

DESIGN OF BEARING BOLTS

Design of Bearing Bolts Subjected to Eccentric Loading Causing Moment in the Plane Perpendicular to the Plane of Group of Bolts.

This type of connection is shown in Fig. 3.23. Referring to Fig. 3.28, let P be factored load at an eccentricity „ e “. Then the section is subjected to a direct shear force P and moment $M = Pxe$. If there are „ n “ numbers of bolts in the connection, direct design shear force on each bolt is given by,

$$V_{sb} = P/n$$

The moment causes tension in top side and compression in the bottom side. On tension side, only bolts resist load but on compression side entire contact zone between the columns and the connecting angle resist the load. Hence the neutral axis will be much below in these connections.

It is assumed to lie at a height of $1/7$ th of the depth of the bracket, measured from the bottom edge of the angle.

The variation of the force is as shown in Fig. 3.28(c).

The tensile force in a bolt T_{bi} is proportional to its distance y_i from the line of rotation.

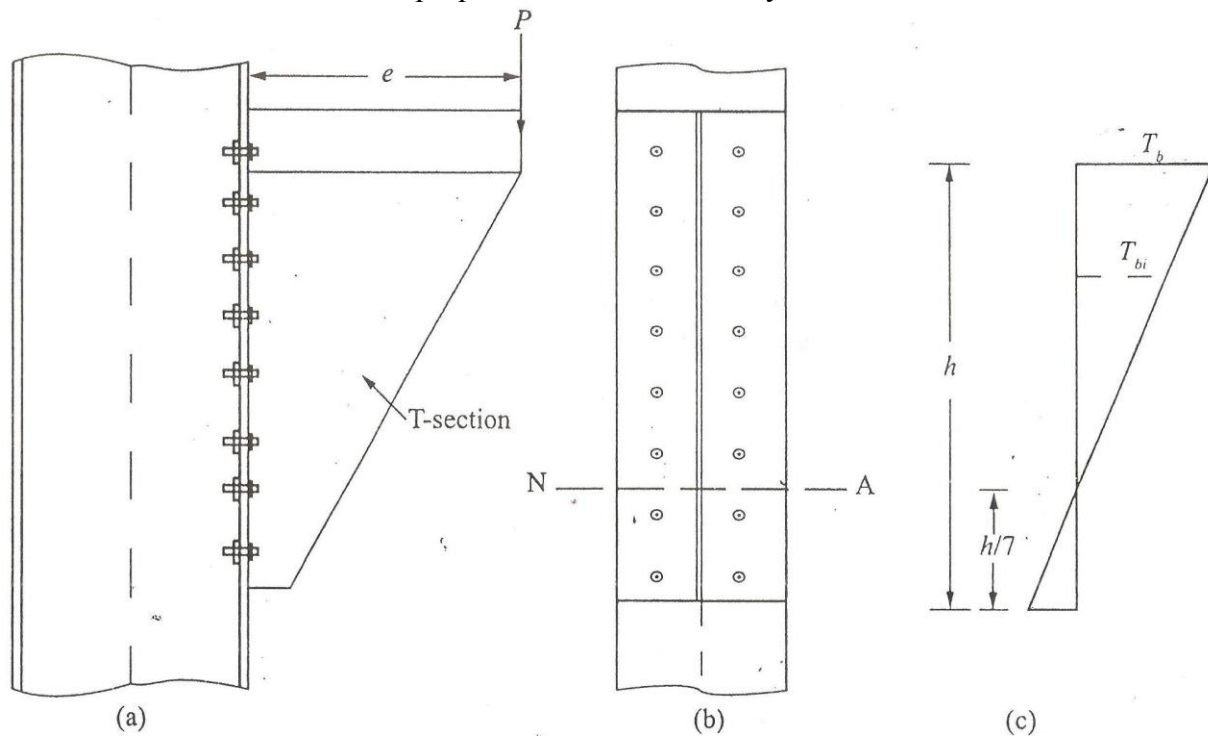


Figure 3.28

Steps to be followed in the design

Step 1: Select nominal diameter „ d “ of bolts.

Step 2: Adopt a pitch(p) of $2.5d$ to $3.5d$ for bolts.

Step 3: Bolts are to be provided in two vertical rows. Number of bolts necessary in each row is computed from the expression.

Step 4: Find the direct shear and tensile forces acting on the extreme bolt. If it is HSFG bolted connection adds prying force [Ref. Fig. 3.28] to direct tension. Check whether the interaction formula is satisfied.

SHEAR CAPACITY OF HSFG BOLTS

As stated in Fig, these are the bolts made of high tensile steel which are pretensioned and then provided with nuts. The nuts are clamped also. Hence resistance to shear force is mainly by friction. There are two types of HSFG bolts. They are parallel shank and waisted shank type. Parallel shank type HSFG bolts are designed for no-slip at serviceability loads. Hence they slip at higher loads and slip into bearing at ultimate loads. Hence such bolts are checked for their bearing strength at ultimate load. Waisted shank HSFG bolts are designed for no slip even at ultimate load and hence there is no need to check for their bearing strength.

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