NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

TECHNICAL NOTE

No. 1553

COMPRESSIVE STRENGTH OF 24S-T ALUMINUM-ALLOY FLAT PANELS WITH LONGITUDINAL FORMED HAT-SECTION STIFFENERS HAVING FOUR RATIOS OF STIFFENER THICKNESS TO SKIN THICKNESS

By William A. Hickman and Norris F. Dow

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Langley Field, Va.

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SUMMARY

Results are presented for a test program on 24S-T aluminum-alloy flat compression panels with longitudinal formed hat-section stiffeners. The results for panels in which the thicknesses of the stiffener material are 0.39 and 1.25 times the skin thickness are presented and incorporated with the results previously presented for panels in which the thicknesses of the stiffener material are 0.63 and 1.00 times the skin thickness. The results, presented in tabular and graphical form, show the effect of the relative dimensions of a panel on the buckling stress and the average stress at failure.

INTRODUCTION

An extensive experimental investigation of the strength of 24S-T aluminum-alloy flat compression panels with longitudinal formed Z-section stiffeners was reported in reference 1. The data presented in reference 1 were reworked on the basis of a selected design parameter and were used for the preparation of design charts in reference 2. A similar investigation is now being completed on panels of the same material with formed hat-section stiffeners in order to make design charts and also to provide an eventual comparison of the structural efficiencies of the two types of stiffener.

This compression-panel test program consisted of four parts. The first two parts, for which the thicknesses of the stiffener material were 0.63 and 1.00 times the skin thickness, were reported in references 3 and 4. The last two parts, for which the thicknesses of the stiffener material were 0.39 and 1.25 times the skin thickness, have now been completed and are presented herein with the results of the first two parts.

The present paper deals only with the data as obtained; no attempt has yet been made to prepare design charts from these data.

SYMBOLS

Symbols for dimensions of panel cross sections are shown in figure 1. In addition, the following symbols are used:

P_i compressive load per inch of panel width, kips per inch

$\bar{t}$ cross-sectional area per inch of panel width, expressed as an equivalent or average thickness, inches

L length of panel, inches

c coefficient of end fixity in Euler column formula

σ_{cr} local-buckling stress of skin or stiffener, ksi

$\bar{\sigma}_f$ average stress at failure, ksi

TEST SPECIMENS

A typical cross section of the test panels is shown in figure 1. Both the skin and the stiffeners were made of 24S-T aluminum-alloy sheet with the grain of the material parallel to the longitudinal axis of the panels. The with-grain compressive yield strength of the skin material ranged between 42.2 ksi and 47.9 ksi with an average of 43.8 ksi and that of the stiffener material before forming varied between 41.9 ksi and 46.2 ksi with an average of 44.3 ksi.

For the tests reported herein, the nominal thicknesses of the skin material were 0.102 inch, 0.064 inch, 0.040 inch, and 0.032 inch and the nominal stiffener thickness was 0.040 inch. The nominal ratios of the stiffener thickness to the skin thickness t_W/t_S were therefore constant, the values being 0.39, 0.63, 1.00, and 1.25, respectively. With these dimensions known, numerical values for all other cross-sectional dimensions can be found by means of the proper dimension ratios. The stiffeners were formed from flat sheet to an inside radius of 0.125 inch for all bends $\left(\frac{r_A}{t_W} \approx 3\right)$. For panels having $\frac{t_W}{t_S} = 0.39, 0.63, 1.00,$ and 1.25, the widths of the attachment flange b_A were 0.85 inch, 0.75 inch, 0.65 inch, and 0.55 inch, respectively. The rivet lines on the stiffeners were on the longitudinal center lines of the attachment flanges.

The NACA flush-riveting method (method E of reference 5) was employed in the construction of the test specimens. The rivet holes were countersunk on the skin side of the panel to a depth of three-fourths of the skin thickness, the countersink having an included angle of 60°. Ordinary flat-head A17S-T aluminum-alloy rivets were inserted from the stiffener side, and the shanks were upset into the countersunk cavity. The protruding part of the upset shank was then milled off to provide a smooth surface. The rivet diameters and rivet pitches used are shown in the following table:

t_W/t_S	Rivet diameter (in.)	Rivet pitch (in.)
0.39	3/16	1
.63	5/32	3/4
1.00	1/8	1/2
1.25	3/32	3/8

METHOD OF TESTING

The specimens were tested flat-ended, without side support, in the 1,200,000-pound-capacity testing machine at the Langley structures research laboratory. Within the range of loads used, the indicated load on the testing machine was within one-half of 1 percent of the applied load. Provisions were made for setting the specimens in the testing machine in such a manner as to maintain the flatness of the panels and afford uniform bearing at the ends. Figure 2 shows a failed panel in the testing machine.

Resistance-type wire strain gages were used to measure strains at successive increments of load. The gages were placed in those locations on the stiffeners and skin where buckles were expected to appear first.

METHODS OF TREATING TEST DATA

In reference 6, the coefficient of end fixity c was found to be about 3.75 for panels which were tested flat-ended in the same testing machine used in the present investigation. Because the panels of this investigation are similar to the panels of reference 6, this value of c was used in working up the present data.

In order to obtain the average stress at failure $\bar{\sigma}_f$, the load at which failure occurred was divided by the cross-sectional area of the panel. No adjustment was made to offset the effect of having an unequal number of stiffeners and bays. The effect of such an adjustment would be to decrease slightly the values of $\bar{\sigma}_f$ at high values of $\frac{b_S}{t_S}$ and $\frac{P_i}{L/\sqrt{c}}$. Inasmuch as the purpose of the present paper is to present test data, however, and not to prepare final design charts, the adjustment was considered unwarranted.

The local buckling load was determined by the "strain-reversal method" (see reference 7) as the load at which a plot of the strains near the crest of a buckle first shows a decreasing strain with increasing load. The buckling load was divided by the cross-sectional area of the panel to give the observed buckling stress. An adjustment was made in the observed buckling stress to correct for slight variations of the actual dimensions from the nominal dimensions of the specimens. The method for making the adjustment is explained in the appendix of reference 3.

Because stresses are determined by the relative rather than by the absolute dimensions of the panels, nondimensional ratios are used in presenting the data. In reference 2 the quantity $\frac{P_i}{L/\sqrt{c}}$ is developed as a suitable parameter against which to plot the average stress at maximum load. This parameter is used in plotting the results of the tests in the present investigation.

RESULTS AND CONCLUSIONS

The primary results of this investigation are to be found in tables 1 to 16 and figures 3 to 18.

Tables 1 to 16 (facing figs. 3 to 18, respectively) list both the observed and the adjusted buckling stresses, together with the average stress at failure, for corresponding values of $\frac{P_i}{L/\sqrt{c}}$. The nominal values of $\bar{t}/t_S$ are included in the tables for convenience in making comparisons with other panels. Values of $L/\sqrt{c}$ are also given.

In figures 3 to 18 the average stress at failure $\bar{\sigma}_f$ is plotted against $\frac{P_i}{L/\sqrt{c}}$ for the various dimension ratios used. The initial dashed parts of the curves were computed from the column strength of the panels based on nominal dimensions and the combination of Euler and straight-line column curves recommended for 24S-T aluminum-alloy material in reference 8; the solid-line parts of the curves were drawn through the experimental test points.

The following conclusions may be drawn regarding the effect of the various dimension ratios on the strength of the test panels. It is assumed that as each dimension ratio is changed all others remain constant. These conclusions can only be considered to apply within the range of panels tested.

1. At very low values of $\frac{P_i}{L/\sqrt{c}}$ (long panels that fail by column bending), the stress developed by the panels increases with an increase in b_W/t_W because an increase in the height of the stiffeners provides increased column strength. For high values of $\frac{P_i}{L/\sqrt{c}}$ (short panels that fail by local buckling), however, the stress generally decreases as b_W/t_W increases because an increase in the height of the stiffeners decreases the local-buckling strength.

2. At very high values of $\frac{P_i}{L/\sqrt{c}}$ (short panels that fail by local buckling), an increase in the ratio b_H/t_W tends to decrease the stress developed by the panels because an increase in the width of the stiffeners tends to decrease the local-buckling strength.

3. Except at very low values of $\frac{P_i}{L/\sqrt{c}}$ (long panels that fail by column bending), the stress developed by the test panels tends to increase as b_S/t_S is decreased because a decrease in the stiffener spacing increases the local-buckling strength.

Langley Memorial Aeronautical Laboratory
National Advisory Committee for Aeronautics
Langley Field, Va., February 2, 1948

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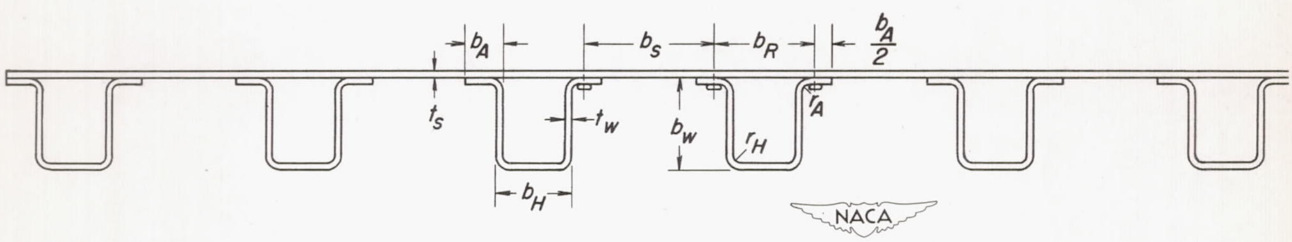

Figure 1.- Cross section of a test panel.

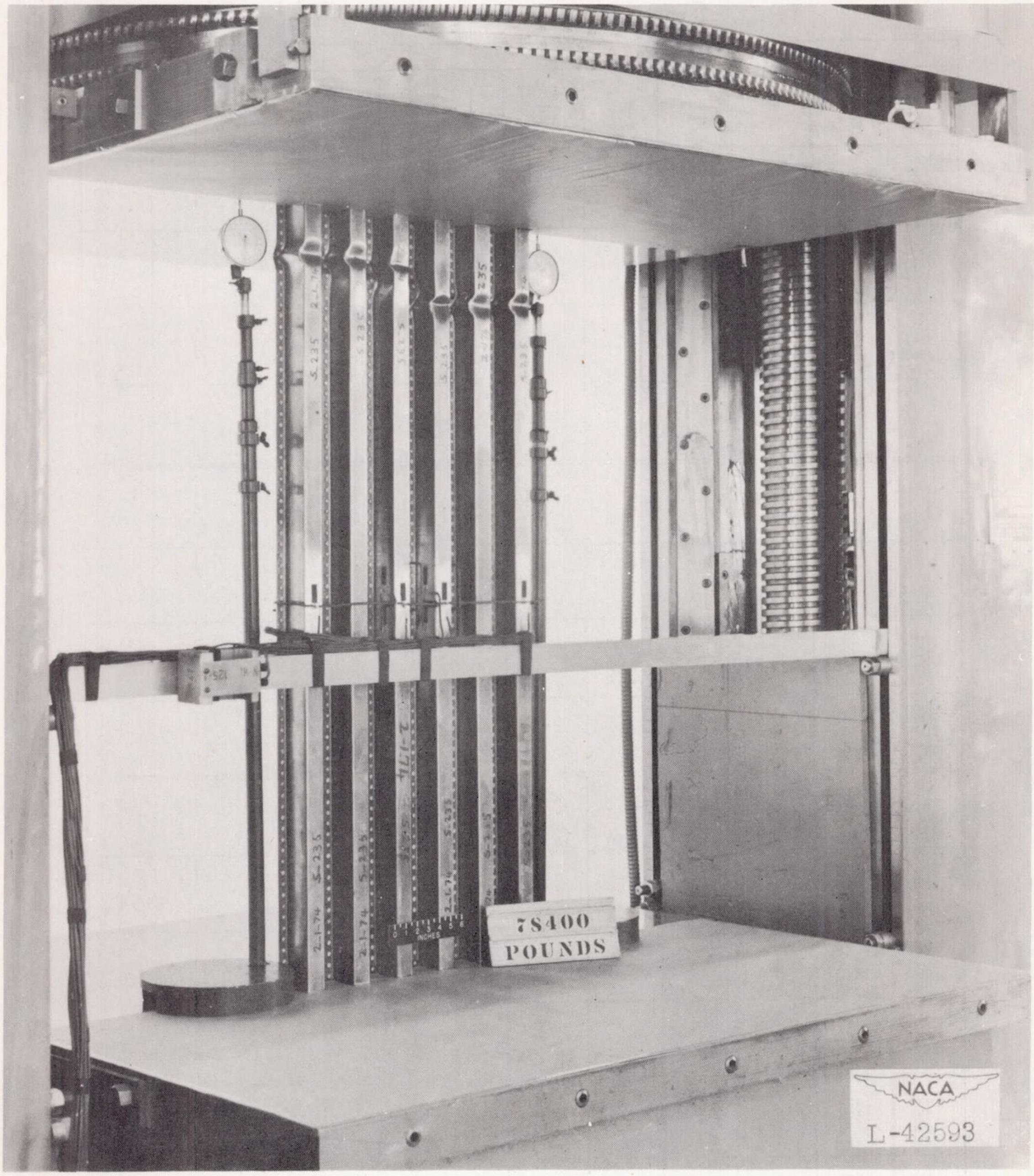

Figure 2.- Panel after failure.

