CS _W | HB _L | HB _D |
| BU6.5x33 | HFMF | 5 7/8" | 2 1/4" | N/A | N/A | N/A | N/A |
| | HFPIC | N/A | N/A | 17" | | 29 3/4" | 10 1/2" |
| BU8.5x59 | HFMF | 5 1/4" | 5 1/4" | 17" | | 29 3/4" | 10 1/2" |
| | HFPIC | N/A | N/A | 19" | | 34" | 12 1/2" |
| BU10.5x61 | HFMF | 6 1/4" | 5 1/4" | 17" | 18" | 30 3/4" | 10 1/2" |
| | HFPIC | N/A | N/A | 19" | | 35" | 12 1/2" |
| BU12.5x64 | HFMF | 6 1/2" | 5 1/4" | 17" | | 30 3/4" | 10 1/2" |
| | HFPIC | N/A | N/A | 19" | | 35" | 12 1/2" |
| BU14.5x66 | HFMF | 6 1/2" | 5 1/4" | 17" | | 30 3/4" | 10 1/2" |
| | HFPIC | N/A | N/A | 19" | | 35" | 12 1/2" |

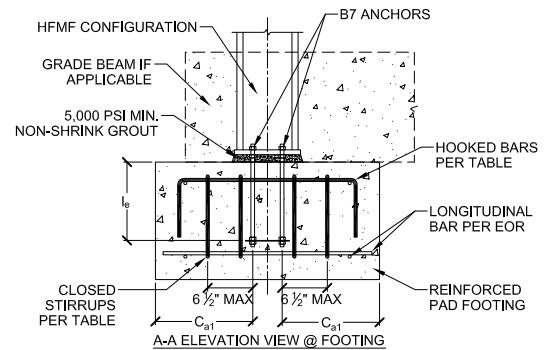
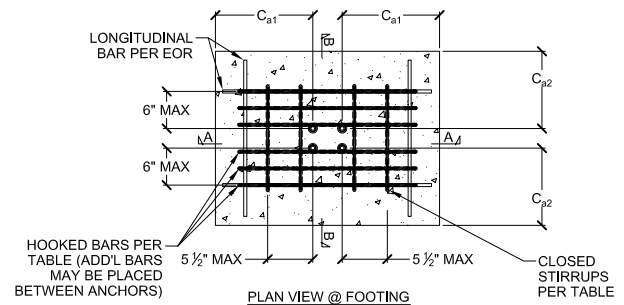


ANCHORAGE REINFORCEMENT

2

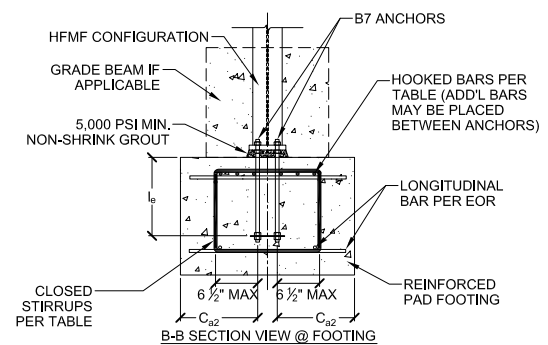
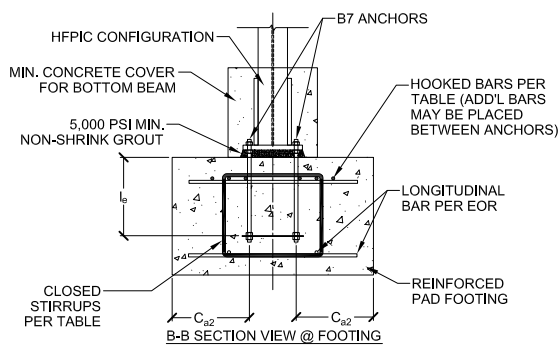


HFPIC ANCHORAGE AT FOOTING



HFMF ANCHORAGE AT FOOTING

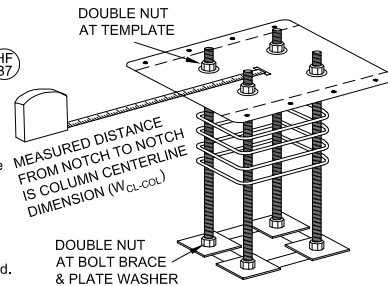
4A



| ANCHORAGE & TEMPLATE KITS ^{1,2,3,9,10} | | | | | | | | | | | | |
|---|------------|----------------------|--------------|--------------|-----------------|---------------------------|--------------------|--------------------|---------------------|------------------------------|--------------------------|--|
| COLUMN SECTION | FRAME TYPE | ANCHORAGE | | | TOP OF CONCRETE | | | CONCRETE FOOTING | | | | |
| | | QTY-DIA ⁴ | PLATE WASHER | MIN END DIST | MIN EDGE DIST | SHEAR TIES ^{5,6} | EMBED DEPTH, l_e | END DIST, C_{e1} | EDGE DIST, C_{e2} | CLOSED STIRRUPS ⁷ | HOOKED BARS ⁸ | |
| BU6.5x33 | HFMF | 2 - 3/4" | N/A | 2 3/4" | 2 1/4" | #3 @ 3" o.c. | 18" | 27" | 21" | N/A | N/A | |
| | HFPIIC | 4 - 1 1/2" | N/A | N/A | N/A | N/A | | | | 4-#5 | 4-#5 | |
| BU8.5x59 | HFMF | 4 - 3/4" | N/A | 3 1/4" | 2 1/4" | #3 @ 3" o.c. | | | | 4-#5 | 4-#5 | |
| | HFPIIC | 4 - 1 1/2" | 1/2"x3"x3" | N/A | N/A | N/A | | | | 8-#5 | 6-#6 | |
| BU10.5x61 | HFMF | 4 - 3/4" | 1/2"x3"x3" | 3 3/4" | 2 1/4" | #3 @ 3" o.c. | | | | 4-#5 | 6-#5 | |
| | HFPIIC | 4 - 1 1/2" | 1/2"x3"x3" | N/A | N/A | N/A | | | | 8-#5 | 8-#6 | |
| BU12.5x64 | HFMF | 4 - 3/4" | 1/2"x3"x3" | 4 3/4" | 2 1/4" | #3 @ 3" o.c. | | | | 5-#5 | 6-#5 | |
| | HFPIIC | 4 - 1 1/2" | 1/2"x3"x3" | N/A | N/A | N/A | | | | 8-#5 | 8-#6 | |
| BU14.5x66 | HFMF | 4 - 3/4" | 1/2"x3"x3" | 5 3/4" | 2 1/4" | #3 @ 3" o.c. | | | | 4-#5 | 8-#5 | |
| | HFPIIC | 4 - 1 1/2" | 1/2"x3"x3" | N/A | N/A | N/A | | | | 8-#5 | 10-#6 | |

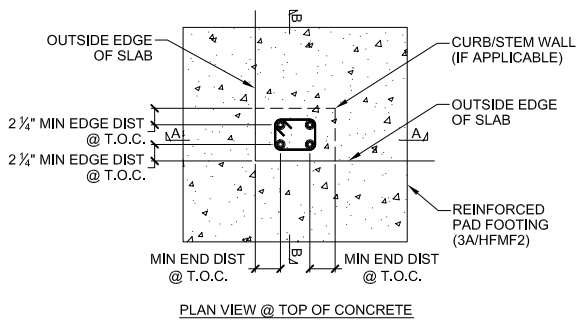
NOTES:

- Dimensions provided are the minimum requirement to satisfy pullout and shear transfer. Foundation, stem wall, and grade beam design by the engineer of record.
- Anchorages are designed per AISC 341-10 and ACI 318-14 Chapter 17 assuming $f_c = 2,500$ psi, min.
- Anchorages to shallow podium slabs or to existing concrete shall be designed by the engineer of record.
- Anchor rods provided by MiTek-Hardy Frame comply with ASTM A193 Gr. B7 (or equal) and are stamped on both ends.
- Unless frame is sitting directly on pad footing, shear ties will be required.
- The number of shear ties should be determined based on the curb/stem wall/pedestal height and following the maximum spacing. In any case, at least 4 shear ties should be provided with min of 1 shear tie in the pad footing.
- Closed stirrups are for transferring tension from anchorage to the concrete. See table for size and number per column.
- Hooked bars are for transferring shear from anchorage to the concrete. See table for size and number per column.
- Anchorages are designed assuming using Hardy Frame Template Kits. For alternate anchorage designs, calculations shall be supplied by the engineer of record.
- Hardy Frame Moment Frame Template Kits include the following accessories (see illustration for complete assembly):
 - 2- Templates (HFMF-T)
 - 2-Bolt Braces (HFMF-BB)
 - 5-#3 Grade 60 Shear Ties
 - 8-Anchor rods (4 for HFMF6) w/ 2 ea. Hardened Washers, 4 ea. Heavy Hex Nuts, & 1 ea. 3"x3"x1/2" plate washer per rod.

