



AUSTRALIAN STEEL INSTITUTE

# Architecturally Exposed Structural Steelwork (AESS)

## Sample Specification (for Engineers)





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### **PART 1 – GENERAL**

#### **1.1. RELATED DOCUMENTS**

- A. Drawings and specifications.
- B. For definitions of Categories AESS 1, 2, 3, 4, and C as listed in the AESS Matrix (see Table 1), refer to the Code of Practice (for Fabricators) covered in ASI AESS Series Document F or NZS 3404.1:2009.

#### **1.2. SUMMARY**

- A. This Subsection includes requirements regarding the appearance, surface preparation and integration of Architecturally Exposed Structural Steel (AESS) only.

For technical requirements, refer to the Structural Steel Section.

This Subsection applies to any structural steel members noted on Structural Design Documents as AESS. All AESS members must also be identified by their Category.

- B. Related Sections: The following Sections contain requirements that may relate to this Subsection:
  - 1. Architectural Metalwork
  - 2. Structural Steel
  - 3. Painting

#### **1.3. SUBMITTALS**

- A. General: Submit each item below according to the Contract Documents.
- B. Shop Drawings detailing fabrication of AESS components:
  - 1. Provide erection drawings clearly indicating which members are considered as AESS members and their Category;
  - 2. Include details that clearly identify all of the requirements listed in sections 2.3 "Fabrication" and 3.3 "Erection" of this Specification. Provide connections for AESS consistent with concepts, if shown on the Structural Design Documents;
  - 3. Indicate welds by standard symbols in accordance with AS 1101.3, 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;
  - 4. Indicate type, finish of bolts. Indicate which side of the connection bolt heads should be placed;
  - 5. Indicate any special tolerances and erection requirements.

#### 1.4. QUALITY ASSURANCE

- A. Fabricator Qualifications: In addition to any qualifications listed in the Structural Steel Section, engage a firm competent in fabricating AESS similar to that indicated for this Project with sufficient production capacity to fabricate the AESS elements.
- B. Erector Qualifications: In addition to any qualifications listed in the Structural Steel Section, engage a competent Erector who has completed comparable AESS work or who has a good understanding of AESS requirements.
- C. Comply with applicable provisions of the following specifications and documents:
  - 1. Code of Practice (for Fabricators) in ASI AESS F or NZS 3404.1:2009.
- D. Visual samples when specified may include any of the following:
  - 1. 3-D rendering of specified element;
  - 2. Physical sample of surface preparation and welds;
  - 3. First off inspection: First element fabricated for use in finished structure subject to alterations for subsequent pieces.
  - 4. Mockups: As specified in Structural Design Document. Mockups are either scaled or full-scale. Mockups are to demonstrate aesthetic effects as well as qualities of materials and execution:
    - a. Mockups may have finished surface (including surface preparation and paint system);
    - b. Architect's approval of mockups is required before starting fabrication of final units;
    - c. Mockups are retained until project is completed;
    - d. Approved full-scale mockups may become part of the completed work.

#### 1.5. DELIVERY, STORAGE, AND HANDLING

- A. Ensure that all items are properly prepared, handled and/or packaged for storage and shipping to prevent damage to product.
- B. Erect finished pieces using softened slings or other methods such that they are not damaged. Provide padding as required to protect while rigging and aligning members' 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.

### **PART 2 – PRODUCTS**

#### 2.1 MATERIALS

- A. General: Meet the requirements of the Structural Steel Specification Section.

Specialty bolts, if applicable, must be specified.

#### 2.2 SPECIAL SURFACE PREPARATION

- A. Note any special surface finish if not covered under Painting Section.

## 2.3 FABRICATION

- A. For the special fabrication characteristics, see Table 1 – AESS Category Matrix.
- B. 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.
- C. Fabricate AESS with surface quality consistent with the AESS Category and visual samples if applicable.

## 2.4 SHOP CONNECTIONS

- A. Bolted Connections: Make in accordance with the Structural Steel Section. Provide bolt type and finish as specified and place bolt heads as indicated on the approved shop drawings.
- B. Welded Connections: Comply with AS/NZS 1554.1 and Structural Steel Section. Appearance and quality of welds shall be consistent with the Category and visual samples if applicable. Assemble and weld built-up sections by methods that will maintain alignment of members to the tolerance of this Subsection.

## 2.5 ARCHITECTURAL REVIEW

- A. The Architect shall review the AESS steel in place and determine acceptability based on the Category and visual samples (if applicable). The Fabricator/Erector will advise the consultant the schedule of the AESS Work.

## 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 erection drawings. Temporary connections 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. Set AESS accurately in locations and to elevations indicated, and according to AS 4100/ NZS 3404.1:2009.
- B. In addition to the special care used to handle and erect AESS, employ the proper erection techniques to meet the requirements of the specified AESS Category:
  - 1. AESS Erection Tolerances: Erection tolerances shall meet the requirements of standard frame tolerances for structural steel per AS 4100/ NZS 3404.1:2009;

2. Bolt Head Placement: All bolt heads shall be placed as indicated on the structural design document. Where not noted, the bolt heads in a given connection shall be placed to one side;
3. 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. 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 where specified;
4. Filling of Connection Access Holes: Filling shall be executed with proper procedures to match architectural profile, where specified;
5. Field Welding: Weld profile, quality and finish shall be consistent with Category and visual samples, if applicable, approved prior to fabrication.

