Getting Up-to-Date With Steel Design

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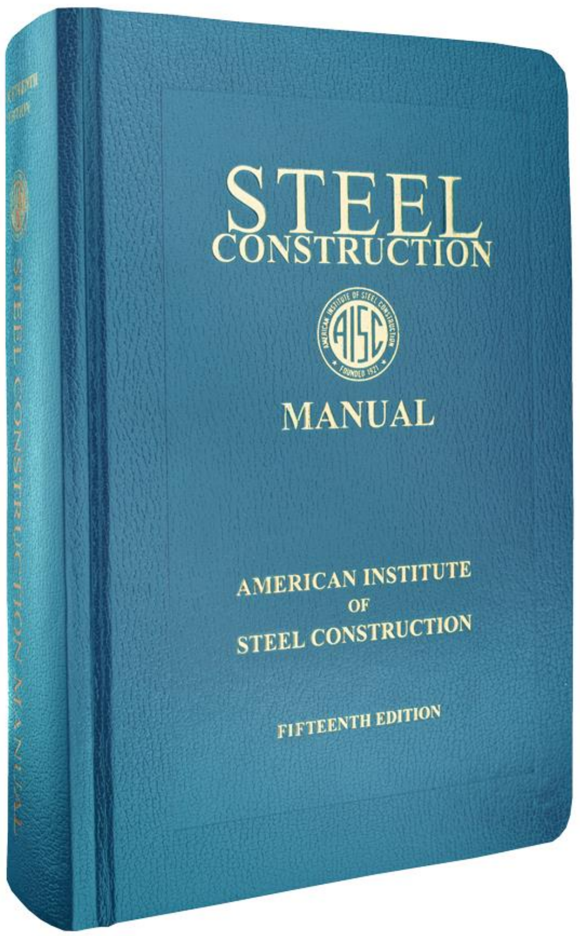
April 28-30, 2021

SEANM 2021 ANNUAL CONFERENCE

2016 AISC *Specification for Structural Steel Buildings*

2016 AISC *Code of Standard Practice for Steel Buildings and Bridges*

15th Ed. *Steel Construction Manual* (A Handbook)



PART 16. SPECIFICATIONS & CODES

2016 *Specification for Structural Steel Buildings*

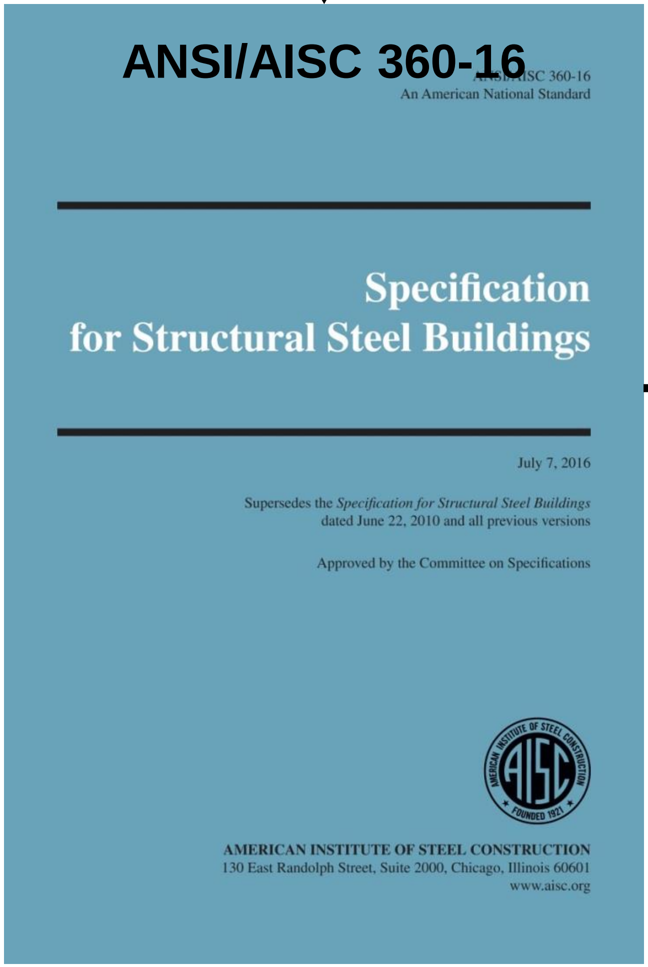
2014 *Specification for Structural Joints Using High-Strength Bolts*

2016 *Code of Standard Practice for Structural Steel Buildings & Bridges*

2016 AISC Standards

2018 *INTERNATIONAL BUILDING CODE*

ANSI/AISC 360-16


ANSI/AISC 360-16
An American National Standard

Specification
for Structural Steel Buildings

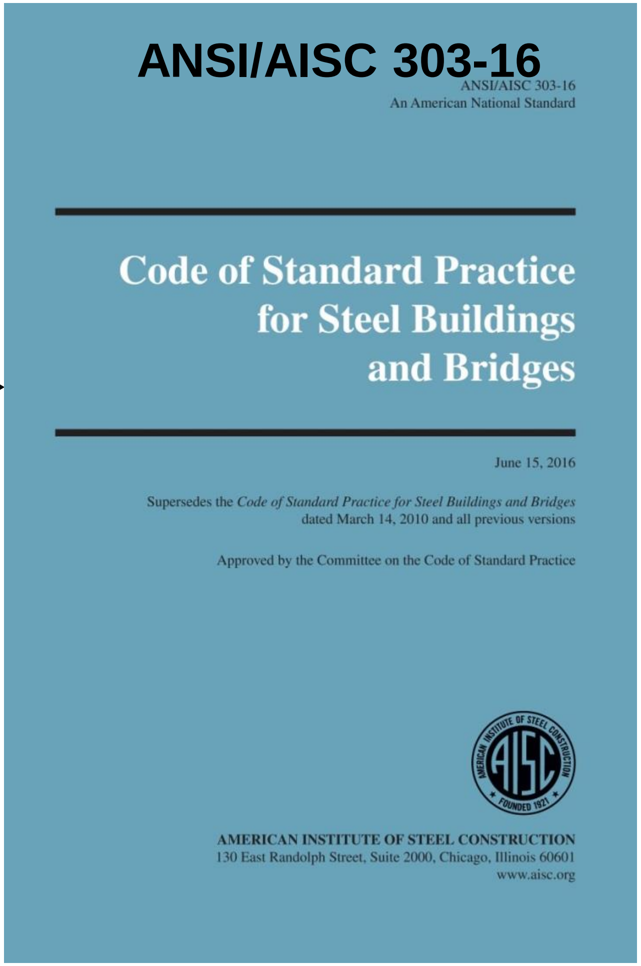
July 7, 2016

Supersedes the *Specification for Structural Steel Buildings*
dated June 22, 2010 and all previous versions

Approved by the Committee on Specifications

AMERICAN INSTITUTE OF STEEL CONSTRUCTION
130 East Randolph Street, Suite 2000, Chicago, Illinois 60601
www.aisc.org

ANSI/AISC 303-16


ANSI/AISC 303-16
An American National Standard

Code of Standard Practice
for Steel Buildings
and Bridges

June 15, 2016

Supersedes the *Code of Standard Practice for Steel Buildings and Bridges*
dated March 14, 2010 and all previous versions

Approved by the Committee on the Code of Standard Practice

AMERICAN INSTITUTE OF STEEL CONSTRUCTION
130 East Randolph Street, Suite 2000, Chicago, Illinois 60601
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AISC 360 References to *AISC 303*

A1: refers to Code definition of structural steel

A4: requires structural design drawings and specifications meet the requirements in the Code

Chap. C: uses Code erection tolerance to define the notional load used in the stability design

M2.7: refers to Code Section 6 for dimensional tolerances

M3.1: refers to Code Section 6 for painting requirements

M4.1 and M4.2: refer to Code Section 7 for column base placement, erection tolerance, and temporary bracing requirements

N2: refers to Code Section 6.1 for material identification and Sections 6 and 7.13 for fabrication and erection tolerances

2016 AISC Standards

ANSI

American National Standards Institute

2016 AISC Standards: Consensus Committees

Specification for Structural Steel Buildings
(ANSI/AISC 360-16)

AISC

Committee on Specifications

Code of Standard Practice for Steel Buildings and Bridges
(ANSI/AISC 303-16)

AISC

Committee on Code of Standard Practice

COMMITTEE ON SPECIFICATIONS

ANSI Accredited Procedures

Balanced Membership: Industry, Consultants, General Interest

TASK COMMITTEES	
TC 1 – Coordination	**TC 7** – Evaluation & Repair
TC 2– Editorial/Economy/Efficiency/ Practical Use	**AISI/AISC Fire Committee**--Design for Fire Conditions
TC 3 – Loads, Analysis & Stability	**TC 9** – Seismic Systems
TC 4 – Member Design	**TC 10** – Materials, Fabrication, Erection & Inspection
TC 5 – Composite Design	**TC 11** – Nuclear Facilities Design
TC 6 – Connection Design	**TC 12** – Quality Certification and Quality Assurance

2016 *Specification for Structural Steel Buildings*

GOALS:

- Implement only essential changes
- Coordinate with other standards
- Reflect new research
- More efficient designs
- Broaden scope or fix omissions
- Improve usability/transparency
- Improve editorial content

Specification for Structural Steel Buildings

Chapter A. General Provisions

Chapter B. Design Requirements

Chapter C. Design for Stability

Chapter D. Design of Members for Tension

Chapter E. Design of Members for Compression

Chapter F. Design of Members for Flexure

Chapter G. Design of Members for Shear

Chapter H. Design of Members for Combined Forces and Torsion

ANSI/AISC 360-16

Specification for Structural Steel Buildings

Chapter I. Design of Composite Members

Chapter J. Design of Connections

Chapter K. ~~Design of HSS and Box Members Connections~~Additional Requirements for HSS and Box-Section Connections

Chapter L. Design for Serviceability

Chapter M. Fabrication and Erection

Chapter N. Quality Control and Quality Assurance

Specification for Structural Steel Buildings

Appendix 1. Design by ~~Inelastic~~ Advanced Analysis

Appendix 2. Design for Ponding

Appendix 3. ~~Design for~~ Fatigue

Appendix 4. Structural Design for Fire Conditions

Appendix 5. Evaluation of Existing Structures

Appendix 6. Member Stability Bracing ~~for Columns and Beams~~

Appendix 7. Alternative Methods of Design for Stability

Appendix 8. Approximate Second-Order Analysis

CHAPTER A
GENERAL PROVISIONS

A1. SCOPE

The *Specification for Structural Steel Buildings* (ANSI/AISC 360)…shall apply to the design, fabrication and erection of the structural steel system or systems with structural steel acting compositely with reinforced concrete, where the steel elements are defined in Section 2.1 of the AISC *Code of Standard Practice for Steel Buildings* (ANSI/AISC 303)….


