

SECTION 05 12 13

ARCHITECTURALLY EXPOSED STRUCTURAL STEEL

PART 1 – GENERAL

1.1 PURPOSE

- A. This guideline is intended to provide useful information to the Professional Service Provider (PSP) to establish a basis of design. PSP is to apply the principles of this section such that the University of Texas at Arlington (UTA) may achieve a level of quality and consistency in the design and construction of their facilities. Deviations from these guidelines must be approved by UTA and may require justification through Life Cycle Cost (LCC) analysis and submitted to UTA for approval.

1.2 LESSONS LEARNED AND DESIGN CONSIDERATIONS

- A. **UTA shall review and approve all work in place related to construction.**

1.3 SUMMARY

- A. See Division 01 for submittal procedures.
- B. This Section includes requirements regarding the appearance and surface preparation of Architecturally Exposed Structural Steel (AESS). Refer to Division 05, Section ‘Structural Steel’ for all other requirements regarding steel work not included in this section.
- C. This section applies to any members noted on Architectural [and Structural] drawings as AESS [and in the areas defined as AESS below].
- D. Division 09 Section “Painting” for finish coat requirements and coordination with primer and surface preparation specified in this section.

1.4 SUBMITTALS

- A. See Division 01 for submittal procedures.
- B. Work Product Data for each type of product specified.
- C. Extent Shop Drawings detailing fabrication of AESS components.
 - 1. Provide erection drawings clearly indicating which members are considered as AESS members.
 - 2. Include details that clearly identify all of the requirements listed in sections 2.3 “Fabrication” and 3.3 “Erection” of this specification.
 - 3. Provide connections for exposed AESS consistent with concepts shown on the architectural or structural drawings
 - 4. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length and type of each weld. Identify grinding, finish and profile of welds as defined herein.
 - 5. Indicate type, size, finish and length of bolts, distinguishing between shop and field bolts. Identify high-strength bolted slip critical, direct-tensioned shear/bearing connections. [Indicate to which direction bolt heads should be oriented.]
 - 6. Clearly indicate which surfaces or edges are exposed and what class of surface preparation is being used.
 - 7. Indicate special tolerances and erection requirements as noted on the drawings or defined herein.
- D. Qualification data for firms and persons specified in the ‘Quality Assurance’ Article to demonstrate their capabilities and experience. Include lists of completed projects names and address, names and addresses of architects and owners, and other information specified.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: In addition to those qualifications listed in Division 05, Section ‘Structural Steel,’ engage a firm experienced in fabricating AESS similar to that indicated for this Project with a record of successful in-service performance, as well as sufficient production capacity to fabricate AESS without delaying the Work.
- B. Erector Qualifications: In addition to those qualifications listed in Division 05, Section ‘Structural Steel,’ engage an experienced Erector who has completed AESS work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- C. Comply with applicable provisions of the following specifications and documents:
 - 1. AISC “Code of Standard Practice,” latest edition, Section 10 as amended herein.
- D. Mockups: At least four weeks prior to fabricating AESS, the contractor shall construct mockups to

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demonstrate aesthetic effects as well as qualities of materials and execution. A mockup for each of the following elements shall be constructed: Build mockups to comply with the following requirements, using materials indicated for final unit of Work

1. Testing Locate mockups on-site as directed by Architect. Refer to drawings for size components to be included in mock up. Mockups shall be full-size pieces unless the Architect approves smaller models.
 2. Notify the Architect one week in advance of the dates and times when mockups will be available for review.
 3. Demonstrate the proposed range of aesthetic effects regarding each element listed under the fabrication heading below.
 4. Mockup will have finished surface (including surface preparation and paint system).
 5. Obtain Architect's approval of mockups before starting fabrication of final units.
 6. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed work.
 7. Approved mockups in an undisturbed condition at the time of Substantial completion may become part of the completed work.
- E. Pre-installation Conference: The General Contractor shall schedule and conduct conference at the project site to comply with requirements of Division 01 "Project Meetings."
1. As a minimum, the meeting shall include the General Contractor, Fabricator, Erector, the finish painting subcontractor, and the Architect. Coordinate requirements for shipping, special handling, attachment of safety cables and temporary erection bracing, touch up painting and other requirements for AESS.
- 1.6 DELIVERY, STORAGE, AND HANDLING
- A. Deliver AESS to Project site in such quantities and at such times to ensure continuity of installation.
 - B. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration. Use special care in handling to prevent twisting or warping of AESS members.
 - C. Erect pre-painted finish pieces using padded slings or other methods such that they are not damaged. Provide padding as required to protect while rigging and aligning member's frames. Weld tabs for temporary bracing and safety cabling only at points concealed from view in the completed structure or where approved by the Architect during the pre-installation meeting. Methods of removing temporary erection devices and finishing the AESS members shall be approved by the Architect prior to erection
- 1.7 PROJECT CONDITIONS
- A. Field Measurements: Where AESS is indicated to fit against walls and other construction, verify dimensions by field measurements before fabrication and indicate measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the work.
- 1.8 COORDINATION
- A. Coordinate installation of anchors for AESS members that connect to the work of other trades. Furnish setting drawings, templates, and directions for installing anchors, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to the project site in time for installation. [Anchorage concepts shall be as indicated on drawings and approved on final shop drawings.]

