

A SUMMARY OF REVISIONS TO THE
AISC SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS

General Revisions:

- Symbols revised throughout
- Glossary terms revised throughout

Chapter A

- A1. Scope –The fourth paragraph has been added to discuss building code and general design requirements.
A1.1. Seismic Applications – The 2005 version had both Low and High Seismic Applications. This has now condensed into one section. The R factor discussion has been deleted and the scope has been generalized.
- A2. Referenced Specifications, Codes and Standards – Some references have been updated while others have been added.
- A3. Material – Some new ASTM designations have been added along with metric designation. Added ASTM A1043/A1043M, which is used for seismic applications. Revised the definition of unidentified steel in A3.1b. Clarified the CVN toughness requirements with revised language. The 70 degree F temperature is now a maximum temperature.
- A4. Structural Design Drawings and Specifications – Language revised (reverted to the 1999 LRFD version) and added a User Note at the end of the section.

Chapter B

- B1. General Provisions - No change
- B2. Loads and Load Combinations – User Note has been modified.
- B3. Design Basis – Reorganization and revisions to titles. Design wall thickness of HSS provision has moved to B4.2.
B3.2. Limit States – Completely rewritten to address structural integrity issue, including as it relates to connections.
B3.6. Design of Connections – Added a few sentences detailing restraint in connections.
B3.7. Moment Redistribution in Beams – completely rewritten.
B3.8 Diaphragms and Collectors – new section
B3.14 Anchorage to Concrete – new section
- B4. Member Properties
B4.1. Classification of Sections for Local Buckling –
Added distinction that compression members are classified as nonslender and slender, and flexural members as noncompact and compact. Table B4.1 has been divided into B4.1a and B4.1b accordingly. Also editorially revised some of the descriptive language and added figures.

Specific revisions to the limiting width-thickness ratios given in Table B4.1 are:

- Stems of tees for Compression Elements in Members Subject to Flexure

B5. Fabrication, Erection and Quality Control – No change, except to exclude quality control as that is not covered in a separate Chapter N.

B6. Evaluation of Existing Structures – No change

Note: A new section will be added here to provide charging language to Chapter N.

Chapter C

Chapter C and Appendix 7 have been reorganized to place the Direct Analysis Method in the main body of the Specification (Chapter C) and the other methods in Appendix 7 and 8 (B1-B2 method).

Other specific revisions include:

C1. General Stability Requirements

-Incorporated an explicit requirement that uncertainty in component and system stiffness and strength be considered.

- The requirement for the 1.6 multiplier with AS, formerly specified with particular design methods, is now listed as a general requirement

C2. Calculation of Required Strengths

- Added an exception that permits neglecting the $P - \delta$ effect when certain conditions are satisfied.

Chapter D

D1. Slenderness Limitations – No change

D2. Tensile Strength – There is only slight change in symbol definition.

D3. Effective Net Area – Moved “Gross Area” and “Net Area” sections into Section B4 and retitled this section.

- Deleted the exception permitted when addressing the effect of eccentricity for tension members.

Table D3.1 – Shear Lag Factors for Connections to Tension Members

Modifications include:

- Revised the requirement for single angle elements (and included double angles)

- Editorial clarifications

D4. Built-Up Members – No change

D5. Pin-Connected Members – Some of the symbols have been modified in this section (b_{eff} to b_e).

D6. Eyebars – No change

Chapter E

E1. General Provisions – There is a new Table E1.1 added as a user note. Deleted general direction for which limit states need to be checked.

- E2. Effective Length – The title has changed, also the definition of “K” has been modified to be within the text.
- E3. Flexural Buckling of Members without Slender Elements – The title has changed.
 - Revised the format of the alternate limits (in parens) for determining which flexural buckling stress eqn. applies
 - Added alternate for determining F_e (elastic buckling analysis)
- E4. Torsional and Flexural-Torsional Buckling of Members without Slender Elements – The title has changed.
 - Added provision that this section is not required if $b/t \leq 20$ (then use E5)
 - Added clarification of the KL/r value that applies for double angles (from Sect. E6)
 - Added further explanation that Section E4 applies to all doubly symmetric members when the torsional unbraced length $>$ lateral unbraced length.
- E5. Single Angle Compression Members
 - Added clarification of the definition of “leg length ratios”
- E6. Built-Up Members
 E6.1. Compressive Strength –
 - Added specific connection requirements for end connections.
 - Revised the $(KL/r)_m$ equations for intermediate connectors that are welded or pretensioned bolted
- E6.2. Dimensional Requirements – Only minor editorial changes have been made.
 - Revised “milled surfaces” to “finished surfaces”
- E7. Members with Slender Elements –
 - Revised the alternate inequalities used to determine which F_{cr} equation to use.