D REES-EVANS (C) 2004

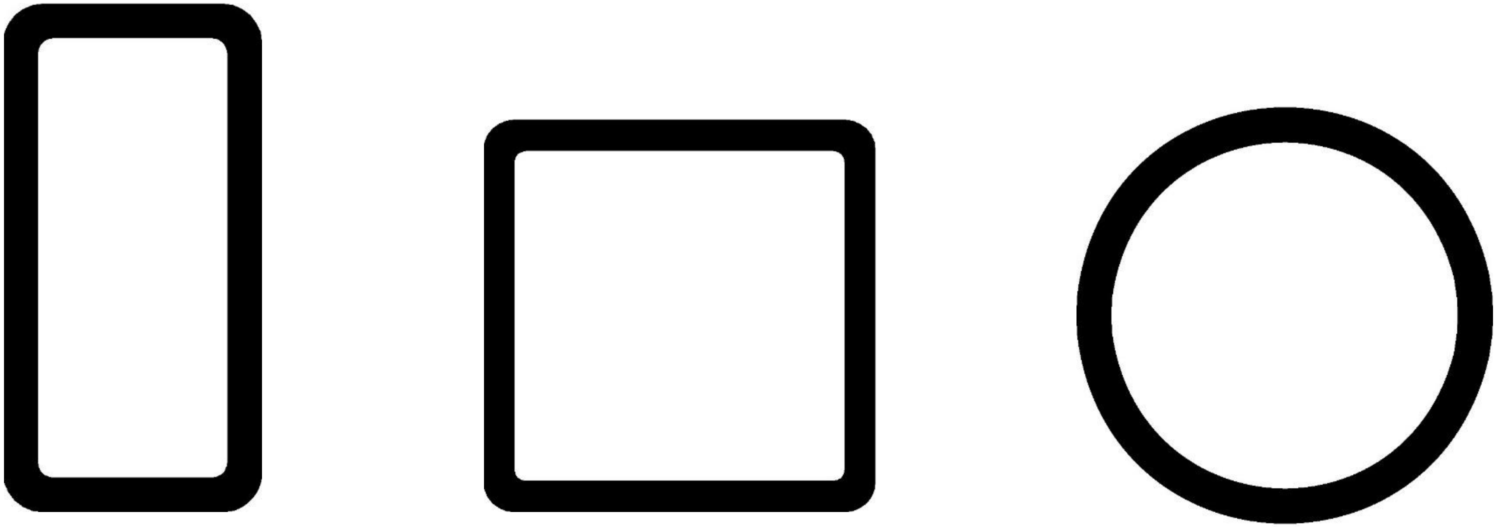
CHAPTER A
GENERAL PROVISIONS

A2. REFERENCED SPECIFICATIONS, CODES AND STANDARDS

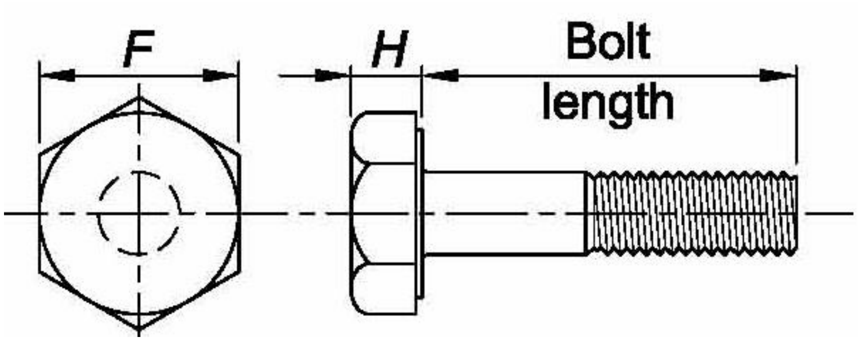
New Referenced Standards:

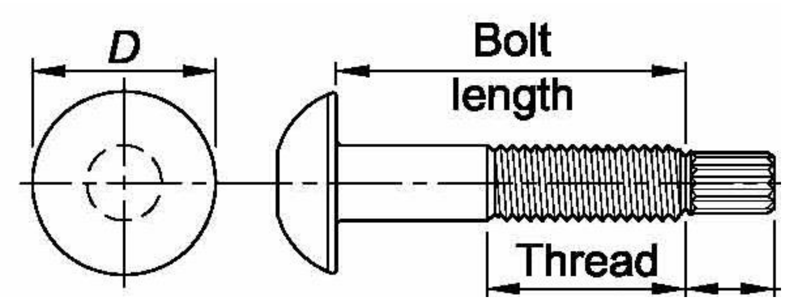
- 2016 ASCE/SEI 7
- 2015 AWS D1.1
- 2014 RCSC Specification
- 2014 ACI 318

- **ASTM A1065—New HSS material**
- **ASTM A1085—New HSS material**



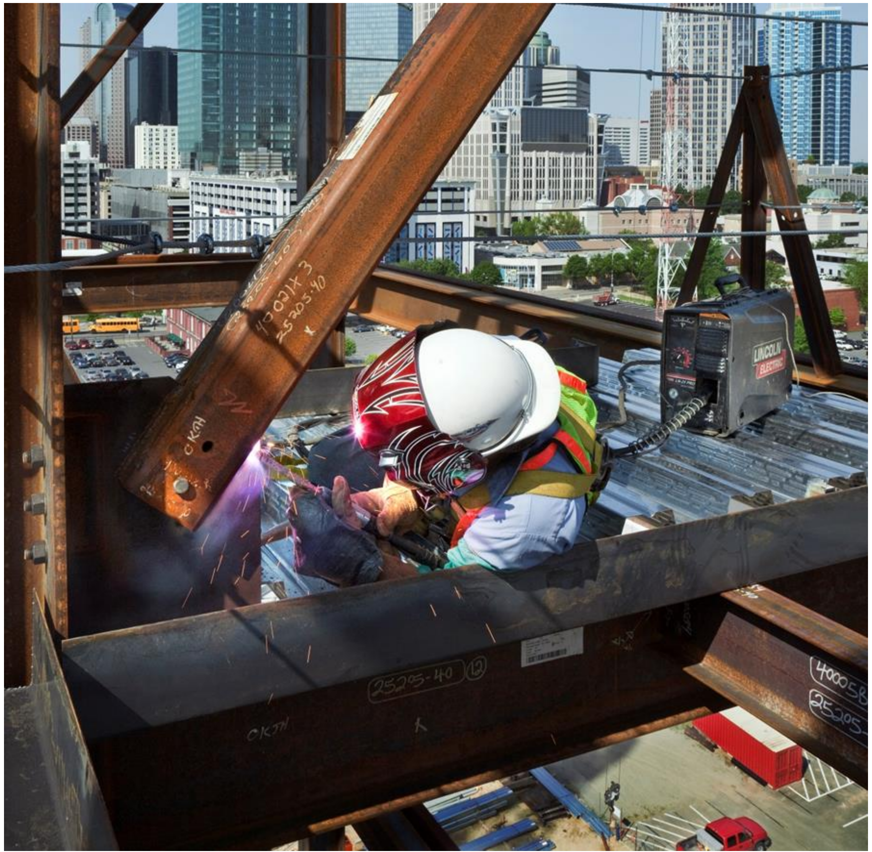
ASTM F3125	New bolt standard
	Grades A325, A325M, A490, A490M, F1852 & F2280
ASTM F3043	200 ksi TC bolt
ASTM F3111	200 ksi heavy hex bolt





AWS A5.36 - New electrode classification

- Combines A5.20 & A5.29 into one specification



CHAPTER B
DESIGN REQUIREMENTS

- **Reorganized**
- **New Structural Integrity provisions**

B3.9. Design for Structural Integrity

When design for structural integrity is required by the applicable building code, the requirements of this section shall be met.

CHAPTER B
DESIGN REQUIREMENTS

B3.9. Design for Structural Integrity

New provisions for structural integrity:

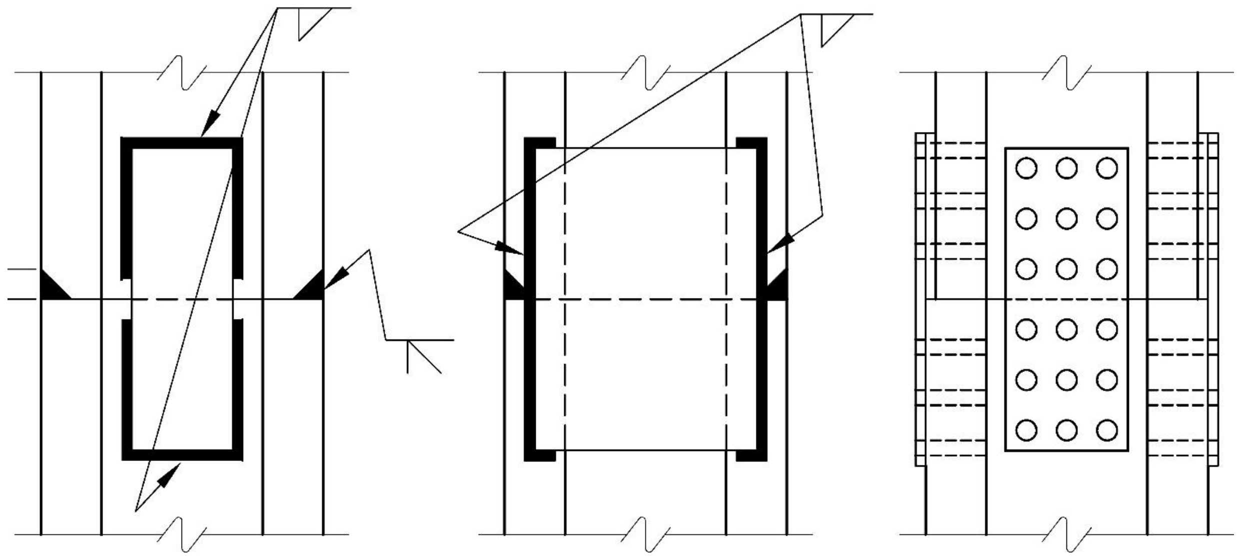
- Column splices
- Beam/girder end connections
- End connections of members bracing columns