TABLE 1

TEST DATA FOR FLAT PANELS WITH HAT-SECTION STIFFENERS WITH $\frac{t_W}{t_S} = 0.39$, $\frac{b_H}{b_W} = 0.6$

[Nominal proportions are given in parentheses]

Proportions of test specimens							Test data			
t_W (in.)	$\frac{t_W}{t_S}$	$\frac{b_S}{t_S}$	$\frac{b_W}{t_W}$	$\frac{b_H}{b_W}$	$\frac{L}{\sqrt{c}}$ (in.)	$\frac{\bar{t}}{t_S}$	σ_{cr} (ksi) Observed	σ_{cr} (ksi) Adjusted	$\bar{\sigma}_f$ (ksi)	$\frac{P_1}{L/\sqrt{c}}$ (ksi)
(0.040)	(0.39)	(25)	(20)	(0.6)						
0.040	0.392	25.1	19.9	0.60	3.14		31.3	29.6	33.7	1.474
.039	.384	23.8	20.3	.61	5.28	(1.349)	31.2	28.8	33.0	.859
.040	.386	24.0	19.9	.61	8.40		--	--	29.6	.486
.040	.389	24.1	20.0	.60	12.53		--	--	19.8	.217
			(30)							
.039	.378	24.0	30.6	.59	5.31		--	--	33.2	.911
.039	.376	23.9	30.6	.60	8.90	(1.430)	31.7	33.0	32.4	.530
.040	.374	23.4	30.2	.60	14.26		--	--	31.0	.317
.040	.382	24.0	30.5	.60	21.35		14.3	15.4	15.5	.106
			(40)							
.039	.378	23.9	40.6	.60	7.67		--	--	30.7	.611
.040	.381	23.6	40.2	.61	12.85	(1.499)	28.0	27.0	28.8	.343
.040	.381	23.9	40.4	.60	20.51		27.2	27.7	29.4	.219
.040	.383	23.8	40.2	.60	30.76		--	--	21.4	.106
			(60)							
.039	.378	23.8	61.3	.60	12.53		14.9	15.6	25.2	.333
.040	.380	24.0	60.7	.61	20.98	(1.621)	13.1	13.7	24.3	.191
.039	.374	24.6	61.2	.60	33.48		14.4	14.9	24.1	.119
.040	.376	23.8	60.6	.60	50.25		13.0	13.3	16.8	.055
		(35)	(20)							
.039	.393	35.5	20.3	.62	2.93		26.0	26.6	31.3	1.391
.039	.394	35.0	19.7	.64	4.83	(1.275)	23.3	23.3	30.2	.813
.039	.393	34.8	20.4	.62	7.69		23.5	23.3	26.5	.447
.039	.393	34.5	19.8	.64	11.62		--	--	16.1	.180
			(30)							
.039	.380	34.5	30.2	.60	4.98		24.6	22.9	29.9	.821
.039	.382	34.0	30.2	.60	8.36	(1.342)	24.1	23.1	29.1	.476
.039	.379	34.2	31.0	.58	13.33		25.6	24.9	27.6	.284
.038	.380	34.7	31.4	.58	19.96		--	--	19.7	.135
			(40)							
.039	.391	35.0	41.1	.58	7.25		25.8	27.2	27.1	.535
.040	.392	35.0	40.4	.60	12.05	(1.404)	26.8	27.0	27.0	.321
.039	.379	33.6	40.8	.60	19.33		25.8	28.0	26.8	.198
.040	.393	34.5	40.4	.60	28.99		20.3	23.7	21.2	.105
			(60)							
.040	.388	34.4	60.9	.60	5.01		14.0	14.4	22.3	.284
.039	.388	34.4	60.9	.60	8.35	(1.510)	14.5	14.8	22.0	.169
.040	.382	33.6	60.2	.60	13.35		13.6	13.6	21.3	.103
.040	.389	34.2	60.2	.60	20.07		12.9	13.0	17.2	.055
		(50)	(20)							
.040	.382	48.7	20.0	.63	2.72		22.3	26.0	27.3	1.238
.039	.380	49.0	20.0	.63	4.46	(1.208)	15.7	15.1	26.4	.730
.039	.384	48.8	20.4	.60	7.02		13.3	12.7	23.9	.419
.039	.384	49.2	20.4	.60	10.58		14.2	13.8	17.6	.205
			(30)							
.039	.398	51.0	30.8	.60	4.59		14.7	15.4	26.1	.733
.039	.396	50.7	30.3	.60	7.64	(1.262)	14.4	14.8	25.0	.421
.039	.394	49.8	30.4	.60	12.17		14.4	14.3	24.0	.254
.039	.381	48.6	30.5	.62	18.37		15.7	14.8	17.5	.123
			(40)							
.039	.399	51.0	40.6	.60	6.72		14.3	14.9	24.6	.490
.039	.396	50.9	40.6	.60	11.20	(1.313)	13.4	13.9	23.6	.282
.040	.398	50.4	40.7	.60	17.94		15.9	16.1	23.5	.176
.040	.398	50.0	40.1	.60	26.82		13.7	13.7	20.9	.104
			(60)							
.040	.389	49.3	60.2	.61	11.34		13.8	13.9	20.4	.258
.039	.387	49.2	61.7	.60	18.87	(1.404)	15.8	16.7	20.7	.157
.039	.388	49.5	61.0	.60	30.12		14.4	14.9	18.8	.089
.040	.387	49.4	60.7	.60	45.25		12.4	12.7	16.8	.053
		(75)	(20)							
.039	.379	73.5	20.0	.61	2.35		17.4	16.7	22.4	1.118
.039	.379	73.4	20.4	.61	3.87	(1.148)	11.3	10.8	20.8	.628
.039	.378	73.2	19.6	.63	6.16		7.8	7.4	17.2	.327
.039	.382	73.8	19.9	.62	9.33		8.8	8.5	14.6	.184
			(30)							
.040	.386	73.6	30.8	.60	4.09		13.4	12.9	22.9	.678
.039	.380	73.0	30.4	.60	6.71	(1.189)	8.6	8.1	22.0	.397
.040	.382	72.4	30.3	.58	10.84		8.0	7.5	20.4	.228
.040	.380	72.0	30.0	.61	16.27		7.5	6.9	18.0	.134
			(40)							
.040	.398	76.2	41.0	.60	6.11		7.8	8.1	20.6	.421
.040	.394	74.8	39.0	.60	10.03	(1.229)	7.2	7.1	21.0	.262
.040	.379	72.4	39.2	.60	16.01		8.6	8.0	21.1	.165
.040	.382	72.8	40.1	.60	24.18		7.8	7.4	18.9	.098
			(60)							
.039	.378	73.2	60.4	.62	10.34		8.6	8.2	18.8	.241
.039	.390	75.4	61.0	.59	17.24	(1.299)	6.8	6.9	19.0	.146
.046	.467	77.8	52.8	.60	27.59		6.5	7.0	20.1	.097
.046	.452	75.8	52.5	.60	41.46		8.2	8.4	18.3	.058

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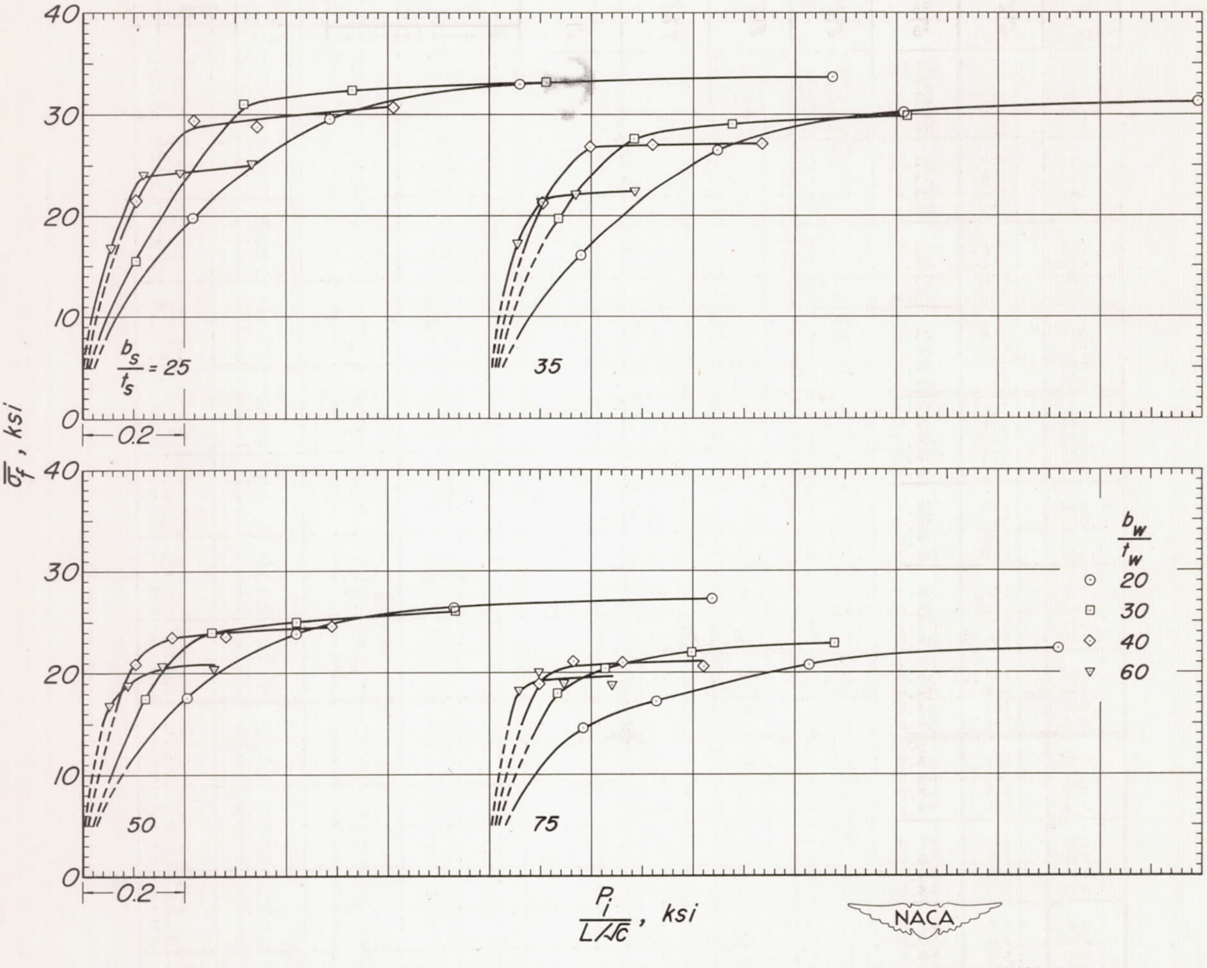

Figure 3.- Compressive strength of flat panels with hat-section stiffeners.
$\frac{t_w}{t_s} = 0.39$; $\frac{b_H}{b_w} = 0.6$.

