ASCE STANDARD

ASCE/SEI 10–15

Design of Latticed Steel Transmission Structures

This document uses both the International System of Units (SI) and customary units

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PREFACE

The first edition of this Standard was published in 1992. The second edition was published in 2000, at which time minor changes were implemented and an annex of design examples was added. From a historical perspective, the predecessor to this Standard was the ASCE-published *Guide for Design of Steel Transmission Towers*, Manual of Practice No. 52, published in 1971 and 1988. This edition of the Standard reflects minor changes to the design requirements and new sections on redundant members, welded angles, anchor bolts with base plates on leveling nuts, and post angle member splices. An example was added on how to determine the design parameter *j*. Appendix C, Guidelines for Existing Towers, was added to provide guidance when evaluating existing transmission towers.

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DESIGN OF STEEL TRANSMISSION TOWERS STANDARDS COMMITTEE

This Standard was prepared through the consensus standards process by balloting in compliance with procedures of the ASCE Codes and Standards Committee. Those individuals who serve on the Design of Steel Transmission Towers Standards Committee are

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CHAPTER 1
GENERAL

1.1 SCOPE

Design of Latticed Steel Transmission Structures specifies requirements for the design, fabrication, and testing of members and connections for electrical transmission structures. These requirements are applicable to hot-rolled and cold-formed steel shapes. Structure components (members, connections, guys) are selected to resist design-factored loads at stresses approaching yielding, buckling, fracture, or any other limiting condition specified in this Standard.

1.2 APPLICABLE DOCUMENTS

The following standards are referred to in the body of this document:

American Society for Testing and Materials (ASTM) Standards:

A6/A6M-14 *Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling*

A36/A36M-14 *Standard Specification for Carbon Structural Steel*

A123/A123-13 *Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products*

A143/A143M-07 *Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement*

A153/A153M-09 *Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware*

A242/A242M-13 *Standard Specification for High-Strength Low-Alloy Structural Steel*

A394-08e1 *Standard Specification for Steel Transmission Tower Bolts, Zinc-Coated and Bare*

A529/A529M-14 *Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality*

A563-07a *Standard Specification for Carbon and Alloy Steel Nuts*

A568/A568M-14 *Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for*

A572/A572M-13a *Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel*

A588/A588M-10 *Standard Specification for High-Strength Low-Alloy Structural Steel, up to 50 ksi [345 MPa] Minimum Yield Point, with Atmospheric Corrosion Resistance*

A606/A606M-09a *Standard Specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance*

A1008/A1008M-13 *Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable*

A1011/A1011M-14 *Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength*

C33/C33M-13 *Standard Specification for Concrete Aggregates*

American Welding Society Standard:

AWS D1.1/D1.1M: *Structural Welding Code—Steel*

1.3 DEFINITIONS

Block shear: A combination of shear and tensile failure through the end connection of a member caused by high bolt forces acting on the material; also called rupture.

Deformed bars: Steel bars meeting the requirements of ACI 318 (1983) for reinforcing bars.

Design-factored load: Unfactored load multiplied by a specified load factor to establish the design load on a structure.

Downthrust: The downward vertical component of the loads on a foundation.

Engineer of record (EOR): Prime design professional, engineering firm, or organization that is legally responsible for the tower design.

Leg member: A primary member that serves as the main corner support member of a structure; sometimes called a post member.

Line security: Criteria established to prevent a progressive (cascade) failure of structures.

Load factor: A multiplier used with the assumed loading condition, or unfactored load, to establish the design-factored load.

Primary members: Tension or compression members that carry the loads on the structure to the foundation.

Redundant members: Members that reduce the unbraced length of primary members by providing intermediate support.

Shear friction: For anchor bolts with the base assembly resting on concrete, shear is usually transferred from the base assembly to the concrete through bearing of the bolt at the surface forming a concrete wedge; translation of the wedge under the shear force cannot occur without an upward thrust of the wedge on the base assembly; this thrust induces a clamping force, and this mechanism is called shear friction.