Ref: L.F. Geschwindner & K.D. Gustafson, AISC *Engineering Journal*, 2010

B3.9. Design for Structural Integrity

Column Splices

$T_n \geq (D + L)$ **for area tributary to column**

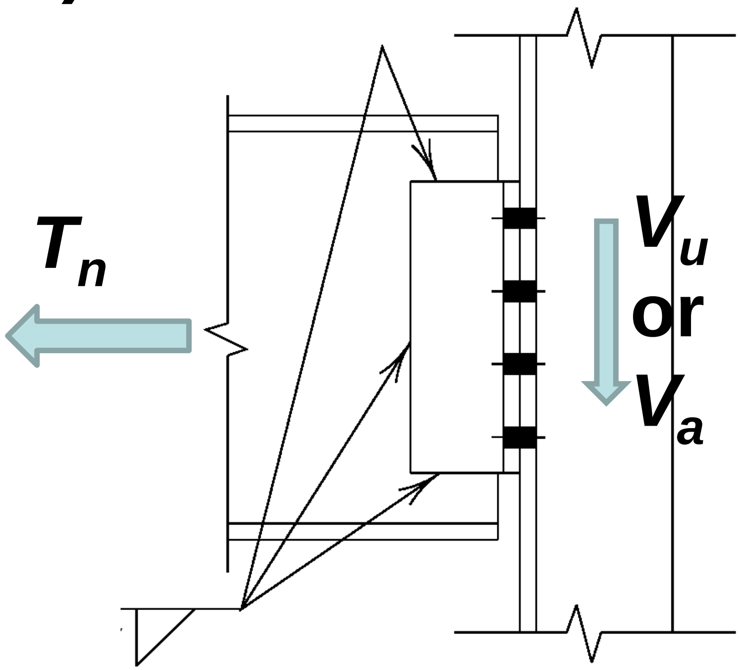


B3.9. Design for Structural Integrity

Beam and girder end connections

$T_{n,min} = (2/3)\, V_u \geq 10$ kips (LRFD)

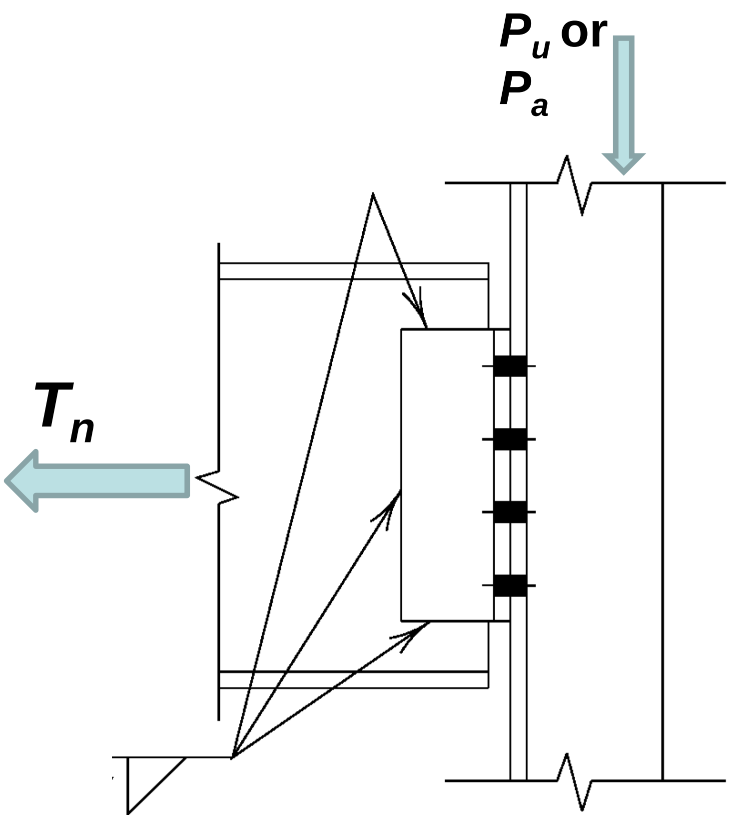
$T_{n,\, min} = V_a \geq 10$ kips (ASD)



B3.9. Design for Structural Integrity

End connections of members bracing columns

$$T_n \geq 0.01(2/3)P_u \text{ (LRFD)}$$
$$T_n \geq 0.01P_a \text{ (ASD)}$$



CHAPTER B
DESIGN REQUIREMENTS

In 2005 & 2010 Specification:

B3.10. Design for Ponding

"The roof system shall be investigated through structural analysis to ensure strength and stability under ponding conditions, unless the roof surface is provided with a slope of ¼ in. per ft or greater toward points of free drainage or an adequate system of drainage is provided to prevent the accumulation of water."

CHAPTER B
DESIGN REQUIREMENTS

In 2016 Specification

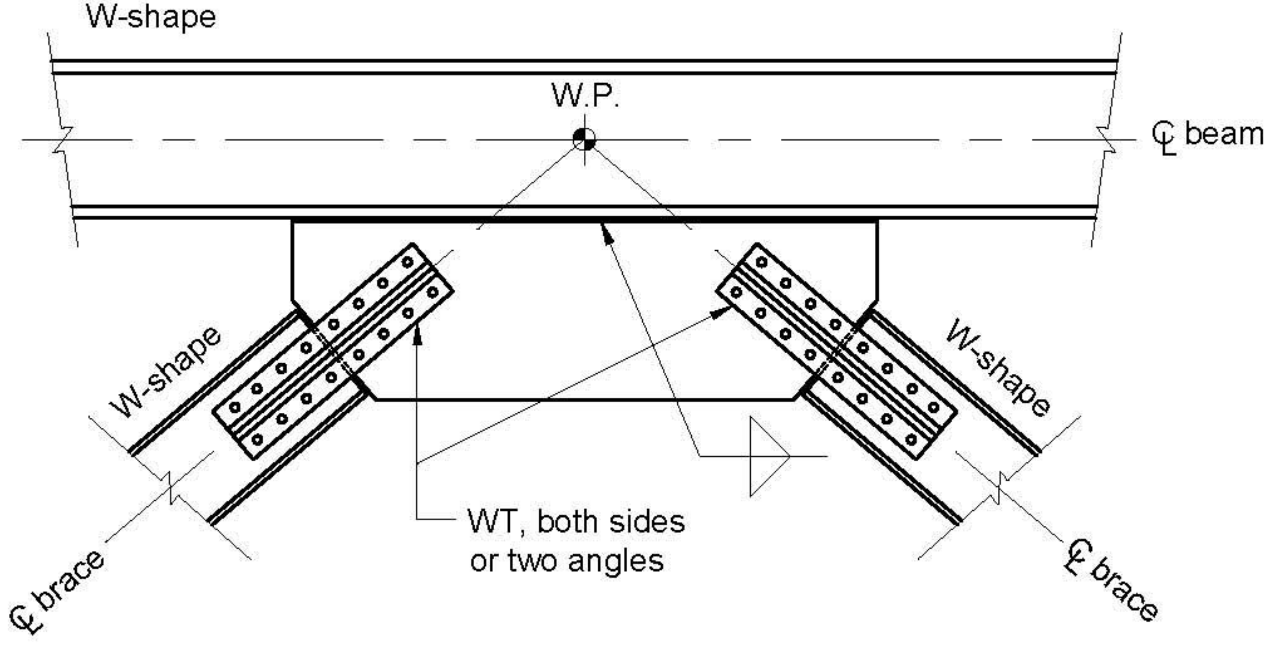
B3.10. Design for Ponding

"The roof system shall be investigated through structural analysis to ensure strength and stability under ponding conditions, unless the roof surface is ~~provided with a slope of ¼ in. per ft or greater toward points of free drainage or an adequate system of drainage is provided~~ configured to prevent the accumulation of water."