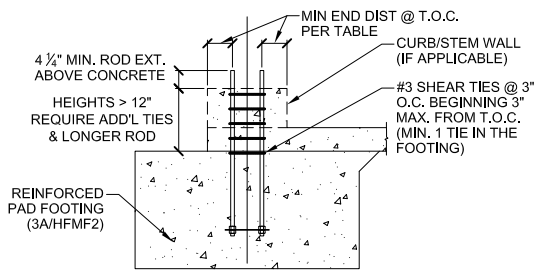


ANCHORAGE REQUIREMENTS

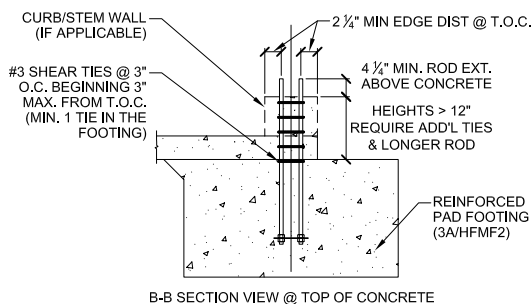
1



PLAN VIEW @ TOP OF CONCRETE



A-A ELEVATION VIEW @ TOP OF CONCRETE



B-B SECTION VIEW @ TOP OF CONCRETE

HFMF AT TOP OF CONCRETE

3

ORDERING AND INSTALLATION INSTRUCTIONS

- CALL MiTek-USA, Inc. (800) 754-3030 FOR ORDERING INFORMATION.
 - PROVIDE THE FOLLOWING INFORMATION FOR PRICING AND ORDERING:
 - JOB NAME, DELIVERY ADDRESS AND REQUESTED DELIVERY DATE
 - MODEL NUMBER AND TRACKING NUMBER (TRACKING NUMBERS APPLY TO NON-STANDARD MOMENT FRAMES ONLY)
 - ORDER QUANTITY FOR EACH MODEL NUMBER
- JOBSITE CONDITIONS
 - CONSIDER JOBSITE ACCESS FOR UNLOADING, LOCATING AND INSTALLING PRE-ASSEMBLED MOMENT FRAMES
 - DETERMINE EQUIPMENT NEEDED TO UNLOAD AND INSTALL PRE-ASSEMBLED MOMENT FRAMES SUCH AS FORKLIFT, CRANE, ETC.
- ORDER HARDY FRAME MOMENT FRAME TEMPLATE KITS (ALLOW 5-6 BUSINESS DAYS LEAD TIME FOR DELIVERY)
- CONCRETE PREPARATION
 - DETERMINE LOCATION AND LAYOUT OF TEMPLATES AND MOMENT FRAMES PER PLANS
 - INSTALL TEMPLATES AND EMBED ANCHORS PER PLAN DETAILS. REFER TO INSTALLATION INSTRUCTIONS FOR CORRECT TEMPLATE ORIENTATION, ROD ASSEMBLIES, ROD HEIGHT ABOVE CONCRETE AND TEMPLATE SPACING FOR FINISH FRAME WIDTH
 - SLOTTED HOLES ARE PROVIDED IN TEMPLATES FOR PULLING THE COLUMN CENTERLINE WIDTH (W_{col}). PRIOR TO POURING CONCRETE CONFIRM THE SLOT TO SLOT DIMENSION CORRESPONDS TO THE CORRECT W_{col} DIMENSION FOR THE MOMENT FRAME MODEL NUMBER BEING INSTALLED.
- MOMENT FRAME INSTALLATION
 - INSTALL BOTTOM (LEVELING) NUT AND WASHER ON ALL ANCHORS.
 - AT ONE ANCHOR SET TOP OF WASHER TO BE 1-1/2 INCH ABOVE TOP OF FINISH CONCRETE. USE A LEVELING DEVICE (HAND HELD LASER RECOMMENDED) TO SET THE OTHER LEVELING NUTS AND WASHERS TO ASSURE THE FRAME WILL BE INSTALLED LEVEL AND PLUMB.
 - LIFT AND PLACE THE MOMENT FRAME ONTO THE ANCHORS ONE COLUMN AT A TIME. THE COLUMNS WILL FLEX SLIGHTLY TO ALLOW SETTING THE SECOND COLUMN.
 - INSTALL WASHERS AND NUTS ABOVE THE BASE PLATES AND FINGER TIGHTEN.
 - VERIFY THE COLUMNS ARE PLUMB, THE FRAME IS IN THE WALL PLANE AND THE HEADER IS LEVEL. MAKE NECESSARY ADJUSTMENTS BY RAISING OR LOWERING THE LEVELING NUTS BELOW THE BASE PLATES.
 - WHEN FIT AND ALIGNMENT MEET FRAMERS APPROVAL TIGHTEN ALL NUTS UNTIL "SNUG TIGHT".
 - BRACE THE INSTALLED MOMENT FRAME IN THE OUT OF PLANE DIRECTION AND RE-CHECK FOR PLUMB.
 - MAKE TOP CONNECTIONS PER PLANS AND SPECIFICATIONS.
 - INSTALL HIGH STRENGTH NON-SHRINK GROUT BELOW BASE PLATES PER DETAILS AND INSTALLATION INSTRUCTIONS.

RECOMMENDED INSTALLATION TOOLS

- MOMENT FRAME TEMPLATES ON HAND TO CHECK EMBED SPACING
- HAND HELD LASER AND STANDARD LEVEL (3' TO 4')
- ONE OR TWO 16"-18" CRESCENT WRENCHES
- ELECTRIC IMPACT WRENCH OR HAND RATCHET WRENCH
- IMPACT 1-1/8" SOCKETS FOR PLAIN NUTS AT 3/4" ANCHORS
- SOCKET EXTENSION AND U-JOINT (SWIVEL)
- THREAD CHASERS FOR EMBED BOLTS IN CASE THREADS ARE DAMAGED

GENERAL NOTES

A

MiTek USA, Inc.
1732 PALMA DRIVE, SUITE 200
VENTURA, CA 93003
800 754-3030 / www.hardyframe.com

HARDY FRAME

HARDY FRAME® SPECIAL MOMENT FRAME

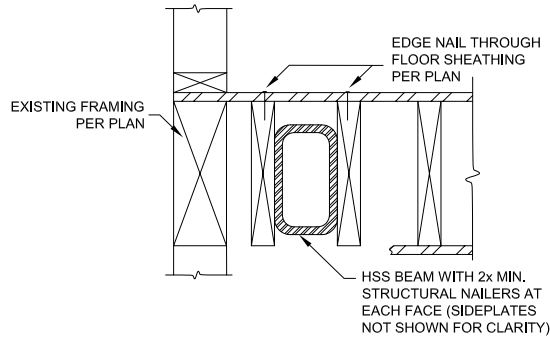
TYPICAL INSTALLATION DETAILS

FRAME ANCHORAGE & SECTION PROPERTIES

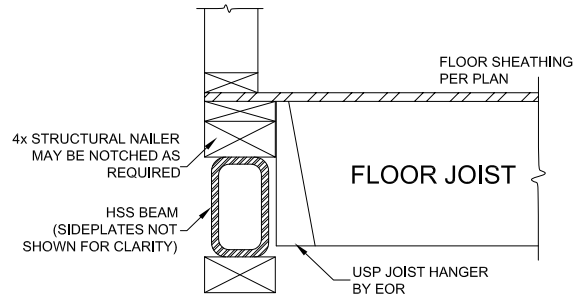
| REVISIONS | DATE |
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DATE:
08-01-18

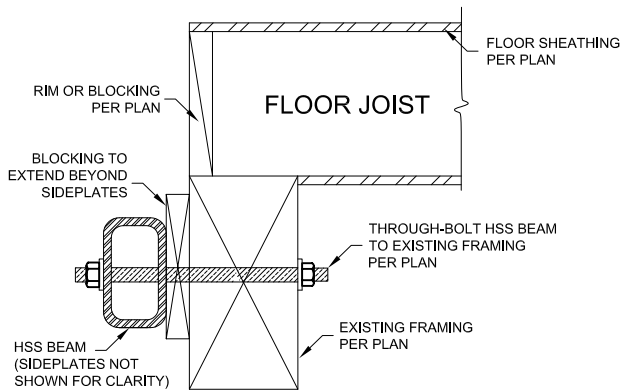
HFMF
2



EDGE NAILING AT BEAM FACE NAILERS 4



SECTION AT HEADER W/ HANGING JOISTS 3



THROUGH-BOLT AT HSS BEAM 7

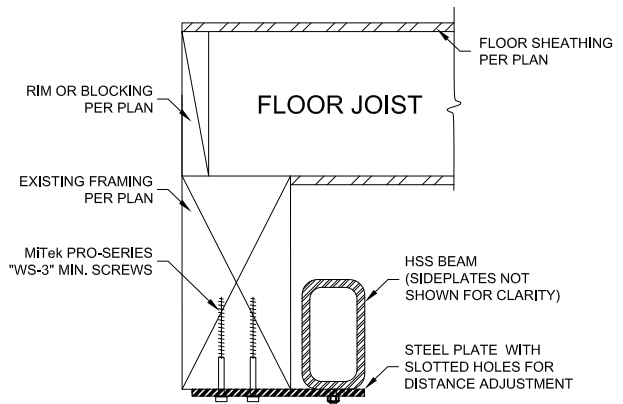
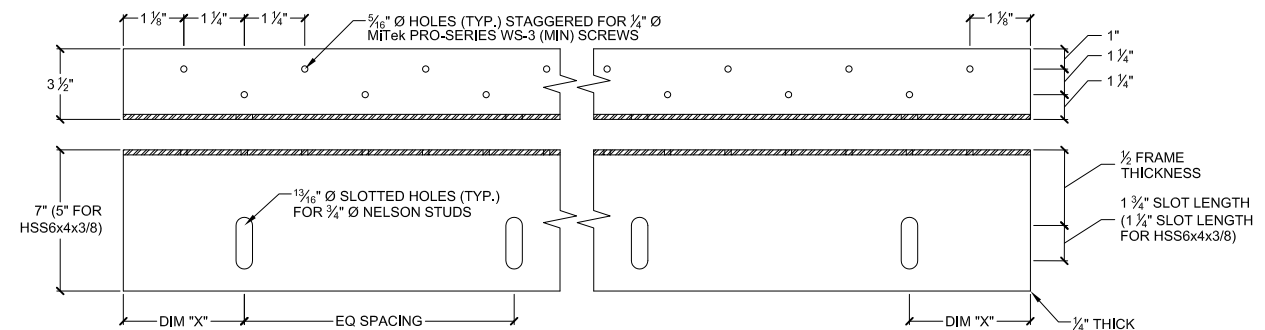
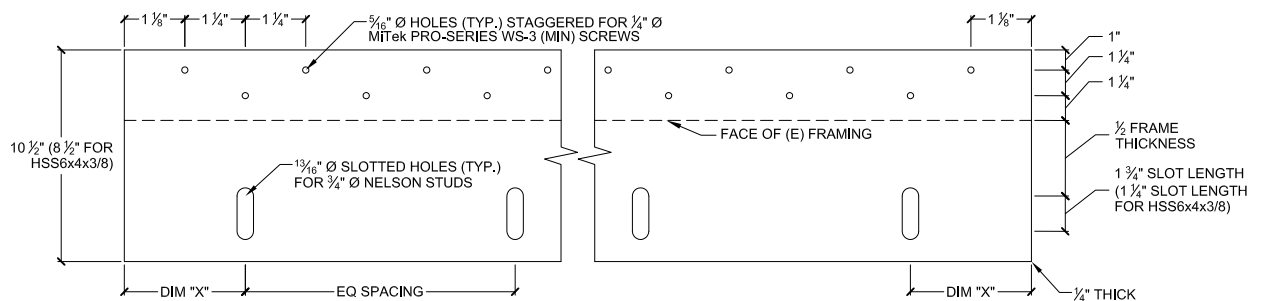