Chapter F

- F1. General Provisions – The C_b (Eqn. F1-1) has been slightly modified (Eliminated R_m term and limit of 3.0). Clarified when the C_b equation is used.
- F2. Doubly Symmetric Compact I-Shaped Members and Channels Bent about Their Major Axis
 F2.2. Lateral-Torsional Buckling
 – Added a User Note with an equation of M_{cr} also the User Note at the end of the section has been modified.
 - Revised format of Eqn F2-6 for L_r .
- F3. Doubly Symmetric I-Shaped Members with Compact Webs and Noncompact or Slender Flanges Bent about Their Major Axis – only editorial changes.
- F4. Other I-Shaped Members with Compact or Noncompact Webs Bent about Their Major Axis –
 - Modified L_r equation
 - Added clarification of how to determine R_{pc} when the compression flange is a very small portion of the beam

- F5. Doubly Symmetric and Singly Symmetric I-Shaped Members with Slender Webs Bent about Their Major Axis – Only minor editorial change in the first paragraph.
- F6. I-Shaped Members and Channels Bent about Their Minor Axis – The equation for F_{cr} has changed also another couple definitions was added.
- F7. Square and Rectangular HSS and Box-Shaped Members – Added a User Note and couple editorial changes.
- F8. Round HSS – Added a definition.
- F9. Tees and Double Angles Loaded in the Plane of Symmetry -
 - F9.3. Flange Local Buckling of Tees – This section has been rewritten to be in terms of M_n and not F_{cr} . Also some of the symbols have been altered and modified. The terminology was updated consistent with the new Tables B4.1a and b.
 - F9.4. Local Buckling of Tee Stems in Flexural Compression – This section is new.
- F10. Single Angles
 - A paragraph has been added in the beginning of this section to clarify the application of the interaction provisions in Chapter H.
 - F10.2 Lateral-Torsional Buckling
 - This section has been moved from section (iii) and (iv) to sections (i) and (ii). This subsection has been reduced from 5 sections to 3.
- F11. Rectangular Bars and Rounds – no change
- F12. Unsymmetrical Shapes – no change
- F13. Proportions of Beams and Girders – Equations F13-3 and F13-4 have changed.
 - F13.2 Proportioning Limits for I-Shaped Members
 - revised coefficients on the equations for $(h/tw)_{max}$
 - F13.5 Unbraced Length for Moment Redistribution
 - new section that applies when moment redistribution is used in beams according to B3.7

Chapter G

- G1. General Provisions
- G2. Members with Unstiffened or Stiffened Webs –
 - G2.2. Transverse Stiffeners
 - Revised how to determine I for transverse stiffeners
 - Deleted lateral bracing requirement as it is covered in App. 6
- G3. Tension Field Action –
 - G3.3 Transverse Stiffeners - Revised requirements for transverse stiffeners
- G4. Single Angles –
 - Revised how to calculate nominal shear strength for single angles
- G5. Rectangular HSS and Box-Shaped Members

- G6. Round HSS – no technical change
- G7. Weak Axis Shear in Singly and Doubly Symmetric Shapes– no technical change
- G8. Beams and Girders with Web Openings– no technical change

Chapter H

H1. Doubly and Singly Symmetric Members Subject to Flexure and Axial Force – in the symbols definition, the word *tensile* has been switched to *axial*.

H1.2 Doubly and Singly Symmetric Members Subject to Flexure and Tension
 - Revised the C_b multiplier allowed for axial tension combined with flexure

H1.3 Doubly Symmetric Rolled Compact Members Subject to Single Axis Flexure and Compression
 - Language revised to only apply to “rolled compact” members; also clarified that the section only applies when $(KL)_z \leq (KL)_y$ when moments are primarily about the major axis
 - Revised interaction equation for out-of-plane buckling and LTB; M_{cx} is redefined

H2. Unsymmetric and Other Members Subject to Flexure and Axial Force – only a few editorial changes to the definition, the technical content is still the same.

H3. Members Subject to Torsion and Combined Torsion, Flexure, Shear and/or Axial Force
 - Provided a definition of h for use in the rect. HSS

H4. Rupture of Flanges with Holes Subject to Tension – New section

Chapter I

Chapter I has been reorganized and includes many new provisions, with some major ones described below.