CHAPTER D

DESIGN OF MEMBERS FOR TENSION

Revision to Table D3.1, Shear Lag Factors, *U*



Chapter D
DESIGN OF MEMBERS FOR TENSION

Available tensile strength, $\phi_t P_n$ or P_n/Ω_t

Tensile yielding

$$P_n = F_y A_g \qquad \text{(Eq. D2-1)}$$

Tensile rupture

$$P_n = F_u A_e \qquad \text{(Eq. D2-2)}$$

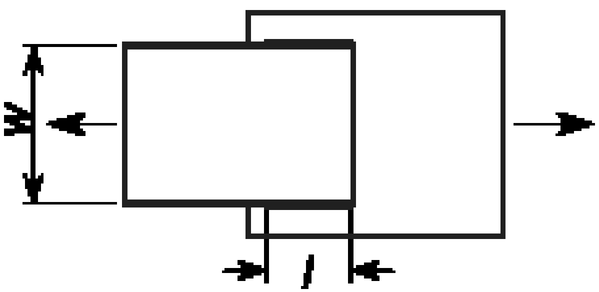
where

$$A_e = A_n U \qquad \text{(Eq. D3-1)}$$

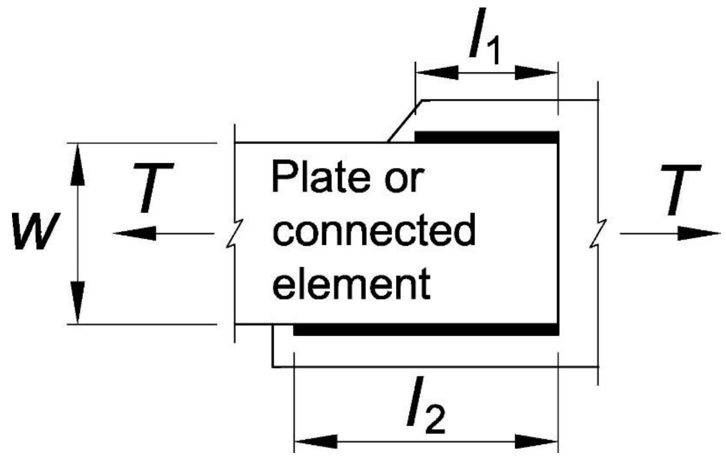
TABLE D3.1

Shear Lag Factors for Connections to Tension Members

U = shear lag factor from Table D3.1, Case 4



2010



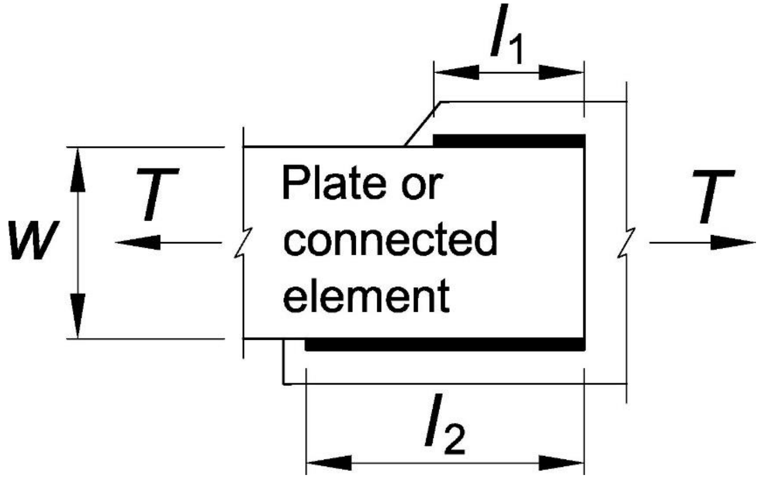
2016

TABLE D3.1

Shear Lag Factors for Connections to Tension Members

Case 4:

$$U = \left(\frac{3l^2}{3l^2 + w^2} \right) \left(1 - \frac{\bar{x}}{l} \right)$$



$$\text{where } l = \frac{l_1 + l_2}{2} \geq 4 \times (weld\ \ size)$$

Ref: P. Fortney & W. Thornton, *AISC Engineering Journal*, 2012

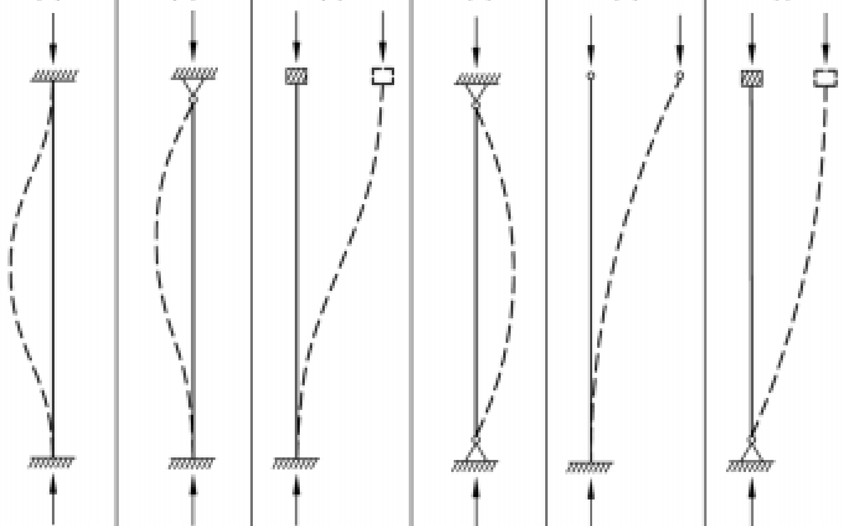
CHAPTER E

DESIGN OF MEMBERS FOR COMPRESSION

- ***KL, effective length*** → L_c

$$L_c = KL$$

TABLE C-A-7.1
Approximate Values of Effective Length Factor, *K*

	(a)	(b)	(c)	(d)	(e)	(f)
Buckled shape of column is shown by dashed line						
Theoretical *K* value	0.5	0.7	1.0	1.0	2.0	2.0
Recommended design value when ideal conditions are approximated	0.65	0.80	1.2	1.0	2.1	2.0
	Rotation fixed and translation fixed Rotation free and translation fixed					

CHAPTER E

DESIGN OF MEMBERS FOR COMPRESSION

- *KL, effective length* → L_c

- **Slender element members:**

  revised procedure → no *Q* factor

E7. MEMBERS WITH SLENDER ELEMENTS

(for $\lambda > \lambda_r$)

2010:

$$P_n = F_{cr} A_g$$

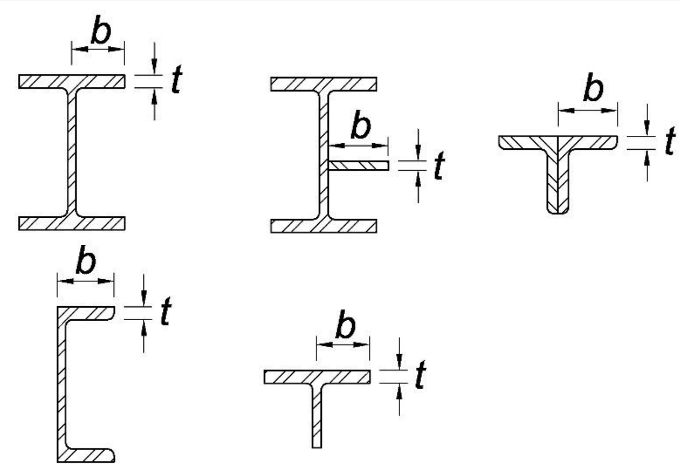
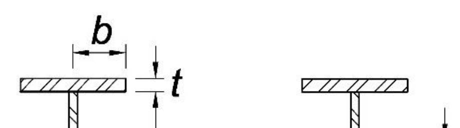
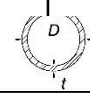
F_{cr} based on a Q factor given in E7

2016:

$$P_n = F_{cr} A_e$$

$A_e = \Sigma$ (effective areas of cross-section elements based on reduced effective widths, b_e, d_e, or h_e…)

TABLE B4.1a
Width-to-Thickness Ratios: Compression Elements
Members Subject to Axial Compression

	Case	Description of Element	Width-to-Thickness Ratio	Limiting Width-to-Thickness Ratio λ_r (nonslender/slender)	Examples
lements	1	Flanges of rolled I-shaped sections, plates projecting from rolled I-shaped sections, outstanding legs of pairs of angles connected with continuous contact, flanges of channels, and flanges of tees	b/t	$0.56\sqrt{\frac{E}{F_y}}$	
	2	Flanges of built-up I-shaped sections and plates or angle	b/t	$0.64\sqrt{\frac{k_c E}{\ldots}}$ [a]	
			D/t	$0.11\frac{E}{F_y}$	

[a] $k_c = 4/\sqrt{h/t_w}$, but shall not be taken less than 0.35 nor greater than 0.76 for calculation purposes.

E7. MEMBERS WITH SLENDER ELEMENTS

(for $\lambda > \lambda_r$)

2016: $P_n = F_{cr} A_e$

$A_e = \Sigma$ (effective areas of cross-section elements based on reduced effective widths, b_e for flanges, d_e for tee stems or h_e for webs)

E7. MEMBERS WITH SLENDER ELEMENTS

(for $\lambda > \lambda_r$)

λ	**Effective Width, b_e**
$\leq \lambda_r \sqrt{\frac{F_y}{F_{cr}}}$	b
$> \lambda_r \sqrt{\frac{F_y}{F_{cr}}}$	$b\left(1 - c_1\sqrt{\frac{F_{el}}{F_{cr}}}\right)\sqrt{\frac{F_{el}}{F_{cr}}}$

where $$F_{el} = \left(c_2 \frac{\lambda_r}{\lambda}\right)^2 F_y$$

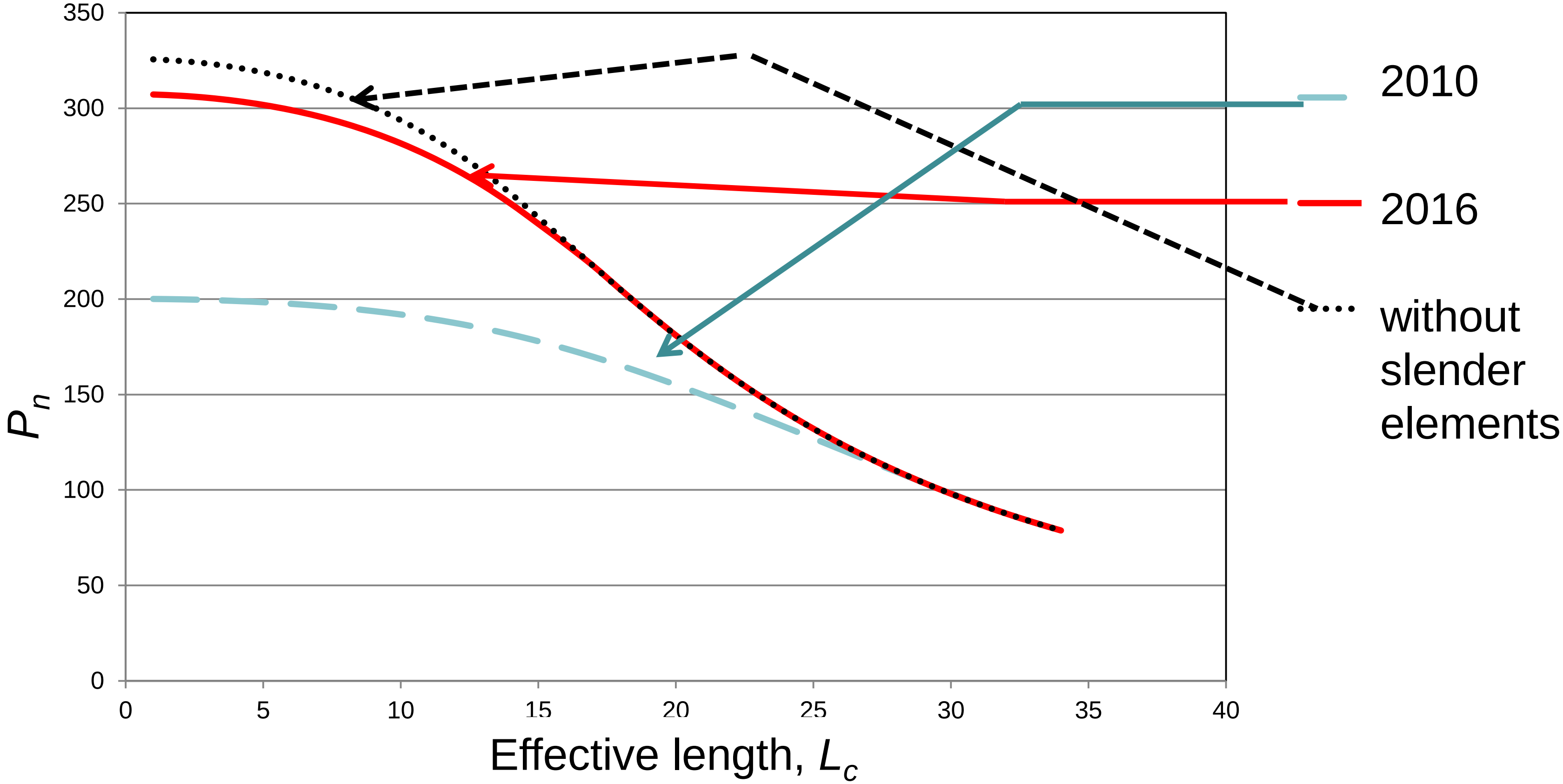
Table E7.1 Effective Width Imperfection Adjustment Factors c_1 and c_2		
Slender Element	c_1	c_2
Stiffened elements except walls of square and rectangular HSS	0.18	1.31
Walls of square and rectangular HSS	0.20	1.38
All other elements	0.22	1.49