PART 2 – PRODUCTS

2.1 MATERIALS

- A. General: Meet requirements Division 05 Section 'Structural Steel' as amended below.
- B. High-Strength Bolts, Nuts, and Washers: Per Section 05 12 00 heavy hex heads and nuts [Provide rounded bolt heads with twist off bolts]. Provide standard carbon steel [Cadmium plated] [Mechanically galvanized] finish.

2.2 PRIMERS

- A. Shop Compatibility: The General Contractor shall submit all components/procedures of the paint system for AESS as a single coordinated submittal. As a minimum, identify required surface preparation, primer, intermediate coat (if applicable) and finish coat. All of the items shall be coordinated with the finish coat specified in Division 09.

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- B. Primer: Fast-curing two-part epoxy. Primer shall comply with all federal standards for VOC, lead and chromate levels.

2.3 FABRICATION

- A. Fabricate and assemble AESS in the shop to the greatest extent possible. Locate field joints in AESS assemblies at concealed locations or as approved by the Architect. Detail AESS assemblies to minimize field handling and expedite erection.
- B. Fabricate AESS with exposed surfaces smooth, square and of surface quality consistent with the approved mock up. Use special care in handling and shipping of AESS both before and after shop painting.
- C. In addition to special care used to handle and fabricate AESS, employ the following fabrication techniques.
 1. Fabrication Tolerance: Fabricate steel to one half the normal tolerance as specified in the Code of Standard Practice Section 10.
 2. Welds ground smooth: Fabricator shall grind welds of AESS smooth. For groove welds, the weld shall be made flush to the surfaces each side and be within $+1/16''$, $-0''$ of plate thickness.
 3. Contouring and blending of welds: Where fillet welds are indicated to be ground-contoured, or blended, oversize welds as required and grind to provide a smooth transition and to match profile on approved mock-up.
 4. Continuous Welds: Where welding is noted on the drawings, provide continuous welds of a uniform size and profile.
 5. Minimize Weld Show Through: At locations where welding on the far side of an exposed connection occurs, grind distortion and marking of the steel to a smooth profile with adjacent material.
 6. Coping and Blocking Tolerance: Maintain a uniform gap of $1/8'' \pm 1/32''$ at all copes and blocks.
 7. Joint Gap Tolerance: Maintain a uniform gap of $1/8'' \pm 1/32''$.
 8. Piece Marks Hidden: Fabricate such that piece marks are fully hidden in the final structure or made with such media to permit full removal after erection.
 9. Mill Mark Removal: Fabricator shall deliver steel with no mill marks (stenciled, stamped, raised etc.) in exposed locations. Mill marks shall be omitted by cutting of mill material to appropriate lengths where possible. Where not possible, the fabricator can fill and/or grind to a surface finish consistent with the approved mock up.
 10. Grinding of sheared edges: Fabricator shall grind all edges of sheared, punched or flamecut steel to match approved mockup.
 11. Rolled Members: Member specified to be rolled to a final curved shape shall be fully shaped in the shop and tied during shipping to prevent stress relieving. Distortion of the web or stem, and of outstanding flanges or legs of angles shall be visibly acceptable to the Architect from a distance of 20' under any lighting condition determined by the Architect. Tolerances for the vertical and horizontal walls of rectangular HSS members after rolling shall be the specified dimension $\pm 1/2''$.
 12. Seal weld open ends of round and rectangular hollow structural section with $3/8''$ closure plates. Provide continuous, sealed welds at angle to gusset-plate connections and similar locations where AESS is exposed to weather

2.4 SHOP CONNECTIONS

- A. Bolted Connections: Make in accordance with Section 05 12 00. Provide bolt type and finish as noted herein and align bolt heads as indicated on the approved shop erection drawings.
- B. Weld Connections: Comply with AWS D1.1 and Section 05 12 00. Appearance and quality of welds shall be consistent with the mock up. Assemble and weld built-up sections by methods that will maintain alignment of members without warp exceeding the tolerance of this section.

