CHAPTER 22

STEEL

SECTION 2201.0 GENERAL

2201.1 Scope: The provisions of this chapter shall govern the materials, design, construction and quality of structural steel members.

SECTION 2202.0 DEFINITIONS

2202.1 General: The following words and terms shall, for the purposes of this chapter and as used elsewhere in this code, have the meanings shown herein.

Steel construction, cold-formed: That type of construction made up entirely, or in part, of steel structural members cold formed to shape from sheet or strip steel such as roof deck, floor and wall panels, studs, floor joists, roof joists and other structural elements.

Steel joist: Any steel structural member of a building or structure made of hot-rolled or cold-formed solid or open-web sections, or riveted or welded bars, strip or sheet steel members, or slotted and expanded, or otherwise deformed rolled sections.

Steel member, structural: Any steel structural member of a building or structure consisting of a rolled steel structural shape other than cold-formed steel, light-gage steel or steel joist members.

SECTION 2203.0 STRUCTURAL STEEL CONSTRUCTION

2203.1 General: Structural steel construction used in all buildings and structures shall be fabricated from materials of uniform quality which are free from defects that vitiate the strength or stability of the structure. All structural steel shall be designed and constructed in accordance with either the AISC *Specification for Structural Steel Buildings — Allowable Stress Design and Plastic Design*, hereafter referred to AISC ASD, or the AISC *Load and Resistance Factor Design Specification for Structural Steel Buildings*, hereafter referred to as AISC LRFD, listed in Chapter 35, except as modified by the provisions of Section 2204.0.

2203.2 Structural steel seismic requirements: The design of structural steel members and connections to resist seismic forces shall be in accordance with Section 2203.1 and the AISC *Seismic Provisions for Structural Steel Buildings*, listed in Chapter 35, except as modified by Section 2203.2.1.

2203.2.1 Modifications to AISC seismic provisions: The AISC *Seismic Provisions for Structural Steel Buildings* shall be modified as indicated in items 1 and 2.

1. In Part 1, Section 1, of the AISC Provisions, modify the first sentence of the second paragraph to read: "Seismic provisions and the nominal loads for each Seismic Performance Category, Seismic Hazard Exposure Group or Seismic Zone shall be as specified by the applicable code under which the structure is designed."
2. Table 1610.1.5 in the *BOCA National Building Code/1999* shall be used in lieu of Table 2-1 in Part 1 of the AISC Provisions.

2203.3 Temporary and special stresses: Provisions shall be made in the design of structural steel construction for temporary stresses that occur during erection, and for the influence of special *loads* producing impact or vibrations as provided for in Sections 1606.6 and 1606.8. Stresses caused by eccentric loading shall be fully provided for and eccentric details shall be shown on the design and shop drawings.

2203.4 Shop drawings: Complete shop drawings shall be prepared in compliance with the best modern practice in advance of the actual fabrication. Such drawings shall clearly distinguish between shop and field rivets, bolts and welds in all connections and details.

2203.5 Painting and special protection: All painting shall comply with the requirements contained in AISC ASD or AISC LRFD listed in Chapter 35. Where exposed to highly corrosive fumes or vapors, or where subject to destruction from other highly hazardous industrial processes, all structural steelwork shall be protected by an approved method.

SECTION 2204.0 SEISMIC REQUIREMENTS FOR STRUCTURAL STEEL

2204.1 General: Steel structural elements that resist seismic forces shall be designed in accordance with the applicable provisions of Sections 2203.0, 2205.0, 2206.0 and 2207.0. Steel structures shall also be designed in accordance with the requirements of Sections 2204.2, 2204.3 and 2204.4 for specific Seismic Performance Categories.

2204.2 Seismic Performance Categories A and B: Buildings assigned to Seismic Performance Categories A and B in accordance with Section 1610.1.7 shall be permitted to be of any type of steel construction permitted by Sections 2203.0, 2205.0, 2206.0 and 2207.0.

2204.3 Seismic Performance Category C: Buildings assigned to Seismic Performance Category C in accordance with Section 1610.1.7 shall be designed in accordance with Section 2203.2.

2204.4 Seismic Performance Categories D and E: Buildings assigned to Seismic Performance Categories D and E in

accordance with Section 1610.1.7 shall be designed in accordance with Section 2203.2 or 2211.6.

SECTION 2205.0 OPEN-WEB STEEL JOIST CONSTRUCTION

2205.1 General: Steel joists and joist girders used as structural members in floor and roof construction shall be designed and constructed in accordance with the standard specifications of SJI *Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders* listed in Chapter 35.