Ref: *Guide to Stability Design Criteria,* 6th Ed., Ed. R.D. Ziemian

2016 vs. 2010 Compressive Strength Comparison

WT15×45 (slender stem)

F_y = 50 ksi



Ref: L.F. Geschwindner and M. Troemner, AISC *Engineering Journal,* 2016

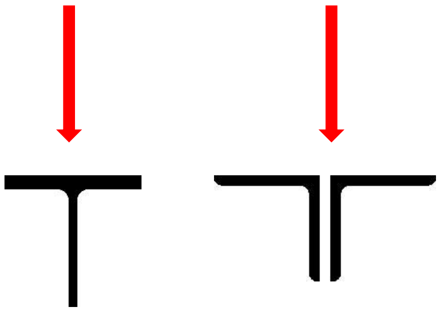
CHAPTER F

DESIGN OF MEMBERS FOR FLEXURE

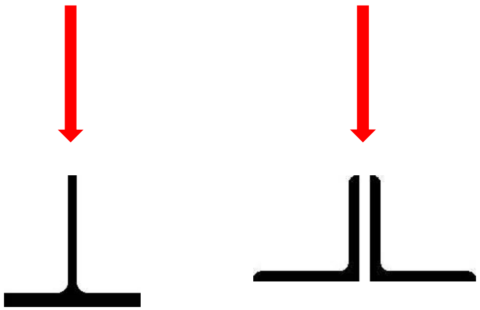
- HSS & Box-Sections
  - *Added web local buckling limit state— slender web box-sections (Sect. F7.3)*
  - *Added lateral-torsional buckling limit state— rectangular HSS & box-sections (Sect. F7.4)*

- Tees & Double-Angles reformulation (Sect. F9)

F9. TEES AND DOUBLE ANGLES LOADED IN THE PLANE OF SYMMETRY



Stem or angle leg
in tension



Stem or angle leg
in compression

F9. TEES AND DOUBLE ANGLES LOADED IN THE PLANE OF SYMMETRY

M_n is the minimum of:

1. Yielding—includes 2L in 2016
2. Lateral-torsional buckling (LTB) of tee stems and 2L legs—Revised
3. Flange local buckling—includes 2L in 2016
4. Local buckling of tee stems and 2L legs—Revised & includes 2L in 2016

F9. TEES AND DOUBLE ANGLES LOADED IN THE PLANE OF SYMMETRY

1. Yielding $M_n = M_p$

(a) Tee stems and web legs in tension

$$M_p = F_y Z_x \leq 1.6 M_y \qquad \text{(F9-2)}$$

(b) Tee stems in compression

$$M_p = M_y \qquad \text{(F9-4)}$$

(c) 2Ls with web legs in compression

$$M_p = 1.5 M_y \qquad \text{(F9-5)}$$

F9. TEES AND DOUBLE ANGLES LOADED IN THE PLANE OF SYMMETRY

2. Lateral-Torsional Buckling

(a) Stem/legs in tension

For $L_p < L_b \leq L_r$: $M_n = M_p - (M_p - M_y)\left(\frac{L_b - L_p}{L_r - L_p}\right)$

For $L_b > L_r$:

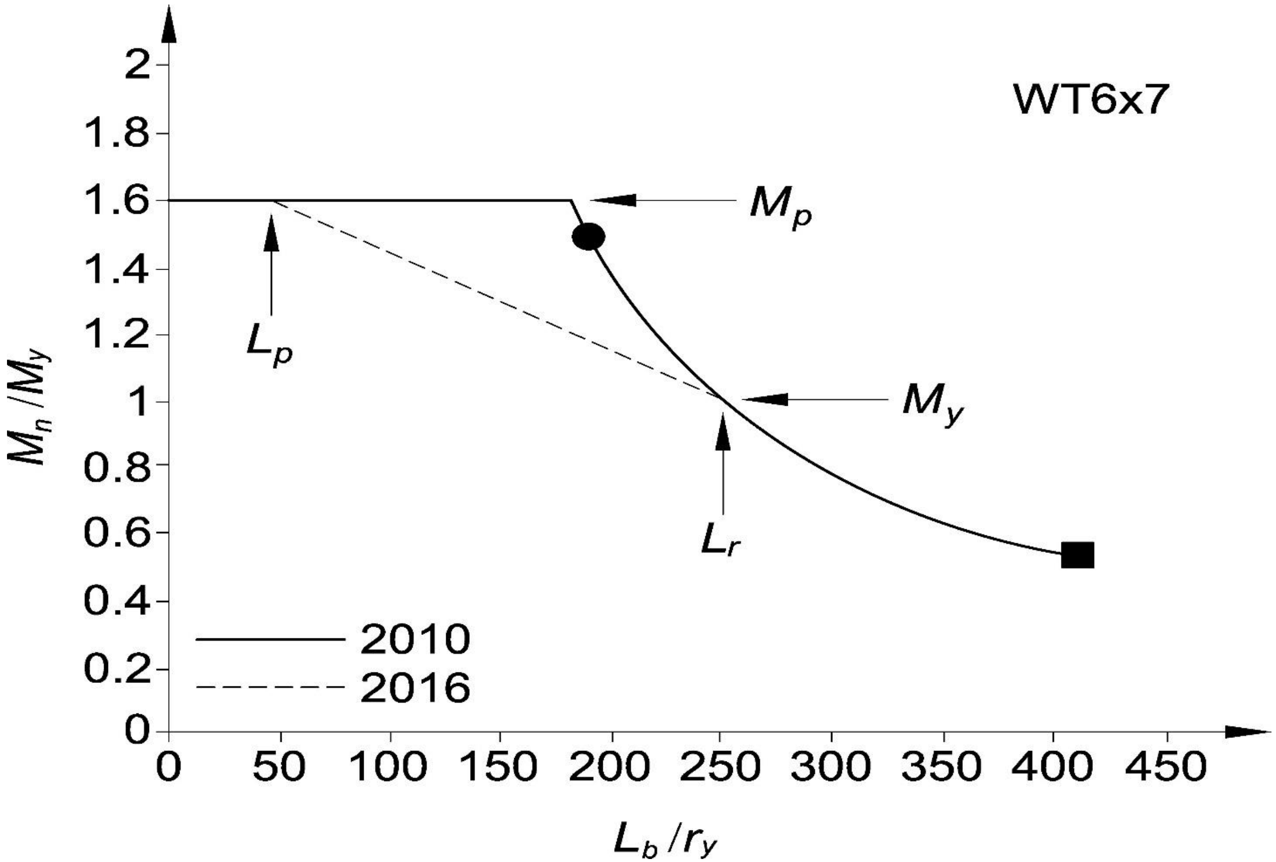
Same Eqn.

$$M_n = M_{cr} = \frac{1.95E}{L_b}\sqrt{I_y J}\left[B + \sqrt{1 + B^2}\right] \quad \textbf{(2016)}$$

$$M_n = M_{cr} = \frac{\pi\sqrt{EI_y GJ}}{L_b}\left(B + \sqrt{1 + B^2}\right) \quad (2010)$$