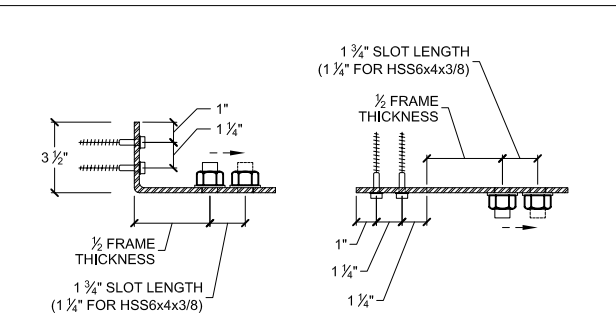
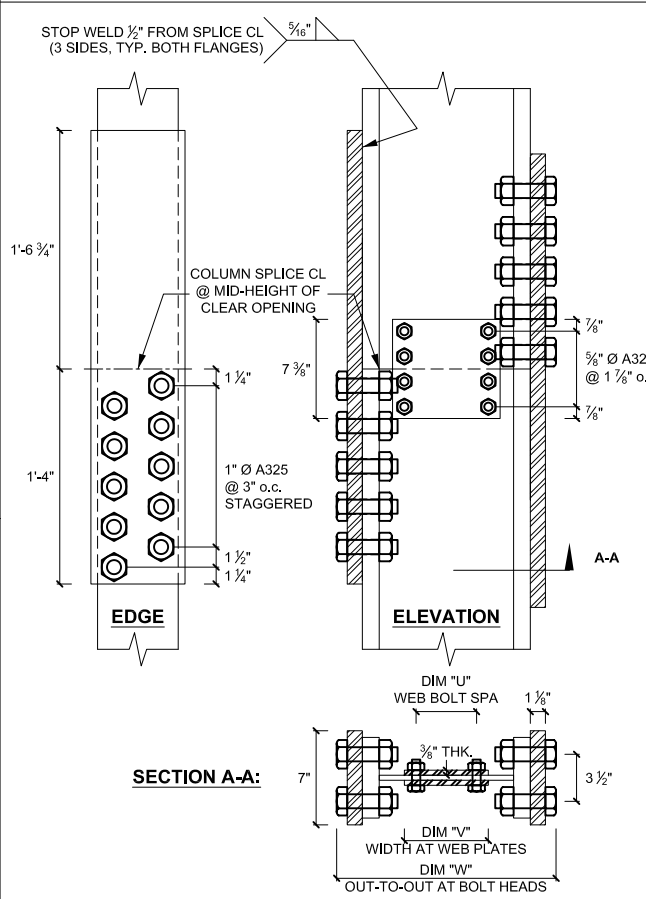
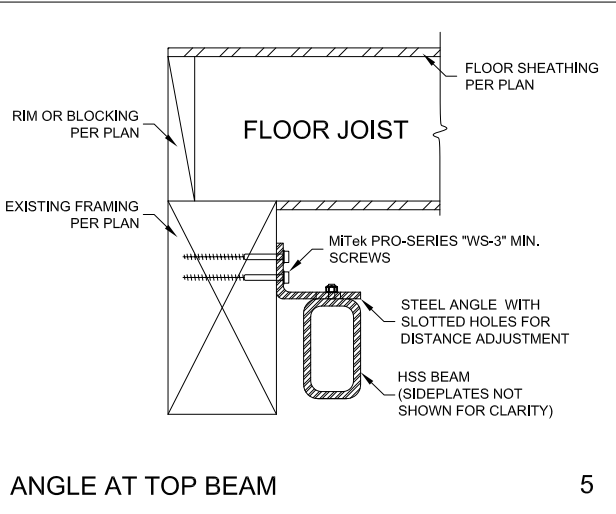
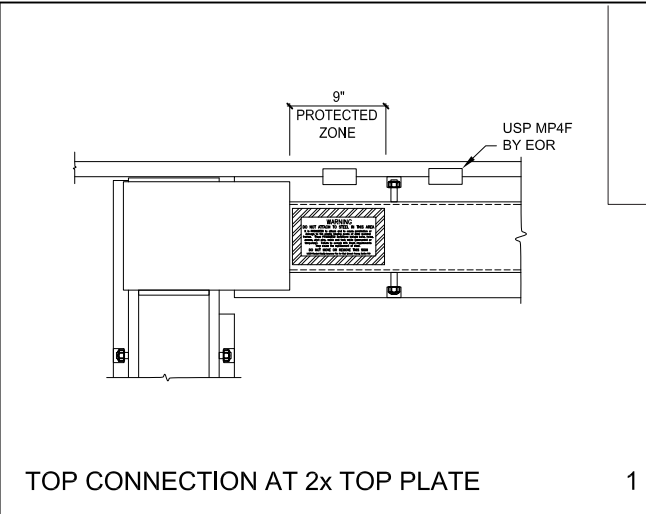
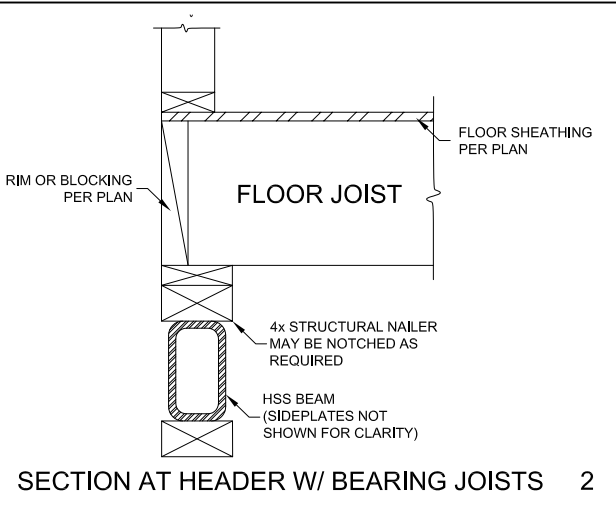
PLATE AT BOTTOM BEAM 6



STEEL ANGLE 9A



STEEL PLATE 9B



| BEAM SECTION | FRAME TYPE | FOR W _{INSTEEL} < | ANGLE/ PLATE QTY EA FRAME | STUD QTY EA ANGLE/ PLATE | *MIN. SCREW QTY EA ANGLE/ PLATE | DIM X |
|--------------|------------|----------------------------|---------------------------|--------------------------|---------------------------------|--------|
| HSS6x4x3/8 | HFMF | 16'-7" | 2 | 4 | 20 | 2 1/2" |
| | HFPIIC | | | | | |
| HSS6x6x5/8 | HFMF | 8'-7" | 1 | 8 | 52 | 8 1/2" |
| | HFPIIC | | | | | |
| HSS8x6x1/2 | HFMF | 10'-7" | 2 | 4 | 20 | 2 1/2" |
| | HFPIIC | | | | | |
| HSS8x6x5/8 | HFMF | 24'-7" | 3 | 4 | 20 | 2 1/2" |
| | HFPIIC | | | | | |

* DESIGN ASSUMES THE USE OF MiTek PRO-SERIES WS-3 MIN. SCREWS. FOR HFPIIC1416 AND W_{INSTEEL} LESS THAN 10'-7", WS-45 MIN. SCREWS ARE REQUIRED.

| COLUMN SECTION | FRAME TYPE | DIM U | DIM V | DIM W |
|----------------|------------|--------|--------|---------|
| BU6.5x33 | HFMF | N/A | N/A | N/A |
| | HFPIIC | | | |
| BU8.5x59 | HFMF | 2 1/2" | 4 1/4" | 12 1/2" |
| | HFPIIC | | | |
| BU10.5x61 | HFMF | 3 1/2" | 5 1/4" | 14 1/2" |
| | HFPIIC | | | |
| BU12.5x64 | HFMF | 4 1/2" | 6 1/4" | 16 1/2" |
| | HFPIIC | | | |
| BU14.5x66 | HFMF | 5 1/2" | 7 1/4" | 18 1/2" |
| | HFPIIC | | | |

STEEL ANGLE & PLATE ATTACHMENTS 9

BOLTED COLUMN SPLICE 8

MiTek USA, Inc.
1732 PALMA DRIVE, SUITE 200
VENTURA, CA 93003
800 754-3030 / www.hardyframe.com

HF HARDY FRAME
HARDY FRAME® SPECIAL MOMENT FRAME
TYPICAL INSTALLATION DETAILS
FRAMING CONNECTIONS & ATTACHMENTS

| REVISIONS | DATE |
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DATE:
08-01-18

HFMF
3

HARDY FRAME[®] SPECIAL MOMENT FRAME - GENERAL NOTES

GENERAL REQUIREMENTS

- REFERENCED DOCUMENTS: THE DESIGN, FABRICATION AND QUALITY ASSURANCE OF THE HARDY FRAME SPECIAL MOMENT FRAME SYSTEM COMPLIES WITH THE FOLLOWING:
 - INTERNATIONAL BUILDING CODE (IBC) - 2012 & 2015
 - PREQUALIFIED CONNECTIONS FOR SPECIAL MOMENT FRAMES FOR SEISMIC APPLICATIONS (AISC 358s2-14 & AISC 358-16, CH. 11)
 - AMERICAN INSTITUTE OF STEEL CONSTRUCTION SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS (AISC 360-10 & AISC 360-16)
 - AMERICAN INSTITUTE OF STEEL CONSTRUCTION SEISMIC PROVISIONS FOR STRUCTURAL STEEL BUILDINGS (AISC 341-10 & AISC 341-16)
 - AMERICAN WELDING SOCIETY D1.1 2015 STRUCTURAL WELDING CODE-STEEL (AWS D1.1 & D1.8)
- ALPHA AND NUMERIC DESIGNATORS (#) & (##) USED HEREIN TO SIMPLIFY THE IDENTIFICATION OF PLATES AND WELDS, RESPECTIVELY. DESIGNATORS ARE DEFINED BELOW (REFER TO DETAIL 1/HFMF 4):
 - [A] SIDE PLATES, PARALLEL TO WEB OF COLUMN, CONNECTING BEAM TO COLUMN.
 - [D] HORIZONTAL SHEAR PLATE
 - {1} FILLET WELD CONNECTING SIDE PLATE [A] TO HORIZONTAL SHEAR PLATE [D]
 - {2} FILLET WELD CONNECTING INSIDE FACE OF SIDE PLATE [A] TO FLANGE TIPS OF W-COLUMN
 - {3} FILLET WELD CONNECTING INTERIOR EDGES OF HORIZONTAL SHEAR PLATE [D] TO FACES OF FLANGES AND WEB OF W-COLUMN
 - {6} FILLET WELD CONNECTING SIDE WALL OF HSS BEAM TO SIDE PLATE [A]
 - {7} HORIZONTAL FLARE-BEVEL WELD CONNECTING HSS BEAM RADIUS TO SIDE PLATE [A]

MATERIAL

- MATERIAL:
 - MOMENT CONNECTION PLATE AND BUILT-UP COLUMN PLATE MATERIAL MEETS THE REQUIREMENTS OF ASTM A572, GRADE 50
 - BASE PLATE MATERIAL MEETS THE REQUIREMENTS OF ASTM A572
 - ALL OTHER FASTENERS AND COMPONENTS MEET THE REQUIREMENTS OF ASTM A36
 - ANCHOR BOLTS SHALL COMPLY WITH THE REQUIREMENTS OF ASTM A307 (AS REQUIRED BY LOCAL JURISDICTIONS)
 - NELSON STUDS (Fy=70ksi)
 - COLUMN & BEAM WOOD NAILERS MEET THE REQUIREMENTS OF NO. 2 DOUGLAS FIR LARCH OR BETTER
- ROLLED SHAPES:
 - ROLLED SHAPES USED FOR COLUMNS MEET THE REQUIREMENTS OF ASTM A992
 - HSS SECTIONS USED FOR BEAMS MEET THE REQUIREMENTS OF ASTM A500 GRADE B
- WELD FILLER METAL:
 - THE WELD FILLER METAL AND ASSOCIATED WELDING PROCESS FOR ALL FILLET AND FLARE-BEVEL WELDS MAY BE ANY OF THE FOLLOWING, PROVIDED COMPLIANCE WITH NOTES 3.b AND 3.c BELOW IS DEMONSTRATED:
 - E70T-6, E71T-1, E71T-8 OR E70TG-K2 FOR FCAW
 - E7XT-9 FOR FLUX CORED ARC WELDING (FCAW) WITH GAS SHIELDING
 - F7A2-EXXX FOR SUBMERGED ARC WELDING (SAW)
 - E7018 STICK ELECTRODE FOR SHIELDED METAL ARC WELDING (SMAW)
 THE WELD FILLER METAL USED DEMONSTRATES AN ENERGY EQUIVALENT TO A MINIMUM CVN TOUGHNESS OF 20 FT-LBS. IMPACT STRENGTH AT A TEMPERATURE OF -20°F AND 40 FT-LBS IMPACT STRENGTH AT 70°F AS DETERMINED BY AWS CLASSIFICATION TEST METHODS OR MANUFACTURER CERTIFICATION.
 - ALL WELD FILLER METAL SATISFIES A MAXIMUM DIFFUSIBLE HYDROGEN CONTENT REQUIREMENT OF 16 MILLILITERS OF HYDROGEN PER 100 GRAMS OF WELD METAL OR LESS (H16).

FIELD WELDING (AS OCCURS FOR FILLET/FLARE BEVEL WELDS ON HSS BEAMS TO SIDE PLATES)

FIELD WELDING SHALL COMPLY FULLY WITH THE REQUIREMENTS OUTLINED IN SECTION "SHOP WELDING."