TABLE 2

TEST DATA FOR FLAT PANELS WITH HAT-SECTION STIFFENERS WITH $\frac{t_W}{t_S} = 0.39$, $\frac{b_H}{b_W} = 0.8$

[Nominal proportions are given in parentheses]

Proportions of test specimens							Test data			
t_W (in.)	$\frac{t_W}{t_S}$	$\frac{b_S}{t_S}$	$\frac{b_W}{t_W}$	$\frac{b_H}{b_W}$	$\frac{L}{\sqrt{c}}$ (in.)	$\frac{\bar{t}}{t_S}$	σ_{cr} (ksi) Observed	σ_{cr} (ksi) Adjusted	$\bar{\sigma}_f$ (ksi)	$\frac{P_1}{L/\sqrt{c}}$ (ksi)
(0.040)	(0.39)	(25)	(20)	(0.8)						
.040	.386	24.2	19.8	.82	3.32	(1.350)	29.9	31.6	34.2	1.418
.040	.387	24.8	20.1	.81	5.58		30.8	28.5	32.8	.809
.040	.388	24.2	20.0	.82	8.90		29.8	28.3	30.5	.472
.040	.388	24.0	19.8	.81	13.32		--	--	19.3	.200
			(30)							
.039	.376	24.8	30.5	.81	5.68	(1.428)	--	--	31.6	.810
.040	.372	23.4	30.2	.81	9.35		--	--	32.2	.501
.039	.376	23.4	30.4	.80	14.97		28.1	29.1	31.4	.305
.039	.372	23.8	31.0	.79	22.38		18.0	18.7	18.9	.123
			(40)							
.040	.386	24.2	40.5	.80	8.04	(1.493)	--	--	29.3	.554
.040	.384	23.8	40.6	.80	13.42		--	--	29.2	.332
.040	.382	24.2	40.7	.80	21.43		27.6	28.4	28.4	.201
.040	.384	24.2	40.6	.80	32.09		--	--	22.1	.105
			(60)							
.039	.381	24.0	61.0	.82	13.04	(1.598)	11.5	11.9	22.8	.285
.039	.378	23.9	61.0	.80	21.66		12.4	12.8	23.5	.177
.040	.388	24.3	60.6	.80	34.62		14.4	14.7	22.3	.105
.040	.386	24.4	59.5	.81	52.05		12.6	12.9	15.5	.049
		(35)	(20)							
.039	.391	34.7	20.5	.82	3.01	(1.280)	25.3	28.7	30.6	1.327
.039	.394	35.0	20.2	.81	5.16		23.3	23.4	29.0	.733
.039	.390	35.5	20.7	.78	8.16		24.2	24.8	28.6	.457
.039	.388	35.2	20.6	.79	12.33		--	--	18.0	.190
			(30)							
.039	.390	35.4	30.4	.82	5.20	(1.345)	23.8	24.2	29.2	.769
.038	.380	34.4	30.9	.80	8.84		22.9	22.0	27.6	.428
.039	.392	35.5	30.8	.78	14.02		23.9	24.7	27.5	.269
.039	.388	34.6	31.1	.79	21.06		--	--	20.6	.134
			(40)							
.039	.390	34.8	40.9	.78	7.58	(1.403)	23.9	25.7	24.7	.466
.039	.390	35.0	41.0	.80	12.62		22.4	22.6	26.4	.300
.039	.388	34.9	41.4	.79	20.26		--	--	25.2	.178
.040	.395	35.0	40.5	.80	30.28		--	--	22.9	.108
			(60)							
.039	.380	33.7	60.6	.80	12.45	(1.502)	14.3	14.8	21.8	.268
.038	.370	33.8	62.0	.80	20.83		14.8	16.0	21.9	.161
.039	.379	33.8	60.8	.81	33.31		12.6	13.4	20.7	.095
.039	.397	35.0	61.0	.80	49.35		11.9	12.3	15.1	.047
		(50)	(20)							
.040	.394	50.3	19.8	.83	2.80	(1.213)	21.1	21.5	29.9	1.323
.039	.398	51.3	20.6	.78	4.76		15.3	16.1	25.6	.665
.040	.386	49.2	20.6	.78	7.49		16.0	15.5	23.0	.380
.039	.386	49.0	20.2	.82	11.27		13.8	14.7	18.2	.200
			(30)							
.039	.385	49.7	30.6	.80	4.82	(1.267)	18.2	18.0	25.8	.691
.040	.397	50.0	30.1	.80	8.07		13.8	13.8	24.3	.388
.039	.385	49.4	30.9	.80	12.94		15.9	15.5	24.4	.244
.040	.394	49.6	30.0	.80	19.41		15.6	15.4	18.1	.120
			(40)							
.039	.397	50.6	40.5	.79	7.08	(1.318)	15.4	15.8	23.7	.448
.040	.408	51.9	39.8	.80	11.80		12.8	13.8	23.5	.268
.039	.398	50.9	40.8	.80	18.86		14.1	14.6	22.8	.162
.040	.400	50.1	40.0	.80	28.33		15.1	15.2	18.2	.086
			(60)							
.039	.381	48.6	61.2	.80	11.83	(1.403)	14.7	15.3	19.8	.240
.040	.384	48.6	60.6	.80	19.74		13.0	13.2	19.7	.143
.040	.381	48.2	59.8	.82	31.52		12.9	12.8	18.4	.084
.040	.380	48.2	60.6	.82	47.23		11.9	12.1	15.5	.047
		(75)	(20)							
.039	.382	73.8	20.2	.80	2.56	(1.153)	12.7	12.3	22.1	1.017
.039	.380	74.2	20.6	.80	4.16		10.6	10.4	21.8	.616
.039	.380	74.0	20.2	.80	6.64		8.5	8.3	20.1	.355
.039	.380	74.4	20.6	.82	9.97		9.0	9.0	11.0	.129
			(30)							
.040	.382	73.2	30.5	.78	4.23	(1.194)	10.6	10.1	24.3	.700
.040	.380	73.2	31.2	.76	7.22		9.8	9.4	22.4	.377
.040	.378	72.6	30.7	.78	11.57		7.9	7.4	21.2	.223
.039	.390	75.4	29.9	.82	17.32		7.0	7.0	17.3	.122
			(40)							
.040	.382	72.9	40.6	.79	6.45	(1.233)	7.4	6.9	21.0	.410
.040	.374	72.2	40.5	.79	10.72		8.4	7.8	21.2	.249
.040	.382	72.4	39.8	.80	16.90		6.6	6.1	21.1	.157
.044	.417	72.6	37.2	.78	25.59		7.9	7.4	19.0	.094
			(60)							
.040	.393	73.9	59.3	.79	10.83	(1.304)	6.7	6.5	18.0	.221
.041	.387	73.3	60.0	.80	18.18		7.8	7.5	19.2	.141
.041	.397	74.4	59.4	.80	28.06		6.6	6.5	18.2	.086
.041	.412	75.8	57.6	.80	43.38		7.4	7.5	15.3	.047

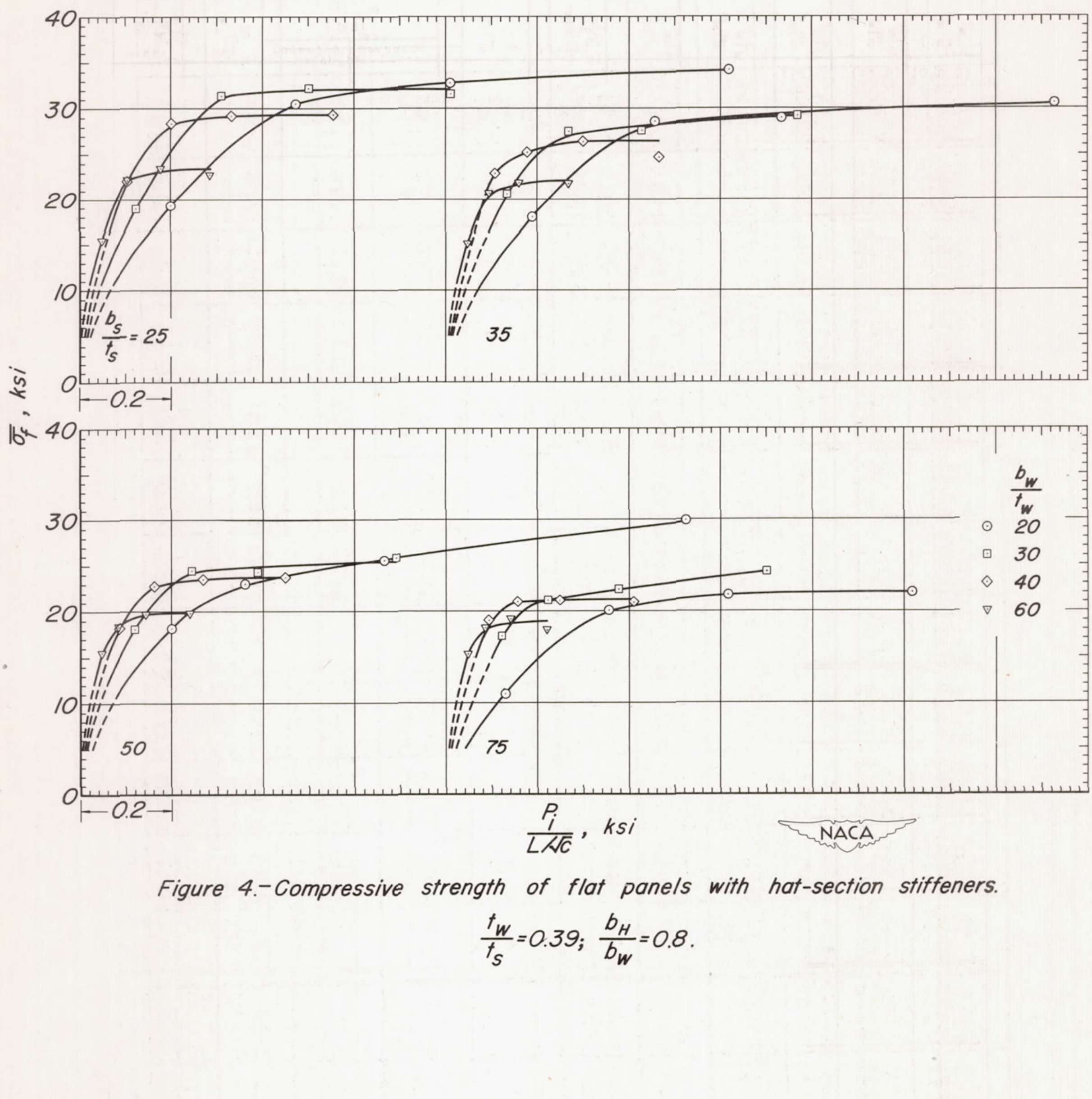

Figure 4.- Compressive strength of flat panels with hat-section stiffeners. $\frac{t_W}{t_S}=0.39$; $\frac{b_H}{b_W}=0.8$.