2016 vs. 2010 Comparison

Lateral-Torsional Buckling—Tee Stems in Tension



F9. TEES AND DOUBLE ANGLES LOADED IN THE PLANE OF SYMMETRY

4. Local Buckling—tee stems in flexural compression

$$M_n = F_{cr}S_x$$

2010

$$0.84\sqrt{\frac{E}{F_y}} < \frac{d}{t_w} \leq 1.03\sqrt{\frac{E}{F_y}}$$

$$F_{cr} = \left[2.55 - 1.84\frac{d}{t_w}\sqrt{\frac{F_y}{E}}\right]F_y$$

$$\frac{d}{t_w} > 1.03\sqrt{\frac{E}{F_y}}$$

$$F_{cr} = \frac{0.69E}{\left(\frac{d}{t_w}\right)^2}$$

2016

$$0.84\sqrt{\frac{E}{F_y}} < \frac{d}{t_w} \leq 1.52\sqrt{\frac{E}{F_y}}$$

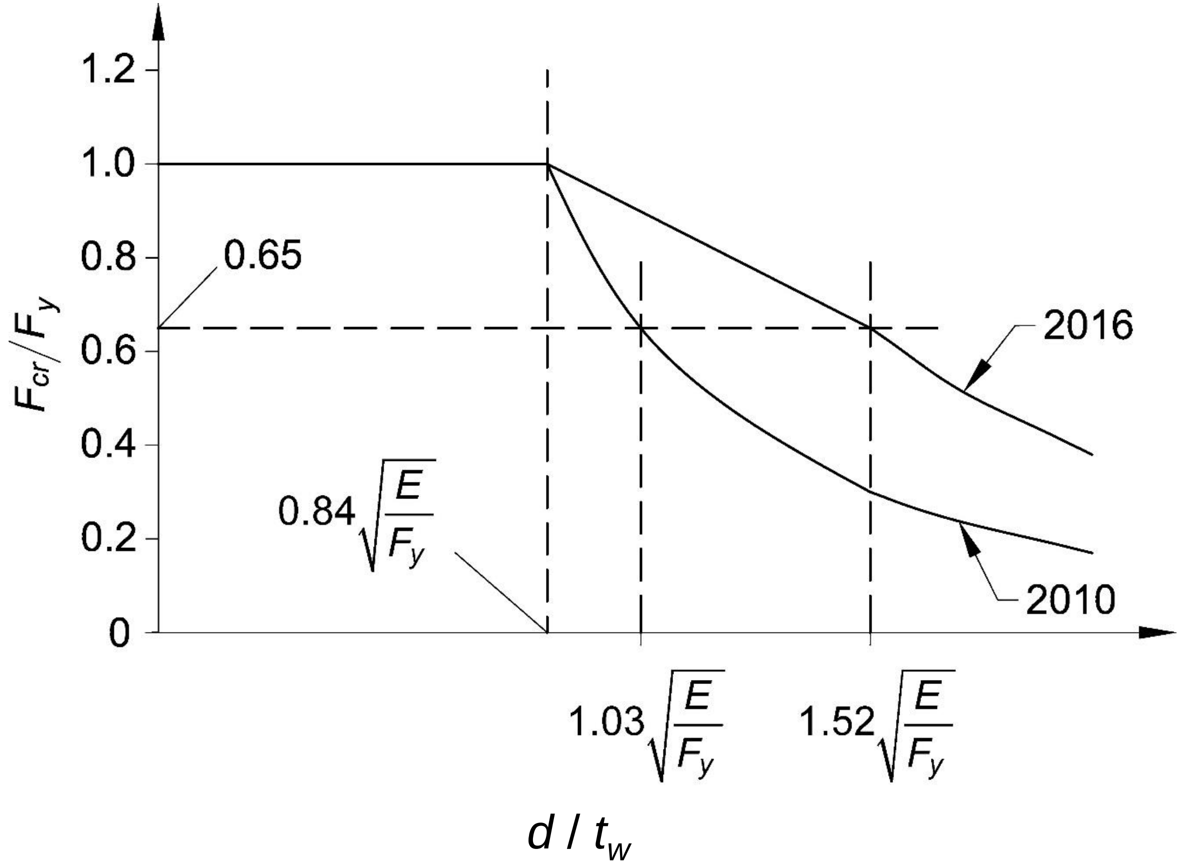
$$F_{cr} = \left[1.43 - 0.515\frac{d}{t_w}\sqrt{\frac{F_y}{E}}\right]F_y$$

$$\frac{d}{t_w} > 1.52\sqrt{\frac{E}{F_y}}$$

$$F_{cr} = \frac{1.52E}{\left(\frac{d}{t_w}\right)^2} \qquad \text{(F9-19)}$$

2016 vs. 2010 Comparison

Local Buckling—Tee Stems in Flexural Compression



CHAPTER G

DESIGN OF MEMBERS FOR SHEAR

G2. I-SHAPES WITHOUT TENSION FIELD ACTION

- *Increased strength by accounting for some post-buckling strength of web*
- *Increased requirements for stiffeners accordingly*

G3. I-SHAPES WITH TENSION FIELD ACTION

- *Expanded tension field action beyond the limits found in 2010*

CHAPTER I

DESIGN OF COMPOSITE MEMBERS

- Material limitations (Sect. I1.3)
  - Increased maximum reinforcing steel strength to 80 ksi
- Concrete filled axially loaded members
  - Clarifies that longitudinal reinforcement is not required (Sect. I2.2a)
  - Updated direct bond interaction provisions (Sect. I6.3c)

    (mechanism to transfer longitudinal shear)

CHAPTER I

DESIGN OF COMPOSITE MEMBERS

- Stiffness for calculation of req'd strengths (Sect. I1.5)
  - Provides criteria to apply the direct analysis method to composite members
  - Research by M.D. Denavit, J.F. Hajjar, T. Perea, and R.T. Leon
- Effect of ductility at beam/slab interface must be considered (Sect. I3.2d)—see *Commentary*

CHAPTER I. DESIGN OF COMPOSITE MEMBERS

Section I3.2d. Flexure—Load Transfer Betwn. Steel Beam and Concrete Slab

“*The effect of ductility (slip capacity) of the shear connection at the interface of the concrete slab and the steel beam shall be considered.*”

See Commentary for more discussion and refs.

CHAPTER J

DESIGN OF CONNECTIONS

- New ASTM bolt standards (Sect. J3)
- New Group C bolts (Sect. J3)

J3. BOLTS AND THREADED PARTS

- New high-strength bolt spec: ASTM F3125

Group A: ASTM F3125 Grades A325, A325M, F1852 and ASTM A354 Grade BC
Group B: ASTM F3125 Grades A490, A490M, F2280 and ASTM A354 Grade BD
Group C: ASTM F3043 and F3111

CHAPTER J

DESIGN OF CONNECTIONS

- ❑ Bolts in Combination with Welds (Sect. J1.8)
- ❑ New ASTM bolt standards (Sect. J3)
- ❑ New Group C bolts (Sect. J3)
- ❑ Increase in pretension for bolts (Sect. J3)
- ❑ Change in minimum bolt hole size (Sect. J3)

J3. BOLTS AND THREADED PARTS

- Table J3.1: Increased min. bolt pretension for Group A bolts for $d_b \geq 1\ 1/8$ in.
- Table J3.3: Nominal hole sizes of std., short & long slots width

When $d \geq 1$ in. → increase d_h by 1/16”

Chapter J

DESIGN OF CONNECTIONS

…

- New minimum bolt hole clear spacing, *d* (Sect. J3.3)
- Revised presentation of bearing and tearout equations (Sect. J3.10)
- Washer requirements moved to RCSC Specification
- Bolts in Combination with Welds (Sect. J1.8)

CHAPTER J.
DESIGN OF CONNECTIONS

- Bolts in Combination with Welds (J1.8)

…Only on a common faying surface where strain compatibility is considered.

…Slip-Critical connections and longitudinal welds only

…Does not consider any additional capacity obtained due to bolt bearing

Chapter J

DESIGN OF CONNECTIONS

…

- ❑ New minimum bolt hole clear spacing, *d* (Sect. J3.3)
- ❑ Revised presentation of bearing and tearout equations (Sect. J3.10)
- ❑ Washer requirements moved to RCSC Specification
- ❑ Bolts in Combination with Welds (Sect. J1.8)
- ❑ Incorporated HSS connections into Sect. J10

Chapter J

DESIGN OF CONNECTIONS

Section J10

Web local crippling

$$R_n = 0.80 t_w^2 \left[1 + 3 \left(\frac{l_b}{d} \right) \left(\frac{t_w}{t_f} \right)^{1.5} \right] \sqrt{\frac{E F_{yw} t_f}{t_w}} Q_f$$

Web compression buckling

$$R_n = \left(\frac{24 t_w^3 \sqrt{E F_{yw}}}{h} \right) Q_f$$

A SUMMARY OF MAJOR REVISIONS

- New bolt and HSS ASTM Specifications
- Revised slender element compressive strength (Chapter E)
- Revisions for double angle & Tee beams (Chapter F)
- Revisions in shear provisions (Chapter G)
- Revised bolt hole sizes & increase in pretension (Chapter J)
- Ductility at beam/slab interface (Chapter I)

Chapter J

DESIGN OF CONNECTIONS

…

- New minimum bolt hole clear spacing, *d* (Sect. J3.3)
- Revised presentation of bearing and tearout equations (Sect. J3.10)
- Washer requirements moved to RCSC Specification
- Bolts in Combination with Welds (Sect. J1.8)

What's new in the

Code of Standard Practice for Steel Buildings and Bridges

(ANSI/AISC 303-16)

Code of Standard Practice for Steel Buildings and Bridges

1. General Provisions
2. Classification of Materials
3. Design Documents~~Drawings~~ and Specifications
4. Approval Documents~~Shop and Erection Drawings~~
5. Materials
6. Shop Fabrication and Delivery
7. Erection
8. Quality Control
9. Contracts
10. Architecturally Exposed Structural Steel
~~Appendix A. Digital building Product Models~~

1.1 Scope

This Code sets forth criteria for the trade practices involved in steel buildings, bridges and other structures….