PREPARATION

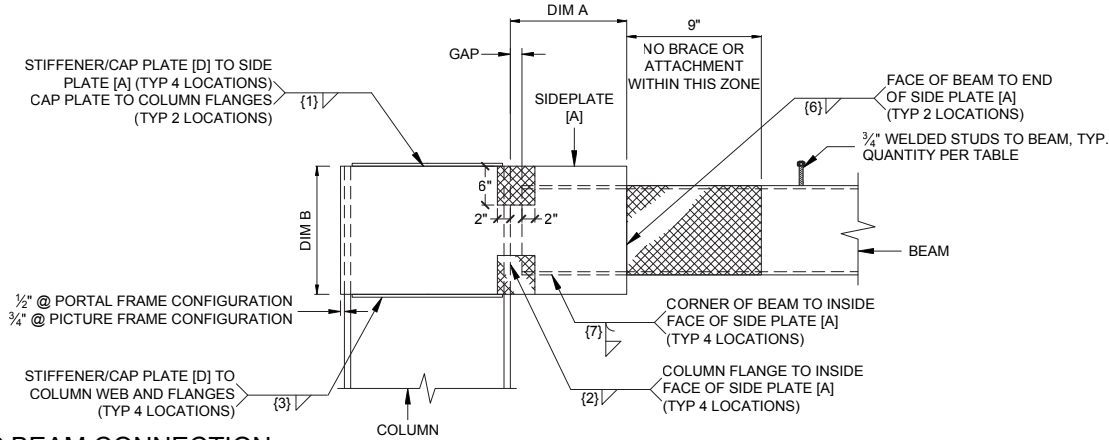
- THE FABRICATOR EMPLOYS A DISTORTION CONTROL PROGRAM TO ADDRESS CONTROL OF DISTORTION AND WELD SHRINKAGE, INCLUDING MAINTENANCE OF DIMENSIONAL ACCURACY.
- BASE METAL SURFACE PREPARATION: SURFACES ON WHICH WELD METAL IS TO BE DEPOSITED, INCLUDING BUT NOT LIMITED TO COLUMN FLANGE TIPS (I.E., COLUMN FLANGE-TO-SIDE PLATE [A] ATTACHMENT), BEAM RADII, AND THERMAL CUT EDGES ARE SMOOTH, UNIFORM, AND FREE FROM LOOSE OR THICK SCALE, SLAG, RUST, MOISTURE, GREASE AND OTHER FOREIGN MATERIAL THAT WOULD PREVENT PROPER WELDING.
- THERMAL CUTTING:
 - THE ROUGHNESSES OF ALL THERMAL-CUT SURFACES ARE NOT GREATER THAN AN ANSI SURFACE ROUGHNESS VALUE OF 1000 MICRO-INCHES. ROUGHNESS EXCEEDING THIS VALUE, AND NOTCHES OR GOUGES NOT MORE THAN 3/16 INCH DEEP, ON OTHERWISE SATISFACTORY SURFACES ARE REMOVED BY MACHINING OR GRINDING.
 - FLAME CUT SURFACES ARE FREE OF GLOBULES AND LOOSE SLAG. THE THERMAL CUTTING EQUIPMENT IS SO ADJUSTED AND MANIPULATED AS TO AVOID CUTTING BEYOND (INSIDE) THE PRESCRIBED LINES.
 - THERMAL CUTTING PROCESSES ARE LIMITED TO PLASMA ARC-CUTTING OR OXYFUEL GAS PROCESSES.

QUALITY CONTROL

- MiTek-USA, INC. OR THEIR SUBCONTRACTORS ARE RESPONSIBLE FOR QUALITY CONTROL AND PROVIDE IN-PROCESS VISUAL INSPECTION OF ALL FABRICATION ACTIVITIES TO ENSURE THAT MATERIALS AND WORKMANSHIP MEET THE REQUIREMENTS OF THE DESIGN. QC INSPECTION INCLUDES HOLD POINTS FOR POST-WELD VISUAL INSPECTION OF FILLET WELD {2} PRIOR TO INSERTION OF BEAM TO VERIFY WELD INTEGRITY. AS OCCURS, FIELD WELDING QUALITY CONTROL IS THE RESPONSIBILITY OF THE PURCHASER (SEE "UT INSPECTION" SECTION).

SHOP WELDING

- WELDER QUALIFICATION: THE PERFORMANCES OF ALL WELDERS, WELDING OPERATORS AND TACK WELDERS ARE QUALIFIED IN CONFORMANCE WITH AWS D1.1, SECTION 4, PART C TO DEMONSTRATE ABILITY TO PRODUCE SOUND WELDS.
- WELDING PROCEDURE SPECIFICATIONS (WPS):
 - THE FABRICATION CONTRACTOR HAS PREPARED A SPECIFIC WRITTEN WPS FOR EACH DIFFERENT WELDING APPLICATION. DIFFERENT WELDING APPLICATIONS INCLUDE, BUT ARE NOT LIMITED TO, THE JOINT DETAILS AND TOLERANCES, PREHEAT AND INTERPASS TEMPERATURE, SINGLE OR MULTIPLE STRINGER PASSES, WELDING CURRENT, POLARITY, ALLOWABLE AMPERAGE RANGES, ALLOWABLE VOLTAGE RANGES, ALLOWABLE TRAVEL SPEED RANGES, ELECTRODE EXTENSION, ROOT TREATMENT, WELDING POSITION, WELDING PROCESS, ELECTRODE MANUFACTURER, FILLER METAL TRADE NAME FOR THE ELECTRODE TYPE SELECTED, AND OTHER ESSENTIAL VARIABLES AS DEFINED IN AWS D1.1 REQUIRED TO COMPLETE THE FABRICATION OF THE MOMENT FRAME(S). AMPERAGE, VOLTAGE, TRAVEL SPEED AND ELECTRODE EXTENSION ARE MAINTAINED WITHIN THE FILLER METAL MANUFACTURER'S RECOMMENDATIONS.
 - EACH WPS PREPARED IS BASED ON AND REFERENCED TO A DOCUMENTED AND APPROVED PROCEDURE QUALIFICATION RECORD (PQR).
 - THE APPROVED WPS FOR EACH APPLICABLE PRODUCTION WELD IS CLEARLY DISPLAYED TO PROVIDE READY ACCESS BY THE ASSIGNED WELDERS, WELDING SUPERVISORS AND INSPECTORS.
 - ALL WPSs ARE PREPARED BY QUALIFIED INDIVIDUALS. WPSs ARE PREPARED BY THE SAME INDIVIDUAL RESPONSIBLE FOR THE SUITABILITY OF THE WPS.
- WELDING PROCEDURE QUALIFICATION (PQR):
 - DOCUMENTED PROCEDURE QUALIFICATION RECORDS ARE MAINTAINED BY HARDY FRAMES, INC. PROCEDURE QUALIFICATION CONFORMS TO THE REQUIREMENTS OF AWS D1.1, TABLE 4.1 AND EMPLOYS THE FOLLOWING TESTING METHODS AND ACCEPTANCE CRITERIA:
 - VISUAL INSPECTION IN ACCORDANCE WITH AWS D1.1, SECTION 4.8.1.
 - RADIOGRAPHIC TESTING (RT) OR ULTRASONIC TESTING (UT) BEFORE PREPARING MECHANICAL TEST SPECIMENS, IN ACCORDANCE WITH AWS D1.1, SECTION 4.8.2.
 - MECHANICAL TESTING IN ACCORDANCE WITH AWS D1.1, SECTION 4.8.3. THE TYPE AND NUMBER OF TEST SPECIMENS, FOR EACH QUALIFIED PRODUCTION WELDING POSITION, SHALL BE PER AWS D1.1, TABLE 4.2 (1), USING A GROOVE WELD TEST PLATE PER FIGURE 4.10(2). CHARTY V-NOTCH IMPACT TESTING OF THE WELD METAL IN ACCORDANCE WITH AWS D1.1, SECTION 4.1.1.3. THE REQUIRED TEST TEMPERATURE AND ENERGY VALUE IS THAT SPECIFIED IN MATERIAL SECTION 3.b. THE TYPE AND NUMBER OF NOTCH TOUGHNESS SPECIMENS, FOR EACH QUALIFIED PRODUCTION WELDING POSITION, IS PER AWS D1.1, ANNEX III, TABLE III-1. ONE SPECIMEN MAY BE LESS THAN THE MINIMUM AVERAGE OF 20 FT-LBS., BUT NOT LESS THAN 15 FT-LBS.
 - ALL PROCEDURE QUALIFICATION TESTING IS PERFORMED BY AN INDEPENDENT CERTIFIED AND APPROVED TESTING LABORATORY.
 - IN LIEU OF THE REQUIREMENTS OF 3.a AND 3.b, A CURRENT CERTIFICATE OF CONFORMANCE PROVIDED BY THE WIRE MANUFACTURER MAY BE USED AS THE SUPPORTING PQR PROVIDED FULL COMPLIANCE IS MET FOR EVERY CONDITION OF PREQUALIFICATION FOUND IN AWS D1.1 SECTION 3 FOR PREQUALIFIED FILLET WELDS. THE SELECTION OF THIS OPTION BY THE CONTRACTOR'S FABRICATION/ERECTION SUBCONTRACTOR IS PREDICATED ON ITS ACKNOWLEDGEMENT THAT ITS CERTIFIED WELDERS ARE EXPERIENCED AND CONFIDENT IN THE USE AND SETTINGS SPECIFIED IN THE CERTIFICATE OF CONFORMANCE WITH THE ALLOWABLE TOLERANCES FOR ESSENTIAL VARIABLES FOUND IN TABLE 4.5 OF AWS D1.1.
- TACK WELDS:
 - TACK WELDS ARE SUBJECT TO THE SAME QUALITY REQUIREMENTS AS THE FINAL WELDS, INCLUDING PREHEAT AND UNDERCUT, IN ACCORDANCE WITH AWS D1.1, SECTION 5.18.2. THESE QUALITY REQUIREMENTS APPLY EQUALLY TO TACK WELDING OF BACKING STRIPS, FILLER PLATE, WELD RUN-OFF TABS, AND ANY OTHER CONSTRUCTION AIDS.
 - VERTICAL TACK WELDS BETWEEN SIDE PLATE [A] AND FLANGE EDGES OF COLUMN ARE NOT PLACED WITHIN 2 INCHES OF EACH END OF WELD {2}.
 - TACK WELDS BETWEEN SIDE PLATES [A] AND HSS BEAM ARE NOT PLACED WITHIN 2 INCHES OF EACH END OF WELD {7}.
 - ALIGNMENT CONTROL METHODS MAY INCLUDE, BUT ARE NOT LIMITED TO, TACK WELDING OF TEMPORARY ANGLE STRUTS ('DOGS') TO TOP AND BOTTOM FREE EDGES OF SIDE PLATE [A], NOT CLOSER THAN 2 INCHES FROM THE VERTICAL FREE EDGE OF SIDE PLATE [A], IN ORDER TO MAINTAIN THE NECESSARY SEPARATION DISTANCE REQUIRED TO INSTALL THE HSS BEAM.
- WELD RUN-OFF TABS ARE NOT USED FOR FILLET WELDS.
- PREHEAT AND INTERPASS TEMPERATURE REQUIREMENTS:
 - THE MINIMUM PREHEAT AND INTERPASS TEMPERATURES FOR A GIVEN THICKNESS OF BASE METAL TO BE WELDED IS DETERMINED BY AWS D1.1 TABLE 3.2.
 - PREHEAT TEMPERATURES ARE MEASURED AT A DISTANCE FROM THE WELD EQUAL TO THE THICKNESS OF THE PART BEING WELDED, BUT NOT LESS THAN THREE INCHES IN ANY DIRECTION INCLUDING THE THROUGH THICKNESS OF THE PIECE. WHERE PLATES ARE OF DIFFERENT THICKNESS, THE PREHEAT REQUIREMENT FOR THE THICKER PLATE GOVERNS. MAINTENANCE OF PREHEAT TEMPERATURE THROUGH THE EXECUTION OF THE WELD (I.E. THE INTERPASS TEMPERATURE) IS ESSENTIAL. MAXIMUM INTERPASS TEMPERATURE IS LIMITED TO 550 DEGREES FAHRENHEIT, MEASURED AT A DISTANCE NOT EXCEEDING ONE INCH FROM THE START OF THE WELD PASS. WELDING OPERATORS AND INSPECTORS ARE IN POSSESSION OF AND UTILIZING TEMPERATURE STICKS.
 - IN NO CASE, REGARDLESS OF THE WELDING PROCESS, SHALL THE PREHEAT TEMPERATURE BE LESS THAN THAT REQUIRED TO DRIVE OFF ANY SURFACE MOISTURE OR CONDENSATION WHICH MAY BE PRESENT ON THE STEEL ELEMENTS TO BE WELDED.
- ALL SLAG IS REMOVED AFTER EACH WELD PASS BEFORE WELDING OVER PREVIOUSLY DEPOSITED WELD METAL, AND THE WELD AND THE ADJACENT BASE METAL SHALL BE BRUSHED CLEAN. THIS REQUIREMENT SHALL APPLY NOT ONLY TO SUCCESSIVE LAYERS BUT ALSO TO SUCCESSIVE BEADS AND TO THE CRATER AREA WHEN WELDING IS RESUMED AFTER ANY INTERRUPTION, IN ACCORDANCE WITH AWS D1.1 SECTION 5.30.1.
- ARC STRIKES ON CONNECTION PLATES, BEAMS AND COLUMNS ARE TO BE AVOIDED.
- WELD TIE-INS ARE NOT PERMITTED
- PEENING IS NOT ALLOWED.