- I1. General Provisions –Section I1 has been extensively rewritten.
 Moved Shear Connector section to new section called Steel Anchors and changed the terminology used for shear connectors.
 - I1.1 Concrete and Steel Reinforcement
 - Defaults to ACI 318 with exceptions listed
 - I1.2 Nominal Strength of Composite Sections
 - Added consideration of local buckling effects for filled members
 - Moved allowance to use higher material strengths into a user note.
 - I1.4 Classification of Filled Composite Sections for Local Buckling
 - New section providing revised local buckling provisions, including Tables I1.1a and I1.1b provide limiting width-to-thickness ratios for steel compression elements in composite members
- I2. Axial Force – new section title. All shear provisions have been moved to I4.
 - I2.1. Encased Composite Members
 - I2.1a Limitations – revised reinforcement requirements

I2.1b Compressive Strength

- clarified that this applies to doubly symmetric members
- revised limits used to determine which P_n eqn to use (consistent with 05, but different format)
- revised (expanded) the definition of P_c and other terms

I2.1e Detailing Requirements – revised

I2.2 Filled Composite Members

I2.2b. Compressive Strength – revised

I2.2d. Load Transfer – This section used to be I2.2e, it has been moved up due to the moving of a section focused on shear provisions.

I3. Flexure – Chapter title changed from “flexural members” – some of the subsections here have also been moved due to the fact that shear provisions have been moved to I4.

I3.3 Encased Composite Members

- Use same phi/omega factors for all methods to determine the available flexural strength (formerly reduced for one method)

I3.4 Filled Composite Members

- Provisions for available flexural strength determination have been revised for these members

I4. Shear – This section is new and it compiles all of the shear provisions and the provisions have been modified.

I5. Combined Axial Force and Flexure – The safety factors from the '05 *Spec.* have been removed and two new paragraphs with a Users' Note have been added.

I6. Load Transfer – this section was in Section I1 in the 05 *Spec.* It has been expanded and modified.

I7. Composite Diaphragms and Collector Beams – this section did not appear in the '05 *Spec.*

I8. Steel Anchors –

This new section contains all of the requirements related to shear connectors and includes significant modifications.

I9. Special Cases – only editorial revisions

Chapter J

J1. General Provisions – couple sentences have been modified editorially.

J1.6 Weld Access Holes – Title changed from “Beam Copes and Weld Access Holes” – - Some parts of this subsection have been modified; in particular to eliminate the reference to beam copes in certain instances.

J2. Welds – Editorially, revised “effective throat thickness” to “effective throat”.

J2.1 Groove Welds

J2.1a. Effective Area

- Added a clause to require welding procedure specs when larger effective throats are used than specified in Table J2.2

J2.2b. Limitations

- Revisions in this section are because of a need for consistency with AWS D1.1
- Revised effective length for end loaded fillet welds
- Added revision to the use of fillet welds in holes or slots transmitting shear

J2.4. Strength

- Some of the symbols have changed in this section
 - Inserted nominal moment capacity for weld elements in a weld group
- Table J2.5 Available Strength of Welded Joints – symbols have been modified and safety factors have been changed for PJP, tension normal to weld axis for base metal.

J2.6 Filler Metal Requirements

- The User Note at the end of the section has undergone major revisions in an effort to make it consistent with AWS D1.1.
- Clarified Charpy V-notch requirements

J3. Bolts and Threaded Parts

J3.1 High-Strength Bolts

- Bolts are classified as Class A or B based on their ASTM designation. This affects provisions throughout J3.
- Add a definition of “high-strength bolts” to the glossary and eliminate specific references to ASTM designations in J3
- Replaced references to ASTM A325 and A490 bolts with reference to RCSC Specification
- Revised definition of snug-tight
- Revise requirement related to snug-tight bolts identification on design drawings

J3.4 Minimum Edge Distance

- Table J3.4/J3.4M, Minimum Edge Distance: Eliminated the “at sheared edges” column. Also modified footnotes.

J3.6 Tension and Shear Strength of Bolts and Threaded Parts

- Revised Table J3.2 so that nominal shear strength is based on the fastener pattern length
- Also modified footnotes in Table J3.2

J3.8 High-Strength Bolts in Slip-Critical Connections

- Provisions for slip-critical connection strength have been revised

J4. Affected Elements of Members and Connecting Elements

J4.1 Strength of Elements in Tension – A user note has been added.

J4.5 Strength of Elements in Flexure – New section

J5. Fillers

J5.2 Bolted

- Revising to faying surface preparations required
- Class A and B bolts require turn-of-nut tightening to prevent slip (using new J3.8)

J6. Splices – No change

J7. Bearing Strength – Editorial changes to symbols.

J8. Column Bases and Bearing on Concrete – Safety factor has been changed from 0.60 to 0.65

J9. Anchor Rods and Embedments

- Contains revisions related to transfer of forces to the concrete foundation

J10. Flanges and Webs with Concentrated Forces – Most of the revision in the section are to the symbols listed. Trying to define all the symbols used and make sure they are consistent with the Symbols List.