Code of Standard Practice

Three Major Revisions in 2016

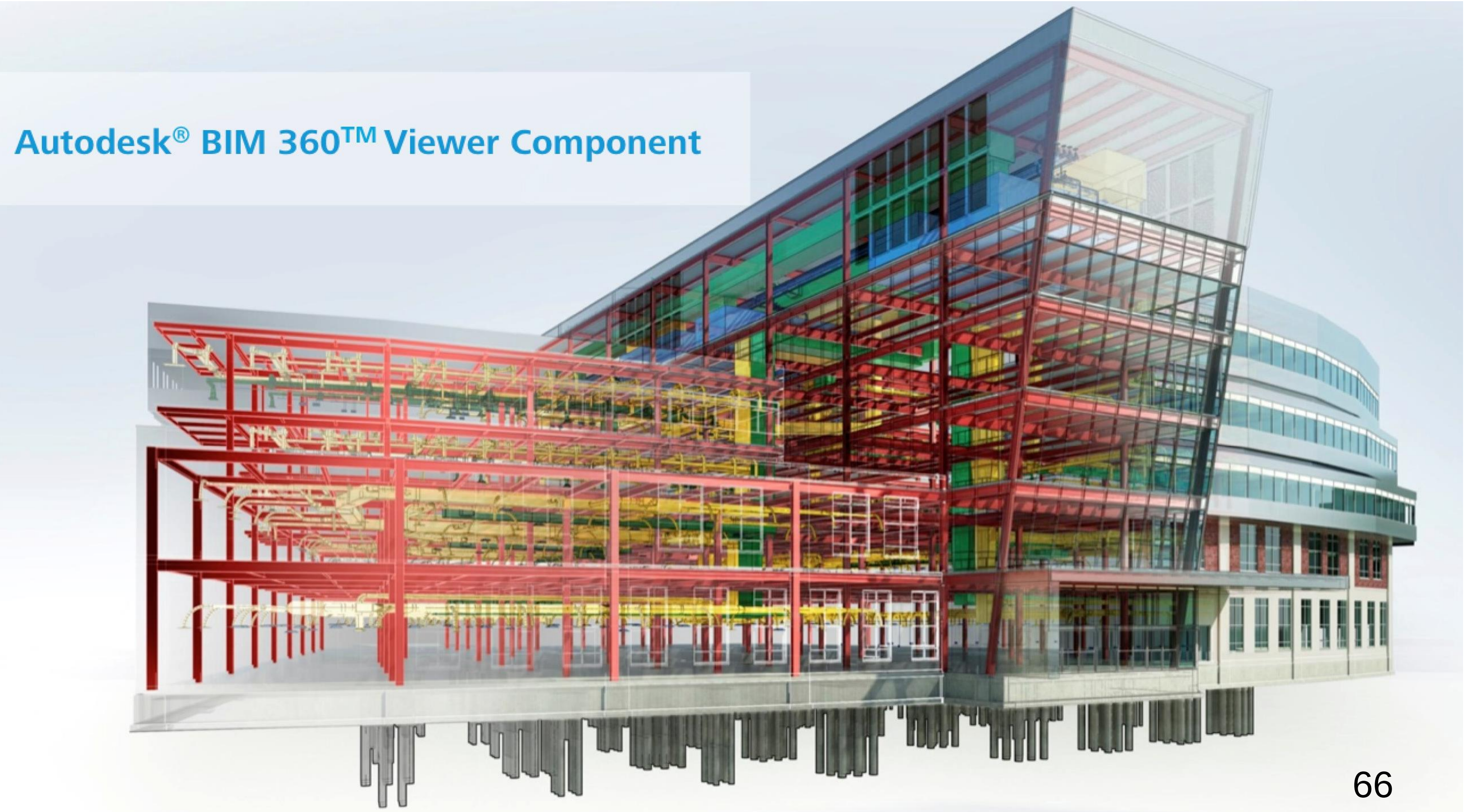
- Models
- Stiffeners
- Architectural Exposed Structural Steel (AESS)

Code of Standard Practice

Other Revisions in 2016

- Lack of tolerances
- Identifying protected zones
- Handling cost of revisions
- Anchor rod placement tolerances

MODELS



MODELS

~~2010—design drawings~~

2016-design documents

- ***design documents*.** The *design drawings*, or where the parties have agreed in the *contract documents* to provide digital model(s), the *design model*. A combination of drawings and digital models also may be provided.

- ***design model.*** *A* dimensionally accurate 3D digital model of the structure that conveys the *structural steel* requirements given in Section 3.1 for the building.

MODELS

~~2010—shop drawings~~

2016-fabrication documents

- ***fabrication documents.*** The *shop drawings*, or where the parties have agreed in the *contract documents* to provide digital model(s), the *fabrication model*. A combination of drawings and digital models also may be provided.

- ***fabrication model.*** A dimensionally accurate 3D digital model produced to convey the information necessary to fabricate the *structural steel*. This may be the same digital model as the *erection model*, but it is not required to be.

MODELS

~~2010—erection drawings~~

2016-erection documents

- ***erection documents***. The *erection drawings*, or where the parties have agreed in the *contract documents* to provide digital model(s), the *erection model*. A combination of drawings and digital models also may be provided.

- ***erection model****.* A dimensionally accurate 3D digital model produced to convey the information necessary to erect the structural steel. This may be the same digital model as the *fabrication model*, but it is not required to be*.*

MODELS

~~2010—shop and erection drawings and embedment drawings~~

2016- approval documents

- ***approval documents***. The *structural steel shop drawings*, *erection drawings*, and *embedment drawings*, or where the parties have agreed in the *contract documents* to provide digital model(s), the *fabrication* and *erection models*. A combination of drawings and digital models also may be provided.

STIFFENING

Ref: L. Muir, *Modern Steel Construction*, October 2016

STIFFENING 2010

Section 3.1.1. Column stiffeners, bearing stiffeners, etc., must be designed and clearly shown on drawings

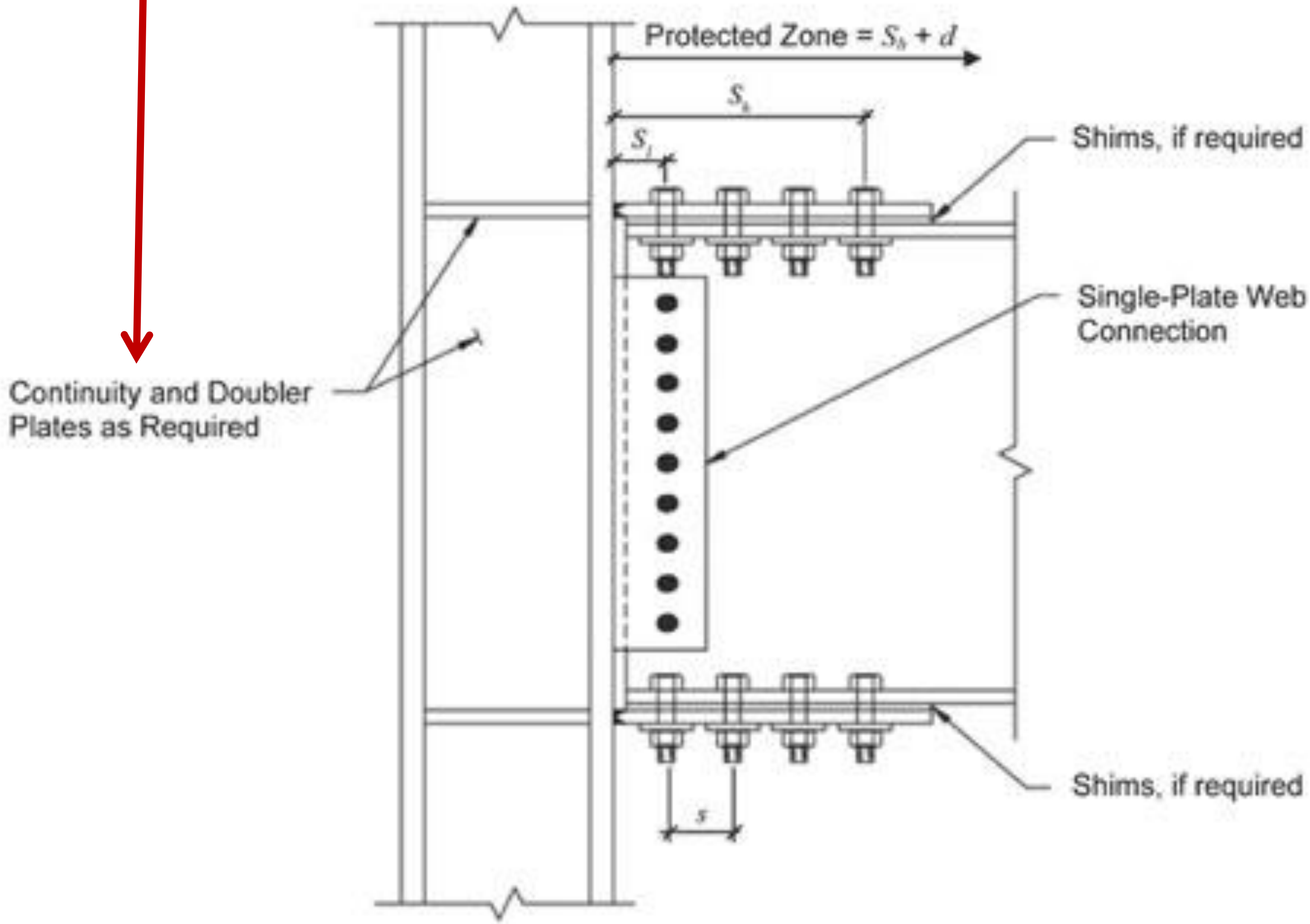
Section 3.1.2. Three options for connection design indicated by owner’s designated representative for design (ODRD).

