

AESS Documents prepared by CISC ad hoc committee

Included:

AESS Matrix (Proposed as base document and part of an Appendix, Spec and Guide)

Appendix I (Proposed for inclusion in CISC Code of Standard Practice)

Sample AESS Specification (Proposed for inclusion in Section 05120)

In preparation:

Guide for Specifying AESS

Version 1

Date 2007-10-11

Table 1 - AESS Category Matrix

<i>Category</i>		AESS C <i>Custom Elements</i>	AESS 4 <i>Showcase Elements</i>	AESS 3 <i>Feature Elements</i> <i>Viewed at a Distance ≤ 6 m</i>	AESS 2 <i>Feature Elements</i> <i>Viewed at a Distance > 6 m</i>	AESS 1 <i>Basic Elements</i>	SSS <i>Standard Structural Steel</i> CSA S16
<i>Id</i>	<i>Characteristics</i>						
1.1	Surface preparation to SSPC-SP 6		√	√	√	√	
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	HSS 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	HSS 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							
	<i>Sample Use:</i>	Elements with special requirements	Showcase or dominant elements	Airports, shopping centres, hospitals, lobbies	Retail and architectural buildings viewed at a distance	Roof trusses for arenas, retail warehouses, canopies	
	<i>Estimated Cost Premium:</i>	Low to High (20-250%)	High (100-250%)	Moderate (60-150%)	Low to Moderate (40-100%)	Low (20-60%)	None 0%

Notes

- 1.1 Prior to blast cleaning, any deposits of grease or oil are to be removed by solvent cleaning, SSPC-SP 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 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.
-
- 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 CSA S16.
 - 2.3 Members marked with specific numbers during the fabrication and erection processes are not to be visible.
-
- 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.
-
- 4.1 HSS 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 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.

ARCHITECTURALLY EXPOSED STRUCTURAL STEEL (AESS)

Proposed "AESS" Subsection of Division 5 "Structural Steel" Section 05120

PART 1 – GENERAL

1.1. RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 "Specifications" Section, apply to this Subsection.
- B. For definitions of Categories AESS 1, 2, 3, 4, and C as listed in the AESS Matrix (see Table 1), refer to the CISC Code of Standard Practice Appendix I.

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 other Subsections of Division 5 "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. Division 1 "Quality Control" Section for independent testing agency procedures and administrative requirements;
 - 2. Division 5 "Steel Joist" Section;
 - 3. Division 5 "Metal Decking" Section for erection requirements relating to exposed steel decking and its connections;
 - 4. Division 9 "Painting" Section for finish coat requirements and coordination with primer and surface preparation specified in this Subsection.

1.3. SUBMITTALS

- A. General: Submit each item below according to the Conditions of the Contract and Division 1 "Specifications" Section.
- 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 CWB 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;
 - 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 those qualifications listed in other Subsections of Division 5 "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 those qualifications listed in other Subsections of Division 5 "Structural Steel" Section, engage a competent Erector who has completed comparable AESS work .
- C. Comply with applicable provisions of the following specifications and documents:
 - 1. CISC Code of Standard Practice, latest edition.
- 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 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.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. General: Meet requirements of Subsections of Division 5 "Structural Steel".
- B. Specialty bolts must be specified.

2.2 SPECIAL SURFACE PREPARATION

- A. Primers: Primers must be specified.

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 Section 05120. Provide bolt type and finish as specified and place bolt heads as indicated on the approved shop drawings.
- B. Welded Connections: Comply with CSA W59-03 and Section 05120. 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 CSA S16-01.
- 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 CSA S16-01;
 - 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 Section 05120. Provide bolt type and finish as specified and place bolt heads as indicated on the approved shop drawings.
- B. Welded Connections: Comply with CSA W59-03 and Section 05120. 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 ASTM A780.

Table 1 – AESS Category Matrix

<i>Category</i>		AESS C <i>Custom Elements</i>	AESS 4 <i>Showcase Elements</i>	AESS 3 <i>Feature Elements</i>	AESS 2 <i>Feature Elements</i>	AESS 1 <i>Basic Elements</i>	SSS <i>Standard Structural Steel</i>
<i>Characteristics</i>				<i>Viewed at a Distance ≤ 6 m</i>	<i>Viewed at a Distance > 6 m</i>		CSA S16
<i>Id</i>							
1.1	Surface preparation to SSPC-SP 6		√	√	√	√	
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	HSS 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	HSS 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, SSPC-SP 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 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.
-
- 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 CSA S16.
 - 2.3 Members marked with specific numbers during the fabrication and erection processes are not to be visible.
-
- 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.
-
- 4.1 HSS 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 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.
- C. Additional characteristics may be added for custom elements.

