| | | | |
|---|---|---|---|
| Company: | Bureau of Reclamation | Page: | 13 |
| Address: | | Specifier: | B. Jackson PE |
| Phone I Fax: | \| | E-Mail: | BPJackson@usbr.gov |
| Design: | Concrete - Sep 7, 2023 | Date: | 9/11/2023 |
| Fastening point: | | | |

### 2.5.1 Anchor plate to profile

Decisive load combination: 1 - Combination 1

**Equations**

$F_{nw} = 0.6\, F_{EXX}\,(1.0 + 0.5\sin^{1.5}\Theta)$

$\Phi R_n = \Phi\, F_{nw}\, A_w$

$\text{Utilization} = \dfrac{F_n}{\Phi\, R_n}$

**Variables**

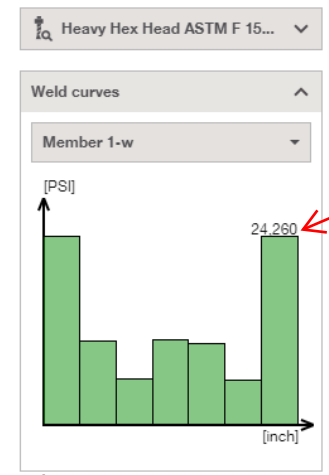
| Edge | $X_u$ | $T_h$ [in] | $L_s$ [in] | L [in] | $L_c$ [in] | $F_{EXX}$ [psi] | $\Theta$ [°] | $A_w$ [in²] |
|---|---|---|---|---|---|---|---|---|
| Member 1-bfl 1 | E70xx | ◢0.354◣ | 0.500 | 8.252 | 1.179 | 70,000 | 89.7 | 0.42 |
| Member 1-bfl | E70xx | ◢0.354◣ | 0.500 | 8.252 | 1.179 | 70,000 | 89.9 | 0.42 |
| Member 1-tfl 1 | E70xx | ◢0.354◣ | 0.500 | 8.252 | 1.179 | 70,000 | 90.0 | 0.42 |
| Member 1-tfl | E70xx | ◢0.354◣ | 0.500 | 8.252 | 1.179 | 70,000 | 90.0 | 0.42 |
| Member 1-w 1 | E70xx | ◢0.442◣ | 0.625 | 8.051 | 1.150 | 70,000 | 54.2 | 0.51 |
| Member 1-w | E70xx | ◢0.442◣ | 0.625 | 8.051 | 1.150 | 70,000 | 54.3 | 0.51 |

**Results**

| Edge | $F_n$ [lb] | $\Phi R_n$ [lb] | Utilization [%] | Status |
|---|---|---|---|---|
| Member 1-bfl 1 | 15,263 | 19,691 | 78 | OK |
| Member 1-bfl | 16,327 | 19,691 | 83 | OK |
| Member 1-tfl 1 | 16,445 | 19,691 | 84 | OK |
| Member 1-tfl | 14,994 | 19,691 | 77 | OK |
| Member 1-w 1 | 16,810 | 21,868 | 77 | OK |
| Member 1-w | 16,815 | 21,872 | 77 | OK |

### 2.6 Concrete

Decisive load combination: 1 - Combination 1




*Force trying to be verified with the weld curve from the web application*

9/12/23

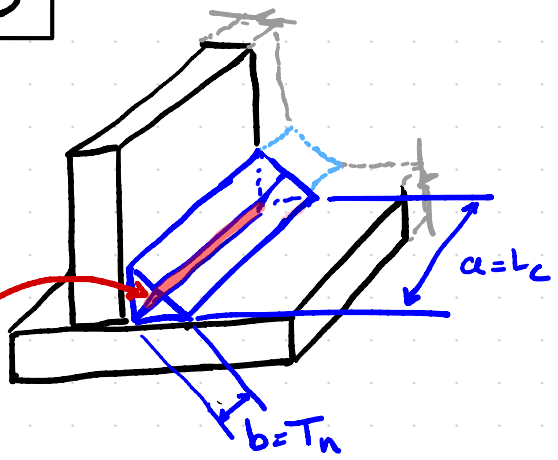
## VERIFY FORCE IN WELD FOR CRITICAL ELEMENT ($F_N$)

USING THROAT THICKNESS:

MAXIMUM STRESS OF WELD CURVE: $\sigma_w = 24{,}260 \frac{lb}{in^2}$

THROAT SIZE OF WELD: $T_h = 0.625\,in$

LENGTH OF WELD CRITICAL ELEMENT: $L_c = 1.150\,in$




AREA ??

$$F_N = \sigma_w \times A = \sigma_w \times (a \cdot b) = \sigma_w (T_h \times L_c)$$

$$\Rightarrow 24{,}260 \frac{lb}{in^2} (0.442\,in \times 1.150\,in) = 12{,}327\,lbs \neq 16{,}815\,lbs$$

FROM PROFIS REPORT

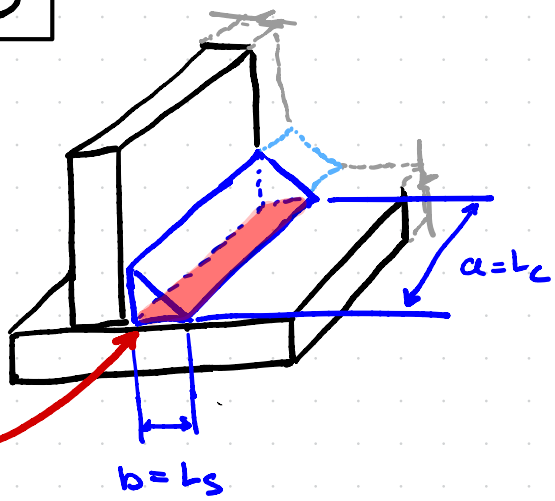
## VERIFY FORCE IN WELD FOR CRITICAL ELEMENT ($F_N$)

USING WELD LEG SIZE

MAXIMUM STRESS OF WELD CURVE: $\sigma_w = 24{,}260 \frac{lb}{in^2}$

LEG SIZE OF WELD: $L_s = 0.625\,in$

LENGTH OF WELD CRITICAL ELEMENT: $L_c = 1.150\,in$




AREA ??

$$F_N = \sigma_w \times A = \sigma_w \times (a \cdot b) = \sigma_w (L_s \times L_c)$$

$$\Rightarrow 24{,}260 \frac{lb}{in^2} (0.625\,in \times 1.150\,in) = 17{,}436\,lbs \neq 16{,}815\,lbs$$

FROM PROFIS REPORT

9/12/23

**KNOWING $\sigma_w$, $a = L_c$, SOLVE FOR $b$:**

FORCE IN CRITICAL WELD ELEMENT: $F_N = 16,615$ lbs ← FROM PROFIS REPORT

LENGTH OF WELD CRITICAL ELEMENT: $L_c = 1.150$ in

MAXIMUM STRESS OF WELD CURVE: $\sigma_w = 24,260 \frac{lb}{in^2}$

$$F_N = \sigma_w (A) = \sigma_w (ab) = \sigma_w (L_c b) \xrightarrow{\text{SOLVE FOR } b} b = \frac{F_N}{\sigma_w L_c}$$

$$\Rightarrow b = \frac{16,615\,lb}{\left(24,260 \frac{lb}{in^2} \times 1.150\,in\right)} = 0.603\,in \neq 0.625\,(L_s)$$

WHERE IS PROFIS COMING UP WITH THIS VALUE?