

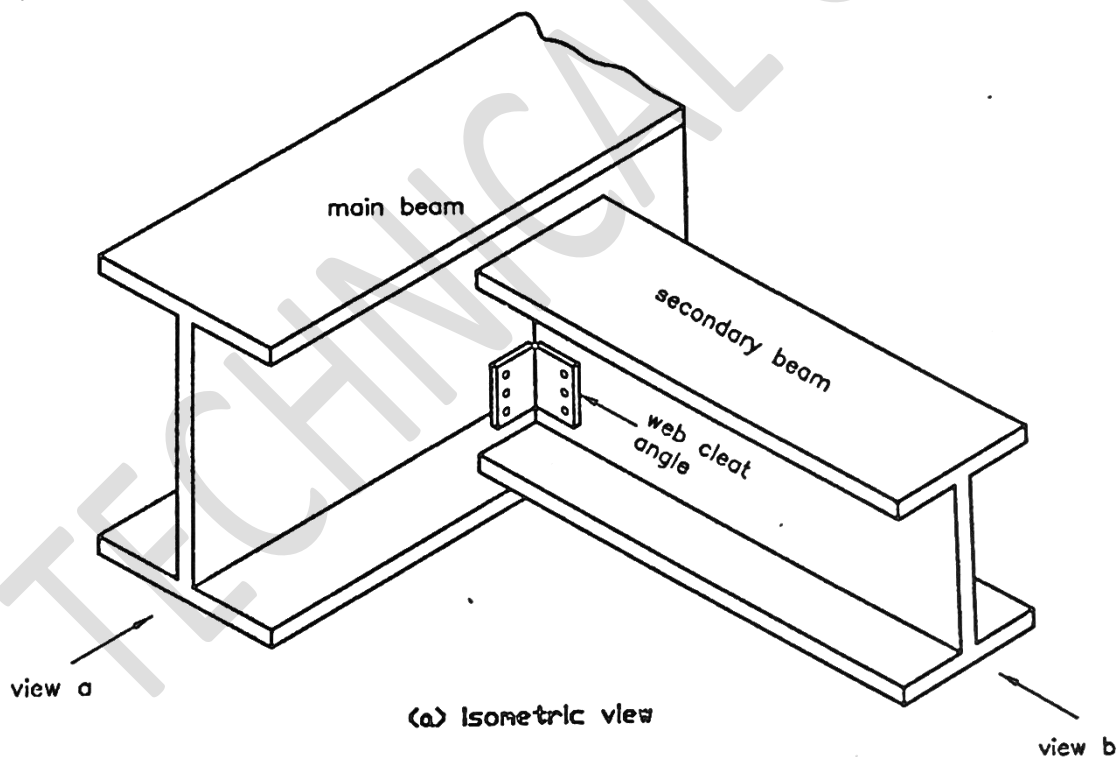
## -! Connections !-

→ Types of connections based on rigidity :

