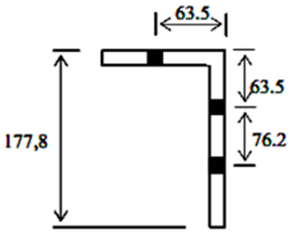
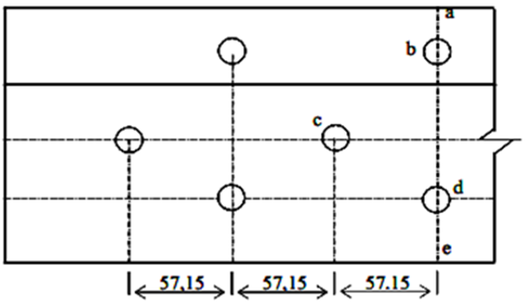
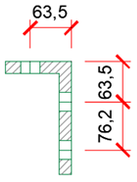
SE1_E03-01

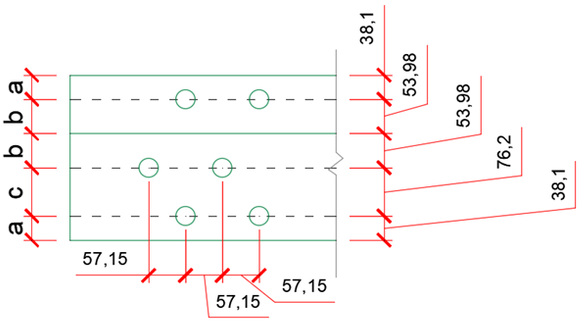
Calcular a área líquida da cantoneira L 177,8 x 101,6 x 19,05 abaixo, com furos padrão para parafusos φ3/4' e em seguida calcular o máximo esforço de tração que a peça poderá suportar.

Adote aço MR250.









$a := 38,1\ \text{mm}$

$b := 53,975\ \text{mm}$

$c := 76,2\ \text{mm}$

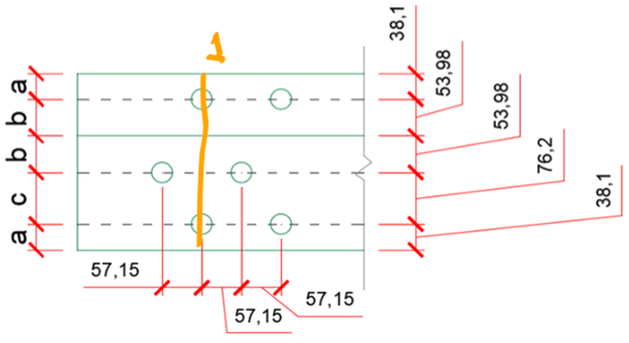
$f := 57,15\ \text{mm}$

$t := 19,05\ \text{mm}$

$dnom := \frac{3}{4} \cdot 25,4\ \text{mm} = 19,05\ \text{mm}$ $dpad := dnom + 1,5\ \text{mm} + 2,0\ \text{mm} = 22,55\ \text{mm}$

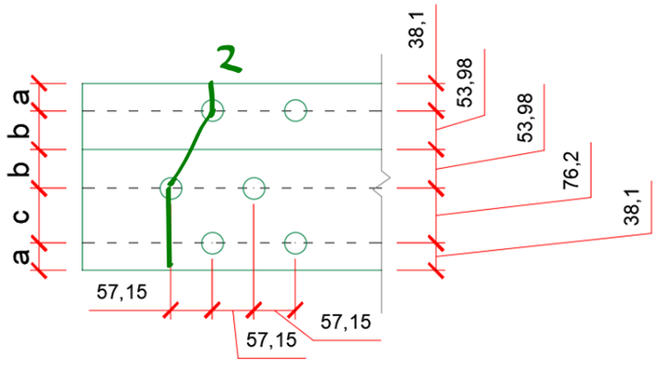
Análise dos caminhos de ruptura possíveis:

Caminho 1 (b1):



$b1 := (a + b + b + c + a) - 2 \cdot dpad = 215,25\ \text{mm}$

Caminho 2 (b2):



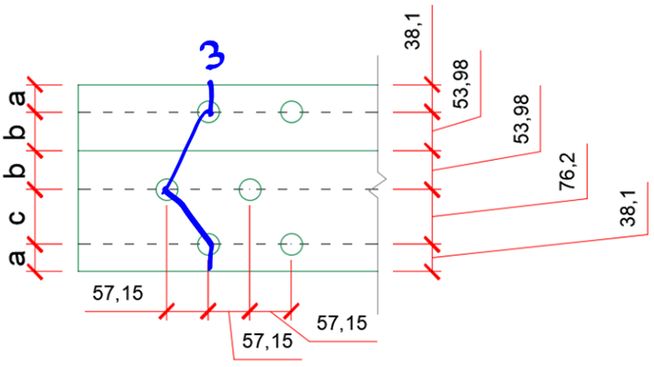
$\frac{s^2}{4 \cdot g}$ Ganho de comprimento devido ao enviesamento

$s := f = 57,15\ \text{mm}$

$g := 2 \cdot b = 107,95\ \text{mm}$

$b2 := (a + b + b + c + a) - 2 \cdot dpad + \frac{s^2}{4 \cdot g} = 222,81\ \text{mm}$

Caminho 3 (b3):



* surgimento de dois enviesamentos diferentes

$\frac{s1^2}{4 \cdot g1}$ Ganho de comprimento devido ao enviesamento superior

$s1 := f = 57,15\ \text{mm}$

$g1 := 2 \cdot b = 107,95\ \text{mm}$

$\frac{s1^2}{4 \cdot g1} = 7,564\ \text{mm}$

$\frac{s2^2}{4 \cdot g2}$ Ganho de comprimento devido ao enviesamento inferior

$s2 := f = 57,15\ \text{mm}$

$g2 := c = 76,2\ \text{mm}$

$\frac{s2^2}{4 \cdot g2} = 10,7156\ \text{mm}$

$b3 := (a + b + b + c + a) - 3 \cdot dpad + \frac{s1^2}{4 \cdot g1} + \frac{s2^2}{4 \cdot g2} = 210,98\ \text{mm}$ $\quad 3 \cdot dpad = 67,65\ \text{mm}$

$bn := \min([\ b1\ \ b2\ \ b3\ ]) = 210,98\ \text{mm}$

$An := bn \cdot t = 40,19\ \text{cm}^2$

* apesar de todas as placas/chapas componentes do perfil fazerem parte da ligação, consideração como coeficiente Ct = 0,90 (on invés de 1,00 - atitude conservadora)

$Ct := 0,90$

$Ae := Ct \cdot An = 36,17\ \text{cm}^2$

$b0 := a + b + b + c + a = 260,35\ \text{mm}$ * largura de chapa sem a consideração de furação

$Ag := b0 \cdot t = 49,60\ \text{cm}^2$

Cálculo das Forças Resistêntes da Cantoneira:

ESB : $fy := 250\ \text{MPa}$ $\quad \gamma a1 := 1,10$ $\quad Rdt_ESB := \frac{Ag \cdot fy}{\gamma a1} = 1127\ \text{kN}$

RSL : $fu := 400\ \text{MPa}$ $\quad \gamma a2 := 1,35$ $\quad Rdt_RSL := \frac{Ae \cdot fu}{\gamma a2} = 1072\ \text{kN}$