TABLE 3

TEST DATA FOR FLAT PANELS WITH HAT-SECTION STIFFENERS WITH $\frac{t_W}{t_S} = 0.39$, $\frac{b_H}{b_W} = 1.0$

[Nominal proportions are given in parentheses]

Proportions of test specimens							Test data			
t_W (in.)	$\frac{t_W}{t_S}$	$\frac{b_S}{t_S}$	$\frac{b_W}{t_W}$	$\frac{b_H}{b_W}$	$\frac{L}{\sqrt{c}}$ (in.)	$\frac{\bar{t}}{t_S}$	σ_{cr} (ksi) Observed	σ_{cr} (ksi) Adjusted	$\bar{\sigma}_f$ (ksi)	$\frac{P_f}{L/\sqrt{c}}$ (ksi)
(0.040)	(0.39)	(25)	(20)	(1.0)		(1.351)				
.040	.374	23.3	20.1	1.00	3.54		32.2	28.8	34.5	1.341
.040	.374	23.4	20.2	.99	5.70		32.4	29.3	34.1	.825
.040	.376	23.3	19.7	1.02	9.28		--	--	30.0	.445
.040	.383	23.7	19.8	1.02	13.91		--	--	18.5	.183
			(30)			(1.424)				
.040	.378	23.7	30.0	.99	5.82		29.7	30.1	31.6	.789
.039	.382	23.8	30.4	1.00	9.74		30.4	30.8	31.1	.464
.039	.380	24.1	30.7	1.00	15.55		--	--	30.4	.284
.039	.384	24.3	30.6	.99	23.29		--	--	21.8	.136
			(40)			(1.486)				
.040	.388	24.2	40.3	.99	8.31		24.7	24.6	28.4	.519
.040	.388	24.0	39.8	1.00	13.88		--	--	28.6	.312
.040	.385	24.2	40.0	1.00	22.10		22.9	22.9	25.5	.175
.039	.386	24.4	40.5	1.00	33.15		--	--	21.8	.100
			(60)			(1.582)				
.040	.374	23.4	60.4	1.00	13.35		11.5	11.7	22.7	.274
.040	.378	23.9	60.2	1.01	22.31		11.5	11.9	22.2	.160
.040	.374	23.6	60.2	.99	35.62		11.3	11.3	20.5	.093
.040	.377	23.8	60.6	1.00	53.40		10.4	10.6	14.4	.044
		(35)	(20)			(1.281)				
.039	.386	35.1	20.4	1.00	3.18		25.1	25.1	32.7	1.345
.039	.384	35.2	20.6	1.00	5.44		23.0	23.0	28.3	.680
.040	.404	35.3	20.1	1.00	8.64		23.2	23.6	28.8	.436
.039	.376	33.5	20.0	1.01	13.03		--	--	19.0	.190
			(30)			(1.347)				
.039	.391	35.4	30.2	1.02	5.52		22.0	22.4	28.6	.709
.039	.391	34.7	30.7	.99	9.21		23.5	23.2	27.5	.410
.039	.390	34.7	30.8	.98	14.64		24.5	24.3	26.4	.248
.039	.386	35.0	31.1	1.00	21.99		20.9	20.7	21.3	.133
			(40)			(1.403)				
.039	.378	34.4	41.2	.98	7.90		24.5	25.1	25.6	.464
.039	.380	33.8	40.6	1.00	13.19		23.0	23.6	24.9	.270
.039	.372	33.7	41.8	1.00	21.06		23.2	24.3	24.4	.166
.040	.381	33.6	40.3	1.00	31.58		18.4	18.6	19.7	.089
			(60)			(1.495)				
.039	.390	34.6	60.8	1.00	12.82		12.1	12.6	21.0	.250
.039	.379	33.8	61.6	1.00	21.44		12.1	12.6	20.3	.144
.039	.382	33.8	60.6	1.00	34.31		12.6	13.2	19.6	.087
.039	.381	34.2	61.4	1.00	51.36		10.3	10.8	14.6	.043
		(50)	(20)			(1.217)				
.039	.396	50.9	20.2	1.02	3.00		17.9	18.6	28.3	1.173
.039	.382	49.0	20.4	.98	4.94		17.9	17.2	25.5	.642
.040	.402	50.4	20.0	1.00	7.91		14.9	15.2	24.7	.387
.040	.404	51.0	20.2	.99	11.82		13.0	13.6	19.3	.203
			(30)			(1.272)				
.039	.400	51.4	30.4	1.00	5.13		16.3	17.2	24.7	.624
.039	.400	51.2	30.6	1.00	8.51		14.5	15.2	24.1	.367
.040	.402	51.1	30.4	1.00	13.61		16.4	17.1	24.3	.231
.039	.379	48.7	31.1	1.00	20.40		16.2	15.4	21.0	.134
			(40)			(1.320)				
.040	.404	51.2	40.3	1.00	7.41		13.9	14.6	23.4	.424
.039	.402	51.4	40.2	1.00	12.27		16.5	17.5	22.4	.245
.039	.399	51.1	40.2	1.02	19.70		13.8	14.4	22.7	.155
.039	.393	51.0	40.8	.99	29.54		14.0	14.6	18.4	.084
			(60)			(1.403)				
.040	.388	49.4	60.4	1.00	12.24		11.6	11.8	18.9	.221
.040	.388	49.4	60.7	1.00	20.36		10.9	11.2	18.5	.130
.040	.385	49.2	60.6	1.00	32.53		10.0	10.4	16.4	.072
.039	.384	49.4	60.8	1.00	48.77		10.8	11.2	14.9	.044
		(75)	(20)			(1.157)				
.039	.380	73.6	20.4	.99	2.68		13.4	12.9	22.2	.978
.039	.380	74.1	20.6	.99	4.38		9.4	9.2	24.1	.650
.039	.380	73.7	20.2	1.00	7.09		9.0	8.7	20.0	.334
.039	.382	73.6	20.0	.99	10.59		8.8	8.5	11.4	.127
			(30)			(1.200)				
.040	.382	72.4	29.6	.96	4.54		10.5	9.8	23.9	.643
.040	.383	72.9	30.2	.99	7.60		9.4	8.9	22.1	.356
.040	.381	73.4	30.2	1.00	12.17		7.3	7.0	21.0	.212
.040	.378	73.0	30.8	.99	18.21		6.8	8.4	18.0	.121
			(40)			(1.238)				
.039	.390	75.2	40.6	.99	6.70		8.8	8.9	20.8	.392
.044	.418	72.4	36.5	.99	11.16		8.8	8.2	22.1	.250
.044	.417	72.8	37.4	.98	17.70		7.9	7.5	21.6	.154
.044	.450	77.8	36.5	1.00	26.80		8.0	8.7	18.7	.088
			(60)			(1.309)				
.040	.379	73.2	61.2	1.00	11.34		8.8	8.3	18.5	.218
.040	.380	72.4	60.0	1.00	18.87		6.9	6.4	18.4	.130
.040	.398	76.8	60.5	1.00	30.15		7.8	8.2	17.6	.078
.040	.400	76.4	59.8	1.00	45.19		7.9	8.2	14.2	.042

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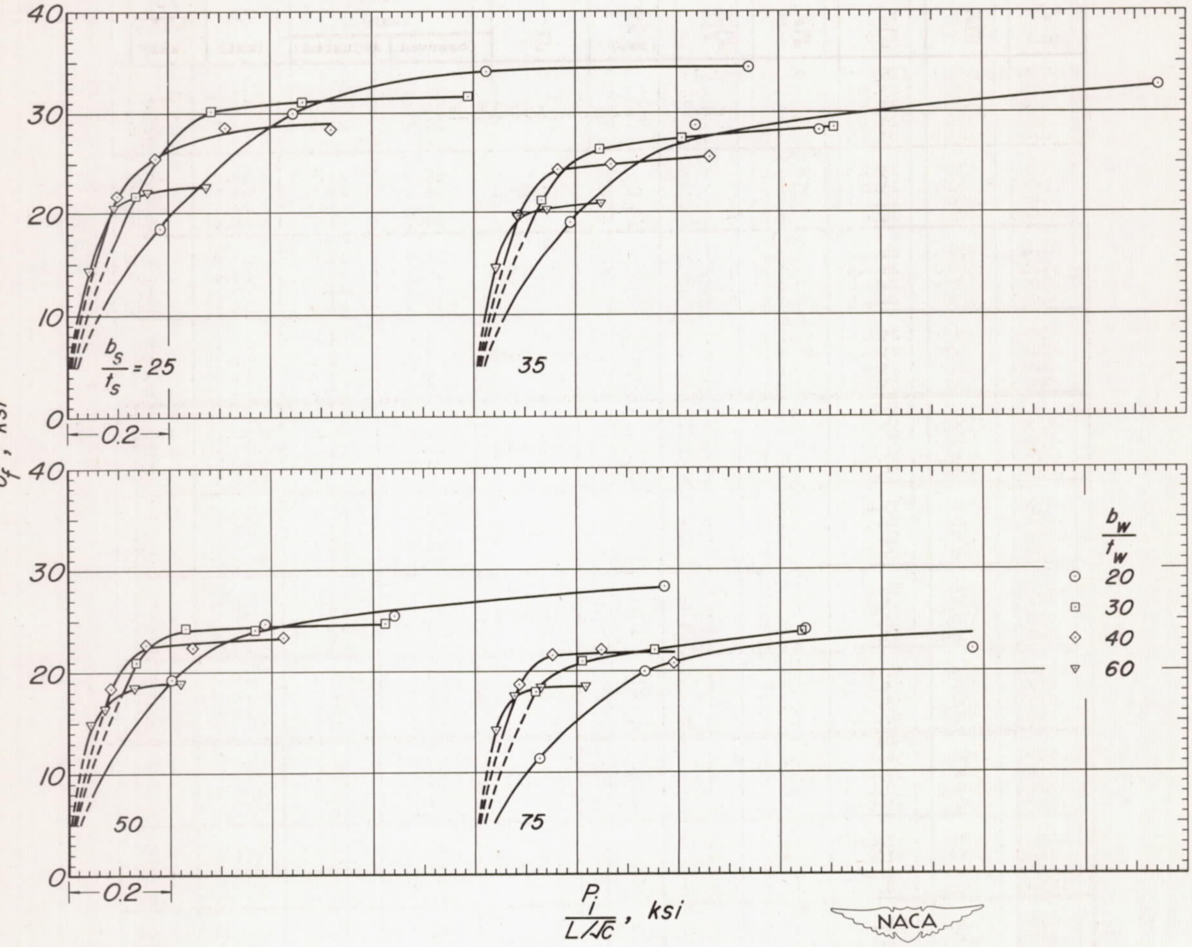

Figure 5.- Compressive strength of flat panels with hat-section stiffeners. $\frac{t_W}{t_S} = 0.39$; $\frac{b_H}{b_W} = 1.0$.