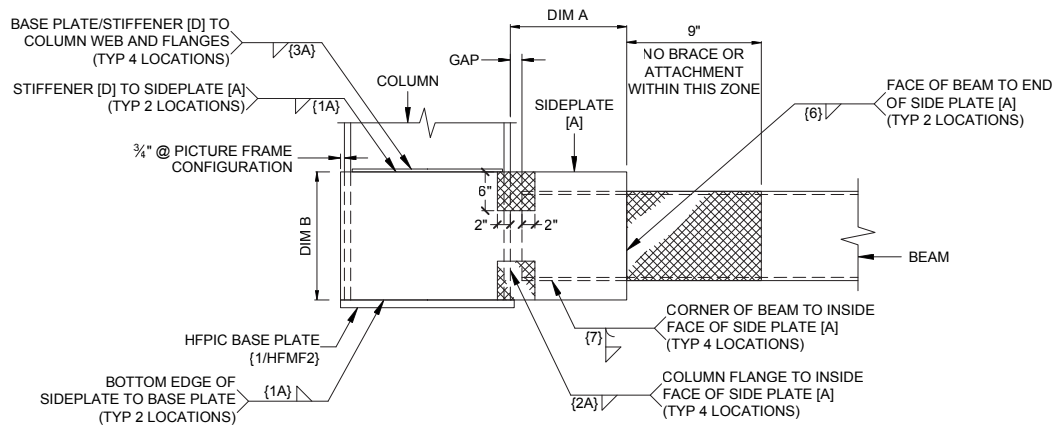


TOP BEAM CONNECTION

1A

NOTICE OF PROPRIETARY INFORMATION

The SIDEPLATE® steel frame connection information for the Hardy Frame® Moment Frame herein is PROPRIETARY information belonging to MiTek-USA, Inc., Tel. (800) 754-3030, www.hardyframe.com. The SIDEPLATE® Connection Technology is patented in the U.S.A. (U.S. Patent nos. 5,660,017, 6,138,427, 6,516,583 & 6,591,573) and other countries, with other patents applied for. Use or disclosure of this information is strictly prohibited except as authorized in writing by MiTek-USA, Inc. Violators will be prosecuted in accordance with U.S.A. and Foreign Patent and Intellectual Property Laws.



BOTTOM BEAM CONNECTION (HFPIC CONFIGURATION ONLY)

1B

SIDEPLATE CONNECTION DESIGN PARAMETERS

| MODEL NUMBER | COLUMN | PLATE THICKNESS | | WELD SIZE | | | | | BEAM | GAP | DIMENSIONS | | WELD SIZE | | 3/4" STUDS** | |
|--------------|-----------|-----------------|------|-----------|-------|-------|-------|------|------|-------------|------------|-----|-----------|------|--------------|------|
| | | [A] | [D] | {1} | {1A} | {2} | {2A} | {3} | | | {3A} | A | B | {6} | | {7}* |
| HFMF611 | BU6.5x33 | 1/2" | 3/8" | 1/4" | N/A | 5/16" | N/A | 1/4" | N/A | HSS6x4x3/8 | 1" | 8" | 11" | 1/4" | 1/4" | 6 |
| HFPIC611 | | | | | 5/16" | 7/16" | 3/16" | | | | | | | | | |
| HFMF811 | BU8.5x59 | 3/4" | 3/8" | 1/4" | N/A | 5/16" | N/A | 1/4" | N/A | HSS6x6x5/8 | 1 1/2" | 8" | 11" | 1/4" | 1/4" | 8 |
| HFPIC811 | | | | | 5/16" | 7/16" | 3/16" | | | | | | | | | |
| HFMF813 | BU8.5x59 | 3/4" | 3/8" | 1/4" | N/A | 5/16" | N/A | 1/4" | N/A | HSS8x6x1/2 | 1 1/2" | 10" | 13" | 1/4" | 1/4" | 8 |
| HFPIC813 | | | | | 5/16" | 7/16" | 3/16" | | | | | | | | | |
| HFMF1013 | BU10.5x61 | 3/4" | 3/8" | 1/4" | N/A | 5/16" | N/A | 1/4" | N/A | HSS8x6x1/2 | 1 1/2" | 10" | 13" | 1/4" | 1/4" | 10 |
| HFPIC1013 | | | | | 5/16" | 7/16" | 3/16" | | | | | | | | | |
| HFMF1014 | BU10.5x61 | 3/4" | 3/8" | 1/4" | N/A | 5/16" | N/A | 1/4" | N/A | HSS8x6x5/8 | 1 1/2" | 10" | 14" | 1/4" | 1/4" | 10 |
| HFPIC1014 | | | | | 5/16" | 7/16" | 3/16" | | | | | | | | | |
| HFMF1214 | BU12.5x64 | 3/4" | 3/8" | 1/4" | N/A | 5/16" | N/A | 1/4" | N/A | HSS8x6x5/8 | 1 1/2" | 10" | 14" | 1/4" | 1/4" | 12 |
| HFPIC1214 | | | | | 5/16" | 7/16" | 3/16" | | | | | | | | | |
| HFMF1216 | BU12.5x64 | 3/4" | 3/8" | 1/4" | N/A | 5/16" | N/A | 1/4" | N/A | HSS10x6x1/2 | 1 1/2" | 13" | 16" | 1/4" | 1/4" | 12 |
| HFPIC1216 | | | | | 5/16" | 7/16" | 3/16" | | | | | | | | | |
| HFMF1416 | BU14.5x66 | 3/4" | 3/8" | 1/4" | N/A | 5/16" | N/A | 1/4" | N/A | HSS10x6x1/2 | 1 1/2" | 13" | 16" | 1/4" | 1/4" | 14 |
| HFPIC1416 | | | | | 5/16" | 7/16" | 3/16" | | | | | | | | | |
| HFMF1416 | BU14.5x66 | 3/4" | 3/8" | 1/4" | N/A | 5/16" | N/A | 1/4" | N/A | HSS10x6x5/8 | 1 1/2" | 13" | 16" | 1/4" | 1/4" | 14 |
| HFPIC1416 | | | | | 5/16" | 7/16" | 3/16" | | | | | | | | | |

* WELD {7} IS A FLAIR-LEVEL GROOVE WELD WITH REINFORCING FILLET. SIZE IN TABLE INDICATES SIZE OF FILLET
 ** STUD QTY ASSUMES ATTACHMENT TO 4x NAILER. FOR ATTACHMENT TO STEEL ANGLE OR PLATE, SEE STUD QTY PER DETAIL 5 / HFMF 3

SIDEPLATE MOMENT CONNECTION PARAMETERS

1

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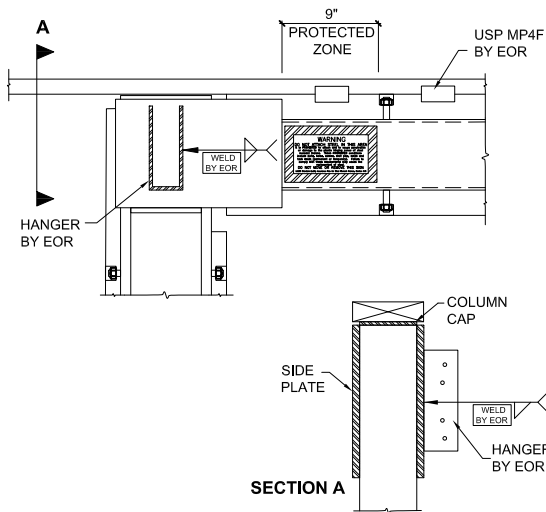


HARDY FRAME® SPECIAL MOMENT FRAME
TYPICAL INSTALLATION DETAILS
GENERAL NOTES AND SIDEPLATE CONNECTIONS

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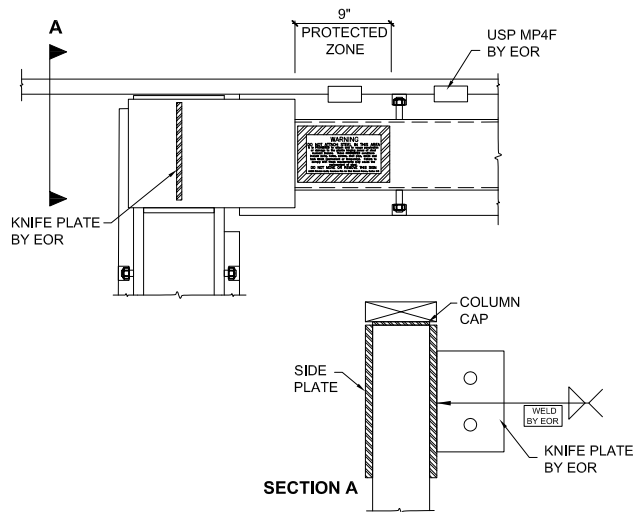
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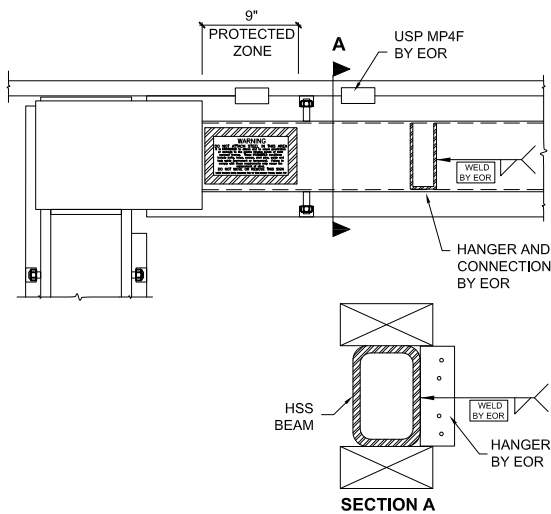
HANGER @ FACE OF SIDEPLATE FACE

4



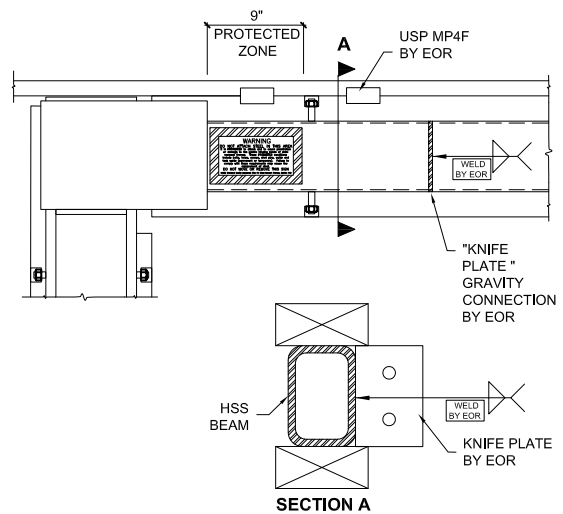
KNIFE PLATE @ FACE OF SIDEPLATE

3



HANGER @ HEADER

8



KNIFE PLATE TO HEADER

7

INFORMATION AND DETAILING ON THIS SHEET IS INTENDED FOR USE BY THE PROJECT DESIGN PROFESSIONAL AS ALTERNATES TO REMOVE AND REPLACE DETAILS ON SHEET HFMF 3.

