## DESAIN GESER BALOK WF TANPA PENGAKU BADAN
## MENURUT AISC-LRFD 2005

Satuan : $kN := 1000N$ $MPa := 1\frac{N}{mm^2}$ $ksi := 6.8971MPa$

Data Penampang: Profil WF 346x174x6x9

$Ix := 11100cm^4$ $A := 52.68cm^2$ $bf := 174mm$ $d := 346mm$

$Iy := 792cm^4$ $tf := 9mm$ $tw := 6mm$ $r := 14mm$

Data Bahan (Bj. 55) $E := 2\cdot10^5MPa$ $Fy := 410MPa$

Gaya Geser Terfaktor $Vu := 200kN$

Besaran Penampang yang perlu dihitung

$h := d - 2\cdot tf - 2r$ $h = 30.00\,cm$ $Aw := d\cdot tw$ $Aw = 20.76\,cm^2$

Kelangsingan badan dan batas-batas kelangsingan untuk tekuk badan

$\frac{h}{tw} = 50$ $2.24\sqrt{\frac{E}{Fy}} = 49.47$

$$\phi v := \begin{cases} 1 & \text{if } \frac{h}{tw} \le 2.24\sqrt{\frac{E}{Fy}} \\ 0.9 & \text{if } 2.24\sqrt{\frac{E}{Fy}} < \frac{h}{tw} \le 260 \end{cases}$$

$\phi v = 0.90$

Penentuan Koefisien Tekuk Pelat Web $kv := 5$ (tanpa pengaku badan)

Penentuan Koefisien Geser Web

$1.10\sqrt{\frac{kv\,E}{Fy}} = 54.33$ $1.37\sqrt{\frac{kv\,E}{Fy}} = 67.66$

$$Cv := \begin{cases} 1 & \text{if } \frac{h}{tw} \le 1.10\cdot\sqrt{\frac{kv\,E}{Fy}} \\ \frac{1.10\sqrt{\frac{kv\cdot E}{Fy}}}{\left(\frac{h}{tw}\right)} & \text{if } \left(1.10\cdot\sqrt{\frac{kv\cdot E}{Fy}} < \frac{h}{tw} \le 1.37\cdot\sqrt{\frac{kv\cdot E}{Fy}}\right) \\ \frac{1.51\cdot E\cdot kv}{\left(\frac{h}{tw}\right)^2\cdot Fy} & \text{if } 1.37\cdot\sqrt{\frac{kv\cdot E}{Fy}} < \frac{h}{tw} \le 260 \\ \text{"Gunakan Pengaku Badan"} & \text{otherwise} \end{cases}$$

$Cv = 1.00$

Kuat Geser Nominal Balok: $Vn := 0.6Fy\cdot Aw\cdot Cv$ $Vn = 510.70\,kN$

Desain Geser Balok: $\phi v\cdot Vn = 459.63\,kN$

$$Cek := \begin{cases} \text{"OK"} & \text{if } Vu < \phi v\cdot Vn \\ \text{"Tidak Kuat Terhadap Geser"} & \text{if } Vu \ge \phi v\cdot Vn \end{cases}$$

$Cek = \text{"OK"}$

$$2.24\sqrt{\frac{E}{Fy}} < \frac{h}{tw} \le 260$$

$$\frac{h}{tw} \le 2.24\cdot\sqrt{\frac{E}{Fy}}$$

$a := 0m$ (jarak bersih antara pengaku badan)

$$kv := \begin{cases} 5 & \text{if } 2.24\cdot\sqrt{\frac{E}{Fy}} < \frac{h}{tw} \le 260 \quad \text{(tanpa pengaku badan)} \\ 5 + \frac{5}{\left(\frac{a}{h}\right)^2} & \text{if } \frac{h}{tw} > 260 \quad \text{(dengan pengaku badan)} \end{cases}$$

kv = 5