

SECTION 05 4600

RETROFIT STEEL ROOF FRAMING SYSTEM

This section includes editing notes to assist the user in editing the section to suit project requirements. These notes are included as hidden text, and can be revealed or hidden by one of the following methods:

Microsoft Word 2007: Click the OFFICE button, select WORD OPTIONS, select DISPLAY, then select or deselect the HIDDEN TEXT option.

Microsoft Word (earlier versions): From the pull-down menus select TOOLS, then OPTIONS. Under the tab labeled VIEW, select or deselect the HIDDEN TEXT option.

Corel WordPerfect: From the pull-down menus select VIEW, then select or deselect the HIDDEN TEXT option.

This master specification section has been prepared by Tophat Framing Systems for use in the preparation of a project specification section covering light gage steel retrofit framing systems for use over existing metal roof assemblies. Framing Systems may include:

Tophat US200DL System: Combines Tophat Subframe and Ultra Seam US200DL mechanically seamed metal roof panels for a single source, engineered, warranted roofing package. For this system utilize both this section and Section 07 6100 - Sheet Metal Roofing, available from Ultra Seam.

Tophat US175LS System: Combines Tophat Subframe and Ultra Seam US175LS snap-lock metal roof panels for a single source, engineered, warranted roofing package. For this system utilize both this section and Section 07 6100 - Sheet Metal Roofing, available from Tophat Framing Systems.

Tophat Subframe: Framing only, for use with any compatible metal roof panel system.

Prior to specifying any retrofit roofing system, consider the following:

Existing roof framing system must be sufficient to withstand new live and dead loads imposed by the new framing system, Loads imposed by newer building codes may be more restrictive than those under which the structure was originally constructed, requiring upgrading of the existing roof framing system. Always consult a professional engineer during the design of a retrofit system.

The Tophat Subframe creates a void between the existing and new roofing systems, which allows for additional insulation or ventilation. Consider this option for increased energy efficiency during the design of the system.

The following should be noted in using this specification:

Hypertext links to specific websites are included after manufacturer names and names of organizations whose standards are referenced within the text, to assist in product selection and further research. Hypertext links are contained in parenthesis and shown in blue, e.g.:

(www.astm.org)

Optional text requiring a selection by the user is enclosed within brackets, e.g.: "Section [09 0000.] [____.]"

Items requiring user input are enclosed within brackets, e.g.: "Section [____ - ____]."

Optional paragraphs are separated by an "OR" statement, e.g.:

**** OR ****

"Green" requirements are included for projects requiring LEED certification, and are included as green text. For additional information on LEEDS, visit the U.S. Green Building Council website at www.usgbc.org.

For assistance on the use of the products in this section, contact Tophat Framing Systems by calling toll-free at 866-361-4141, by email at info@tophatframing.com, or visit their website at www.tophatframing.com.

PART 1 - GENERAL

1.1 SUMMARY

Edit the following paragraphs to include only those items specified in this section.

- A. Section Includes:
 - 1. Light gage steel retrofit roof framing system.
 - 2. [Insulation.]
 - 3. [Metal roofing.]

Coordinate the following paragraphs with other sections in the project manual.

- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Section [07 6100 - Sheet Metal Roofing] [____ - _____]: Metal roofing system.
 - 3. Section [__ ____ - _____]: Roof accessories.

1.2 REFERENCES

In the following paragraphs, retain only those reference standards that are used elsewhere in this section.

- A. American Iron and Steel Institute (AISI) (www.steel.org) - Specification for the Design of Cold-Formed Steel Structural Members.
- B. American Society of Civil Engineers (ASCE) (www.asce.org) 7 - Minimum Design Loads for Buildings and Other Structures.
- C. ASTM International (ASTM) (www.astm.org):
 - 1. A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 2. A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
 - 3. C665 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Wood Frame and Light Construction Buildings.
 - 4. C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.

1.3 SYSTEM DESCRIPTION

- A. Retrofit Steel Roof Framing System:

In the following paragraph 16 gage is standard. Other gages are also available; contact Tophat Framing Systems.

- 1. Material Thickness: [16] [__] gage.
- 2. Punch-out size and location: Determined by existing roof panel; verify on site.

In the following paragraph 2 and 3-1/2 inch heights are standard. Other heights may be available; contact Tophat Framing Systems. The required height of the subframe depends on the existing roof profile and additional insulation requirements.

- 3. Height: [2] [3-1/2] [__] inches.
- 4. Deflection Limiter: Provide additional subframe members between existing purlins when required by system design.

Edit the following paragraphs to suit project requirements.

- B. Design Requirements; design roof system to withstand:
 - 1. Live and dead loads in accordance with [ASCE 7.] Building Code.] [____.]
 - 2. Movement caused by an ambient temperature range of [120] [__] degrees F and a surface temperature range of [160] [__] degrees F.

Retrofit subframe members have the ability to increase the strength of the roof structure. The moment reduction factor (R-Value) tested during uplift loading or the moment amplification factor (A-Value) tested during gravity loading reflect the ability of an existing through fastened panel system with the added subframe to provide lateral and torsional bracing to the purlins to which it is attached.