Architecturally Exposed Structural Steel (AESS)

1.1 SCOPE AND REQUIREMENTS

1.1.1 General Requirements. When members are specifically designated as “Architecturally Exposed Structural Steel” or “AESS” in the Contract Documents, the requirements in Sections 1 through 7 shall apply as modified by this Appendix. AESS members or components shall be fabricated and erected with the care and dimensional tolerances that are stipulated in Sections 1.2 through 1.5.

1.1.2 Definition of Categories. Categories are listed in the AESS Matrix shown in Table 1 where each Category is represented by a set of Characteristics. The following Categories shall be used when referring to AESS:

AESS 1: Basic Elements

Suitable for "basic" elements which require enhanced workmanship.

AESS 2: Feature Elements viewed at a Distance > 6 m

Suitable for "feature" elements viewed at a distance greater than six meters. The process involves basically good fabrication practices with enhanced treatment of weld, connection and fabrication detail, tolerances for gaps, copes.

AESS 3: Feature Elements viewed at a Distance ≤ 6 m

Suitable for “feature” elements – where the designer is comfortable allowing the viewer to see the art of metalworking – welds are generally smooth but visible, some grind marks are acceptable. Tolerances are tighter than normal standards. The structure is normally viewed closer than six meters and is frequently subject to touch by the public.

AESS 4: Showcase Elements.

Suitable for “showcase or dominant” elements – used where the designer intends that the form is the only feature showing in an element. All welds are ground and filled edges are ground square and true. All surfaces are sanded/filled. Tolerances of fabricated forms are more stringent – generally ½ of standard tolerance. All surfaces to be “glove” smooth.

AESS C: Custom Elements.

Suitable for elements who require a different set of Characteristics as specified in Category 1, 2, 3 or 4.

1.1.3 Additional Information. The following additional information shall be provided in the Contract Documents when AESS is specified:

- a. Specific identification of members or components that are AESS using the AESS Categories listed in 1.1.2. Refer to Table 1;
- b. Fabrication and/or erection tolerances that are to be more restrictive than provided for in this Appendix;
- c. For Categories AESS 2, 3, 4 requirements, if any, of a visual sample or first-off component for inspection and acceptance standards prior to the start of fabrication;
- d. For Category AESS C, the AESS Matrix included in Table 1 shall be used to specify the required treatment of the element.

1.2 SHOP DETAIL, ARRANGEMENT AND ERECTION DRAWINGS

1.2.1 Identification. All members designated as AESS members are to be clearly identified to a Category, either AESS 1, 2, 3, 4 or C, on all shop detail, arrangement and erection drawings.

1.2.2 Variations. Any variations from the AESS Categories listed must be clearly noted. These variations could include machined surfaces, locally abraded surfaces, forgings. In addition:

- a. If distinction is to be made between different surfaces or parts of members the transition line/plane must be clearly identified/defined on the Shop detail, arrangement and erection drawings;
- b. Tack welds, temporary braces, fixtures used in fabrication are to be indicated on shop drawings;
- c. All architecturally sensitive connection details will be submitted for approval by the Architect/Engineer prior to completion of shop detail drawings.

1.3 FABRICATION

1.3.1 General Fabrication. The fabricator is to take special care in handling the steel to avoid marking or distorting the steel members.

- a. All slings will be nylon type or chains with softeners or wire rope with softeners.
- b. Care is also taken to minimized damage to any shop paint or coating.
- c. If temporary braces or fixtures are required during fabrication, during shipment, or to facilitate erection, care must be taken to avoid and/or repair any blemishes or unsightly surfaces resulting from the use or removal of such temporary elements.
- d. Tack welds are ground smooth.

1.3.2 Unfinished, Reused or Weathering Steel. Members fabricated of unfinished, reused or weathering steel that are to be AESS may still have erection marks, painted marks or other marks on surfaces in the completed structure. Special requirements shall be specified as Category AESS C.

1.3.3 Tolerances for Rolled Shapes. The permissible tolerances for depth, width, and out of square, camber and sweep of rolled shapes shall be as specified in CSA G40.20/21 and ASTM A6. The following exceptions apply:

- a. For Categories AESS 3 and 4 and otherwise specified in the Contract Documents: The matching of abutting cross-sections shall be required;
- b. For Categories AESS 2, 3 and 4: The as-fabricated straightness tolerance of a member is one-half of the standard camber and sweep tolerance in CSA G40.20/21.