### **3.4 FIELD CONNECTIONS**

- A. Bolted Connections: Make in accordance with the Structural Steel Section. Provide bolt type and finish as specified and place bolt heads as indicated on the approved shop drawings.
- B. Welded Connections: Comply with the Structural Steel Welding Code AS/NZS 1554 and in particular AS/NZS 1554.1. Appearance and quality of welds shall be consistent with the Category and visual samples if applicable. Assemble and weld built-up sections by methods that will maintain alignment of members to the tolerance of this Subsection.
  1. Assemble and weld built-up sections by methods that will maintain alignment of axes. Verify that weld sizes, fabrication sequence, and equipment used for AESS will limit distortions to allowable tolerances.

### **3.5 ARCHITECTURAL REVIEW**

- A. The Architect shall review the AESS steel in place and determine acceptability based on the Category and visual samples (if applicable). The Fabricator/Erector will advise the consultant the schedule of the AESS Work.

### **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.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with Appendix E of AS/NZS 4680:2006.

**Table 1 – AESS Category Matrix**

<i>Category</i>		<b>AESS C</b> <i>Custom Elements</i>	<b>AESS 4</b> <i>Showcase Elements</i>	<b>AESS 3</b> <i>Feature Elements</i>	<b>AESS 2</b> <i>Feature Elements</i>	<b>AESS 1</b> <i>Basic Elements</i>	<b>SSS</b> <i>Standard Structural Steel</i>
<i>Characteristics</i>				<i>Viewed at a Distance ≤ 6 m</i>	<i>Viewed at a Distance &gt; 6 m</i>		AS 4100 / NZS 3404.1
Id							
1.1	Surface preparation to AS1627 Sa2/Class 2		√	√	√	√	
1.2	Sharp edges ground smooth		√	√	√	√	
1.3	Continuous weld appearance		√	√	√	√	
1.4	Standard structural bolts		√	√	√	√	
1.5	Weld spatters removed		√	√	√	√	
2.1	Visual Samples		optional	optional	optional		
2.2	One-half standard fabrication tolerances		√	√	√		
2.3	Fabrication marks not apparent		√	√	√		
2.4	Welds uniform and smooth		√	√	√		
3.1	Mill marks removed		√	√			
3.2	Butt and plug welds ground smooth and filled		√	√			
3.3	RHS/CHS weld seam oriented for reduced visibility		√	√			
3.4	Cross sectional abutting surface aligned		√	√			
3.5	Joint gap tolerances minimized		√	√			
3.6	All welded connections		optional	optional			
4.1	RHS/CHS seam not apparent		√				
4.2	Welds contoured and blended		√				
4.3	Surfaces filled and sanded		√				
4.4	Weld show-through minimized		√				
C.1	_____						
C.2	_____						
C.3	_____						
C.4	_____						
C.5	_____						

*Notes*

- 1.1 Prior to blast cleaning, any deposits of grease or oil are to be removed by solvent cleaning, AS1627 Part 1.
  - 1.2 Rough surfaces are to be deburred and ground smooth. Sharp edges resulting from flame cutting, grinding and especially shearing are to be softened.
  - 1.3 Intermittent welds are to be made continuous, either with additional welding, caulking or body filler. For corrosive environments, all joints should be seal welded. Seams of hollow structural sections shall be acceptable as produced.
  - 1.4 All bolt heads in connections shall be on the same side, as specified, and consistent from one connection to another.
  - 1.5 Weld spatter, slivers, surface discontinuities are to be removed. Weld projection up to 2 mm is acceptable for butt and plug welded joints.
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- 2.1 Visual samples are either a 3-D rendering, a physical sample, a first off inspection, a scaled mock-up or a full-scale mock-up, as specified in Contract Documents.
  - 2.2 These tolerances are required to be one-half of those of standard structural steel as specified in AS 4100:1998 and NZS 3404.1:2009
  - 2.3 Members marked with specific numbers during the fabrication and erection processes are not to be visible.
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- 3.1 All mill marks are not to be visible in the finished product.
  - 3.2 Caulking or body filler is acceptable.
  - 3.3 Seams shall be oriented away from view or as indicated in the Contract Documents.
  - 3.4 The matching of abutting cross-sections shall be required.
  - 3.5 This characteristic is similar to 2.2 above. A clear distance between abutting members of 3 mm is required.
  - 3.6 Hidden bolts may be considered.
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- 4.1 RHS/CHS seams shall be treated so they are not apparent.
  - 4.2 In addition to a contoured and blended appearance, welded transitions between members are also required to be contoured and blended.
  - 4.3 The steel surface imperfections should be filled and sanded.
  - 4.4 The weld show through on backface of the welded element caused by the welding process can be minimized by hand grinding the backside of the weld. The degree of weld-through is a function of weld size and material.
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- C. Additional characteristics may be added for custom elements.



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