2018 Construction Specifications Institute (CSI) Master Format

Prefabricated Special Steel Moment Frames

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MF-L-SMF23

Published 3/27/2023 Expires 3/31/2026

SECTION 05 12 23

Prefabricated Special Steel moment frames

# **PART 1 GENERAL**

## **SECTION INCLUDES**

1. Prefabricated steel moment frames designed and constructed to support gravity loads and resist lateral in-plane wind or earthquake loads in wood and cold-formed steel framed wall construction.

## **RELATED SECTIONS**

1. Section 03 30 00 – Cast-In-Place Concrete – Concrete provides support or anchorage.
2. Section 04 05 00 – Common Work Results for Masonry – Masonry provides support or anchorage.
3. Section 04 20 00 – Unit Masonry – Unit Masonry provides support or anchorage.
4. Section 05 12 00 – Structural Steel Framing – Steel provides support or anchorage.
5. Section 05 40 00 – Cold-Formed Metal Framing – Cold-Formed Metal Framing supported by fastenings or providing support or anchorage.
6. Section 06 10 00 –Rough Carpentry

## **REFERENCES**

1. AISC 303 – Code of Standard Practice for Steel Buildings and Bridges
2. ASTM A36 – Carbon Structural Steel
3. ASTM A307 –Carbon Steel Bolts, and Threaded Rod 60000 psi Tensile Strength
4. ASTM A325– Structural Bolts, Steel, Heated Treated, 12/105 ksi Minimum Tensile Strength
5. ASTM A449 – Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use
6. ASTM A563 – Carbon and Alloy Steel Nuts
7. ASTM A572 – High-Strength Low – Alloy Columbium-Vanadium Structural Steel
8. ASTM A653 – Steel Sheet, Zinc-Coated (Galvanized)
9. ASTM A992 –Structural Steel Shapes
10. ASTM F1554 – Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength
11. AWS D1.1 – Structural Welding Code - Steel
12. AWS D1.8 – Structural Welding Code Seismic Supplement
13. ESR-2802 – Simpson Strong-Tie Strong Frame Steel Moment Frame Connection
14. ICC-ES AC129 – Acceptance Criteria for Steel Moment Connection Systems
15. RCSC – Specification for Structural Joints Using High-Strength Bolts
16. US Patent No. 8,001,734 B2 – Moment frame link wall

## **DELIVERY, STORAGE, AND HANDLING**

1. Deliver products to job site in manufacturer’s or distributor’s packaging undamaged, complete with installation instructions.
2. Protect and handle materials in accordance with manufacturer’s recommendations to prevent damage or deterioration.

# **PART 2 PRODUCTS**

## **MANUFACTURERS**

1. Manufacturer: Simpson Strong-Tie® Company, Inc.

## **MATERIALS**

1. Steel:
2. Wide Flange Beams: ASTM A992, Grade 50
3. Bars/Plates: ASTM A572, grade 50, unless noted otherwise
4. Bolts, Washers and Nuts:

|  |  |  |  |
| --- | --- | --- | --- |
| **Connection Location** | **Bolt** | **Washer** | **Nut** |
| Link- to-Columnflange bolts (Beam side) | ASTM A325, Type 1 | ASTM F436 Type 1 | ASTM A563DH |
| Link- to-Columnflange bolts (bearing plate) | - | ASTM A36 | - |
| Link –to-Beamflange bolts | ASTM F2280,Twist off type(A490 Equivalent) | ASTM F436 Type 1 | ASTM A563DH |
| BRP-to-Beam flange bolts | ASTM A325, Type 1 | ASTM F436 Type 1 | ASTM A563DH |
| Beam top flangenailer bolts | ASTM A307 Gr. A | ASTM F844 | ASTM F563A |
| Beam bottom/column nailer carriage bolts | ASTM A307 Gr. A | ASTM F844 | ASTM F563A |
| Column Base Plate to Anchorage | F1554 GR 36/A36ASTM A449 | ASTM F436 | ASTM F563DH |

