



Design Input Requirements

Size	Material	S _(ab)	Pressure	Temperature	Cycles
3" Nps	ASTM A240-321	20000	0 Psig	0°F	1000
Axial	Lateral	Angular	Bellows PN		Post-form Anneal
+0"/-0"	+0"/-0"	+0°/-0°	3-15-1-SR-HF-B		False

**CALCULATIONS IN ACCORDANCE WITH
STANDARDS OF THE EXPANSION JOINT MANUFACTURERS ASSOCIATION, INC.
TENTH EDITION**

4.13.1 DESIGN EQUATIONS FOR UNREINFORCED BELLOWS

Equation	Relevant Values	Result	Limit
$S_1 = \frac{P}{(D_b + nt)^2 L_{tE_bk} / (2ntE_{bL_t(D_b + nt) + t_{ck} E_{cL_cD_c})}$	$S_1 = \frac{0(3.5 + 1 * 0.036)^2 * 1.25 * 28588234 * 1}{(2(1 * 0.036 * 28588234 * 1.25(3.5 + 1 * 0.036) + 0 * 1 * 0 * 0 * 0))}$	S ₁ =0	407 Psig
$S_2 = \frac{P D_{mK_rq}}{2A_c}$	$S_2 = \frac{0 * 5 * 1 * 1.25}{(2 * 0.1097)}$	S ₂ =0	702 Psig
$S_3 = \frac{Pw}{2nt_p}$	$S_3 = \frac{0 * 1.464}{(2 * 1 * 0.0301)}$	S ₃ =0	109 Psig
$S_4 = \frac{P}{2n} (w / (t_p))^2 C_p$	$S_4 = \frac{0}{(2 * 1) (1.464 / (0.0301))^2 * 0.4434}$	S ₄ =0	109 Psig
$S_5 = \frac{E_{bt_p^2e}}{(2w^3 C_f)}$	$S_5 = \frac{28299999 * 0.0301^2 * 0}{(2 * 1.464^3 * 0.7863)}$	S ₅ =0	
$S_6 = \frac{5E_{bt_pe}}{(3w^2 C_d)}$	$S_6 = \frac{5 * 28299999 * 0.0301 * 0}{(3 * 1.464^2 * 1.2438)}$	S ₆ =0	
$S_t = 0.7(S_3 + S_4) + (S_5 + S_6)$	$S_t = 0.7(0 + 0) + (0 + 0)$	S _t =0	
$P_{(sc)} = \frac{0.34 \pi C_{\theta} f_{(iu)}}{(N^2 q)}$	$P_{(sc)} = \frac{0.34 * \pi * 1 * 2269}{(1^2 * 1.25)}$	P _(sc) =2299	
$P_{(si)} = \frac{1.3 A_{cS_y}}{(K_{rD_mq} \sqrt{\alpha})}$	$P_{(si)} = \frac{1.3 * 0.1097 * 67937}{(1 * 5 * 1.25 \sqrt{150.7571})}$	P _(si) =126	
$N_c = \frac{c}{(S_t / (f_c - b))}^{3.4}$	$N_c = \frac{1860000}{(0 / (1 - 54000))}^{3.4}$	N _c =10000000	
$f_{iu} = 1.7(D_{mE_bt_p^3n}) / (w^3 C_f)$	$f_{iu} = 1.7 * (5 * 28588234 * 0.0301^3 * 1) / (1.464^3 * 0.7863)$	f _{iu} =2269 lbf/in	

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