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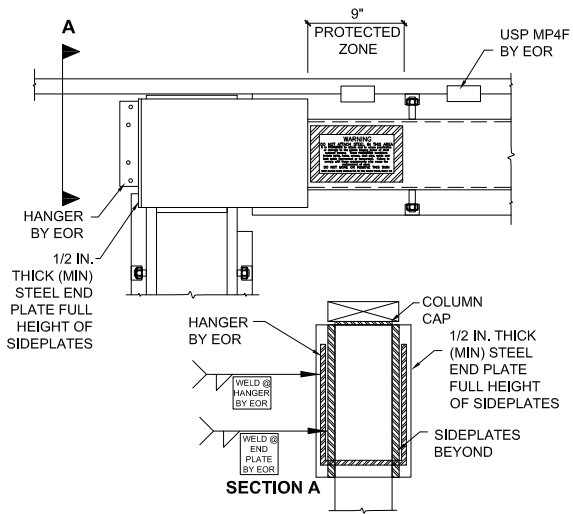
HARDY FRAME

HARDY FRAME® SPECIAL MOMENT FRAME
TYPICAL INSTALLATION DETAILS
SUPPLEMENTAL CONNECTIONS & ATTACHMENTS

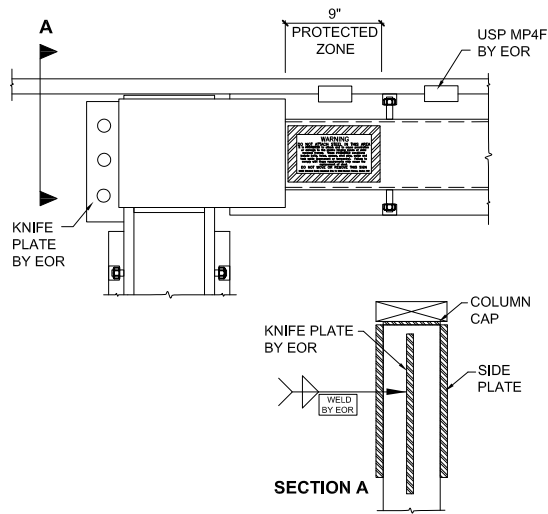
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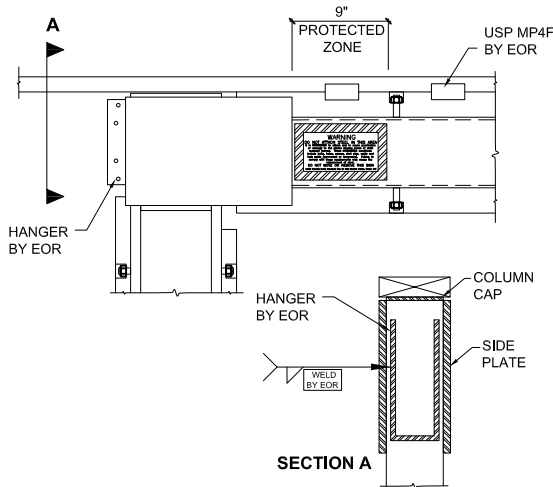
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5



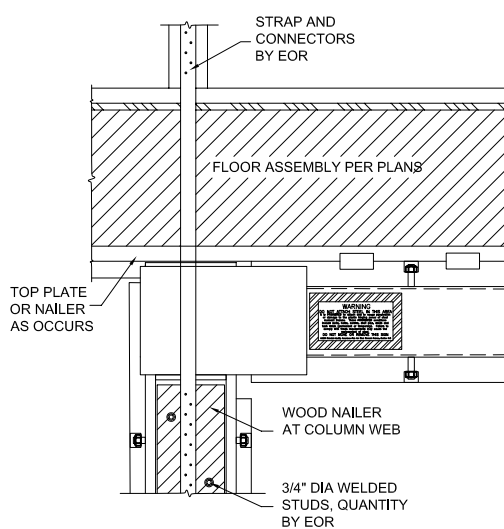
HANGER @ COLUMN TO END PLATE 2



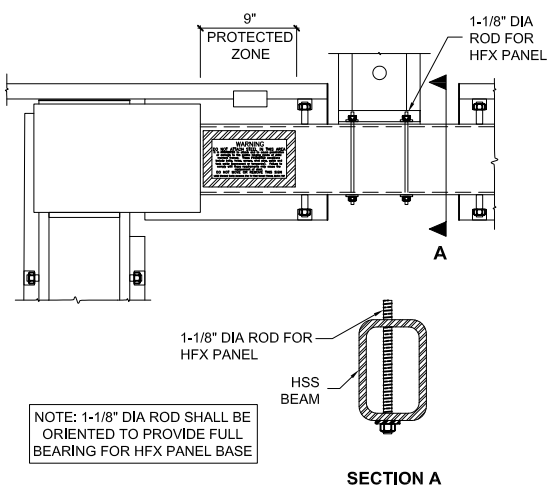
STEEL BEAM TO COLUMN FLANGE 1



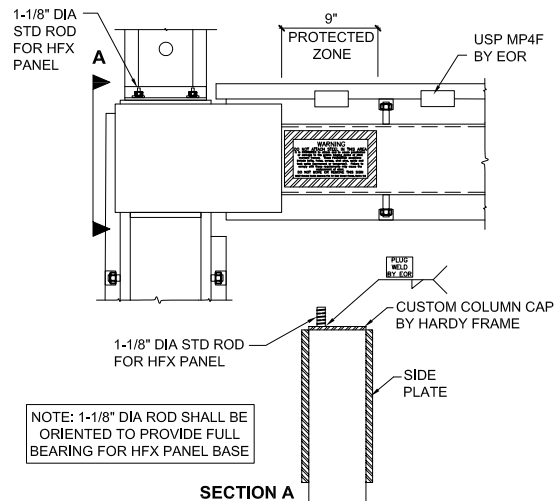
HANGER @ COLUMN FLANGE 6



HOLD DOWN STRAP TO COLUMN WEB 5



HFX PANEL @ HEADER 10



HFX PANEL @ COLUMN CAP 9

MiTek® Hardy Frames introduced the first standardized, prefabricated Special Moment Frame in 2006. Since then we have delivered thousands of Moment Frames that have been successfully installed. Our Special Moment Frames provide maximum structural capacities with minimal member sizes to enable large openings in architectural design.

The MiTek® Hardy Frame® Special Moment Frame (HFSMF) connections are approved in the AISC 358 Prequalified Moment Connection Standard. As part of the review, testing was submitted to confirm that **lateral bracing to prevent twist and out-of-plane displacements is not required** at the Hollow Structural Section (HSS) beams used in the HFSMF.

CONFIGURATIONS

The MiTek® Hardy Frame® Special Moment Frame is available in multi-story, multi-bay, Moment Frame and Picture Frame configurations. Picture Frames consist of four column to beam special moment connections.

HFSMF IN NEW CONSTRUCTION

- Standard Sizes
- Table values
- Pre-engineered anchorage solutions
- Compatible with wood framing
- Fits in standard wood walls/framing



MOMENT FRAME

PICTURE FRAME

HFSMF IN RETROFIT CONDITIONS

- Custom designs to meet job specific conditions
- Delivery options
 - Preassembled
 - Column Splice - Field Bolted
 - Knock-Down - Limited Field Welded Assembly



SPECIAL MOMENT FRAMES NEW CONSTRUCTION



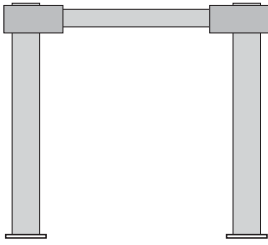
PICTURE FRAME WITH FOUNDATION BEAM INSTALLATION



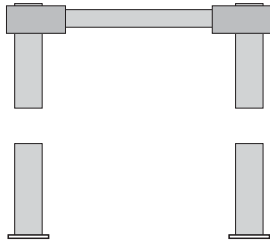
SPECIAL MOMENT FRAMES DELIVERY TO JOB SITE



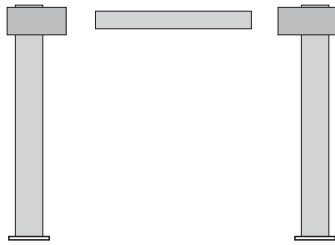
SPECIAL MOMENT FRAME IN RETROFIT APPLICATIONS



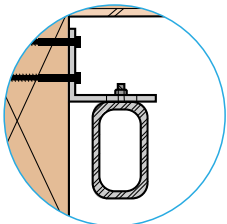
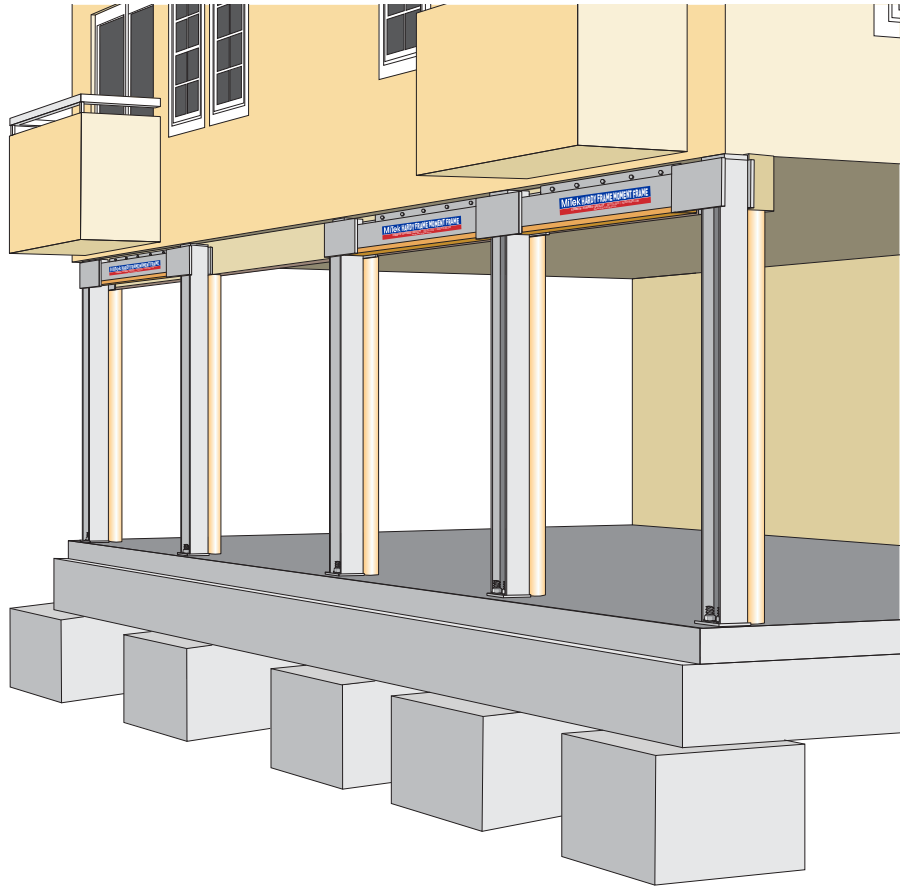
PRE-ASSEMBLED



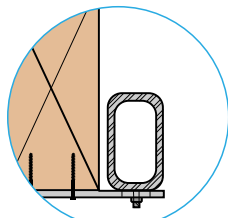
COLUMN SPLICE



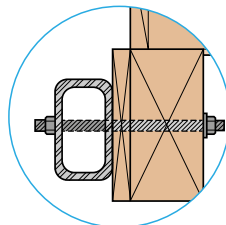
KNOCK DOWN



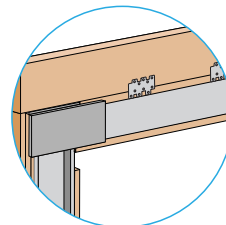
ANGLE



PLATE



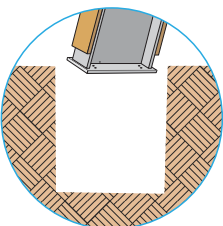
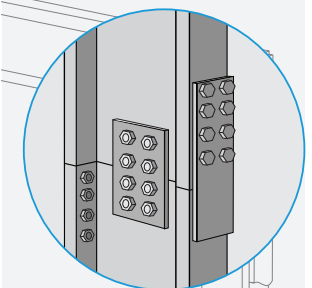
THROUGH BOLT



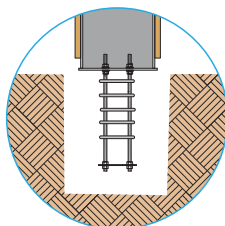
MITEK CONNECTORS

**SPECIAL MOMENT
FRAME COLUMN
SPLICE OPTION**

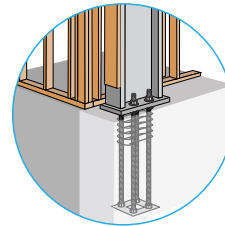
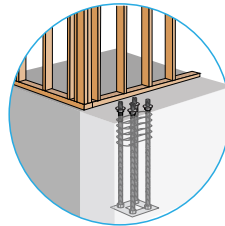
The column splice enables installations in restricted existing conditions.