1. Finger Shims: ASTM A653 Grade 33 with G90 finish.
2. Shear Lug Anchorage Assemblies: ASTM A36
3. Anchor Rods:
	* 1. ASTM F1554 Gr 36 or A36 (MFAB, MFSL, and MF-ATR6EXT-LS)
		2. ASTM A449 (MFAB-HS, MFSL-HS and MF-ATR6EX-HS)
4. Weld Filler Metal:
5. Low hydrogen type conforming to AWS D1.1 Table 3.1, with a minimum yield of 70 ksi.
6. Notch toughness meet 20-lb-ft at 0° F; in addition, demand critical (DC) welds meet CVN toughness of 40-lb-ft at 70° F per AWS D1.8.
7. Wood Nailers:
8. Douglas fir, No 2 grade or better
9. Finishes:
10. Gray Primer

## **FABRICATION**

1. Shop assembly to occur per the manufacturer’s approved production drawings.
2. Fabrication tolerances per manufacturer.
3. The manufacturer’s identification shall be stamped into the metal or a label may be attached to the part with adhesive.
4. The manufacture’s connection patent number is marked on the link-stem of each link.
5. The manufacture’s patent label is applied to each moment connection.

## **DESIGN AND TESTING**

1. Frame design shall be per Design Procedure outlined in Annex A of ICC-ESR 2802.
2. Testing shall be performed as per ICC-ES Acceptance Criteria 129 (AC129).
3. Testing shall be conducted under the supervision of an independent laboratory.

# **PART 3 EXECUTION**

## **EXAMINATION**

1. Moment Frames shall be installed on supporting structural members per the manufacturer’s instructions or Engineer’s construction documents.
2. Verify that the dimensions of the supporting member are sufficient to receive the specified frame columns.

## **INSTALLATION**

1. All specified fasteners must be installed according to the manufacturer’s instructions.
2. Install all specified fasteners before loading the prefabricated steel moment frame.
3. Do not overload by exceeding the manufacturer’s catalog allowable load values, load values obtained from the manufacture’s selector software or from manufactures custom design calculation packages.
4. Use proper safety equipment.
5. Choose the correct template, from the manufacturer, required for proper bolt and anchorages placement.
6. The prefabricated steel moment frames shall be installed directly on concrete foundations, masonry foundations or walls, steel or concrete beams per the manufacturer’s instructions. There may be a reduction of allowable load if a prefabricated steel frame is installed on a masonry foundation or steel/concrete beam.
7. Concrete installation: The prefabricated steel moment frame must be installed directly on a concrete foundation/wall/beam per the manufacturer’s instructions. The column base plate must be secured to the anchor rods with high strength or standard nut matching the anchor rod grade.
8. Masonry or steel installation: Installation of the prefabricated steel moment frame on masonry walls or foundations or steel beams may be permitted, subject to the approval of the code official based on calculations and details prepared by the registered design professional.
9. Bolts connecting the beam to the columns must be tightened in accordance with the manufacturer’s installation instructions.
10. Install infill wood blocking provided on top of the link prior to placement of field installed 2x (for wood construction)
11. Connect column cap plate to field installed 2x with supplied ½” x 1-3/4” SDS screws.
12. Grout shall be placed between top of concrete and bottom of column base plate to provide full bearing of the column base plate. Grout shall meet ASTM C1107 with minimum compression strength of 5000 psi.
13. Holes in base plates are oversized for erection tolerance. Designer must evaluate effect of oversized holes and provide plate washer with standard-size holes welded to base plate where required.
14. Anchor bolt nuts should be finger-tight plus 1/3 to ½ turn with a wrench. Do not use an impact wrench to tighten nuts on the anchor bolts.

## **FIELD QUALITY CONTROL**

1. Determine that the proper part is being used in the correct application and has been fabricated by the approved manufacturer by observation of the manufacture’s patent label applied to each moment connection near the beam –to-column moment connection.
2. The engineer/designer of record shall evaluate and give written approval for substitution request prior to installation.

## **FIELD MODIFICATIONS**

1. Do not cut or enlarge the existing holes. Holes may be bored through the steel column and beams according to manufacturer’s instructions
2. Welding to beam and column outside of the protected zone as indicated in ESR-2802 is allowed. Weld shall be design by the registered design professional and approved by the code official.
3. Weld filler metal shall conform to Section 2.2.B.
4. Welding shall be performed by an AWS certified welder and inspected by an AWS certified inspector.

## **END OF SECTION 05 12 23**