TABLE 4

TEST DATA FOR FLAT PANELS WITH HAT-SECTION STIFFENERS WITH $\frac{t_W}{t_S} = 0.39$, $\frac{b_H}{b_W} = 1.2$

[Nominal proportions are given in parentheses]

Proportions of test specimens							Test data			
t_W (in.)	$\frac{t_W}{t_S}$	$\frac{b_S}{t_S}$	$\frac{b_W}{t_W}$	$\frac{b_H}{b_W}$	$\frac{L}{\sqrt{c}}$ (in.)	$\frac{\bar{t}}{t_S}$	σ_{cr} (ksi) Observed	σ_{cr} (ksi) Adjusted	$\bar{\sigma}_f$ (ksi)	$\frac{P_i}{L/\sqrt{c}}$ (ksi)
(0.040)	(0.39)	(25)	(20)	(1.2)						
.040	.376	23.5	20.1	1.20	3.66		31.8	32.8	33.8	1.274
.040	.376	23.0	20.0	1.21	6.06	(1.353)	30.3	26.5	32.6	.743
.040	.376	23.3	19.8	1.20	9.63		29.4	26.4	30.7	.440
.040	.378	23.4	20.2	1.19	14.51		--	--	19.8	.188
			(30)							
.040	.377	23.8	30.4	1.19	5.95		28.6	26.5	30.7	.749
.039	.384	24.3	30.5	1.20	10.07	(1.423)	28.5	23.6	29.9	.431
.039	.382	24.1	30.6	1.20	16.10		--	--	29.7	.268
.039	.384	24.7	31.0	1.19	24.10		20.4	21.7	20.9	.126
			(40)							
.040	.380	24.0	40.2	1.19	8.57		19.5	19.4	27.8	.490
.040	.382	23.6	40.2	1.20	14.25	(1.479)	20.6	20.8	27.4	.290
.039	.378	24.4	40.8	1.20	22.79		23.1	24.1	26.4	.175
.039	.381	24.4	40.6	1.20	34.14		18.9	19.5	19.6	.087
			(60)							
.039	.371	23.6	61.3	1.20	13.17		8.0	8.4	20.3	.246
.040	.376	23.4	59.8	1.22	22.77	(1.568)	7.1	7.3	21.3	.150
.039	.390	25.0	61.0	1.20	36.41		8.8	9.2	19.6	.086
.039	.372	24.0	61.8	1.20	54.69		8.8	9.3	14.0	.041
		(35)	(20)							
.039	.388	35.4	20.4	1.20	3.34		26.9	29.5	30.1	1.182
.039	.388	34.9	20.5	1.22	5.61	(1.286)	24.2	24.0	29.3	.685
.039	.387	35.0	20.3	1.20	9.05		23.2	23.3	26.4	.382
.039	.389	34.7	19.5	1.30	13.55		--	--	19.8	.191
			(30)							
.039	.391	35.0	30.4	1.22	5.68		22.5	22.7	27.3	.660
.039	.392	35.0	30.5	1.18	9.46	(1.348)	24.2	24.3	26.8	.390
.039	.391	34.9	30.7	1.18	15.17		23.5	23.5	26.0	.236
.039	.386	34.4	30.8	1.22	22.81		20.0	19.3	20.9	.126
			(40)							
.039	.378	33.4	40.8	1.20	8.23		17.7	18.4	24.9	.433
.040	.390	34.7	40.2	1.20	13.56	(1.402)	21.8	22.0	24.3	.256
.038	.369	33.9	41.6	1.17	21.69		20.1	20.8	24.1	.159
.040	.386	33.7	40.1	1.20	32.58		16.0	16.0	17.8	.078
			(60)							
.040	.383	33.7	60.4	1.20	13.20		8.6	8.7	20.1	.231
.040	.393	34.6	59.8	1.20	21.93	(1.487)	9.9	9.9	19.3	.134
.040	.394	35.2	60.0	1.22	35.20		8.4	8.7	19.6	.084
.039	.391	35.2	60.6	1.22	52.78		8.2	8.6	14.0	.040
		(50)	(20)							
.039	.394	50.5	20.3	1.20	3.15		20.2	20.6	27.0	1.067
.039	.383	49.1	20.4	1.20	5.14	(1.221)	17.9	17.3	25.1	.609
.040	.398	50.8	20.4	1.18	8.28		14.4	14.8	23.4	.352
.039	.392	50.0	20.4	1.18	12.41		16.0	16.0	20.0	.201
			(30)							
.039	.384	49.8	30.9	1.18	5.30		16.3	16.1	24.8	.608
.040	.386	49.2	30.3	1.20	8.86	(1.276)	16.0	15.5	23.2	.341
.040	.380	48.3	30.4	1.20	14.11		14.4	13.4	23.6	.218
.039	.384	48.8	30.3	1.20	21.15		15.8	15.1	21.8	.134
			(40)							
.040	.392	49.7	40.3	1.20	7.65		14.0	14.2	21.6	.382
.039	.380	49.0	41.0	1.20	12.78	(1.322)	15.7	15.1	21.7	.229
.040	.384	48.8	40.4	1.20	20.35		15.0	14.3	21.1	.140
.039	.378	48.7	40.5	1.22	30.56		15.0	14.2	16.4	.072
			(60)							
.040	.386	48.6	60.0	1.21	12.58		7.4	7.5	18.2	.206
.040	.386	48.8	60.8	1.20	20.91	(1.402)	8.0	8.2	17.6	.120
.039	.380	49.0	60.8	1.21	33.52		7.8	8.2	16.8	.072
.039	.382	49.4	60.4	1.22	50.23		8.0	8.4	14.0	.040
		(75)	(20)							
.039	.382	73.4	20.4	1.21	2.83		14.0	13.4	21.0	.877
.040	.385	73.5	20.0	1.21	4.65	(1.161)	11.5	11.1	22.0	.562
.040	.382	73.0	20.0	1.20	7.36		9.9	9.4	20.9	.336
.040	.393	75.2	20.6	1.18	11.06		9.9	9.9	16.2	.173
			(30)							
.040	.379	72.7	29.6	1.21	4.79		11.2	10.6	22.4	.574
.040	.378	72.6	30.1	1.20	7.88	(1.204)	9.1	8.6	22.5	.351
.040	.385	74.0	30.8	1.18	12.69		8.6	8.1	19.7	.191
.039	.374	73.2	29.8	1.22	19.06		8.5	8.1	17.9	.115
			(40)							
.044	.438	75.4	36.4	1.19	6.99		7.9	8.0	21.4	.387
.045	.436	74.4	36.0	1.19	11.61	(1.243)	8.1	8.0	21.8	.239
.045	.448	75.2	35.4	1.19	18.62		7.0	7.0	21.0	.143
.044	.454	77.9	35.8	1.20	27.73		7.4	7.9	18.2	.083
			(60)							
.041	.385	72.8	58.2	1.20	11.70		6.4	6.0	17.1	.196
.040	.382	72.4	59.2	1.20	19.45	(1.311)	7.4	6.9	18.6	.128
.041	.385	72.8	58.9	1.20	31.15		7.8	7.3	17.3	.074
.041	.404	76.3	58.8	1.20	46.66		7.6	7.8	13.9	.040

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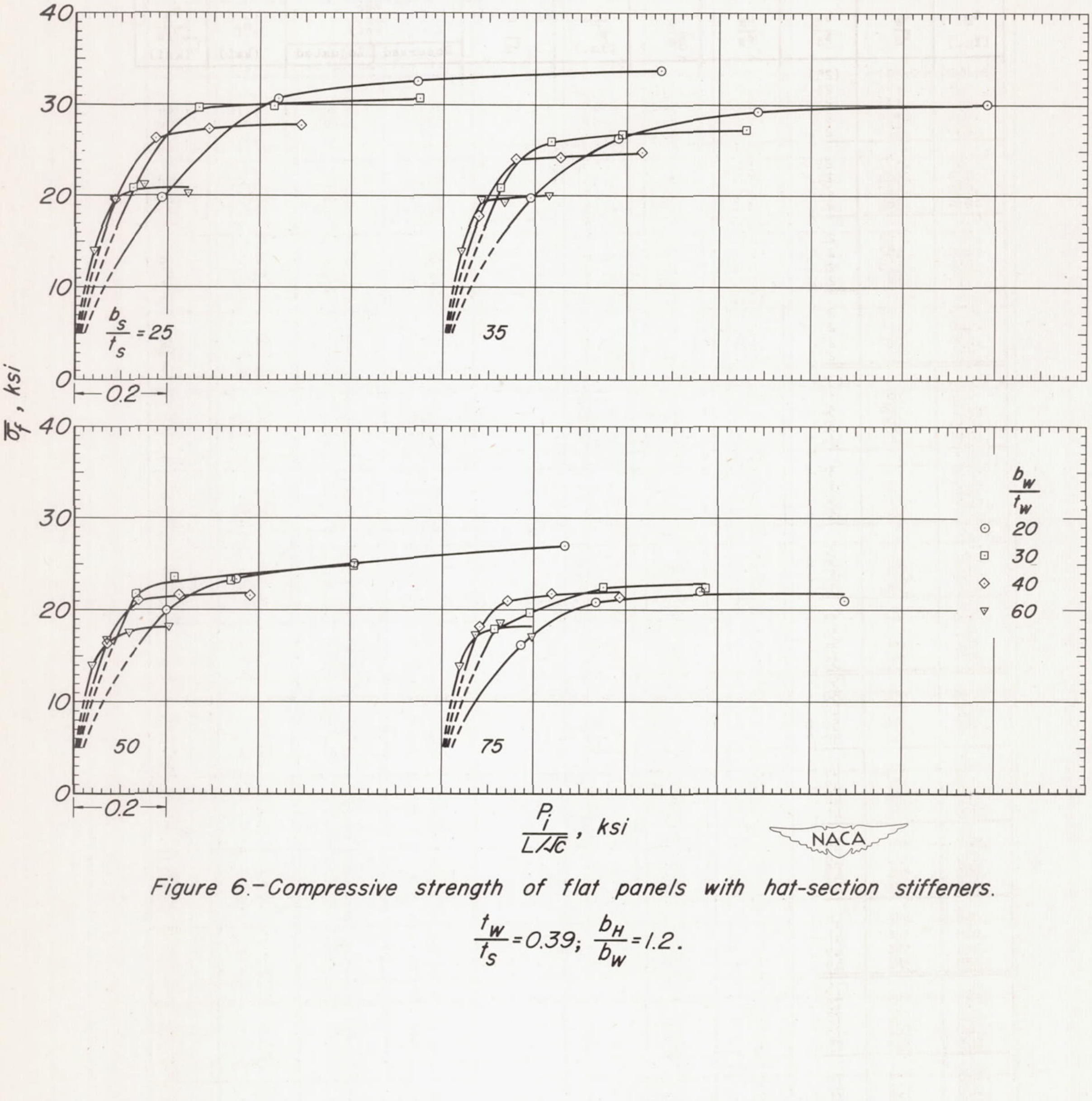

Figure 6.- Compressive strength of flat panels with hat-section stiffeners. $\frac{t_w}{t_s} = 0.39$; $\frac{b_H}{b_w} = 1.2$.