POURED IN PLACE ANCHORS



PRE-CAST ANCHORS



WHAT TO LOOK FOR IN A PRE-FABRICATED STEEL SHEAR WALL SYSTEM

ELECTRICAL ACCESS

3/4 inch holes with grommets for running electrical wiring are provided at upper and lower area of Panels.

STRENGTH, STIFFNESS & DUCTILITY

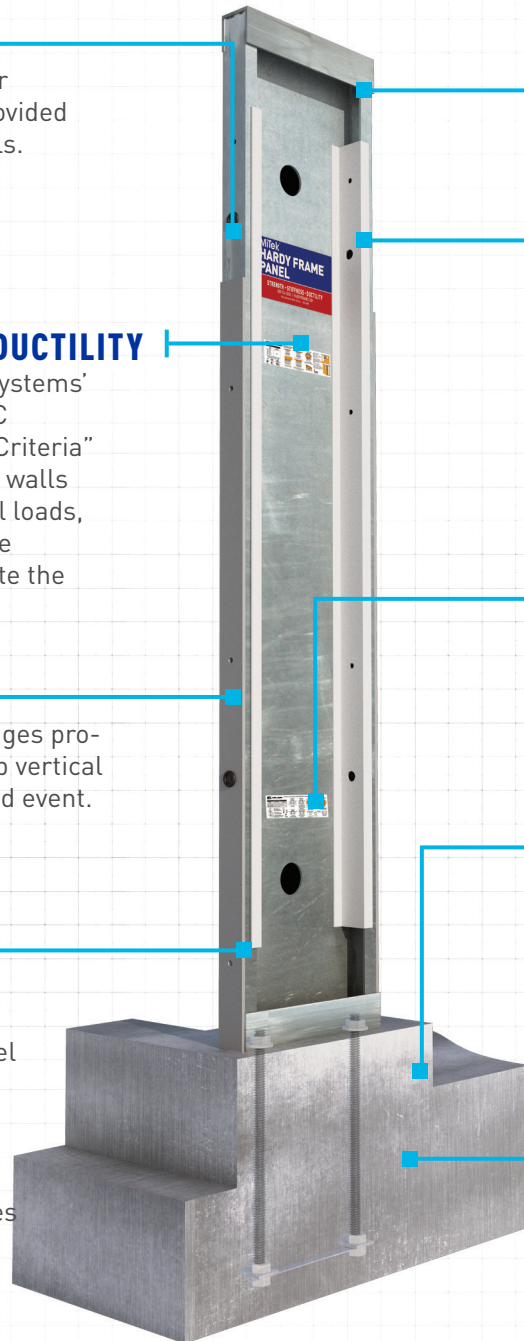
The Hardy Frame[®] Shear Wall Systems' proprietary design meets the ICC Evaluation Service "Acceptance Criteria" (AC308) for pre-fabricated shear walls with the strength to resist lateral loads, stiffness to reduce damage to the structure and ductility to dissipate the energy of an earthquake.

RESERVE CAPACITY

Steel "stiffeners" at the Panel edges provide a reserve capacity to hold up vertical loads after a seismic or high wind event.

WIDTH

The 9 inch wide Hardy Frame[®] is the narrowest pre-fabricated shear Panel in the industry. Panel widths include 9, 12, 15, 18, 21 and 24-inches. For architectural designs that maximize openings choose Hardy Frame[®] Panels to resist earthquake and wind forces with the highest allowable loads in the industry.



CUSTOM HEIGHTS

For non-standard wall heights choose a shear wall system that offers custom height manufacturing.

PANEL SHAPE

Look for the steel Shear Panel that is a C-shape. The cavity of the C-shape can be used to recess fixtures like porch lights and sockets, install wood backing and can be insulated. Hardy Frame[®] Panels are the only C-shape shear wall system in the industry.

INSTALLATION INSTRUCTIONS

Labels provide illustrated instructions for top and bottom connections that won't get lost or separated from the Panel.

MULTIPLE APPLICATIONS

Hardy Frame[®] Shear Wall Systems have multiple applications. Panels can be installed on concrete, on wood floor systems or stacked floor to floor by combining the Panel with the appropriate Hardy Frame[®] accessory.

ECONOMICAL OPTIONS

Shear walls that require high-strength anchors regardless of the design load drive up material cost. Hardy Frame[®] Panels provide allowable loads for both standard and high strength anchors.

WHAT TO LOOK FOR IN A COLD FORMED STEEL MOMENT FRAME

PANEL ZONE

Provides Moment Connection with high capacity and ductile behavior.

ELECTRICAL ACCESS

3/4 inch holes with grommets for running electrical wiring provided at upper and lower area of Panels.

PANEL AND BEAM SHAPE

C-shape construction can be used to recess electrical fixtures, install wood backing or insulate.

PRE-PUNCHED SCREW HOLES

Install USP Pro-Series Screws for shear transfer and wood attachment.

COLD FORMED STEEL (CFS)

Easier to ship, handle and install than structural steel components.

NARROW BEAM DEPTH

Maintains opening height at standard garage fronts.

STANDARD MODEL NUMBERS AND DETAILING

Brings efficiencies to designers, suppliers and installers.

2-BOLT ASSEMBLY

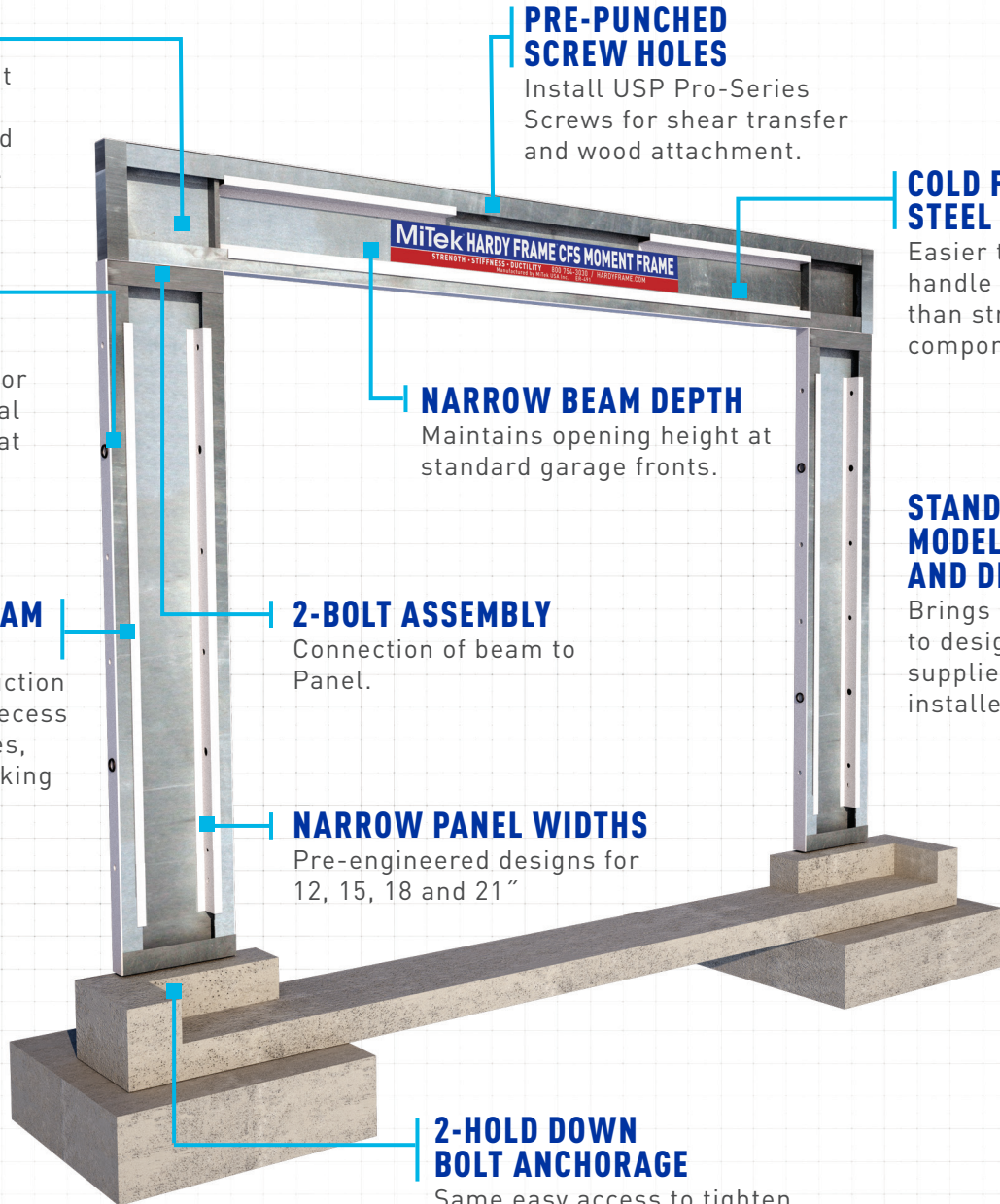
Connection of beam to Panel.

