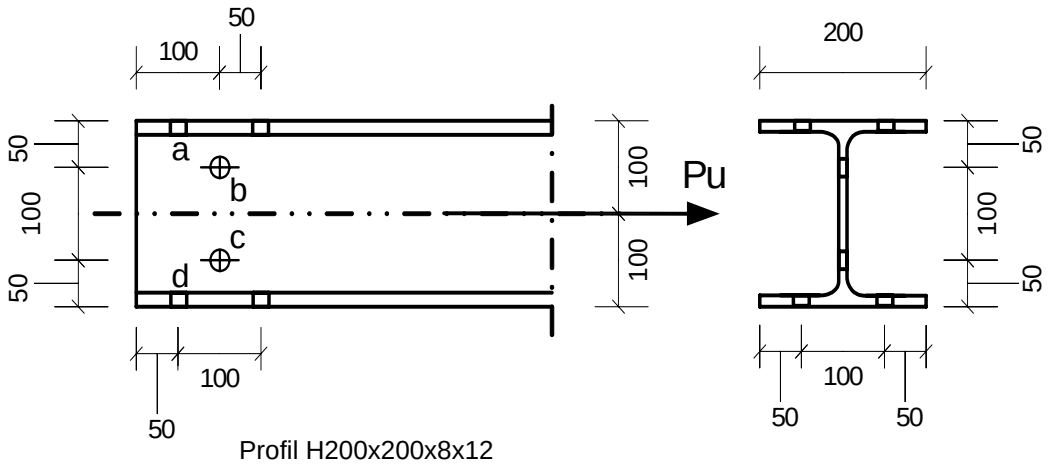
DESAIN BATANG TARIK H200

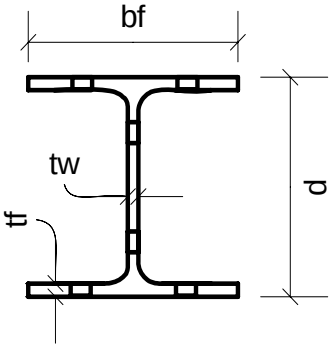
Satuan :

$kN := 1000N \quad MPa := 1\frac{N}{mm^2} \quad ton := 1000kg$



Profil H200x200x8x12

Data Penampang



$Ix := 4720cm^4 \quad A := 63.53cm^2 \quad xbar := 100mm$

$Iy := 1600cm^4 \quad tf := 12mm$

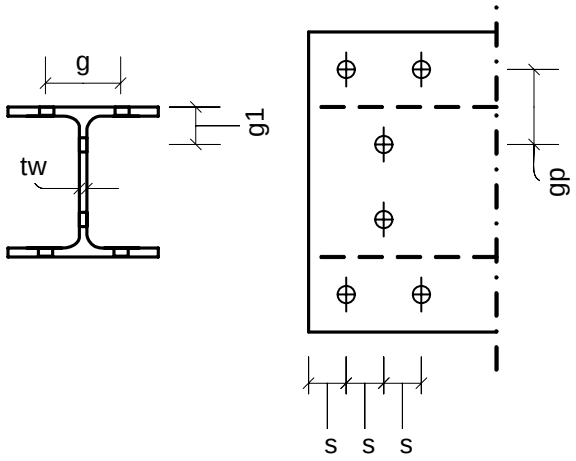
$bf := 200mm \quad d := 200mm$

$tw := 8mm \quad r := 13mm$

Data bahan : $Fy := 240MPa \quad Fu := 370MPa$

Data Sambungan Diameter baut: $db := 16mm$

Data Jarak



$g := 100mm$

$g1 := 50mm$

$gp := \frac{g}{2} + g1 - \frac{tw}{2} \quad gp = 96\,mm$

$s := 50mm$

$d1 := 50mm$

Data beban : $Pu := 600kN$

Mencari Luas Netto Effektif

Diameter lubang (anggap lubang standar) $dhole := db + 2mm$ $dhole = 18\,mm$

$\frac{bf}{d} = 1$ $U := \begin{cases} 0.9 & \text{if } \frac{bf}{d} > \frac{2}{3} \\ 0.85 & \text{if } \frac{bf}{d} < \frac{2}{3} \end{cases}$ $\boxed{U = 0.9}$

Jalur lurus (bc) melalui 2 lubang : $An1 := A - 2\cdot(dhole)\cdot tw$ $An1 = 60.65\,cm^2$

Jalur lurus (ad) melalui 4 lubang : $An2 := A - 4\cdot(dhole)\cdot tf$ $An2 = 54.89\,cm^2$

Jalur belok (abcd) melalui 6 lubang berseling:

$$An3 := A - 4\cdot(dhole)\cdot tf - 2\cdot(dhole)\cdot tw + \frac{2\cdot s^2\cdot\left(tf + \frac{tw}{2}\right)}{4\cdot gp} \qquad An3 = 54.09\,cm^2$$

Jalur belok (abc) melalui 4 lubang berseling:

$$An4 := A - 2(dhole)\cdot tf - 2(dhole)\cdot tw + \frac{s^2\cdot\left(tf + \frac{tw}{2}\right)}{4\cdot gp} \qquad An4 = 57.37\,cm^2$$

$Ae := U\cdot\min(An1, An2, An3, An4)$ $Ae = 48.68\,cm^2$

Fraktur pada penampang neto $\phi t := 0.75$ $Pu1 := \phi t\cdot Fu\cdot Ae$ $Pu1 = 1350.98\,kN$

Leleh pada penampang bruto $\phi t := 0.90$ $Pu2 := \phi t\cdot Fy\cdot A$ $Pu2 = 1372.25\,kN$

Kekuatan Geser Blok pada 1 flens (diperiksa blok yang lebarnya: $d1 = 50\,mm$)

$Agv := 3\cdot s\cdot tf$ $Agv = 18\,cm^2$

$Agt := d1\cdot tf$ $Agt = 6\,cm^2$

$Anv := Agv - 1.5\cdot dhole\cdot tf$ $Anv = 14.76\,cm^2$

$Ant := Agt - 0.5\cdot dhole\cdot tf$ $Ant = 4.92\,cm^2$

$\phi := 0.75$ $0.6Fu\cdot Anv = 327.67\,kN$ $Fu\cdot Ant = 182.04\,kN$

$Rn1 := \begin{cases} \phi\cdot(0.6\cdot Fu\cdot Anv + Fy\cdot Agt) & \text{if } 0.6Fu\cdot Anv > Fu\cdot Ant \\ [\phi\cdot(0.6\cdot Fy\cdot Agv + Fu\cdot Ant)] & \text{if } 0.6Fu\cdot Anv \le Fu\cdot Ant \end{cases}$ (leleh tarik dan fraktur geser) (leleh geser dan fraktur tarik)

$Rn1 = 353.75\,kN$

Kekuatan Geser Blok Profil (pada 2 flens) : $Rn := 2\cdot Rn1$ $Rn = 707.51\,kN$

Kuat tarik batang profil H200 adalah $Pn := \min(Pu1, Pu2, Rn)$ $Pn = 707.51\,kN$

$Cek := \begin{cases} \text{"OK!"} & \text{if } Pn > Pu \\ \text{"Tidak OK!"} & \text{otherwise} \end{cases}$ $\boxed{Cek = \text{"OK!"}}$