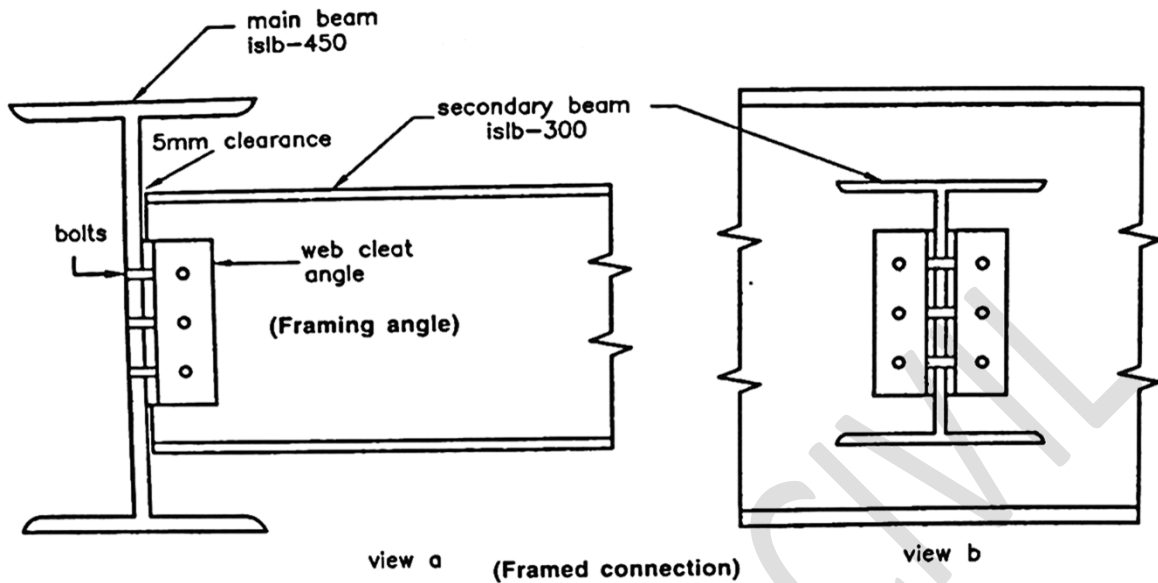
- (i) Rigid connection (Moment connection)
- (ii) Semi-rigid connection
- (iii) Simple connection.

→ Beam to Beam connections:

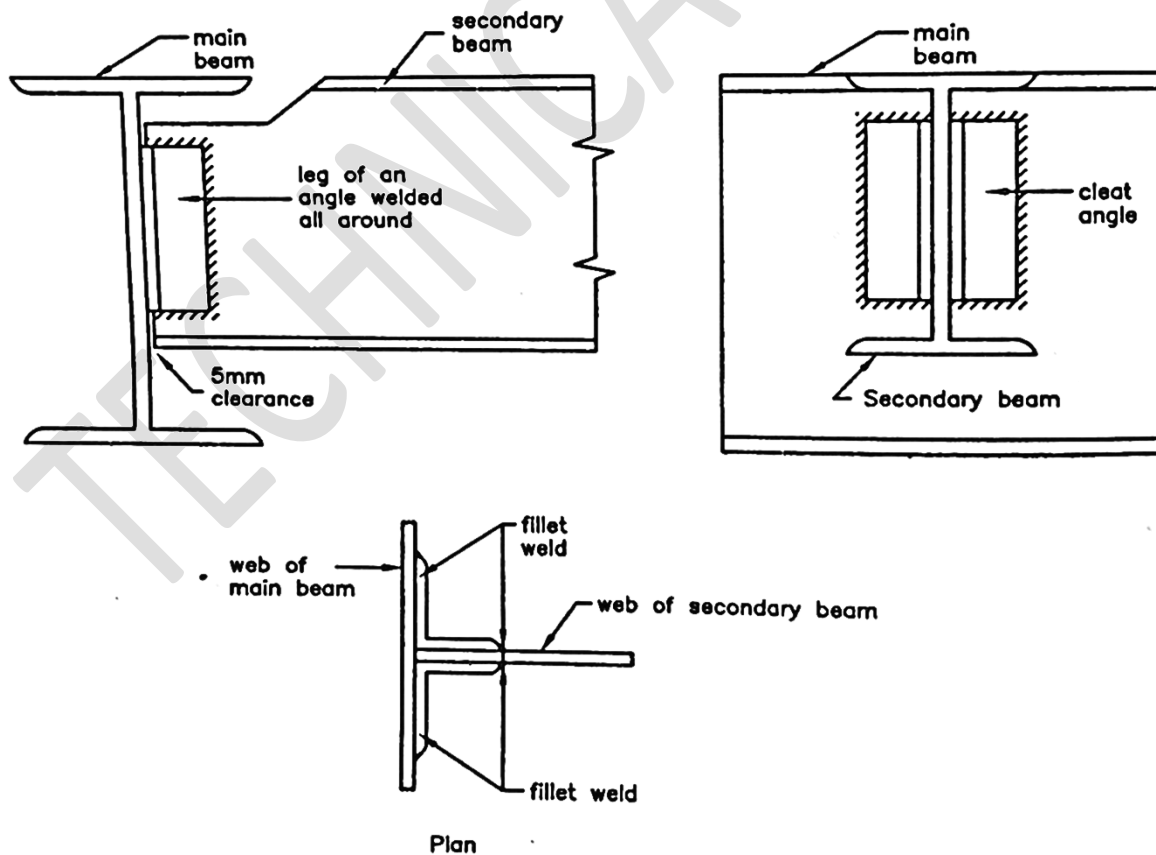
- (i) Web cleat angle connection. (Framed connection)
- (ii) Web cleat & seat angle connection (Seated connect<sup>n</sup>.)



