

PART XIV: MISCELLANEOUS FASTENERS

14.1-DRIFT BOLTS AND DRIFT PINS

14.1.1-Withdrawal Design Values

Drift bolts and pins are unthreaded rods used to join large structural members where a smooth surface without protruding metal parts is desired.

Provisions for establishing withdrawal design values for round drift bolts or pins were included in the 1973 and earlier editions of the Specification. Such design values were determined from the equation

$$W = 1200\, G^2 D \qquad \text{(C14.1-1)}$$

where:

W = allowable withdrawal design value per inch of penetration, lbs
G = specific gravity based on oven dry weight and volume
D = bolt or pin diameter, in.

Equation C14.1-1 assumes the fastener is driven into a prebored hole having a diameter 1/8 inch less than the fastener diameter (57). The equation, which is generally applicable to all species (57), gives design values that are approximately one-fifth average ultimate test values (57,62).

Beginning in the 1977 edition, specific provisions for calculating withdrawal resistance of drift bolts or pins were dropped from the Specification. Other fasteners, such as spiral dowels (twisted rods with spirally grooved ridges) (4) which are not as dependent upon friction and workmanship for providing withdrawal resistance, should be used where withdrawal loads are a significant element in the design. However, where drift bolts or pins must be designed for withdrawal resistance, current good practice for such design is based on Equation C14.1-1 and the use of a predrilled hole that is 1/8 inch smaller in diameter than the fastener (4,66).

14.1.2-Lateral Design Values

In the 1944 through the 1982 editions of the Specification, lateral design values for drift bolts or pins were required not to exceed, and to be generally taken as less than, those for common bolts of comparable diameter (62). Use of additional penetration of the fastener into the members was recommended to compensate for the fact that the head, nut and washers contributing to the lateral resistance of common bolts are not present with drift bolts and pins. In the 1986 edition of the Specification, the general lateral design value provision for drift bolts and pins was replaced with a specific provision limiting lateral design values for such fasteners to 75 percent of the design value for common bolts of the same diameter. This specific requirement has been continued in the 1991 edition with the additional provision that use of increased penetrations to compensate for the absence of head, nut and washer is now mandatory. To implement these provisions, the length of the drift bolt or pin in the side member and in the main member, reduced by either the thickness of the bolt head and washer or the thickness of the nut and washer, may be taken as the thickness of these respective members when entering the yield mode equations of 8.2 or 8.3, or when entering Tables 8.2A, 8.2C, 8.3A or 8.3C of the Specification.

It is to be noted that end distance, edge distance and spacing requirements, and group action adjustments that are applicable to common bolts are also applicable to drift bolts and drift pins.

14.2-SPIKE GRIDS

Spike grids were first referenced in the Specification in the 1977 edition. These connectors consist of malleable iron grids with blunt teeth or spikes protruding outward from both sides at grid intersection points (179). Square grids can be flat on both sides or flat on one side and curved on the other; the latter for attachment to a pole or pile. Circular grids have teeth protruding around the perimeter of the connector. Grids are approximately 4-1/8 inches square or 3-1/4 inches in diameter and have an overall depth of less than 1-1/4 inch. Grids, which behave similarly to toothed-rings (see Commentary for 10.1 - Background) are embedded in the members being joined by tightening 3/4 or 1 inch center bolts passing through the center of the grid through a prebored hole in the wood members.

Spike grids are used in wood-to-wood connections in railway and highway trestle construction and similar uses where more than bolt strength is required and where resistance to loosening from vibration, impact and load reversals is needed (179). Grids have the advantage over split ring and shear plate connectors in not requiring precut grooving. Design values in excess of 3000 pounds for one spike grid and bolt in single shear can be obtained (178).