

THE EFFECT OF EDGE REINFORCEMENT ON THE STRESSES IN SKIN PANELS UNDER UNIFORM PRESSURE

1. NOTATION

b	width of skin between rivet lines	in	m
b_r	width of reinforcement	in	m
E	Young's modulus	lbf/in ²	N/m ²
f_0	nominal stress at rivet line in unreinforced panel	lbf/in ²	N/m ²
f_1	nominal stress at rivet line in reinforced panel	lbf/in ²	N/m ²
f_2	nominal stress at edge of reinforcement	lbf/in ²	N/m ²
p	uniform pressure on panel	lbf/in ²	N/m ²
t	thickness of panel	in	m
t_r	total thickness of panel and reinforcement	in	m

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

2. NOTES

Figure 1 shows f_1/f_0 and f_2/f_0 plotted against b_r/b for five values of t_r/t .

The derivation of the curves assumes that the skin panel is fixed at the rivet line and that its deflection is within the linear region where membrane stresses are negligible, that is $p/E < 35(t/b)^4$. The curves apply strictly to panels with aspect ratio 2 or greater.

This data sheet is primarily intended for use with Item No. 72005 in the calculation of r.m.s. nominal stresses under random acoustic loading. Item No. 72005 is first used with the unreinforced panel dimensions b and t and the natural frequency of that panel. The r.m.s. nominal stresses at the rivet line and at the edge of the reinforcement are then obtained by multiplying the stresses, obtained from Item No. 72005 by f_1/f_0 and f_2/f_0 respectively.

3. DERIVATION

1. TIMOSHENKO, S. *Theory of plates and shells*. Second edition. McGraw-Hill, New York, 1959.

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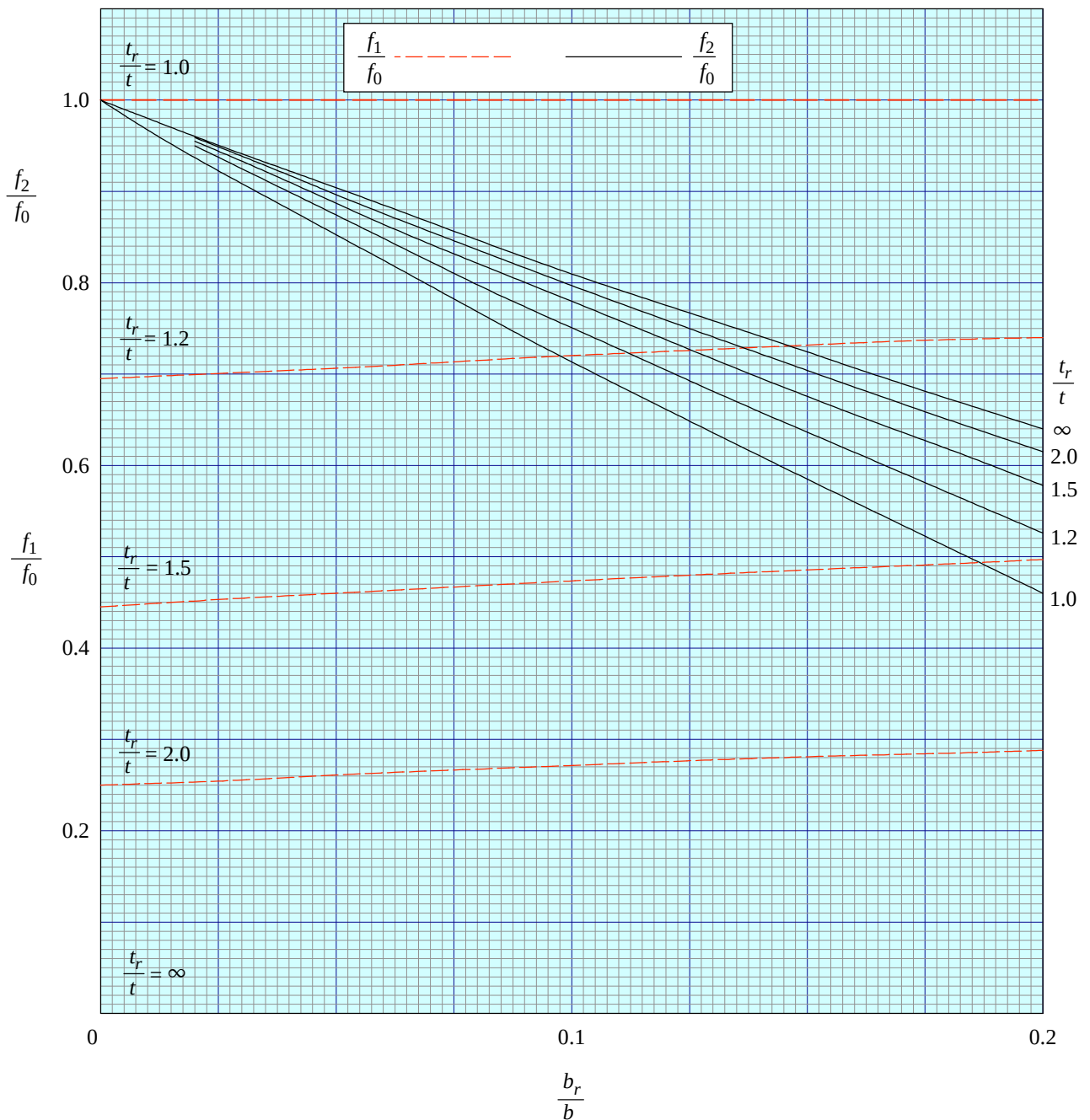
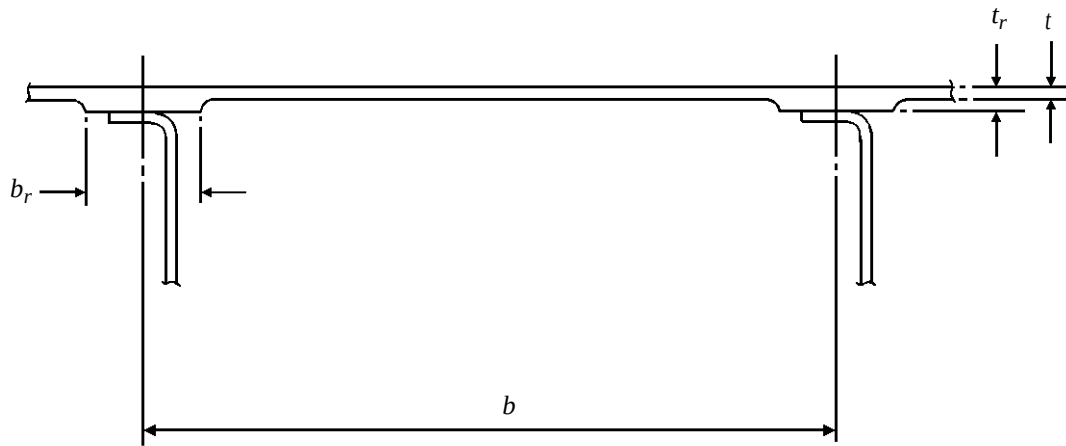


FIGURE 1