i. Web cleat angle connection (Framed)

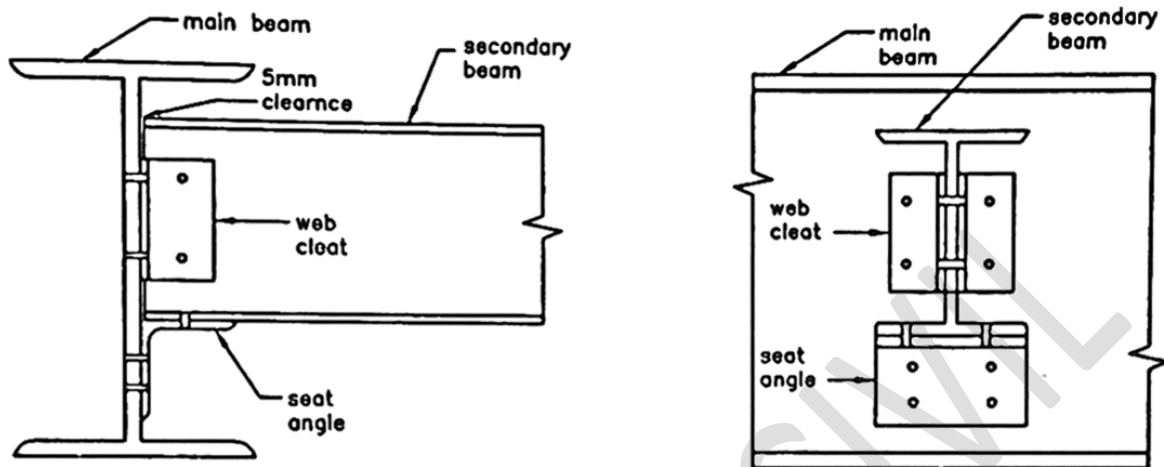


Beam to Beam connection (web cleat angle connection - Bolted)