- C. Performance Requirements: Tests shall be conducted by or witnessed by a recognized independent laboratory or independent professional engineer. Test reports shall be signed and sealed by a independent professional engineer.
 - 1. Retrofit Subframe member shall be tested for the following minimum moment reduction (amplification) factor used in determining the nominal flexural strength of a purlin in negative (positive) bending supporting a through fastened panel system with a subframe attached.
 - a. 16 ga. (33 ksi min.) Subframe over 16 ga. Purlins, Uplift: R-Value = 0.779
 - b. 16 ga. (50 ksi min.) Subframe over 16 ga. Purlins, Uplift: R-Value = 0.902
 - c. 16 ga. (33 ksi min.) Subframe over 16 ga. Purlins, Gravity: A-Value = 1.646

1.4 SUBMITTALS

Limiting submittals to only those actually required helps to minimize liability arising from the review of submittals. Minimize submittals on smaller, less complex projects.

Include the following for submission of shop drawings and product data for the Architect's review.

- A. Submittals for Review:
 - 1. Shop Drawings: Indicate framing layout, fastenings, and pertinent details.
 - 2. Product Data: Indicate framing sizes, materials, finishes, and accessories.

Include the following for submission of quality control submittals. These submittals are intended for the Owner's record purposes and are not intended to be reviewed by the Architect.

- B. Quality Control Submittals:
 - 1. Certificate of Compliance: Certificate from Professional Structural Engineer responsible for system design that system was designed in accordance with Contract Document requirements, applicable Building Code, and generally accepted engineering practices.
 - 2. Engineering Data: Calculations indicating wind uplift and deadload capacity of roof system and fastening requirements to meet loading, sealed by registered professional engineer responsible for system design.

Include the following for submission of sustainable design submittals.

- C. Sustainable Design Submittals:
 - 1. Recycled Content: Certify recycled content of metal roofing; indicate recycled content percent and whether pre-consumer or post-consumer.

1.5 QUALITY ASSURANCE

The following two paragraphs specify a minimum level of experience required of the parties performing the work of this section. Retain if required, and edit to suit project requirements.

- A. Manufacturer Qualifications: Minimum [2] [__] years [documented] experience in work of this Section.
- B. Installer Qualifications: Minimum [5] [__] years [documented] experience in work of this Section.

Adding a retrofit subframe system increases the flexural strength of an existing structure; choose an appropriate subframe system that maximizes this increase.

- C. Calculate structural properties of roof system in accordance with AISI Specifications.
- D. Design framing under the direct supervision of a Professional Structural Engineer experienced in the work of this Section and licensed in the State in which the Project is located.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Store framing members off ground, with one end elevated.
- B. Protect framing members from damage and corrosion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Contract Documents are based on products by:

TopHat Framing Systems
8660 Lambright Road
Houston, TX 77075
Voice: (866) 361-4141 or (713) 991-2246
Fax: (713) 991-4747
Email: info@tophatframing.com

Edit the following to indicate whether or not substitutions will be permitted for the products in this section.

- B. Substitutions: [Under provisions of Division 01.] [Not permitted.]

2.2 MATERIALS

- A. Galvanized Steel Sheet:
 - 1. ASTM A653/A653M or A1011/A1011M, minimum yield strength of 33 ksi, G60 coating class, 16 gage minimum.
 - 2. Recycled content: Minimum 25 percent, classified as post consumer.

Consider adding additional insulation between the subframes. Determine R-value based on project requirements. Other insulation options may be available.

- B. Insulation: ASTM C665, unfaced glass fiber batts, or ASTM C1289, [foil] [____] faced rigid polyisocyanurate.

Edit the following paragraph to suit project requirements.

- C. Metal Roofing System: Specified in Section [07 6100.] [__ ____.]

2.3 ACCESSORIES

- A. Fasteners: Self-drilling, self-tapping, corrosion-resistant coated steel screws, type and length to suit project design requirements.

2.4 FABRICATION

- A. Verify existing metal roof panel profile prior to fabrication of subframes.
- B. Roll form subframes in longest practical lengths.

- C. Fabricate subframes to hat-shaped profile, custom punched to fit existing roof panel profile.
- D. Provide deflection limiters when project design dictates attachment points between existing purlins.

Edit the following paragraph to suit project requirements. Web height is dependent on existing roof profile and additional insulation requirements.

- E. Web Height: [Manufacturer's standard.] [[__] inches.
- F. Punch base flange to receive fasteners for attachment to existing roof framing.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verify that existing roof framing is acceptable to receive new roof framing system.
- B. Do not remove existing metal panel fasteners unless they substantially interfere with placement of new framing system.

3.2 INSTALLATION OF FRAMING SYSTEM

- A. Install framing system in accordance with manufacturer's instructions and approved Shop Drawings.
- B. When system design requires attachment points between existing purlins, install deflection limiters as required by engineering and recommended by system manufacturer.
- C. Locate subframes directly over existing roof framing members.
- D. Screw attach subframes through base flange to existing framing members or to deflection limiters when used. Space fasteners in accordance with system design or as directed by manufacturer.

Include the following for new insulation placed between the subframes.

3.3 INSTALLATION OF INSULATION

- A. Friction fit insulation between framing members.
- B. Butt insulation to adjacent construction. Butt ends and edges.
- C. Carry insulation continuously over or under pipes, conduits, boxes, and other components.
- D. Ensure complete insulation coverage without voids.
- E. Do not install more insulation than can be covered with metal panels on same day.

3.4 INSTALLATION OF METAL ROOFING

Edit the following paragraph to suit project requirements.

- A. Install roofing system as specified in Section [07 6100.] [__ ____.]

END OF SECTION