NARROW PANEL WIDTHS

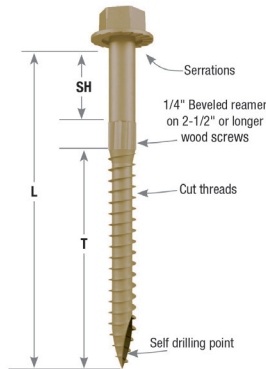
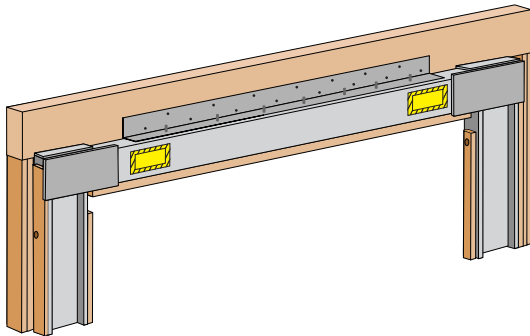
Pre-engineered designs for 12, 15, 18 and 21"

2-HOLD DOWN BOLT ANCHORAGE

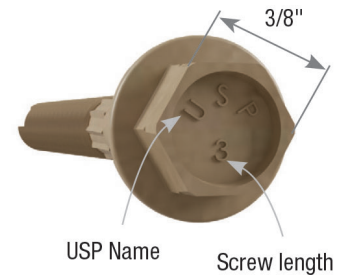
Same easy access to tighten connection as in Hardy Frame Panels



MITEK[®] PRO-SERIES[™] SCREWS FOR TOP CONNECTION WITH ANGLE OR PLATE



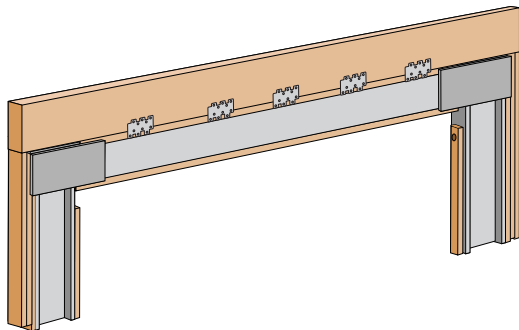
WS Screws



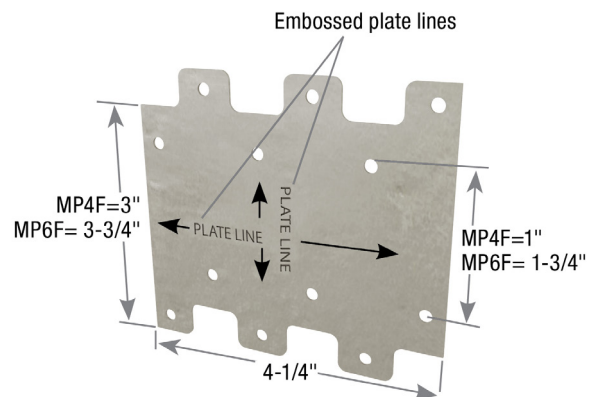
| USP Stock No. | Description | Dimensions (in) | | | | Finish | Allowable Shear (160%) | |
|---------------|---------------|-----------------|-------|-------|--------|--------|------------------------|---------------------|
| | | L | SH | T | Thread | | 3 GA Steel to DF-L/SP | 3 GA Steel to S-P-F |
| WS3 | 1/4" x 3" | 3 | 3/4 | 2-1/4 | 2 | Zinc | 731 lbs | 584 lbs |
| WS45 | 1/4" x 4-1/2" | 4-1/2 | 1-1/4 | 3-1/4 | 3 | Zinc | 849 lbs | 606 lbs |

Allowable loads have been increased 60% for short term loading; no further increase shall be permitted.
Zinc finish = Yellow Zinc Dichromate.
Code Approved by ICC Evaluation Service (ESR-2761), LA City (RR-25850), and State of Florida (FL-16091).w

MITEK[®] PLATE CONNECTORS FOR TOP CONNECTION TO FRAMING ABOVE

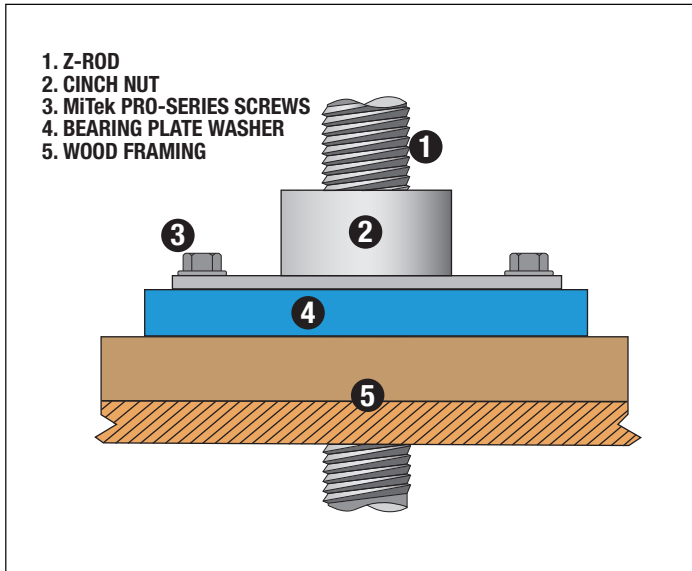


"MP4F" Plate Connector



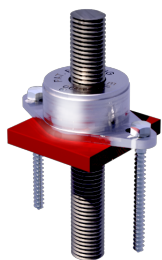
| USP Stock No. | Steel Gauge | Orientation | Fastener Schedule | | Direction of Load | Allowable Shear (160%) | |
|---------------|-------------|-------------|-------------------|------------|-------------------|------------------------|---------|
| | | | Each Member | | | DF-L/SP | S-P-F |
| | | | Qty | Type | | | |
| MP4F | 20 | H | 6 | 8d x 1-1/2 | H | 845 lbs | 710 lbs |

Allowable loads have been increased 60% for short term loading; no further increase shall be permitted.
8d nails are .131" dia. x 1-1/2" long, minimum embedment shall be 1-5/16".
Code Approved by ICC Evaluation Service (ESR-3455), LA City (RR-25779), and State of Florida (FL-821).

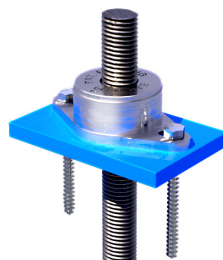


MiTek® Z4 Tie-Down Systems utilize CNX-Series Cinch Nuts to compensate for wood shrinkage and building settlement that cause connections to loosen over time. The Cinch Nut uses a self-ratcheting action that permits the cinch nut to move (the rod doesn't move) or "travel" perpetually in one direction only down the rod. Available for installation with threaded rods that are 3/8 inch through 1-1/2 inch diameter in 1/8 inch increments, the CNX Cinch Nut has been code evaluated and published in ESR-2190.

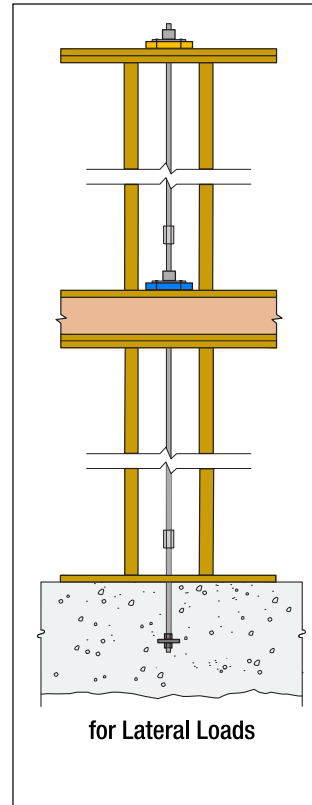
- Place the specified Bearing Plate Washer onto the bottom plate of a wood framed wall.
- With the "wings" oriented downward, place Cinch Nut over the Z-Rod extending from below and push down until it seats firmly on the Bearing Plate Washer.
- Install 1/4 inch diameter MiTek® Pro-Series™ Screws through the wings, penetrating 1-1/2 inches (minimum) into the wood bottom plate.
- Model numbers BPW5 and BPW6 fit in-between the screws fastening the wings.
- Model numbers BPW7 (3-1/4 x 4-3/8) and larger are provided with two screw holes. Align the wing and the Bearing Plate Washer screw holes to allow installation of 1/4 inch diameter MiTek® Pro-Series™ Screws.



**BPW5, BPW6
INSTALLATION**

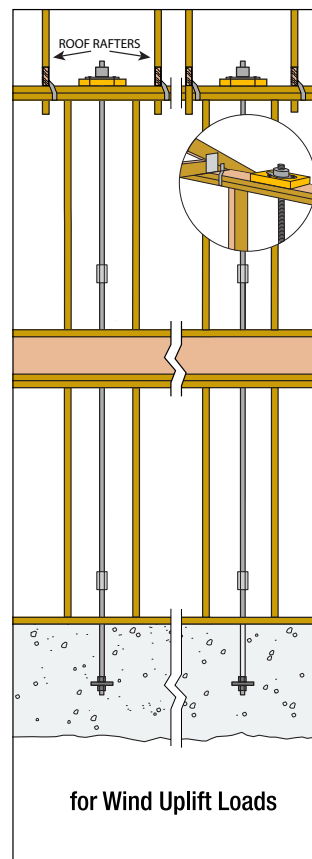


**BPW7 AND LARGER
INSTALLATION**



MITEK® Z4 TIE-DOWN SYSTEM FOR LATERAL LOAD

To resist tension loads due to overturning moments in multi-story buildings the CNX Cinch Nut is installed over a Bearing Plate Washer at each level in a fast and easy application. At the upper-most level a Cinch Nut is installed over a Bearing Plate Washer above the top plates. At walls below that bear on wood floor systems, the Cinch Nut and Bearing Plate Washer are installed over the bottom plate. Tension loads are gathered at each level and transferred into the foundation through a continuous system of Cinch Nuts, Bearing Plate Washers, Z-Rods/ATRs and Couplers are all available lines of **MiTek®, USA.**



MITEK® Z4 TIE-DOWN SYSTEM FOR WIND UPLIFT

For resisting roof uplift loads resulting from wind the Z4 Cinch Nut is installed over a Bearing Plate Washer above the top plates with roof framing above to create a tie-down system. Uplift forces are transferred into a continuous system of Z-Rods / ATRs and Couplers that form a load path to the foundation.

ADDITIONAL PUBLICATIONS FROM MiTek[®], USA

MiTek[®] Builder Products is a division of MiTek[®] USA, Inc. MiTek product lines include the Hardy Frame[®] Shear Wall system, USP[®] Structural Connectors and Z4 Tie-Down System.



HARDY FRAME[®] SPECIAL MOMENT FRAME DESIGN MANAGER

The interactive, web based HF SMF Design Manager from MiTek[®] enables you to easily input SMF design parameters then submit to our engineers with the click of a mouse. Custom SMF Designs and job specific installation details have never been so easy. Submittal of the design request provides all project information and data necessary for the MiTek[®] – Hardy Frame engineering department to deliver the most economical design with the best up-to-date SidePlate[®] technology. Visit: <https://builderproducts.mii.com/specialmomentframe>



PRODUCT CATALOG

The MiTek[®] Hardy Frame[®] Product Catalog provides complete information for Engineers, Architects and Designers to specify our shear wall system. There is a complete listing of all Panels, Brace Frames and Accessories, allowable shear loads, corresponding uplift and drift, pre-engineered anchorage information, specification tips, photos and Typical Installation Details. The Installation Details in the Product Catalog conveniently match our ACad version that can be included as supplemental sheets to plan submittals.



INSTALLATION GUIDE

The MiTek[®] Hardy Frame[®] Installation Guide was written specifically for Suppliers and Installers. This publication provides all HFX model numbers, dimensions, bolt and screw patterns, connectors, installation illustrations, attachments and information regarding Template Kit (HFXTK) and Floor to Floor Tension Connector Kit (HFTC) components.



RETROFIT GUIDE

Provides Building Owners with an introduction to construction techniques and MiTek[®] product lines available to strengthen soft-story buildings in retrofit applications. The MiTek[®] Hardy Frame[®] Shear Wall System combined with USP[®] Structural Connectors provides soft story solutions. This guide can be used by the Design Professional to illustrate retrofit concepts to their clients.



MITEK[®] Z4 PRODUCT CATALOG

The MiTek[®] Z4 product line includes the Cinch Nut, Continuity Tie (CT) and Tension Tie (T2). The Cinch Nut is a self ratcheting device that is designed to maintain a tight connection in the Z4 continuous "Quick Connect" rod system. The Cinch Nut, along with the CT and T2, offer more design options than any other hold down system and are rated for tension capacities that range from 5,000 to over 82,000 lbs. In addition to continuous rod applications, the T2 can be used as a hold down in conventionally framed shear walls.



MITEK[®] USP[®] STRUCTURAL CONNECTORS PRODUCT CATALOG

Introducing the 2017 online catalog featuring new structural connector products and updated technical information. Our digital version will be updated often to ensure content is always current. This catalog is a comprehensive guide to our extensive product line featuring over 250 detailed application illustrations and detailed installation instructions, fastening schedules and load ratings. EWP and Plated Truss connectors are included. www.mitek-us.com/resources/Product-Catalog/

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HARDY FRAME[®]
Leading in Lateral

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