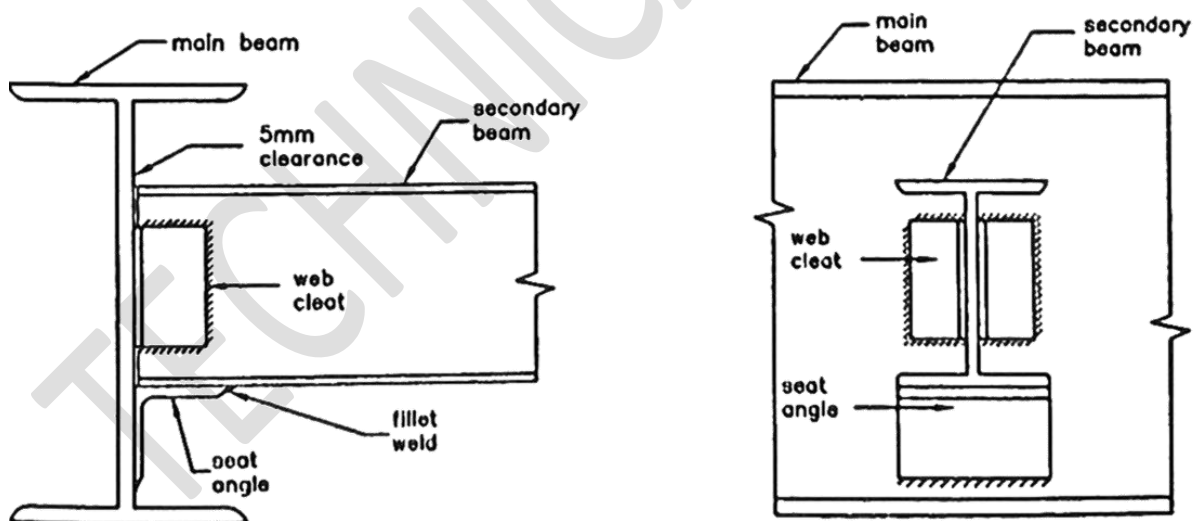


Beam to Beam connection (web cleat angle connection - Welded)

ii. Web cleat and seat angle connection (Seated)



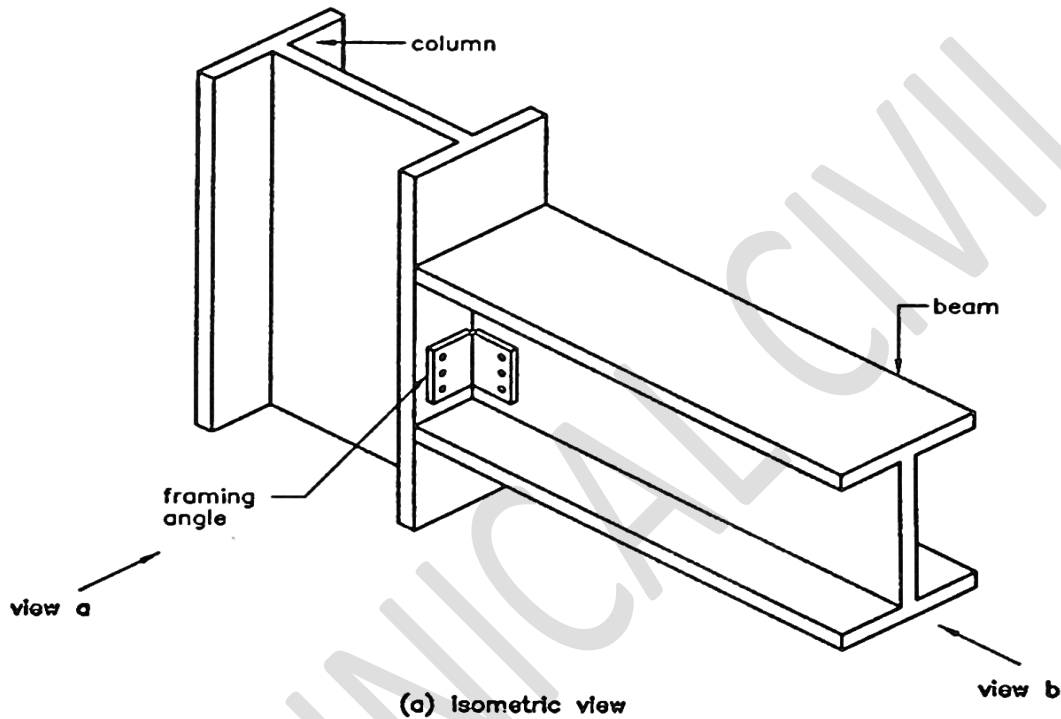
Beam to Beam connection (web cleat and seat angle connection - Bolted)