(1) *ODRD* provides complete connection design

(2) *Steel detailer* selects or completes connection design

(3) *Licensed engineer* working for fabricator provides complete connection design

Often missed in connection design



STIFFENING 2016

Section 3.1.1. The *owner's representative for design* (ODRD) shall indicate one of the following options for each connection:

(1) Option 1: *ODRD (EOR)* provides complete connection design

(2) Option 2: *Steel detailer* selects or completes connection design

(3) Option 3: *Licensed engineer* working for fabricator provides complete connection design

STIFFENING 2016

Section 3.1.2 (Connection Stiffening)

(1) If Option 1 or 2, ODRD designs stiffening and shows on structural design bid documents

(2) If Option 3:

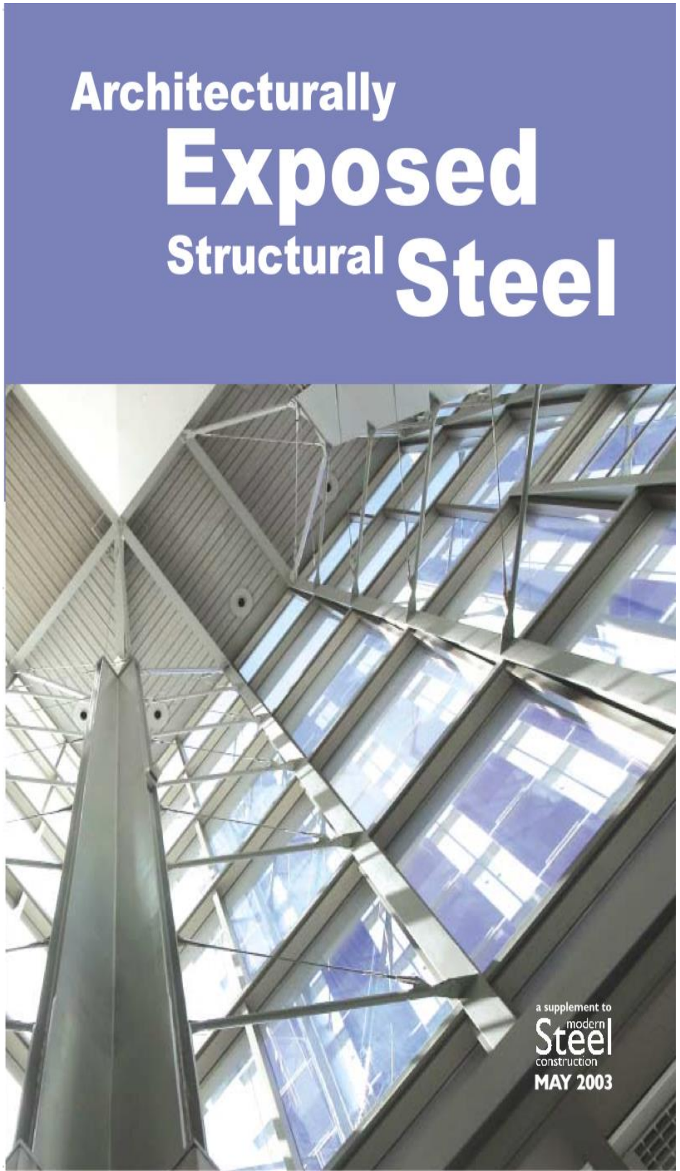
- **(a) Option 3A,** ODRD designs stiffening and shows on structural design bid documents
- **(b) Option 3B,** ODRD provides bidding quantity of items for stiffening (an estimate). If no estimate provided, stiffening will not be included in bid.

ARCHITECTURALLY EXPOSED STRUCTURAL STEEL (AESS)

ARCHITECTURALLY EXPOSED STRUCTURAL STEEL (AESS)

Section 10 completely revised

ARCHITECTURALLY EXPOSED STRUCTURAL STEEL



RMSCA


CISC
Guide for Specifying
Architecturally Exposed
Structural Steel
cisc icca
by Terri Meyer Boake

ARCHITECTURALLY EXPOSED STRUCTURAL STEEL

Section 10 completely changed

AESS 1: $

AESS 2: $$

AESS 3: $$$

AESS 4: $$$$

AESS C: $$$$$

ARCHITECTURALLY EXPOSED STRUCTURAL STEEL

AESS 1: Basic elements

AESS 2: Feature elements > 20 ft

AESS 3: Feature elements ≤ 20 ft

AESS 4: Showcase elements w/special surface & edge treatment

AESS C: Custom

Some Additional Revisions:

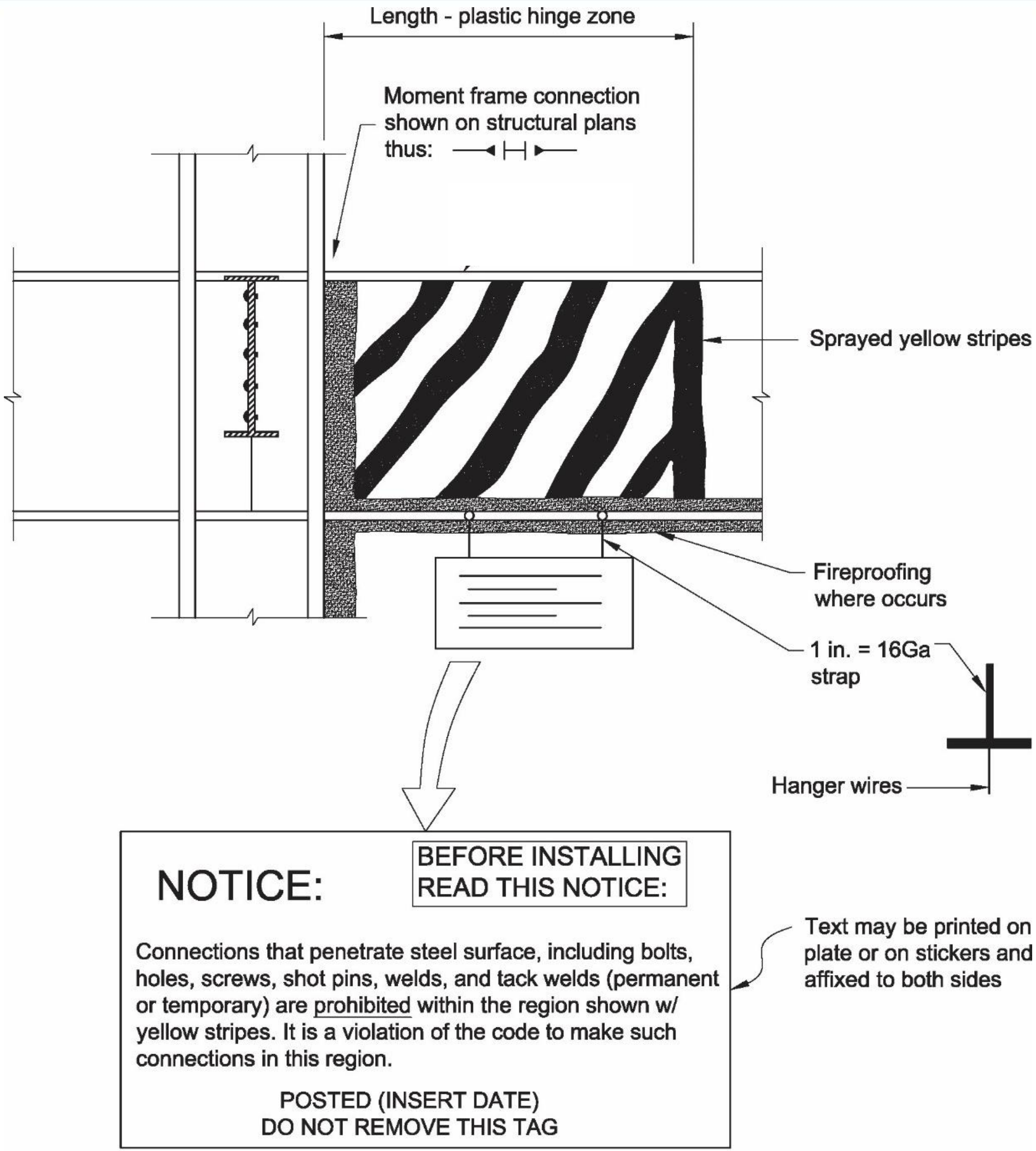
- Lack of tolerances
- Identifying protected zones
- Handling cost of revisions
- Anchor rod placement tolerances

There is no zero tolerance.

Section 1.10. Tolerances

Tolerances for materials, fabrication and erection shall be as stipulated in Sections 5, 6, 7, and 10. Tolerances absent from this Code or the contract documents shall not be considered zero by default.

Section 1.11. Marking of Protected Zones in High-Seismic Applications



Section 3.2. Architectural, Electrical and Mechanical Design Documents and Specifications

…When the referenced information is not available at the time of structural design, bidding, detailing or fabrication, subsequent *revisions* shall be the responsibility of the *owner* and shall be made in accordance with Sections 3.5 and 9.3.

Section 7.5.1. (Anchor rod placement)

(b) The horizontal variation in location from the specified position of each *anchor rod* centerline at any location along its projection above the concrete shall be equal to or less than the dimensions given for the *anchor rod* diameters listed as follows:

Anchor Rod Dia., in.	**Horizontal Variation, in.**
3/4, 7/8	11/4
1,1-1/4,1-1/2	3/8
11-3/4, 2, 2-1/2	1/2

Code of Standard Practice

Three Major Revisions in 2016

- MODELS
- STIFFENERS
- ARCHITECTURAL EXPOSED STRUCTURAL STEEL (AESS)

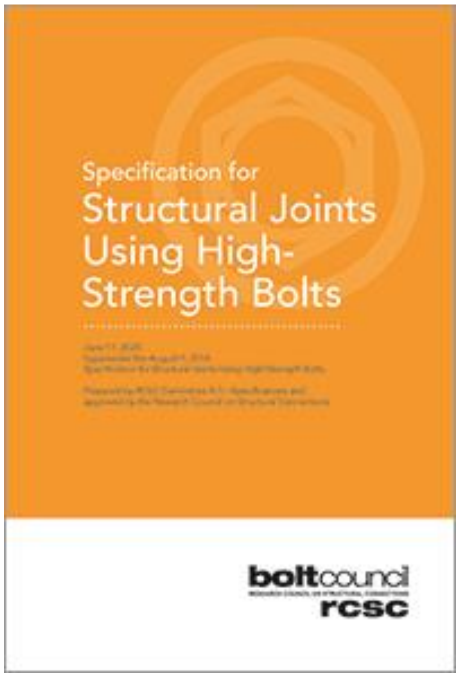
OTHER RECENT AISC STANDARDS

2016 *Seismic Provisions for Structural Steel Buildings* (ANSI/AISC 341-16)

2016 *Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications* incl. Supp. 1 and 2 (ANSI/AISC 358-16, s1-2018, s2-2020)

All available at www.aisc.org

OTHER RECENT AISC STANDARDS



Specification for Structural Joints Using High-Strength Bolts, June 11, 2020

Free download available at www.aisc.org

For steel-related technical questions, contact:

solutions@aisc.org

2016 AISC Standards

1. Which of the following is NOT a key change to the 2016 AISC Standards?

a. Revised flexural strength provisions for tees and double angles in the Specification
b. An increase in nominal hole size for 1 inch and greater diameter bolts given in the Specification
c. Significant reorganization of the Specification for Structural Steel Buildings
d. Significant change to Section 10 of the Code of Standard Practice regarding AESS

THANK YOU

There's always a solution in steel.