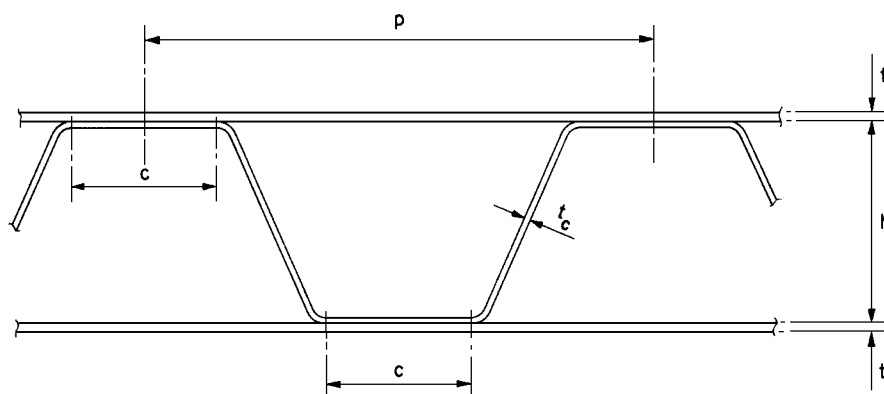


LOCAL INSTABILITY OF BONDED CORRUGATED-CORE SANDWICH PANELS UNDER LONGITUDINAL COMPRESSION (SYMMETRICAL CORES WITH IDENTICAL FACE PLATES)

1. NOTATION

c	effective width of core to face plate bond	m	in
E	Young's modulus of both face-plate and core material	N/m ²	lbf/in ²
f_b	average compressive stress in direction of corrugations at which local instability first occurs	N/m ²	lbf/in ²
h	depth of core	m	in
K	buckling stress coefficient defined by $f_b = KE(t/p)^2$		
p	pitch of corrugations	m	in
t	thickness of each face plate	m	in
t_c	thickness of core material	m	in
ν	Poisson's ratio of both face plates and core material		

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



2. NOTES

Figures 1 to 3 show K plotted against c/p for various values of h/p ; each figure relates to a different ratio of t/t_c . The curves are applicable to corrugated-core sandwich panels of symmetrical construction having identical face plates in which $h \leq p/2$. The curves have been calculated for $\nu = 0.3$.

The core and face plates are assumed to act as a single plate of thickness $(t + t_c)$ over the width c and the sandwich is assumed to buckle into one of the two modes of deformation illustrated with the figures. The buckling stress in mode 1 is independent of h/p provided that $h \leq p/2$ but the buckling stress in mode 2

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depends upon h/p . Examples of constructions to which the data apply are those in which the core and the face plates are bonded or brazed together.

The curves for mode 1 have been derived using the calculation procedure of Data Sheet 02.01.37, the theory of which is outlined in Data Sheet 02.01.28. For cases where the depth of core is greater than $p/2$ the value of K will generally be lower than that given by the curves. However, the value of f_b at $h = 0.5p$ will provide a good initial estimate of the buckling stress when following the procedure of Data Sheet 02.01.37.

The curves for mode 2 are derived from Data Item No. 72019 using the infinitely long clamped-edge-plate condition for the transverse member of the core. For $t/t_c = 1.0$, the buckling stress in mode 1 is always less than that in mode 2. Note that mode 2 slightly over-estimates f_b because the plates' edges are never fully clamped.

In tests conducted on a limited range of specimens whose core and face plates were resin bonded together the value of f_b for cases where $t/t_c > 1.5$ fell below the values predicted by the curves. There is some evidence to suggest that the buckling mode for such specimens does not coincide with that assumed for the curves. However, the tests indicate that a conservative estimate for cases where $t/t_c > 1.5$ is given by Data Item No. 80010 using the same values of h , p , t and t_c .

This Item should not be used to determine f_b for sandwich panels that do not have a complete bond over the length c . Such panels will generally buckle into a mode of deformation different from that assumed. Examples of such panels are those in which the core and the face plates are riveted or spot-welded together and for such cases see Section 6 of Data Item No. 68029.

Additional notes on the local instability of corrugated-core sandwich panels are given in Data Item No. 68029 "Information on the use of Data Items on sandwich panels". Further data on sandwich panels may be located by reference to the Engineering Sciences Data Index.

3. DERIVATION

1. COX, H.L. Computation of initial buckling stress for sheet-stiffener combinations. *Jl R. aeronaut. Soc.*, Vol. 58, No. 525, pp. 634-638, September 1954.
2. — Strength and stiffness tests on corrugated-core sandwich. Handley Page Test Department Report No. 8B34, 1957.