TABLE 5

TEST DATA FOR FLAT PANELS WITH HAT-SECTION STIFFENERS WITH $\frac{t_W}{t_S} = 0.63$, $\frac{b_H}{b_W} = 0.6$

[Nominal proportions are given in parentheses]

Proportions of test specimens							Test data			
t_W (in.)	$\frac{t_W}{t_S}$	$\frac{b_S}{t_S}$	$\frac{b_W}{t_W}$	$\frac{b_H}{b_W}$	$\frac{L}{\sqrt{c}}$ (in.)	$\frac{\bar{t}}{t_S}$	σ_{cr} (ksi) Observed	σ_{cr} (ksi) Adjusted	$\bar{\sigma}_f$ (ksi)	$\frac{P_i}{L/\sqrt{c}}$ (ksi)
(0.040)	(0.63)	(25)	(20)	(0.6)						
.039	.632	26.4	20.2	.58	2.48	(1.721)	32.4	35.0	36.7	1.626
.039	.625	26.0	20.4	.59	4.99		32.7	34.6	35.8	.790
.039	.624	26.1	20.5	.60	7.51		--	--	34.8	.509
.039	.623	26.0	20.9	.60	12.52		--	--	27.1	.238
			(30)							
.044	.690	25.7	27.1	.63	4.24	(1.880)	34.8	36.1	36.9	1.047
.040	.638	26.2	30.2	.61	8.37		30.7	33.1	34.3	.493
.039	.615	25.4	30.6	.58	12.58		32.4	33.2	33.7	.322
.040	.612	24.6	29.9	.62	20.85		--	--	26.5	.153
			(40)							
.039	.638	26.5	40.3	.60	5.90	(2.016)	29.6	30.0	31.0	.678
.040	.634	25.8	40.0	.62	11.72		27.5	27.6	30.8	.339
.039	.623	26.1	41.1	.61	17.69		28.1	29.4	30.0	.219
.040	.630	25.4	40.2	.62	29.32		--	--	26.5	.117
			(60)							
.039	.623	25.8	60.3	.60	9.31	(2.235)	15.5	16.0	24.5	.376
.040	.625	25.4	60.1	.59	18.56		14.0	14.0	24.4	.188
.041	.630	24.6	57.9	.60	27.87		14.8	13.8	24.5	.126
.039	.626	25.9	60.8	.60	46.43		15.2	15.6	23.7	.073
		(35)	(20)							
.041	.652	35.6	19.3	.54	2.40	(1.585)	25.9	26.6	34.3	1.448
.040	.634	35.5	19.6	.60	4.81		27.4	28.0	33.2	.701
.042	.681	36.0	18.4	.64	7.14		26.6	27.8	34.1	.485
.040	.644	36.8	19.6	.59	11.91		--	--	26.0	.222
			(30)							
.041	.656	36.1	28.5	.59	3.74	(1.725)	26.4	27.8	33.4	.986
.040	.651	36.7	30.1	.62	8.04		24.1	26.1	31.2	.428
.040	.640	36.2	30.0	.60	12.02		22.6	24.1	31.6	.290
.040	.654	36.9	29.6	.60	20.13		--	--	24.9	.137
			(40)							
.040	.656	36.8	39.8	.58	5.76	(1.848)	22.2	24.2	28.5	.585
.039	.644	37.0	39.6	.62	11.44		21.0	23.4	27.4	.283
.040	.648	36.4	39.6	.61	17.21		22.4	24.2	28.1	.193
.039	.636	35.9	39.7	.61	28.56		23.5	24.5	26.1	.108
			(60)							
.040	.656	36.6	59.2	.60	9.20	(2.053)	15.3	14.9	23.1	.330
.043	.684	36.2	55.0	.60	18.20		16.6	14.0	24.4	.176
.040	.638	35.4	60.0	.59	27.40		13.7	13.6	22.9	.110
.043	.696	35.8	55.2	.60	45.57		16.8	14.3	22.2	.064
		(50)	(20)							
.040	.646	50.8	19.8	.60	3.80	(1.455)	18.5	19.1	30.5	.748
.042	.667	50.8	19.2	.60	7.67		16.0	16.5	30.2	.366
.041	.656	50.6	19.3	.58	11.60		15.2	15.5	22.6	.181
.041	.651	50.9	19.2	.62	19.35		--	--	6.1	.029
			(30)							
.042	.664	51.0	28.6	.64	4.86	(1.573)	17.2	18.0	30.3	.628
.042	.660	50.7	28.4	.64	9.72		15.9	16.4	30.1	.311
.040	.631	50.7	30.0	.60	14.59		17.7	18.2	27.8	.192
.042	.658	50.5	28.8	.61	24.28		18.5	18.9	19.7	.082
			(40)							
.043	.668	50.0	37.4	.60	6.21	(1.679)	18.0	18.0	28.0	.485
.043	.666	50.1	37.7	.59	12.47		15.8	15.9	28.2	.243
.043	.659	48.8	37.4	.62	18.66		17.3	16.4	27.9	.161
.042	.644	49.2	38.4	.60	31.14		19.3	18.7	21.6	.075
			(60)							
.042	.658	49.8	56.8	.60	8.36	(1.863)	16.2	14.6	23.4	.333
.042	.648	48.8	57.4	.60	18.64		15.0	13.7	22.8	.146
.043	.661	49.0	56.4	.60	27.91		15.5	13.7	23.6	.101
.041	.653	50.8	58.6	.60	46.47		14.2	13.6	21.1	.054
		(75)	(20)							
.039	.620	76.4	20.2	.58	3.06	(1.333)	10.5	10.9	25.8	.718
.039	.622	76.8	20.3	.58	5.12		8.2	8.6	25.1	.418
.040	.630	75.6	19.6	.61	8.17		8.6	8.8	24.1	.252
.045	.723	76.8	17.6	.61	12.23		9.9	10.4	20.6	.143
			(30)							
.040	.628	74.6	29.7	.60	5.32	(1.425)	8.3	8.2	24.9	.428
.038	.606	75.8	30.4	.60	8.84		9.8	10.0	25.0	.258
.040	.614	74.8	30.4	.60	14.15		9.8	9.7	24.1	.155
.039	.600	74.3	31.0	.58	21.24		9.0	8.9	19.2	.083
			(40)							
.040	.624	75.4	40.3	.59	7.69	(1.510)	9.0	9.1	23.6	.297
.040	.624	75.2	40.8	.58	12.88		7.9	7.9	23.9	.179
.040	.624	74.8	40.4	.57	20.59		9.7	9.7	23.4	.110
.039	.612	75.0	40.8	.60	30.86		8.9	8.9	20.5	.064
			(60)							
.040	.633	76.2	60.2	.60	12.70	(1.663)	9.8	10.1	20.4	.171
.039	.630	76.2	60.6	.60	21.28		9.9	10.3	20.0	.100
.041	.632	74.2	58.7	.62	33.95		9.2	9.0	20.2	.063
.040	.622	75.0	60.0	.66	50.81		10.4	10.4	17.6	.037

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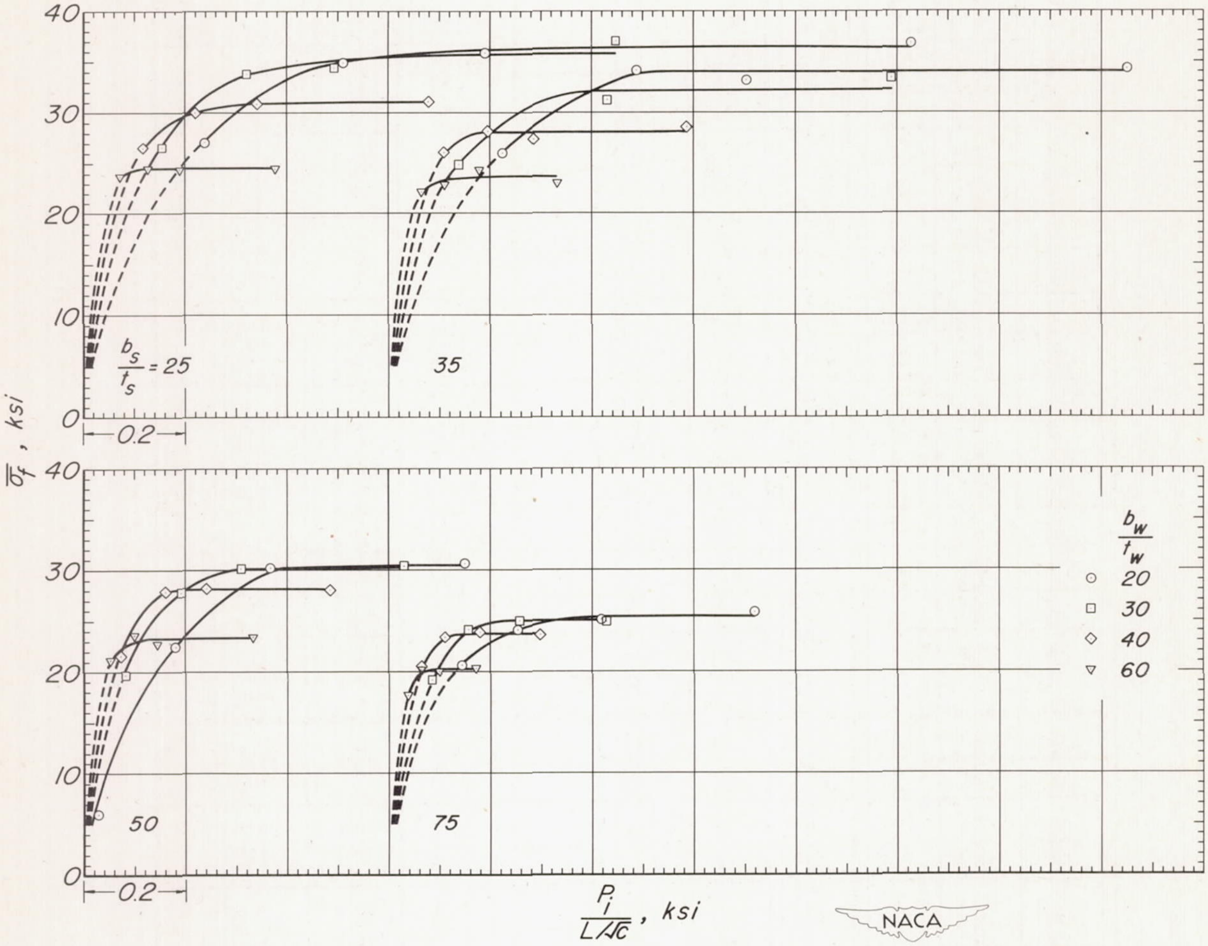

Figure 7.—Compressive strength of flat panels with hat-section stiffeners. $\frac{t_w}{t_s} = 0.63$; $\frac{b_H}{b_w} = 0.6$.

TABLE 6

TEST DATA FOR FLAT PANELS WITH HAT-SECTION STIFFENERS WITH $\frac{t_W}{t_S} = 0.63$, $\frac{b_H}{b_W} = 0.8$

[Nominal proportions are given in parentheses]