1.3.4 Tolerances for Built-up Members. The tolerance on overall profile dimensions of members made up from a series of plates, bars and shapes by welding is limited to the accumulation of permissible tolerances of the component parts as provided by CSA W59 and ASTM A6. For Categories AESS 2, 3 and 4, the as-fabricated straightness tolerance for the member as a whole is one-half of the standard camber and sweep tolerances in CSA W59.

1.3.5 Joints. For Categories AESS 3 and 4, all copes, miters and butt cuts in surfaces exposed to view are made with uniform gaps, if shown to be open joint, or in uniform contact if shown without gap.

1.3.6 Surface Appearance. For Categories AESS 1, 2 and 3, the quality surface as delivered by the mills should be acceptable. For Category AESS 4, the steel surface imperfections should be filled and sanded.

1.3.7 Welds. For corrosive environments, all joints should be seal welded. In addition:

- a. For Categories AESS 1, 2 and 3, a smooth uniform weld will be acceptable. For Category AESS 4, the weld will be contoured and blended.

- b. For Categories AESS 1, 2, 3 and 4, all weld spatter is to be avoided/removed where exposed to view.
- c. For Categories AESS 1 and 2, weld projection up to 2 mm is acceptable for butt and plug welded joints. For Categories AESS 3 and 4, welds will be ground smooth/filled.

1.3.8 Weld Show-through. It is recognized that the degree of weld show-through, which is any visual indication of the presence of a weld or welds on the opposite surface from the viewer, is a function of weld size and material thickness.

- a. For Categories AESS 1, 2 and 3, the members or components will be acceptable as produced.
- b. For Category AESS 4, the fabricator shall minimize the weld show-through.

1.3.9 Surface Preparation for Painting. Unless otherwise specified in the Contract Documents, the Fabricator will clean AESS members to meet the requirement of SSPC-SP 6 "Commercial Blast Cleaning" (sandblast or shotblast). Prior to blast cleaning:

- a. Any deposits of grease or oil are to be removed by solvent cleaning, SSPC-SP 1;
- b. Weld spatter, slivers, surface discontinuities are to be removed;
- c. Sharp edges resulting from flame cutting, grinding and especially shearing are to be softened.

1.3.10 Hollow Structural Sections (HSS) Seams.

- a. For Categories AESS 1 and 2, seams of hollow structural sections shall be acceptable as produced.
- b. For Category AESS 3, seams shall be oriented away from view or as indicated in the Contract Documents.
- c. For Category AESS 4, seams shall be treated so they are not apparent.

1.4 DELIVERY OF MATERIALS

1.4.1 General Delivery. The Fabricator shall use special care to avoid bending, twisting or otherwise distorting the Structural Steel. All tie downs on loads will be either nylon strap or chains with softeners to avoid damage to edges and surfaces of members.

1.4.2 Standard of Acceptance. The standard for acceptance of delivered and erected members shall be equivalent to the standard employed at fabrication.

1.5 ERECTION

1.5.1 General Erection. The Erector shall use special care in unloading, handling and erecting the AESS to avoid marking or distorting the AESS. The Erector must plan and execute all operations in such a manner that allows the architectural appearance of the structure to be maintained.

- a. All slings will be nylon strap or chains with softeners.
- b. Care shall be taken to minimize damage to any shop paint or coating.
- c. If temporary braces or fixtures are required to facilitate erection, care must be taken to avoid and/or repair any blemishes or unsightly surfaces resulting from the use or removal of such temporary elements..
- d. Tack welds shall be ground smooth and holes shall be filled with weld metal or body filler and smoothed by grinding or filling to the standards applicable to the shop fabrication of the materials.
- e. All backing bars will be removed and ground smooth.
- f. All bolt heads in connections shall be on the same side, as specified, and consistent from one connection to another.

1.5.2 Erection Tolerances. Unless otherwise specified in the Contract Documents, members and components are plumbed, leveled and aligned to a tolerance equal to the tolerance permitted for structural steel.

1.5.3 Adjustable Connections. Specifically designated more stringent erection tolerances for AESS require that the Owner's plans specify/allow adjustable connections between AESS adjoining structural elements, in order to provide the Erector with means for adjustment and/or specify the method to be used to achieve the desired dimensions. Any proposed adjustment details desired by the Erector shall be submitted to the Architect and Engineer for review.

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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		√	√	√		
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3.1	Mill marks removed		√	√			
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3.3	HSS 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	HSS seam not apparent		√				
4.2	Welds contoured and blended		√				
4.3	Surfaces filled and sanded		√				
4.4	Weld show-through minimized		√				
C.1	_____						
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 - 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.
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 - 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 CSA S16.
 - 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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 - 4.2 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 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.