



**American
Iron and Steel
Institute**

AISC AND AISI STANDARD

Standard Definitions for Use in the Design of Steel Structures

2007 EDITION

Approved by
the AISC Committee on Specifications
and
the AISI Committee on Specifications for the Design of
Cold-Formed Steel Structural Members

The material contained herein has been developed by a joint effort of the American Institute of Steel Construction Committee on Specifications and the American Iron and Steel Institute Committee on Specifications. The organizations and the committees have made a diligent effort to present accurate, reliable, and useful information on joint terminology used in the standards developed by the consensus bodies of both organizations. The Committees acknowledge and are grateful for the participation of the numerous researchers, engineers, and others who have contributed to the body of knowledge on the subject.

It is anticipated that the terminology will be expanded and updated in future editions.

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American Iron and Steel Institute

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STANDARD DEFINITIONS FOR USE IN THE DESIGN OF STEEL STRUCTURES

PREFACE

In an effort to standardize terminology used for the design of steel structures, the Committees on Specifications of the American Institute of Steel Construction and the American Iron and Steel Institute formed a joint Committee on Terminology to develop a common terminology for use by all standards committees of both institutes. The first edition was published in 2005. In this edition, more terminology related to the type of *load effect* and *limit states* is added. The terms presented herein have been approved by both committees in accordance with our operating procedures. These terms are only a subset of the complete glossary lists given in the AISI and AISC Standards.

It is also suggested that other steel related standards use these terms in an effort to bring commonality, where possible, across the design of all steel structures. We expect that future editions of this standard will expand to include additional common terms and nomenclature.

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American Iron and Steel Institute

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STANDARD DEFINITIONS FOR USE IN THE DESIGN OF STEEL STRUCTURES

ASD (Allowable Strength Design). Method of proportioning structural components such that the *allowable strength* equals or exceeds the *required strength* of the component under the action of the *ASD load combinations*.

ASD Load Combination. Load combination in the *applicable building code* intended for *allowable strength design* (allowable stress design).

*Allowable Strength**. Nominal strength divided by the *safety factor*, R_n/Ω .

Applicable Building Code. Building code under which the structure is designed.

*Available Strength**. Design strength or allowable strength as appropriate.

Bearing. In a connection, *limit state* of shear forces transmitted by the mechanical fastener to the connection elements.

Bearing (local compressive yielding). Limit state of local compressive yielding due to the action of a member bearing against another member or surface.

Block shear rupture. In a connection, *limit state* of tension rupture along one path and shear yielding or shear rupture along another path.

Braced Frame. Essentially vertical truss system that provides resistance to lateral loads and provides stability for the structural system.

Buckling. Limit state of sudden change in the geometry of a structure or any of its elements under a critical loading condition.

Buckling strength. Nominal strength for *instability limit states*.

Cold-Formed Steel Structural Member. Shape manufactured by press-braking blanks sheared from sheets, cut lengths of coils or plates, or by roll forming cold- or hot-rolled coils or sheets; both forming operations being performed at ambient room temperature, that is, without manifest addition of heat such as would be required for hot forming.

Connection. Combination of structural elements and *joints* used to transmit forces between two or more members.

Design Load. Applied load determined in accordance with either *LRFD load combinations* or *ASD load combinations*, whichever is applicable.

*Design Strength**. Resistance factor multiplied by the *nominal strength*, ϕR_n .

Diaphragm. Roof, floor or other membrane or bracing system that transfers in-plane forces to the lateral force resisting system.

Factored Load. Product of a *load factor* and the *nominal load*.

Fatigue. Limit state of crack initiation and growth resulting from repeated application of live loads.

Flexural buckling. Buckling mode in which a compression member deflects laterally without twist or change in cross-sectional shape.

Flexural-Torsional Buckling. Buckling mode in which a compression member bends and twists simultaneously without change in cross-sectional shape.

Girt. Horizontal structural member that supports wall panels and is primarily subjected to bending under horizontal loads, such as wind load.

In-plane instability. Limit state involving buckling in the plane of the frame or the member.

Instability. Limit state reached in the loading of a structural component, frame or structure in which a slight disturbance in the loads or geometry produces large displacements.

Joint. Area where two or more ends, surfaces, or edges are attached. Categorized by type of fastener or weld used and the method of force transfer.

Lateral-torsional buckling. Buckling mode of a flexural member involving deflection out of the plane of bending occurring simultaneously with twist about the shear center of the cross-section.

Limit state. Condition in which a structure or component becomes unfit for service and is judged either to be no longer useful for its intended function (*serviceability limit state*) or to have reached its ultimate load-carrying capacity (*strength limit state*).

Load. Force or other action that results from the weight of building materials, occupants and their possessions, environmental effects, differential movement, or restrained dimensional changes.

Load Effect. Forces, stresses, and deformations produced in a structural component by the applied loads.