2.5 SHOP PRIMING

- A. General: Shop-prime steel surfaces, except the following:
- B. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2".
- C. Surfaces to be field welded.
- D. Surfaces to be high-strength bolted with slip critical connections, if primer does not meet the specified AISC slip coefficient.
- E. Surface Preparation: Clean surfaces to be painted. Remove loose rust, loose mill scale, and spatter, slag, or flux deposits. Prepare surfaces according to SSPC Specifications as follows:
 1. SSPC-SP 6 "Commercial Blast Cleaning."
- F. Coordinate the required blast profile with the approved paint submittal prior to beginning surface

preparation.

1. Priming: Immediately after surface preparation, apply primer according to manufacturer's instructions to provide a dry film thickness of not less than 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
2. Stripe paint corners, crevices, bolts, welds, and sharp edges.
3. Apply two coats of shop primer to surfaces that are inaccessible after assembly or erection.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. The erector shall check all AESS members upon delivery for twist, kinks, gouges or other imperfections which might result in rejection of the appearance of the member. Coordinate remedial action with fabricator prior to erecting steel.

3.2 PREPARATION

- A. Provide connections for temporary shoring, bracing and supports only where noted on the approved shop drawings. Temporary connections not shown shall be made at locations not exposed to view in the final structure or as approved by the Architect. Handle, lift and align pieces using padded slings and/or other protection required to maintain the appearance of the AESS through the process of erection.

3.3 ERECTION

- A. Maximum Set AESS accurately in locations and to elevations indicated, and according to AISC specifications referenced in this Section.
- B. In addition to the special care used to handle and erect AESS, employ the following erection techniques:
 1. AESS Erection Tolerances: Erection Tolerances shall meet the requirements of Chapter 10 of the AISC Code of Standard Practice.
 2. Welds ground smooth: Erector shall grind welds smooth in the connections of AESS members. For groove welds, the weld shall be made flush to the surfaces of each side and be within + 1/16", -0" of plate thickness.
 3. Contouring and blending of welds: Where fillet welds are indicated to be ground contoured, or blended, oversize welds as required; grind to provide a smooth transition and to match profile on approved mock-up.
 4. Continuous Welds: Where noted on the drawings, provide continuous welds of a uniform size and profile.
 5. Minimize Weld Show Through: At locations where welding on the far side of an exposed connection occurs, grind distortion and marking of the steel to a smooth profile with adjacent material.
 6. Bolt Head Orientation: All bolt heads shall be oriented as indicated on the contract documents. Where bolt-head alignment is specified, the orientation shall be noted for each connection on the erection drawings. Where not noted, the bolt heads in a given connection shall be oriented to one side.
 7. Removal of field connection aids: Run-out tabs, erection bolts and other steel members added to connections to allow for alignment, fit-up, and welding in the field shall be removed from the structure. Field groove welds shall be selected to eliminate the need for backing bars or to permit their removal after welding. Welds at run-out tabs shall be removed to match adjacent surfaces and ground smooth. Holes for erection bolts shall be plug welded and ground smooth.
 8. Filling of weld access holes: Where holes must be cut in the web at the intersection with flanges on W shapes and structural tees to permit field welding of the flanges, they shall be filled. Filling shall be executed with proper procedures to minimize restraint and address thermal stresses in group 4 and 5 shapes.
 9. Field Welding: Weld profile, quality, and finish shall be consistent with mock-ups approved prior to fabrication.
 10. Splice members only where indicated.
 11. Obtain permission for any torch cutting or field fabrication from the Architect. Finish sections thermally cut during erection to a surface appearance consistent with the mock up.
 12. Do not enlarge unfair holes in members by burning or by using drift pins. Ream holes that must be enlarged to admit bolts. Replace connection plates that are misaligned where holes cannot be aligned with acceptable final appearance.

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3.4 FIELD CONNECTIONS

- A. Bolted Connections: Install bolts of the specified type and finish in accordance with Division 05, Section “Structural Steel.”
- B. Welded Connections: Comply with AWS D1.1 for procedures, and appearance. Refer to Division 05, Section “Structural Steel” for other requirements.
- C. Assemble and weld built-up sections by methods that will maintain true alignment of axes without warp. Verify that weld sizes, fabrication sequence, and equipment used for AESS will limit distortions to allowable tolerances.
- D. Obtain Architects approval for appearance of welds in repaired or field modified work.

3.5 FIELD QUALITY CONTROL

- A. Structural requirements: The Owner will engage an independent testing and inspecting agency to perform field inspections and tests and to prepare test reports. Refer to Division 05, Section “Structural Steel” for detailed bolt and weld testing requirements.
- B. AESS acceptance: The Architect shall observe the AESS steel in place and determine acceptability based on the mockup. The Testing Agency shall have no responsibility for enforcing the requirements of this section.

3.6 ADJUSTING AND CLEANING

- A. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint shall be completed to blend with the adjacent surfaces of AESS. Such touch up work shall be done in accordance with manufacturer’s instructions as specified in Division 09, Section “Painting.”

END OF SECTION