2205.2 Seismic requirement: Steel joists and joist girders designed as part of the seismic-resisting system shall be designed as trusses in accordance with the applicable provisions of Sections 2203.2, 2204.0 and 2206.0.

2205.3 Painting: Painting of steel joists shall be in accordance with the requirements of the standard specifications of SJI *Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders* listed in Chapter 35 and with Section 2206.4.2.

SECTION 2206.0 FORMED STEEL CONSTRUCTION

2206.1 Design: The design of all cold-formed carbon and low-alloy steel structural members and assembled wall, floor and roof panels, used alone or in combination with other structural members, or with component materials, shall be in accordance with the *AISI Specification for the Design of Cold-Formed Steel Structural Members*, hereafter referred to as AISI ASD/LRFD, listed in Chapter 35, except as modified by the provisions of this section. The design of all cold-formed stainless steel structural members and components shall be based on a *load* and resistance factor design method or an allowable stress design method and maximum deflections in accordance with the ASCE *Specification for the Design of Cold-Formed Stainless Steel Structural Members*, hereafter referred to as ASCE 8-SSD-LRFD, or ASCE 8-SSD-ASD listed in Chapter 35, except as modified by the provisions of Section 2206.3. The lateral resistance of cold-formed steel stud wall systems shall be in accordance with Section 2211.0.

2206.1.1 Composite slabs: Composite slabs of concrete on steel deck shall be designed and constructed in accordance with ASCE 3 listed in Chapter 35.

2206.2 Secondary structural systems: Formed steel floor, wall and roof systems are permitted to be designed and constructed to resist all vertical and horizontal moments and shears resulting from lateral forces. Such members, where designed to transmit horizontal shears due to wind or other lateral forces, shall be connected to the supporting structure so as to resist adequately all primary and secondary stresses. Where concrete topping or other approved decking is installed and strength of the composite member is included in the calculations, the concrete topping or decking shall be installed in such a manner as to insure composite action of the assembly.

2206.3 Steel deck diaphragms: Steel deck diaphragms shall be made from materials conforming to the requirements of AISI ASD/LRFD or ASCE 8-SSD-ASD listed in Chapter 35. Nominal strengths shall be determined in accordance with approved test procedures developed by a *registered design professional*. Design strengths shall be determined by multiplying the nominal strength by a resistance factor of 0.60.

The steel deck installation for the building, including fasteners, shall comply with the test assembly arrangement.

2206.4 Protection: Formed steel shall be protected in accordance with Sections 2206.4.1 through 2206.4.4.

2206.4.1 Shop coat: All individual structural members and assembled panels of light gage and formed steel construction, except where fabricated of approved corrosion-resistant metallic steel or of steel having a corrosion-resistant or other approved coating, shall be protected against corrosion with an approved shop coat of paint, enamel or other approved protection.

2206.4.2 Field coat: After erection where directly exposed to the weather, except where encased in concrete made of non-corrosive aggregates, or where fabricated of approved corrosion-resistant steel, or of galvanized or otherwise adequately protected steel, individual structural members and assembled panels of light gage and formed steel construction shall be given an additional coat of approved protection.

2206.4.3 Siding: Exposed siding or sheathing shall be fabricated of approved corrosion-resistant steel or otherwise protected at the ground level for sufficient height above grade as determined by the depth of average snowfall in the locality, but not less than 8 inches (203 mm).

2206.4.4 Protection at exterior walls: Floor or roof construction which extends into an exterior wall shall be adequately waterproofed and protected from the weather to prevent corrosion.

2206.5 Tests: Where not capable of design by approved engineering analysis, the code official shall require tests of the individual or assembled structural units and the connections as prescribed in Sections 1709.0 and 1710.0. At least three specimens truly representative of the construction to be used in practice shall be subjected to the prescribed test and the mean of the results shall determine the safe working value, provided that any individual test varying more than 10 percent from the mean value shall cause rejection of the series.

2206.6 Identifying mark: Each structural member, siding panel and roof panel of a metal building system, other than hardware items such as bolts, nuts, washers, shims and rivets, shall be marked by the manufacturer. The identifying mark shall include the manufacturer's name or logo, and the part number or part name consistent with assembly instructions.

SECTION 2207.0 SPECIAL STEEL AND STEEL CABLE STRUCTURAL SYSTEMS

2207.1 Special steels: Alloy, high-carbon or other special high-strength steels not covered in this chapter, where used in the design and construction of buildings and structures, shall conform to Section 1706.0.

2207.2 Structural steel cable systems: The design, fabrication and erection of steel cables used as loadbearing members in buildings and structures shall be in accordance with ASCE 19 listed in Chapter 35, except as modified by the provisions of Section 2207.2.1.