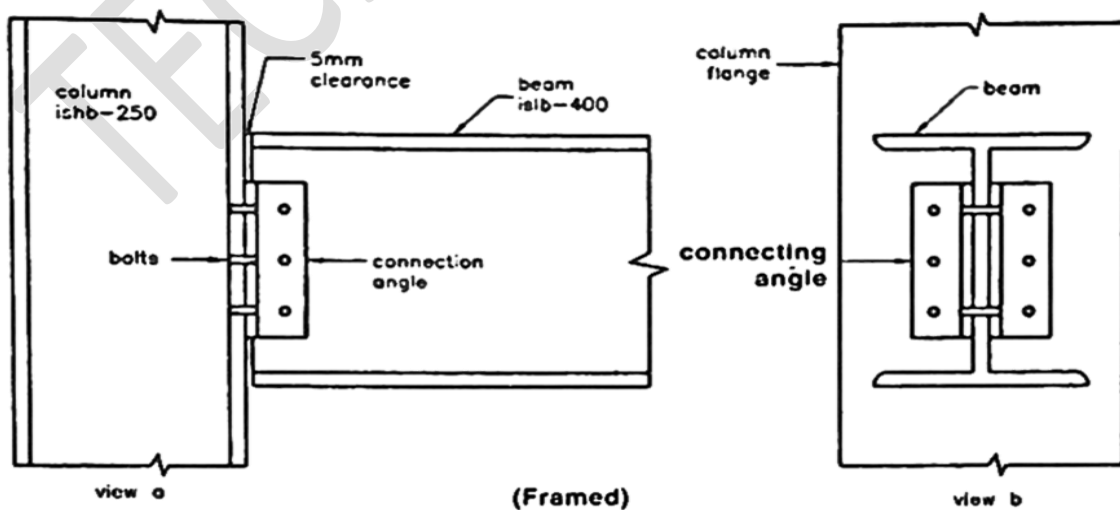
Beam to Beam connection (web cleat and seat angle connection - Bolted)

→ Beam to Column connections:

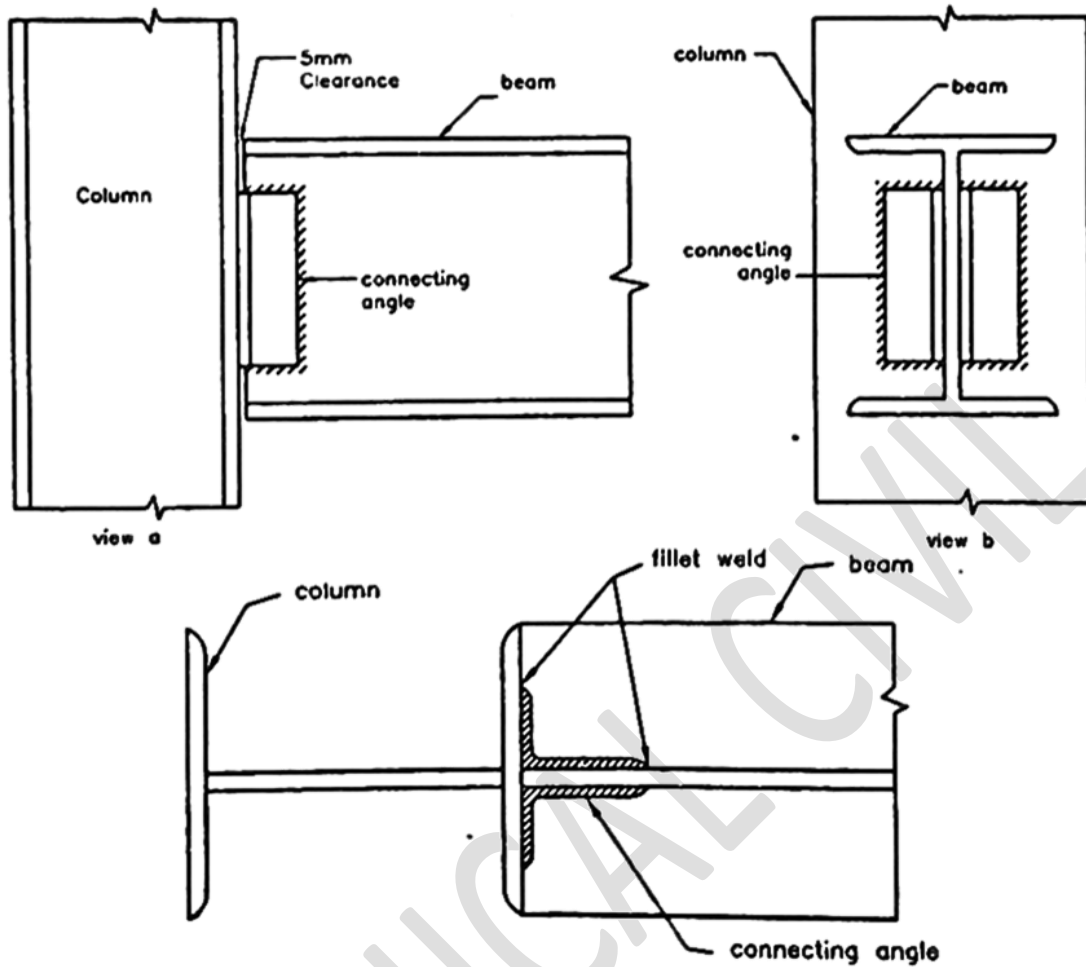
- (i) Web cleat angle connection.
- (ii) Cleat & seat angle connection - unstiffened.
- (iii) Cleat & seat angle connection - stiffened.