Chapter K

Chapter K – Chapters K1-K3 have been completely rewritten. They have undergone major changes from paragraph form to tabular form.

- K1. Concentrated Forces on HSS
- K2. HSS-to-HSS Truss Connections
- K3. HSS-to-HSS Moment Connections
- K4. Welds to Branches – Brand new section.

Chapter L

- L1. General Provisions – there is only a minor editorial change in the User Note.
- L2. Camber – The User Note from '05 has been deleted.
- L3. Deflections – No change
- L4. Drift – No change
- L5. Vibration – No change
- L6. Wind-Induced Motion – No change
- L7. Expansion and Contraction – No change
- L8. Connection Slip – Only a minor change in the last part of the section.

Chapter M

The Quality control provisions have been moved into new Chapter N.

M1. Shop and Erection Drawings – A sentence has been relocated from earlier in the paragraph to be the first sentence. Other than that, it hasn't changed.

M2. Fabrication - This section has been modified to include the most recent terminology such as "construction documents" etc. There has been a paragraph and a User Note added to subsection 2.2. A few User Notes have been added but not major changes.

M3. Shop Painting – Only a few editorial changes.

M4. Erection –

M4.1 Column Base Setting – New title – previous title was "Alignment of Column Bases"

M4.2 Stability and Connections – New title – previous title was "Bracing" – A sentence was added saying that the structure should be able to support itself during construction (previous section M4.7)

M4.5 Field Welding – This subsection has been completely rewritten.

Chapter N – This is a new chapter. Some parts have been taken out of the '05 Chapter M5.

Appendix 1 – Most of this Appendix has been rewritten. It has been rewritten to be in 3 subsections instead of 9 and it has been made clearer as to how to design by inelastic analysis.

Appendix 2

2.1. Simplified Design for Ponding – There is a change to one of the symbols. Also, the final paragraph has been modified and a User Note has been added.

2.2. Improved Design for Ponding – Only editorial changes.

Appendix 3

3.1. General Provisions – The title has been changed from “General” – A few sentences have been modified in this section.

3.2. Calculation of Maximum Stresses and Allowable Stress Ranges – No change.

3.3. Plain Material and Welded Joints – NEW SECTION TITLE – has not been changed at the top of the draft. The word “design” has been changed to “allowable”. Also, there have been a few revisions in the list of definitions.

3.4. Bolts and Threaded Parts – Only editorial and symbol revisions.

3.5. Special Fabrication and Erection Requirements – A sentence and a User Note was added to make the section consistent with AWS.

Appendix 4

4.1. General Provisions – All of the definitions in the '05 Spec. have been relocated from section 4.1.2 Design by Engineering Analysis – A paragraph has been added at the end to put a restriction on member design equations.

4.2 Structural Design for Fire Conditions by Analysis – A paragraph was moved from 4.2.1.3 to 4.2.1.2. Also, some of the symbols which are time dependant have been changed by TC 2. There are also some editorial revisions.

- Table A-4.2.1 Properties of Steel at Elevated Temperatures – this table has been modified.

4.2.3b Simple Method of Analysis – the title has changed along with most of this subsection. This section has been edited.

4.3. Design by Qualification Testing – only editorial changes

Appendix 5

5.1. General Provisions – only a few words have been altered.

5.2. Material Properties – changed the word “mill” to “material”

5.3. Evaluation by Structural Analysis – only one phrase in final paragraph has been altered.

5.4. Evaluation by Load Tests – editorial changes only.

5.5. Evaluation Report – changed the word “mill” to “material”

Appendix 6 – This appendix has been revised to include braces and be more clear in its presentation of column and beam stability.

6.1. General Provisions – This whole section has been modified since the '05 *Spec.* A User Note has also been added.

6.2. Column Bracing – title changed from “Columns” – only other revisions were editorial.

6.3. Beam Bracing – title changed from “Beams” – This section has been rewritten for clarity purposes. Paragraphs are taken and summarized into a few more concise bullet points.

6.4. Beam-Column Bracing – This is a brand new section.

Appendix 7

7.1. General Stability Requirements – Title changed from “General Requirements” – This section has been rewritten and contains material formerly in Chapter C.

7.2. Effective Length Method – This section has been expanded upon and made clearer. Most changes are editorial.

7.3. First-Order Analysis Method – This section has been modified to be clearer. Sentences have been modified to be consistent with Chapter C.

Appendix 8 – This material was in Chapter C and has been moved to this appendix

8.1. Limitations – The word “method” has been changed to “procedure.”

8.2. Calculation Procedure – This whole section has been moved from Chapter C. It has been reorganized and fine tuned but the only major technical changes are in Section 8.2.2.