B1T5TRPERL $b = 7{,}62cm$ $t = 1{,}111cm$

Aço MR250 $f_y = 25 kN/cm^2$ $f_u = 40 kN/cm^2$

$d = 16mm$ $d_{pap} = 16 + 3{,}5 = 19{,}5mm$

→ ÁREA BRUTA DA SEÇÃO TRANSVERSAL:

$$A_g = b \times t + (b-t)\,t = 2bt - t^2$$

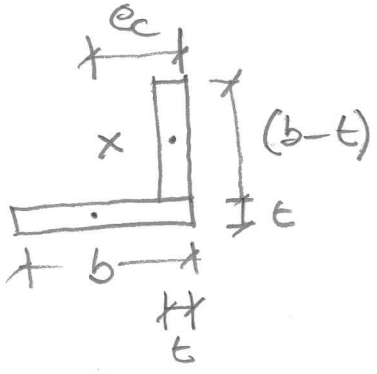
$$A_g = 2 \times 7{,}67cm \times 1{,}111cm - (1{,}111cm)^2 = \underline{15{,}808cm^2}$$

→ ÁREA LIQUIDA DA SEÇÃO TRANSVERSAL:

$$A_n = A_g - d_{pad} \times t = 15{,}808cm^2 - 1{,}95cm \times 1{,}111cm$$

$$A_n = 13{,}642cm^2 \quad \boxed{Q01}$$

→ Cálculo da excentricidade e_c



$$e_c = \frac{b \times t \times b/2 + (b-t) \times t \times t/2}{b \times t + (b-t) \times t}$$

logo:

$$e_c = \frac{7{,}62cm \times 1{,}111cm \times 7{,}62cm/2 + (7{,}62cm - 1{,}111cm) \times 1{,}111cm \times \frac{1{,}111cm}{2}}{7{,}62cm \times 1{,}111cm + (7{,}62cm - 1{,}111cm) \times 1{,}111cm}$$

$$e_c = 2{,}3107 \sim \underline{2{,}313cm} \quad \boxed{Q02}$$

→ cálculo do e_t:

$$L_c = 2 \times 3d = 2 \times 3 \times 16mm = 96mm = 9{,}6cm$$

$$C_t = 1 - e_c/L_c = 1 - \frac{2{,}313\,cm}{9{,}6\,cm} = 0{,}743$$

$C_t = 0{,}743 \in [0{,}6;\ 0{,}90]$ ok! **Q03**

→ Cálculo de A_{gv}:

$$A_{gv} = (2d + 2 \times 3d)\,t = 8dt$$

$$A_{gv} = 8 \times 1{,}6\,cm \times 1{,}111\,cm = 14{,}221\,cm^2$$ **Q04**

→ Cálculo de A_{nv}:

$$A_{nv} = A_{gv} - 2{,}5\,d_{pad} \times t$$

$$A_{nv} = 14{,}221\,cm^2 - 2{,}5 \times 1{,}95\,cm \times 1{,}111\,cm$$

$$A_{nv} = 8{,}8049\,cm^2$$ **Q05**

→ Cálculo de A_{nt}:

$$A_{nt} = \left(\frac{b}{2} - \frac{d_{pad}}{2}\right) \times t$$

$$A_{nt} = \left(\frac{7{,}62\,cm - 1{,}95\,cm}{2}\right) \times 1{,}111\,cm$$

$$A_{nt} = 3{,}1497\,cm^2$$ **Q06**

→ Esforço Axial Resistente de Tração ESB:

$$N_{tRd\,ESB} = \frac{A_g \cdot f_y}{\gamma_{a1}} = \frac{15{,}808\,cm^2 \times 25\,kN/cm^2}{1{,}1}$$

$$N_{tRd\,ESB} = 359{,}27\,kN$$ **Q07**

→ Esforço Axial Resistente de Tração RSL:

- $Ae = Ct \cdot An = 0{,}743 \times 13{,}642 cm^2$

$Ae = 10{,}136 cm^2$

$$Nt_{Rd\,RSL} = \frac{Ae \cdot fu}{\gamma_{a2}} = \frac{10{,}136 cm^2 \cdot 40 kN/cm^2}{1{,}35}$$

$Nt_{Rd\,RSL} = 300{,}33 kN$ // Q08 //

→ Esforço Axial Resistente ao Cisalhamento de Bloco:

$$N_{tRd\,cis1} = \frac{1}{\gamma_{a2}}(0{,}6 fu\, Anv + Cts \cdot fu\, Ant)$$

$$= \frac{1}{1{,}35}\left(0{,}6 \times 40\frac{kN}{cm^2} \times 8{,}8049 cm^2 + 1 \times 40\frac{kN}{cm^2} \times 3{,}1497 cm^2\right)$$

$$= 249{,}86 kN$$

$$N_{tRd\,cis2} = \frac{1}{\gamma_{a2}}(0{,}6 fy\, Agv + Cts\, fu\, Ant)$$

$$= \frac{1}{1{,}35}\left(0{,}6 \times 25\frac{kN}{cm^2} \times 14{,}221 cm^2 + 1 \times 40\frac{kN}{cm^2} \times 3{,}1497 cm^2\right)$$

$$= 251{,}34 kN$$

$N_{tRd\,cis} = Mínimo(249{,}86 kN; 251{,}34 kN)$

$N_{tRd\,cis} = 249{,}86 kN$ // Q09 //

$N_{tRd\,FINAL} = Mínimo(N_{tRd\,RSL}; N_{tRd\,ESB}; N_{tRd\,cis})$

$N_{tRd\,FINAL} = 249{,}86 kN$ // Q10 //