Proportions of test specimens							Test data			
t_W (in.)	$\frac{t_W}{t_S}$	$\frac{b_S}{t_S}$	$\frac{b_W}{t_W}$	$\frac{b_H}{b_W}$	$\frac{L}{\sqrt{c}}$ (in.)	$\frac{\bar{t}}{t_S}$	$\bar{\sigma}_{cr}$ (ksi) Observed	$\bar{\sigma}_{cr}$ (ksi) Adjusted	$\bar{\sigma}_f$ (ksi)	$\frac{P_1}{L/\sqrt{c}}$ (ksi)
(0.040)	(0.63)	(25)	(20)	(0.8)		(1.715)				
.040	.634	26.0	20.4	.78	2.62		34.2	36.1	36.9	1.548
.039	.631	25.6	20.2	.80	5.32		33.4	34.4	36.0	.743
.039	.628	25.7	20.5	.78	7.93		--	--	34.9	.483
.039	.629	25.9	20.5	.78	13.22		--	--	27.0	.224
			(30)			(1.861)				
.044	.708	26.6	27.2	.78	4.35		32.6	35.5	35.8	.981
.040	.637	26.2	30.2	.79	8.68		30.8	33.2	33.5	.460
.039	.637	26.6	30.6	.78	13.09		30.2	33.2	33.3	.303
.040	.640	26.5	30.2	.82	21.80		--	--	23.8	.130
			(40)			(1.981)				
.041	.670	26.6	39.0	.80	6.07		29.3	28.1	30.5	.637
.041	.662	26.3	38.6	.81	12.25		29.3	27.7	30.5	.316
.041	.652	26.0	39.0	.80	18.31		--	--	29.5	.204
.040	.646	26.2	40.4	.78	30.49		--	--	27.2	.113
			(60)			(2.165)				
.040	.628	25.8	60.2	.80	9.62		13.2	13.3	22.8	.329
.039	.610	25.1	61.6	.80	19.23		13.6	14.4	22.3	.161
.040	.626	25.4	59.7	.80	28.70		14.4	14.1	22.3	.107
.039	.626	25.2	60.8	.80	47.90		13.8	14.1	20.7	.060
		(35)	(20)			(1.586)				
.044	.714	36.0	17.0	.86	2.45		--	--	34.8	1.441
.041	.647	36.0	19.3	.82	4.97		24.0	25.4	33.3	.680
.040	.634	35.2	19.9	.80	7.59		25.2	25.5	32.8	.439
.040	.641	35.7	19.8	.81	12.56		--	--	26.4	.213
			(30)			(1.719)				
.041	.655	36.2	29.4	.79	4.24		25.2	26.6	32.8	.849
.041	.679	36.8	28.4	.80	8.42		23.0	25.1	32.3	.421
.041	.657	36.5	29.0	.80	12.58		22.8	24.7	31.0	.271
.040	.652	36.7	29.4	.81	21.02		24.3	26.2	25.4	.133
			(40)			(1.831)				
.042	.686	37.2	37.5	.80	5.96		22.2	24.6	29.0	.570
.041	.666	36.6	38.6	.80	11.86		24.5	26.4	28.3	.280
.039	.642	35.5	40.8	.80	17.84		21.3	21.9	27.1	.178
.040	.644	36.6	39.2	.80	29.90		23.5	25.4	25.9	.101
			(60)			(2.010)				
.044	.703	36.0	54.5	.80	9.43		17.0	14.0	23.4	.319
.043	.689	36.0	55.3	.78	18.86		16.6	14.1	23.0	.157
.043	.693	36.1	55.2	.80	28.24		16.1	13.7	22.6	.103
.043	.701	35.8	56.4	.80	47.24		16.1	14.2	20.7	.056
		(50)	(20)			(1.461)				
.041	.637	48.5	19.6	.79	3.88		14.9	14.1	30.9	.745
.042	.666	50.4	19.2	.74	7.88		18.8	19.2	30.1	.358
.041	.650	50.2	19.4	.80	11.87		17.6	17.7	24.7	.194
.041	.656	50.2	19.5	.78	19.73		--	--	10.2	.048
			(30)			(1.575)				
.042	.635	49.4	28.6	.82	5.08		18.7	18.2	30.7	.608
.041	.638	50.0	29.3	.80	10.07		15.2	15.2	29.1	.291
.041	.645	50.2	28.6	.81	15.15		15.1	15.3	28.8	.192
.042	.643	49.5	29.0	.79	25.20		18.8	18.5	20.1	.080
			(40)			(1.676)				
.042	.638	48.6	38.2	.80	6.45		15.1	14.2	27.2	.452
.041	.634	49.4	39.2	.80	12.92		15.7	15.3	27.3	.227
.041	.632	48.8	39.1	.80	19.34		15.5	14.8	26.6	.148
.042	.644	49.4	38.4	.80	32.14		18.4	18.0	24.2	.081
			(60)			(1.844)				
.043	.680	50.6	55.8	.81	9.65		14.0	12.1	21.7	.265
.041	.629	48.8	58.4	.80	19.26		14.1	13.4	21.5	.132
.043	.683	50.4	55.4	.80	28.85		15.0	12.8	21.8	.089
.042	.646	50.8	57.6	.82	48.05		14.8	13.6	20.2	.050
		(75)	(20)			(1.340)				
.042	.658	75.1	19.0	.81	3.30		9.7	9.7	26.1	.679
.039	.611	75.4	20.2	.80	5.38		11.5	11.6	24.3	.388
.037	.584	75.6	21.6	.80	8.70		9.2	9.4	23.5	.231
.038	.602	76.3	20.8	.82	13.06		9.1	9.4	18.5	.121
			(30)			(1.433)				
.039	.596	74.2	31.2	.78	5.61		--	--	25.0	.408
.039	.600	74.2	30.7	.80	9.39		9.8	9.6	25.3	.249
.040	.613	74.1	31.8	.76	14.99		10.2	10.0	24.8	.152
.039	.603	74.0	30.6	.80	22.40		9.3	9.1	19.5	.080
			(40)			(1.516)				
.040	.632	76.6	40.2	.80	8.01		10.1	10.6	23.6	.286
.040	.620	74.0	40.0	.78	13.48		9.4	9.2	23.0	.165
.040	.633	76.2	40.3	.78	21.50		9.5	9.8	23.4	.106
.040	.636	75.9	39.7	.80	32.17		8.7	8.9	21.7	.066
			(60)			(1.661)				
.040	.635	76.6	61.0	.80	13.13		10.2	10.6	19.4	.157
.039	.613	75.0	60.9	.80	22.06		9.4	9.4	19.0	.091
.039	.612	74.8	61.2	.79	35.31		8.7	8.7	19.1	.058
.040	.623	75.8	60.0	.82	52.93		9.0	9.2	16.3	.033

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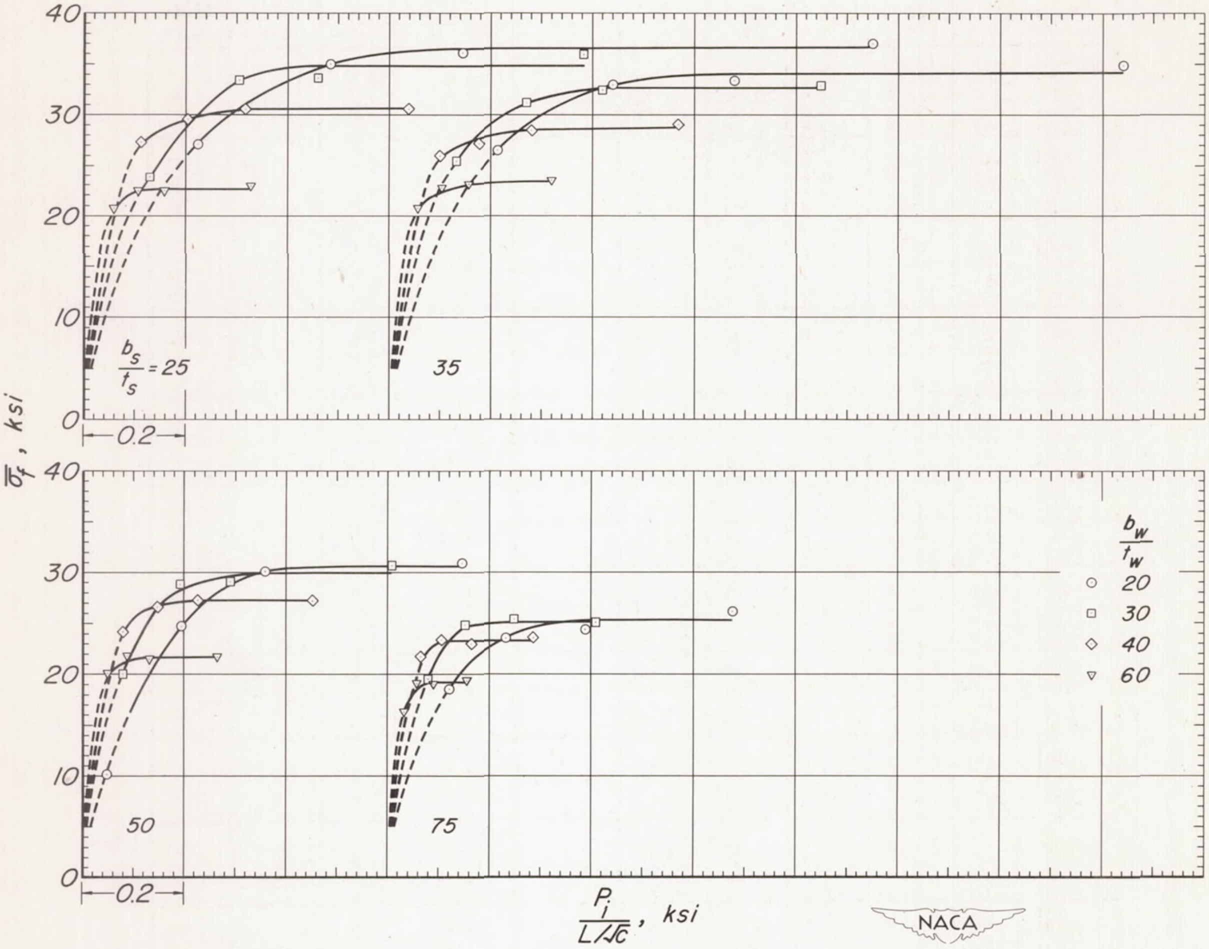

Figure 8.—Compressive strength of flat panels with hat-section stiffeners.
$\frac{t_w}{t_s} = 0.63$; $\frac{b_H}{b_w} = 0.8$.

TABLE 7

TEST DATA FOR FLAT PANELS WITH HAT-SECTION STIFFENERS WITH $\frac{t_W}{t_S} = 0.63$, $\frac{b_H}{b_W} = 1.0$

[Nominal proportions are given in parentheses]

Proportions of test specimens							Test data			
t_W (in.)	$\frac{t_W}{t_S}$	$\frac{b_S}{t_S}$	$\frac{b_W}{t_W}$	$\frac{b_H}{b_W}$	$\frac{L}{\sqrt{c}}$ (in.)	$\frac{\bar{t}}{t_S}$	σ_{cr} (ksi) Observed	σ_{cr} (ksi) Adjusted	$\bar{\sigma}_f$ (ksi)	$\frac{P_1}{L/\sqrt{c}}$ (ksi)
(0.040)	(0.63)	(25)	(20)	(1.0)						
.040	.640	26.4	20.2	1.00	2.78	(1.711)	34.0	36.6	35.8	1.407
.039	.629	25.8	20.4	1.00	5.53		33.0	34.7	35.2	.698
.039	.632	26.2	20.5	.99	8.28		31.6	34.0	33.4	.442
.039	.643	26.4	20.4	.98	13.81		--	--	27.7	.220
			(30)							
.040	.642	26.1	30.1	1.00	4.50	(1.845)	31.1	33.4	33.4	.877
.039	.629	25.8	30.6	.99	9.01		--	--	32.7	.428
.039	.642	26.8	30.2	.99	13.60		31.1	34.5	32.0	.278
.043	.692	26.4	28.2	.98	22.56		--	--	27.1	.142
			(40)							
.040	.650	26.6	40.1	1.00	6.36	(1.951)	27.3	27.5	28.2	.555
.040	.648	26.3	40.0	1.00	12.56		25.6	26.2	28.3	.281
.040	.654	26.0	39.1	1.00	18.88		26.4	25.5	28.0	.185
.040	.643	25.8	40.0	1.00	31.38		--	--	24.4	.097
			(60)							
.040	.624	25.7	60.4	.99	9.80	(2.110)	12.4	12.4	21.2	.292
.039	.626	25.8	60.4	.99	19.71		12.3	12.5	20.8	.143
.038	.596	26.0	63.3	1.00	29.49		11.7	13.1	20.2	.093
.039	.620	25.4	61.4	1.00	49.14		12.5	13.1	19.0	.052
		(35)	(20)							
.043	.682	35.2	17.8	1.07	2.63	(1.588)	--	--	34.7	1.341
.042	.660	36.0	19.1	.94	5.29		25.7	26.9	33.5	.643
.040	.638	35.9	20.0	1.00	7.90		26.2	27.3	32.2	.414
.041	.663	36.2	18.6	1.00	13.26		--	--	25.2	.193
			(30)							
.040	.644	36.1	31.1	.94	4.42	(1.713)	24.5	25.9	31.0	.769
.040	.649	35.2	28.8	.99	8.68		24.3	24.4	30.8	.389
.040	.642	36.3	30.2	.98	13.09		23.8	25.2	30.0	.251
.040	.648	36.1	29.2	1.02	21.84		--	--	26.0	.130
			(40)							
.040	.638	36.2	39.0	1.03	6.12	(1.816)	21.6	23.0	24.7	.469
.040	.636	36.0	39.8	.99	12.28		24.0	25.2	26.6	.252
.042	.640	35.9	38.8	1.00	18.57		21.5	22.6	26.5	.166
.040	.636	35.8	39.1	1.02	30.75		20.3	21.2	25.0	.095
			(60)							
.043	.684	34.2	54.8	1.01	9.70	(1.976)	13.4	11.4	21.7	.283
.043	.699	36.2	55.0	.99	19.34		14.4	11.9	21.4	.140
.043	.686	35.4	55.3	.98	29.01		14.1	11.7	21.4	.093
.043	.690	36.1	55.6	1.00	47.84		12.4	10.6	19.1	.050
		(50)	(20)							
.042	.663	50.3	19.2	.99	4.02	(1.467)	14.6	14.8	30.7	.717
.042	.676	51.0	19.4	.98	8.02		16.1	16.7	30.8	.361
.042	.666	51.2	19.2	1.00	12.02		16.3	17.2	25.3	.198
.041	.664	51.2	19.8	.94	20.05		--	--	12.9	.060
			(30)							
.041	.642	50.2	29.3	.98	5.09	(1.578)	16.4	16.6	30.4	.603
.041	.649	50.0	29.0	1.00	10.38		15.0	15.0	30.3	.295
.042	.634	48.7	28.8	1.00	15.51		17.6	16.7	29.4	.191
.041	.632	49.2	29.4	.99	25.83		16.8	16.3	21.1	.083
			(40)							
.041	.644	49.6	38.6	1.00	6.62	(1.673)	14.2	14.0	25.8	.418
.042	.677	51.1	38.4	1.00	13.27		15.5	16.2	26.0	.210
.042	.662	50.6	38.4	1.00	19.54		15.2	15.7	26.3	.144
.041	.656	50.4	38.8	.99	33.13		16.0	16.2	22.1	.071
			(60)							
.042	.660	50.8	57.5	1.01	9.85	(1.827)	13.1	12.2	20.0	.237
.041	.655	50.2	58.2	1.00	19.75		12.1	11.6	19.3	.114
.041	.648	51.1	59.4	1.01	29.66		13.1	13.3	19.5	.077
.042	.628	48.0	57.3	1.01	49.39		12.5	11.8	18.1	.043
		(75)	(20)							
.045	.692	74.4	18.4	1.00	3.38	(1.348)	11.0	10.8	28.2	.719
.045	.722	77.0	17.8	1.00	5.78		9.5	10.0	27.0	.403
.039	.610	75.3	20.4	1.01	9.20		12.8	12.9	23.6	.222
.042	.640	73.6	19.1	.98	13.76		9.8	9.4	19.9	.125
			(30)							
.040	.616	74.4	30.0	1.00	5.91	(1.440)	9.7	9.6	25.8	.402
.040	.611	73.5	29.9	1.00	9.73		9.3	9.0	26.0	.246
.040	.607	73.4	30.2	1.00	15.65		10.0	9.5	25.4	.149
.039	.630	76.6	31.1	.96	23.39		9.8	10.3	20.8	.082
			(40)							
.040	.610	73.6	39.9	1.00	8.43	(1.521)	9.0	8.7	23.6	.272
.040	.624	74.5	39.8	1.00	13.99		8.7	8.6	22.6	.157
.039	.610	74.0	40.6	.99	22.31		9.4	9.2	22.3	.097
.040	.619	73.2	39.6	1.00	33.66		8.2	7.8	21.7	.063
			(60)							
.039	.624	75.8	61.2	.99	13.67	(1.658)	9.6	9.8	18.1	.141
.040	.616	74.8	60.2	1.01	22.80		8.2	8.2	18.1	.084
.039	.624	75.2	61.0	1.00	36.46		8.6	8.6	18.2	.053
.039	.622	75.2	60.6	1.01	54.70		8.0	8.1	14.9	.029

