

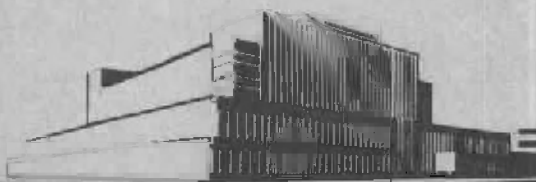
Supplement to
BUCKLING OF FLAT PLYWOOD PLATES IN COMPRESSION,
SHEAR, OR COMBINED COMPRESSION AND SHEAR

Buckling of Flat Isotropic Plates in Compression,
Shear, or Combined Compression and Shear

Original report dated 1942

Information Reviewed and Reaffirmed 1960

No. 1316-A



FOREST PRODUCTS LABORATORY
MADISON 5, WISCONSIN

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

In Cooperation with the University of Wisconsin

BUCKLING OF FLAT ISOTROPIC PLATES IN COMPRESSION

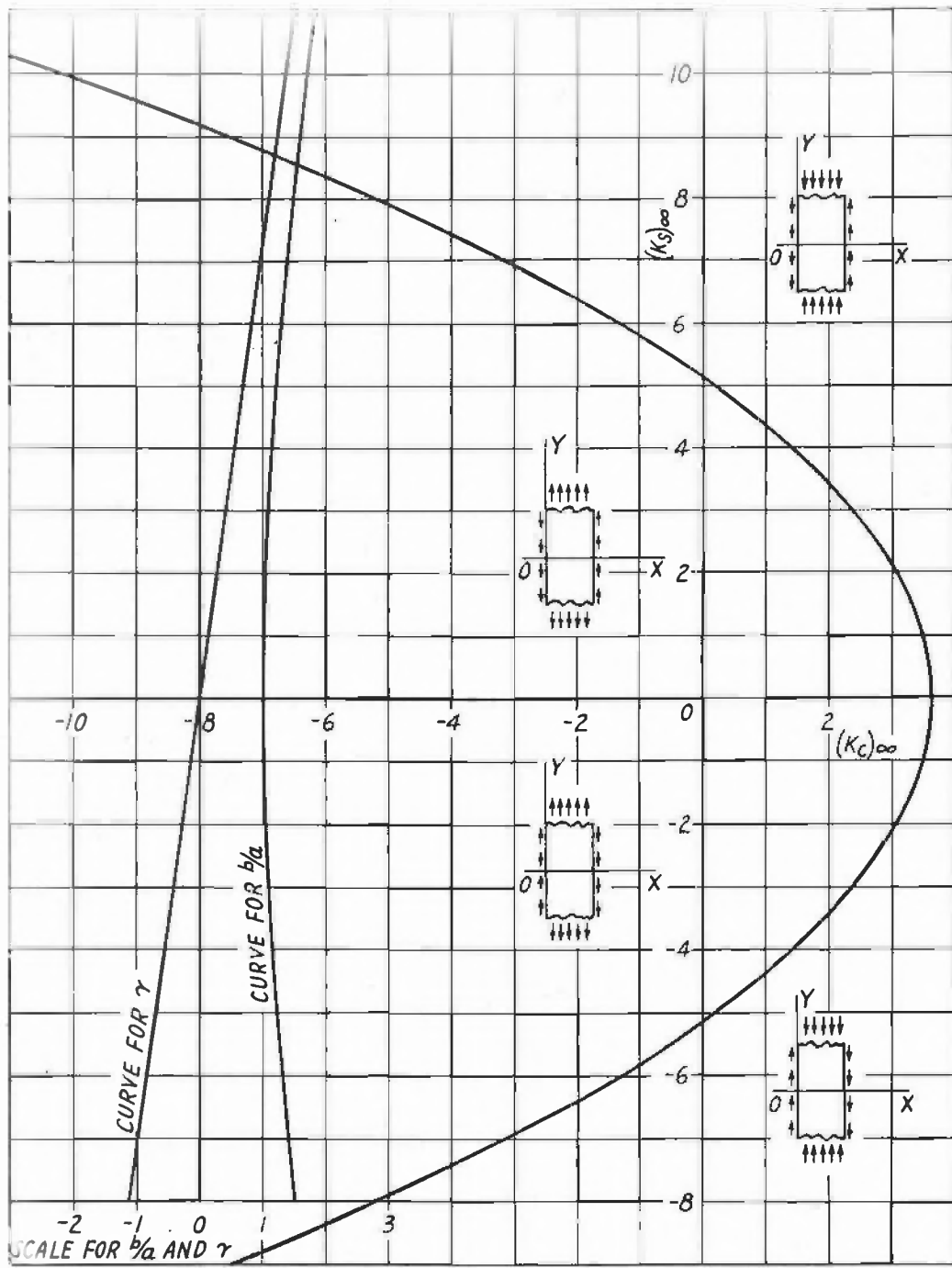
SHEAR, OR COMBINED COMPRESSION AND SHEAR¹