Load Factor. Factor that accounts for deviations of the nominal load from the actual load, for uncertainties in the analysis that transforms the load into a load effect, and for the probability that more than one extreme load will occur simultaneously.

*Local bending**.* Limit state of large deformation of a flange under a concentrated transverse force.

*Local yielding**.* Yielding that occurs in a local area of an element.

LRFD (Load and Resistance Factor Design). Method of proportioning structural components such that the design strength equals or exceeds the required strength of the component under the action of the LRFD load combinations.

LRFD Load Combination. Load combination in the applicable building code intended for strength design (Load and Resistance Factor Design).

Moment Frame. Framing system that provides resistance to lateral loads and provides stability to the structural system primarily by shear and flexure of the framing members and their connections.

Nominal load. Magnitude of the load specified by the applicable building code.

Nominal Strength.* Strength of a structure or component (without the resistance factor or safety factor applied) to resist the load effects, as determined in accordance with this Specification or Standard.

Out-of-plane buckling. Limit state of a beam, column or beam-column involving lateral or lateral-torsional buckling.

Permanent Load. Load in which variations over time are rare or of small magnitude. All other loads are variable loads.

Purlin. Horizontal structural member that supports roof deck and is primarily subjected to bending under vertical loads such as snow, wind or dead loads.

Rational Engineering Analysis. Analysis based on theory that is appropriate for the situation, relevant test data if available, and sound engineering judgment.

*Required Strength.** Forces, stresses, and deformations produced in a *structural component*, determined by either *structural analysis*, for the *LRFD* or *ASD load combinations*, as appropriate, or as specified by this *Specification or Standard*.

Resistance Factor, ϕ . Factor that accounts for unavoidable deviations of the *nominal strength* from the actual strength and for the manner and consequences of failure.

Rupture strength.* Strength limited by breaking or tearing of members or connecting elements. *Safety Factor, Ω .* Factor that accounts for deviations of the actual strength from the *nominal strength*, deviations of the actual load from the *nominal load*, uncertainties in the analysis that transforms the load into a *load effect*, and for the manner and consequences of failure.

Service Load. Load under which serviceability limit states are evaluated.

Serviceability limit state. Limiting condition affecting the ability of a structure to preserve its appearance, maintainability, durability or the comfort of its occupants or function of machinery, under normal usage.

Shear buckling. Buckling mode in which a plate element, such as the web of a beam, deforms under pure shear applied in the plane of the plate.

Shear Wall. Wall that provides resistance to lateral loads in the plane of the wall and provides stability for the structural system.

Specification or Standard. [Editorial note: This will have to be defined for each specification or standard with language in the scope such as, The "*Specification (or Standard)* for the design of XXXXX" hereinafter referred to as this *Specification (or Standard)* shall apply.....]

Specified Minimum Yield Stress. Lower limit of *yield stress* specified for a material as defined by ASTM.

Strength limit state. Limiting condition, in which the maximum strength is reached.

Structural Analysis. Determination of *load effects* on members and connections based on principles of structural mechanics.

Structural Component. Member, connector, connecting element or assemblage.

Tensile Strength (of material). Maximum tensile stress that a material is capable of sustaining as defined by ASTM.

Tension and shear rupture. In a bolt or other type of mechanical fastener, *limit state* of rupture due to simultaneous tension and shear force.

Torsional buckling. Buckling mode in which a compression member twists about its shear center axis.

Variable Load. Load not classified as *permanent load*.

Web crippling. *Limit state* of local failure of web plate in the immediate vicinity of a concentrated load or reaction.

Yield moment. In a member subjected to bending, the moment at which the extreme outer fiber first attains the *yield stress*.

Yield Point. First stress in a material at which an increase in strain occurs without an increase in stress as defined by ASTM.

Yield Strength. Stress at which a material exhibits a specified limiting deviation from the proportionality of stress to strain as defined by ASTM.

Yield Stress. Generic term to denote either *yield point* or *yield strength*, as appropriate for the material.

Yielding. Limit state of inelastic deformation that occurs when the *yield stress* is reached.

Yielding (plastic moment). Yielding throughout the cross section of a member when the bending moment reaches the *plastic moment*.

Yielding (yield moment). Yielding at the extreme fiber on the cross section of a member when the bending moment reaches the *yield moment*.

Note:

- * These terms are usually qualified by the type of *load effect*, for example, *nominal tensile strength*, *available compressive strength*, or *design flexural strength*.
- ** Terms designated with ** are usually qualified by the type of component, for example, *web local buckling*, *flange local bending*.



American Institute of Steel Construction
One East Wacker Drive
Suite 700
Chicago, IL 60601
www.aisc.org



American Iron and Steel Institute
1140 Connecticut Avenue, NW
Suite 705
Washington, DC 20036
www.steel.org

