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Loaded pins in axially loaded bars. Maximum elastic stress at hole boundary

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THE PREPARATION OF THIS DATA ITEM

The work on this particular Data Item was monitored and guided by the Stress Analysis and Strength of Components Committee. This Committee first met in 1964 and now has the following membership:

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LOADED PINS IN AXIALLY LOADED BARS. MAXIMUM ELASTIC STRESS AT HOLE BOUNDARY

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LOADED PINS IN AXIALLY LOADED BARS. MAXIMUM ELASTIC STRESS AT HOLE BOUNDARY

1. NOTATION

Both SI and British units are quoted but any coherent system of units may be used.

D	width of bar	m	in
d	hole diameter	m	in
$d + \varepsilon$	pin diameter	m	in
E	Young's modulus of bar material	N/m ²	lbf/in ²
E_1	Young's modulus of pin material	N/m ²	lbf/in ²
f_{ref}	$\frac{P_{pin} + \alpha P_{pl}}{(D - d)t}$	N/m ²	lbf/in ²
P_{pin}	load applied by pin to bar acting along bar axis	N	lbf
P_{pl}	total axial load in bar excluding P_{pin}	N	lbf
q	maximum shear stress on transverse diameter of hole in joint with push-fit pin (see Section 2.2)	N/m ²	lbf/in ²
q'	maximum shear stress on transverse diameter of hole in joint with interference-fit pin	N/m ²	lbf/in ²
q'_0	maximum shear stress on transverse diameter of hole due to interference alone*	N/m ²	lbf/in ²
t	thickness of bar	m	in
α	proportion of plate load treated as equivalent pin load		
ν	Poisson's ratio for bar material		
ν_1	Poisson's ratio for pin material		

* q'_0 is obtained from ESDU 71011 "Stresses due to interference-fit pins and bushes in plates, strips or lugs", and is equivalent to q of that Item obtained using E_1 and ν_1 in place of E and ν respectively.

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