Forest Products Laboratory,² Forest Service
U. S. Department of Agriculture

The following table of constants and curve for determining the buckling stress of a rectangular panel of isotropic material under combined compression and shear are issued to supplement U. S. Forest Products Laboratory Report No. 1316. Details concerning the meaning of the constants, the nature of the approximations involved, and the use of the table or curve are to be found in that publication. The results are presented in the same form as those for plywood even though, because of symmetry, this necessitates representing twice essentially the same state of combined stress. The constants were calculated for panels that are infinitely long and that have their edges simply supported. From these constants those for finite plates under shear alone can be found approximately with the aid of figure 12 of Report No. 1316. It is believed that this curve may be used to obtain a satisfactory estimate of the constants for finite plates under combined compression and shear.

¹-This report is one of a series of progress reports issued by the Forest Products Laboratory to aid the Nation's war program. Results here reported are preliminary and may be revised as additional data become available. Original report dated September 1942.

²-Maintained at Madison, Wis., in cooperation with the University of Wisconsin.



BUCKLING OF FLAT ISOTROPIC PLATES
 UNDER COMBINED UNIFORM COMPRESSION (OR TENSION) AND SHEAR

TABLE OF CONSTANTS

(Buckling of long isotropic plates under combined compression and shear. Edges simply supported. For compression $P_{cr} = k_c E h^2 / a^2$. Negative k_c denotes tension. For shear $q_{cr} = k_s E h^2 / a^2$. For combined stress the shear stress is equal to f times the compressive (or tensile) stress.)

Loading	f	k_c	k_s
Compression		3.62	
Shear			5.11
Compression and shear:	0.5	3.25	1.63
Compression and shear:	1.0	2.65	2.65
Compression and shear:	1.5	2.16	3.24
Compression and shear:	4.0	1.07	4.29
Compression and shear:	- .5	3.25	-1.63
Compression and shear:	-1.0	2.65	-2.65
Compression and shear:	-1.5	2.16	-3.24
Compression and shear:	-4.0	1.07	-4.29
Tension and shear	.5	-32.17	-16.08
Tension and shear	1.0	-9.88	-9.88
Tension and shear	1.5	-5.38	-8.06
Tension and shear	4.0	-1.52	-6.10
Tension and shear	- .5	-32.17	16.08
Tension and shear	-1.0	-9.88	9.88
Tension and shear	-1.5	-5.38	8.06
Tension and shear	-4.0	-1.52	6.10

SUBJECT LISTS OF PUBLICATIONS ISSUED BY THE
FOREST PRODUCTS LABORATORY

The following are obtainable free on request from the Director, Forest Products Laboratory, Madison 5, Wisconsin:

List of publications on
Box and Crate Construction
and Packaging Data

List of publications on
Chemistry of Wood and
Derived Products

List of publications on
Fungus Defects in Forest
Products and Decay in Trees

List of publications on
Glue, Glued Products,
and Veneer

List of publications on
Growth, Structure, and
Identification of Wood

List of publications on
Mechanical Properties and
Structural Uses of Wood
and Wood Products

Partial list of publications for
Architects, Builders,
Engineers, and Retail
Lumbermen

List of publications on
Fire Protection

List of publications on
Logging, Milling, and
Utilization of Timber
Products

List of publications on
Pulp and Paper

List of publications on
Seasoning of Wood

List of publications on
Structural Sandwich,
Plastic Laminates, and
Wood-Base Aircraft
Components

List of publications on
Wood Finishing

List of publications on
Wood Preservation

Partial list of publications
for Furniture Manufac-
turers, Woodworkers
and Teachers of Wood-
shop Practice

Note: Since Forest Products Laboratory publications are so varied in subject, no single list is issued. Instead a list is made up for each Laboratory division. Twice a year, December 31 and June 30, a list is made up showing new reports for the previous six months. This is the only item sent regularly to the Laboratory's mailing list. Anyone who has asked for and received the proper subject lists and who has had his name placed on the mailing list can keep up to date on Forest Products Laboratory publications. Each subject list carries descriptions of all other subject lists.