i. Web cleat angle connection (Framed)

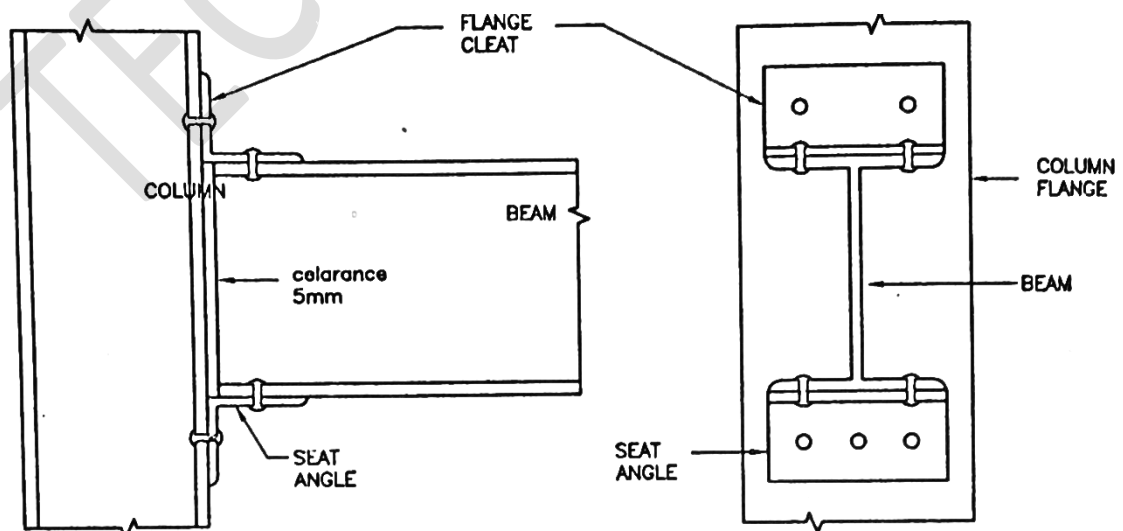


Beam to Column connection (web cleat angle connection - Bolted)

