

BRANCH REINFORCEMENT WORK SHEETS

Prepared by

Pipe Fabrication Institute Engineering Committee



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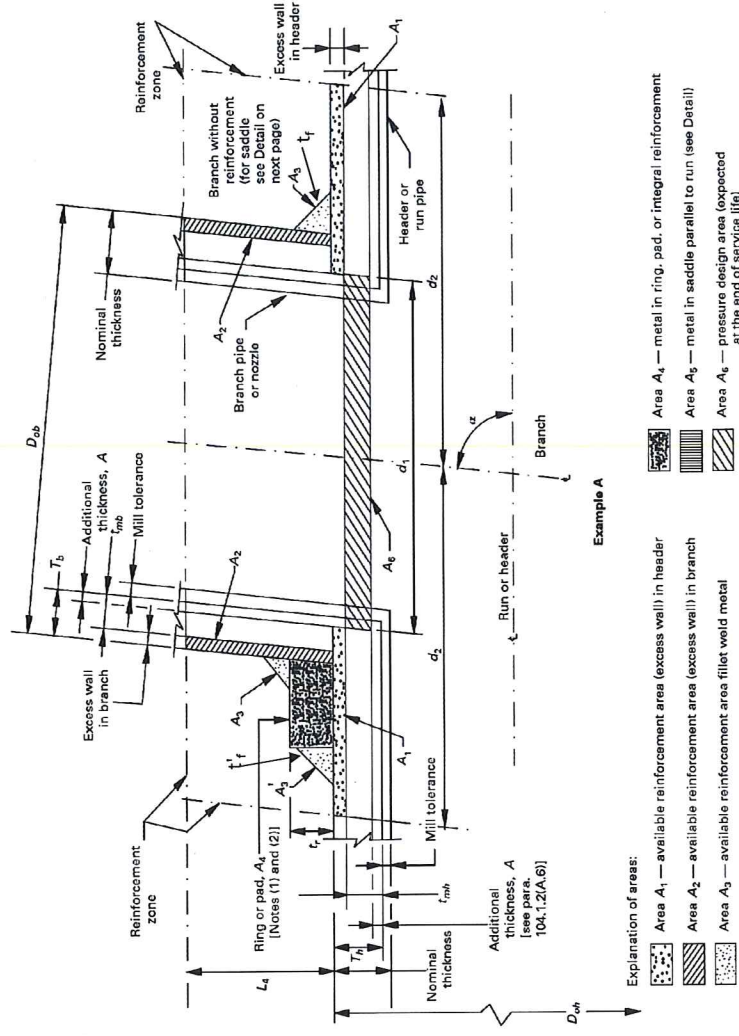
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DESIGN CONDITIONS		Press.	psi	Temp.	F
		HEADER		BRANCH	
MATERIAL SPEC.					
NOMINAL SIZE		N _h		N _b	
OUTSIDE DIAMETER		D _{oh}		D _{ob}	
NOMINAL WALL					
ACTUAL OR MIN. WALL		T _h		T _b	
ALLOWABLE STRESS		SE _h		SE _b	
with joint efficiency (See stress table in B31.1)					
Y COEFFICIENT		Y _h		Y _b	
Table 1041.2					
WELD REDUCTION FACTOR		W _h		W _b	
ADDITIONAL THICKNESS		A _h		A _b	
INTERSECTION ANGLE		α			
REINFORCING PAD THICKNESS		t _r			

REQUIRED MINIMUM THICKNESS :	
$t_{mb} = \frac{PD_{ab}}{2(SE_b W_b + Y_b P)} + A_b =$	$IN.$
$t_{ms} = \frac{PD_{as}}{2(SE_s W_s + Y_s P)} + A_b =$	$IN.$
LIMITS OF REINFORCEMENT :	
$d'_1 = \frac{D_{ab} - 2(T_b - A_b)}{\sin \alpha} =$	$IN.$
$d'_2 = d_1$	$IN.$
Select larger of the values, but not to exceed D_{ab} . $d_2 =$	
$(t = 0 \text{ if no reinforcement (paid or saddle) })$	
$L_4 = 2.5 (T_b - A_b) =$	$IN.$ or $L_4 = 2.5 (T_s - A_b) + t =$
Select lesser of the values. $L_4 =$	$IN.$

REQUIRED REINFORCEMENT AREA :	SQ./IN.
$A_7 = (t_{mh} - A_h) \times d_1 \times (2 - \sin \alpha) =$	
AVAILABLE REINFORCEMENT AREA :	
$A_1 = (2 \times d_2 - d_1) (T_h - t_{mh}) =$	SQ./IN.
$A_2 = \frac{2L(T_h - t_{mh})}{\sin \alpha} =$	SQ./IN.
Fillet Weld Size of Branch, $t_f =$	IN.
$A_3 = (t_f)^2 =$	SQ./IN.
$A_4 = A_1 + A_2 + A_3 =$	SQ./IN.

ADDITIONAL REINFORCEMENT : D ₃ CALCULATION	
Reinforcing Pad Thickness, t =	IN.
Repad OD Fillet Size, t' =	IN.
A ₃ = (t') ² =	SQ. IN.
Required Reinforcing Pad Outside Diameter, D _m =	$\frac{[A_3 - (A_1 + A_2 + A_4 + A'_1)]}{t_r} + d_s =$
Repad Ring Diameter, D _r =	IN.
Max D _r = 2 × d _s =	IN.



Reinforcement is Adequate

ADDITIONAL REINFORCEMENT $A'_3 = (t'_t)^2 =$ Reinforcing Pad Inside Diameter, $d_e = D_{\text{csh}} = \sin \alpha$ $A_3 = (D_e - d_{\text{sh}}) \times t_t =$ $(A_1 + A_2 + A_3) + A'_3 + A_4 =$		SQ./IN. IN. SQ./IN. SQ./IN.	SQ./IN. SQ./IN. SQ./IN.
ADDITIONAL REINFORCEMENT WITH SADDLE			SQ./IN. SQ./IN. SQ./IN.