SUPPLEMENT NO. 1

TO THE SPECIFICATION FOR THE DESIGN, FABRICATION & ERECTION OF STRUCTURAL STEEL FOR BUILDINGS

(ADOPTED NOVEMBER 1, 1978)

Effective March 11, 1986

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SECTION 1.15.12 CONNECTIONS

High-strength bolts installed in accordance with the provisions of Sect. 1.16.1 as friction-type connections, or installed with the bolt tension prescribed in Table 1.23.5 as bearing-type connections, or welds, shall be used for the following connections:

Column splices in all tier structures 200 ft or more in height

Column splices in tier structures 100 to 200 ft in height, if the least horizontal dimension is less than 40% of the height

Column splices in tier structures less than 100 ft in height, if the least horizontal dimension is less than 25% of the height

Connections of all beams and girders to columns and of any other beams and girders on which the bracing of columns is dependent, in structures over 125 feet in height

In all structures carrying cranes of over 5-ton capacity: roof-truss splices and connections of trusses to columns, column splices, column bracing, knee braces, and crane supports

Connections for supports of running machinery, or of other live loads which produce impact or reversal of stress

Any other connections stipulated on the design plans

In all other cases, connections may be made with A307 bolts or high-strength bolts tightened to the snug-tight condition.

For the purpose of this Section, the height of a tier structure shall be taken as the vertical distance from the curb level to the highest point of the roof beams in the case of flat roofs, or to the mean height of the gable in the case of roofs having a rise of more than $2^2/_3$ in 12. Where the curb level has not been established, or where the structure does not adjoin a street, the mean level of the adjoining land shall be used instead of curb level. Penthouses may be excluded in computing the height of structure.

1.23.5 Riveted and High-strength-Bolted Construction—Assembling

All parts of riveted members shall be well pinned or bolted and rigidly held together while riveting. Use of a drift pin in rivet or bolt holes during assembling shall not distort the metal or enlarge the holes. Holes that must be enlarged to admit the rivets or bolts shall be reamed. Poor matching of holes shall be cause for rejection.

Rivets shall be driven by power riveters, of either compression or manually-operated type, employing pneumatic, hydraulic, or electric power. After driving, they shall be tight and their heads shall be in full contact with the surface.

Rivets shall ordinarily be hot-driven, in which case their finished heads shall be of approximately hemispherical shape and shall be of uniform size throughout the work for the same size rivet, full, neatly finished, and concentric with the holes. Hot-driven rivets shall be heated uniformly to a temperature not exceeding 1,950° F; they shall not be driven after their temperature has fallen below 1,000°F.

Surfaces of high-strength-bolted parts in contact with the bolt head and nut shall not have a slope of more than 1:20 with respect to a plane normal to the bolt axis. Where the surface of a high-strength-bolted part has a slope of more than 1:20, a beveled washer shall be used to compensate for the lack of parallelism. High-strength-bolted parts shall fit solidly together when assembled and shall not be separated by gaskets or any other interposed compressible materials. When assembled, all joint surfaces, including those adjacent to the washers, shall be free of scale, except tight mill scale. They shall be free of dirt, loose scale, burrs, and other defects that would prevent solid seating of the parts. Contact surfaces within friction-type connections shall be free of oil, paint, lacquer, or other coatings, except as listed in Appendix E.

Except as noted below, A325 and A490 bolts shall be tightened to a bolt tension not less than that given in Table 1.23.5. Tightening shall be done by the turn-of-the-nut method, by a direct tension indicator or by properly calibrated wrenches. Bolts tightened by means of a calibrated wrench shall be installed with a hardened washer under the nut or bolt head, whichever is the element turned in tightening. Hardened washers are not required when bolts are tightened by the turn-of-the-nut method, except that hardened washers are required under the nut and bolt head when A490 bolts are used to connect material having a specified yield point less than 40 kips per sq. in.

Bolts designed for bearing values may be tightened to the snug-tight condition in connections where,

1. The bolts are not subject to tension loads
2. The bolts are not subject to loosening or fatigue due to vibration or load fluctuations.

The snug-tight condition is defined as the tightness attained by a few impacts of an impact wrench or the full effort of a man using an ordinary spud wrench. The snug-tight condition must ensure that the plies of the connected material have been brought into snug contact. The allowable stress values given in Table 1.5.2.1 for bearing-type connections shall be used for bolts tightened to the snug-tight condition. Bolts to be tightened only to the snug-tight condition shall be clearly identified in the contract documents and erection drawings.

SECTION 1.26.6 INSPECTION OF BOLTING (NEW)

The inspector shall determine that the appropriate requirements of Sections 1.16 and 1.23 of this specification are met in the work. Bolts in connections identified to be tightened only to the snug-tight condition need not be inspected for bolt tension other than to ensure that the plies of the connected elements have been brought into snug contact.

COMMENTARY

SECTION 1.23.5 RIVETED AND HIGH-STRENGTH-BOLTED CONSTRUCTION-ASSEMBLING

Except for bearing-type connections with bolts tightened to the snug-tight condition, A325 and A490 bolts are required to be tightened to 0.7 of their tensile strength. Ordinarily, snug-tight, high-strength bolted connections may be used in lieu of connections with A307 bolts as defined in Specification Sect. 1.15.12.

Where required, tightening to a prescribed tension may be done either by the turn-of-the-nut method,[52] by a calibrated wrench, or by use of direct tension indicators. In these cases, since stiffer parts may be required than is generally the case A307 bolts or A325 and A490 bolts in snug-tight connections, the greater clamping force may be desirable. However, because the performance of bolts in bearing is not dependent upon an assured minimum level of high pre-tension, thorough inspection requirements to assure full and complete compliance with pretightening criteria is not warranted. This is especially true regarding the arbitration inspection requirements of Sect. 6d of the RCSC specification.[52] For high-strength bolts in bearing-type connections installed with a prescribed pre-tension, adequate inspection may consist of visual evidence of solid seating of the connected parts and of wrench impacting. For A307 bolts and high-strength bolts installed to the snug-tight condition, adequate inspection consists of ensuring that the plies of the connected elements have been brought into snug contact.