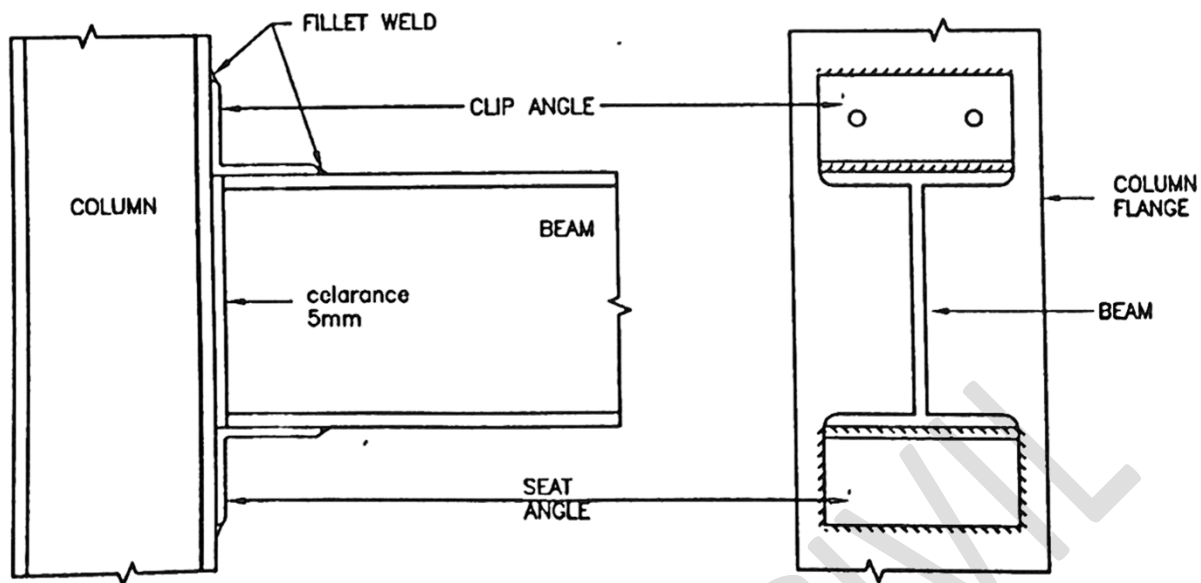


Beam to Column connection (web cleat angle connection - Welded)

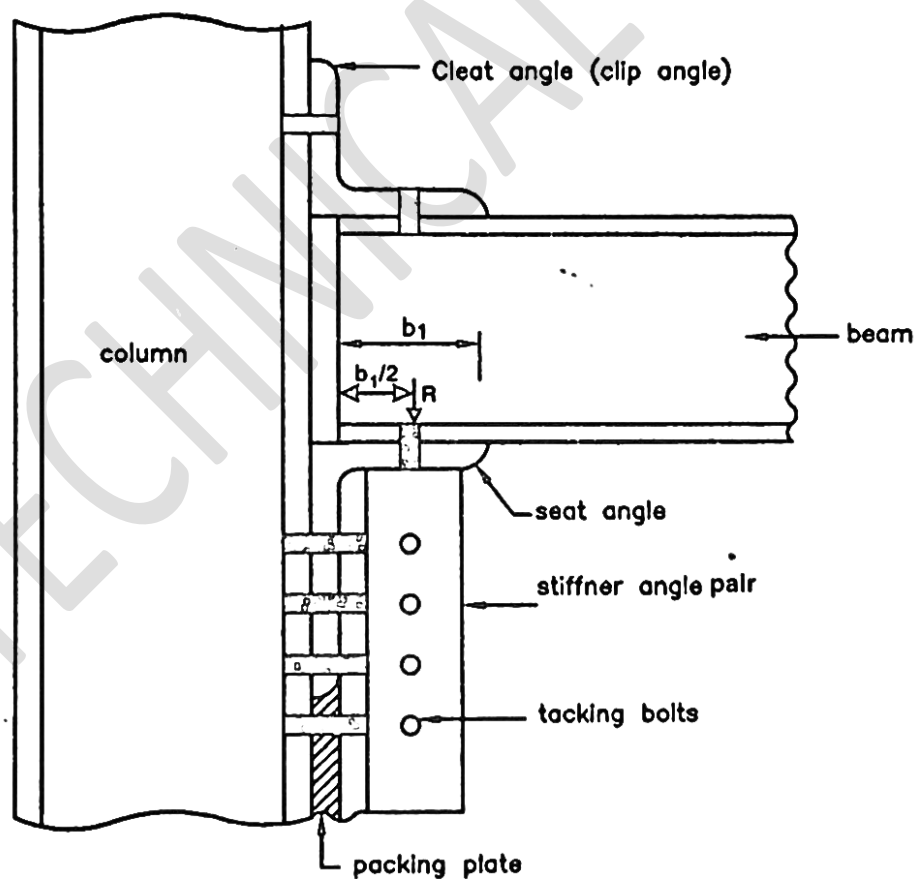
ii. Web cleat and seat angle connection – unstiffened



Web cleat and seat angle connection – unstiffened (Bolted)



Web cleat and seat angle connection – unstiffened (Welded)

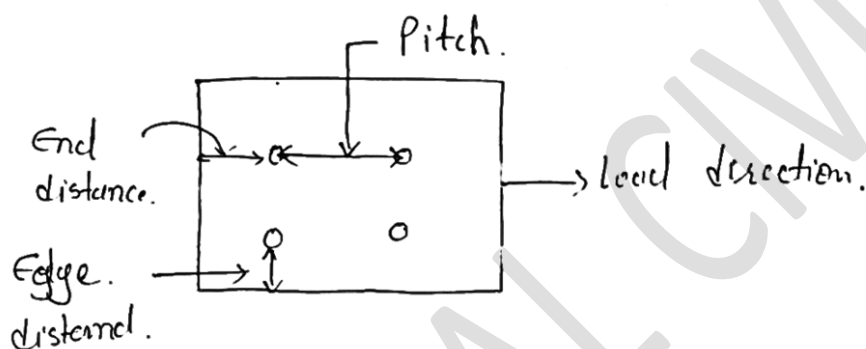


Web cleat and seat angle connection – stiffened

→ Moment Resistant connections:

- (i) Eccentrically loaded connection.
- (ii) Light moment connection
- (iii) Heavy moment connection.

⇒ Terminology used in Bolted connection.



→ Minimum pitch =  $2.5 \times \text{dia. of bolt}$  (IS: 800, pg. 73)

→ Minimum end dist. =  $1.7 \times \text{dia. of hole}$  (IS: 800, pg. 74)

→ Maximum edge dist =  $12 \times t \times \epsilon$  (IS: 800, pg. 74)

∴  $t$  = thickness of thinner plate.

$$\epsilon = \sqrt{\frac{250}{f_y}}$$

→ Dia. of hole with respect to dia. of bolt : (IS: 800, Table-19)

Dia. of bolt	Dia. of hole.
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12mm to 14mm

+ 1mm.

(i.e dia. of hole =  $12 + 1 = 13\text{mm}$ )  
etc.

16mm to 22mm

+ 2mm.

24mm.

+ 2mm.

more than 24mm

+ 3mm.

→ Failure of Bolt:

(i) Shearing failure.

(ii) Bearing failure.

→ Shear capacity of bolt: (IS: 800, Pg-75)

$$V_{dsb} = \frac{f_u (n_n \times A_{nb} + n_s \times A_{sb})}{\sqrt{3} \times \gamma_{mb}} \quad \text{(cl. 10.3.3)}$$

∴  $f_u$  = ultimate tensile strength of bolt.

$n_n$  = no. of shear planes with thread intercepting shear plane.

$n_s$  = no. of shear plane without thread intercepting shear plane

$A_{sb}$  = plain shank area of bolt. =  $\frac{\pi}{4} \times (\text{dia. of bolt})^2$

$A_{nb}$  = net shear area of bolt at thread. =  $0.78 \times A_{sb}$ .

→ Bearing capacity of bolt: (IS: 800, Pg-75)

$$V_{dpb} = \frac{2.5 \times k_b \times d \times t \times f_u}{\gamma_{mb}}$$

∴  $k_b$  is smaller of  $\rightarrow \frac{e}{3d_0}$ ,  $\frac{p}{3d_0} - 0.25$ ,  $\frac{f_{ub}}{f_u}$ , 1.0 ;

$d$  = dia. of bolt.

$t$  = summation of thickness of connected plate in bearing.