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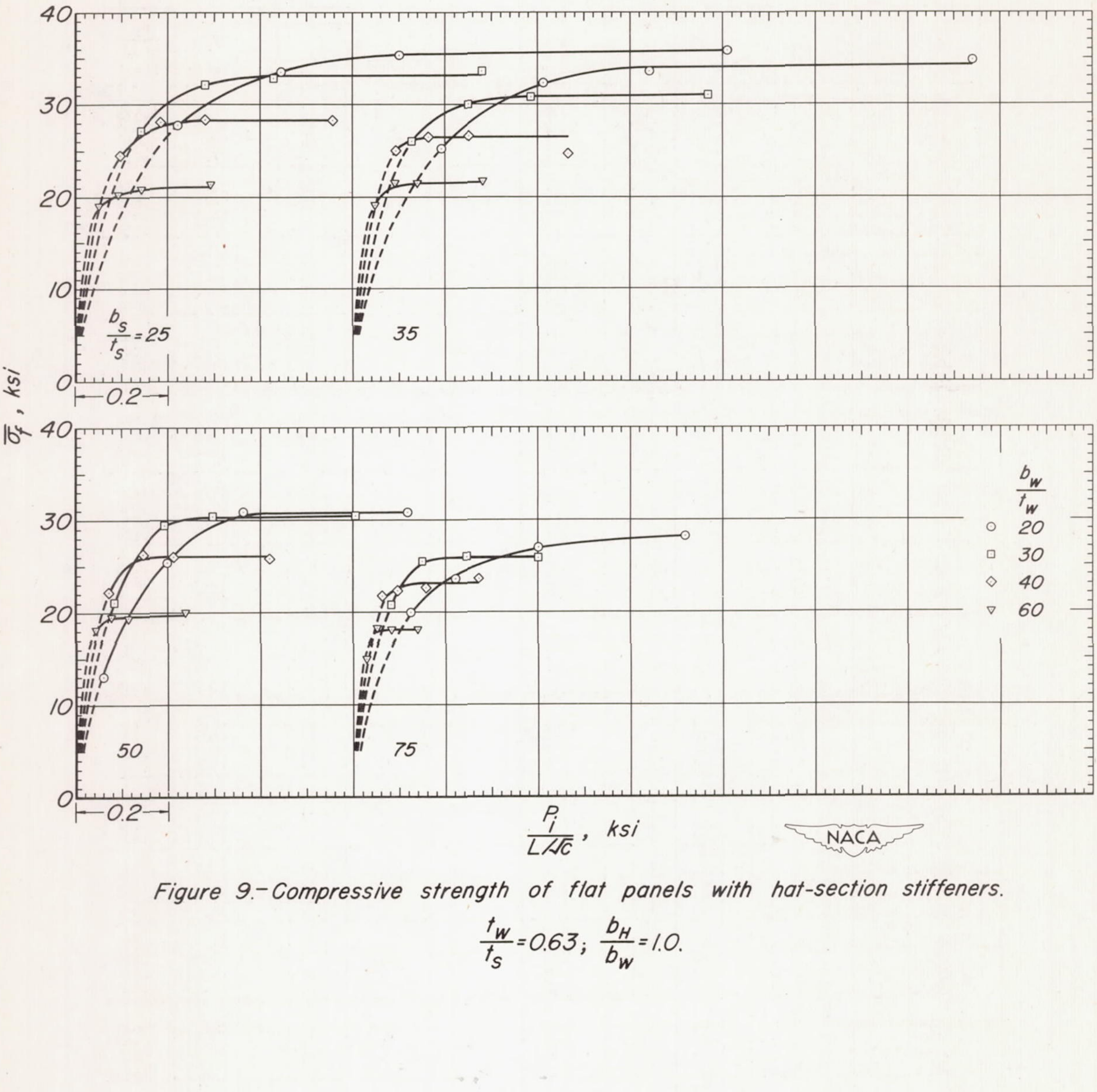

Figure 9.- Compressive strength of flat panels with hat-section stiffeners. $\frac{t_w}{t_s} = 0.63$; $\frac{b_H}{b_w} = 1.0$.

TABLE 8

TEST DATA FOR FLAT PANELS WITH HAT-SECTION STIFFENERS WITH $\frac{t_W}{t_S} = 0.63$, $\frac{b_H}{b_W} = 1.2$

[Nominal proportions are given in parentheses]

Proportions of test specimens							Test data			
t_W (in.)	$\frac{t_W}{t_S}$	$\frac{b_S}{t_S}$	$\frac{b_W}{t_W}$	$\frac{b_H}{b_W}$	$\frac{L}{\sqrt{c}}$ (in.)	$\frac{\bar{t}}{t_S}$	$\bar{\sigma}_{cr}$ (ksi) Observed	$\bar{\sigma}_{cr}$ (ksi) Adjusted	$\bar{\sigma}_f$ (ksi)	$\frac{P_1}{L/\sqrt{c}}$ (ksi)
(0.040)	(0.63)	(25)	(20)	(1.2)						
.040	.638	26.2	20.1	1.19	2.87		34.0	36.3	36.1	1.374
.040	.640	26.2	20.0	1.20	5.74	(1.706)	31.1	33.4	34.9	.663
.039	.628	26.2	20.5	1.22	8.63		32.3	34.6	34.7	.439
.040	.638	25.9	20.4	1.17	14.29		--	--	27.6	.211
			(30)							
.039	.626	26.2	30.8	1.20	4.71		--	--	31.6	.786
.039	.621	25.2	30.5	1.20	9.31	(1.830)	29.9	30.2	32.1	.404
.040	.636	26.2	30.2	1.21	13.93		--	--	31.3	.263
.040	.640	25.8	30.0	1.22	23.13		--	--	26.3	.132
			(40)							
.039	.628	26.2	41.0	1.20	6.47		21.0	21.8	25.9	.494
.040	.644	26.2	40.4	1.16	12.84	(1.927)	22.6	21.7	26.1	.250
.039	.624	25.6	40.8	1.19	19.30		20.4	20.8	25.6	.164
.040	.638	25.7	40.4	1.20	32.15		20.4	21.2	22.1	.085
			(60)							
.040	.624	25.4	60.6	1.19	10.03		10.2	10.2	19.9	.262
.039	.620	25.6	60.5	1.19	20.10	(2.064)	10.0	10.1	19.7	.129
.040	.626	25.4	59.6	1.20	30.11		8.0	8.0	19.1	.084
.039	.621	25.8	61.0	1.21	50.22		6.4	6.8	13.9	.036
		(35)	(20)							
.043	.682	35.8	17.8	1.26	2.71		--	--	34.7	1.302
.041	.666	36.4	19.1	1.18	5.51	(1.590)	26.4	28.2	34.3	.634
.042	.665	36.1	19.1	1.16	8.18		26.6	27.9	33.2	.413
.040	.644	36.1	19.7	1.20	13.70		--	--	26.6	.198
			(30)							
.039	.637	36.4	29.6	1.20	4.47		22.6	24.2	29.0	.710
.040	.646	36.3	29.6	1.22	8.97	(1.708)	23.8	25.2	30.0	.366
.040	.650	36.2	29.0	1.22	13.57		24.5	26.0	29.7	.239
.040	.664	37.3	29.2	1.20	22.56		23.8	26.4	26.0	.126
			(40)							
.040	.667	37.0	39.6	1.20	6.37		20.8	20.6	25.0	.453
.040	.630	34.9	39.9	1.16	12.60	(1.803)	19.6	18.5	24.5	.224
.040	.644	36.4	40.0	1.20	18.93		21.4	21.4	24.5	.149
.040	.643	36.0	40.0	1.21	31.54		19.5	19.7	22.5	.082
			(60)							
.040	.643	36.0	59.8	1.20	9.92		9.9	9.8	19.1	.240
.043	.683	35.6	55.4	1.18	19.73	(1.947)	10.1	8.3	20.3	.128
.040	.644	36.1	59.8	1.19	29.72		9.7	9.5	18.8	.079
.043	.686	34.8	55.1	1.20	49.52		10.3	8.6	17.7	.045
		(50)	(20)							
.041	.650	50.6	20.0	1.16	4.11		17.5	17.9	31.5	.721
.043	.685	51.0	18.6	1.19	8.18	(1.472)	13.4	13.9	31.8	.366
.042	.676	50.8	19.4	1.18	12.23		17.1	17.7	26.2	.202
.042	.662	50.2	19.8	1.18	20.35		--	--	13.5	.063
			(30)							
.041	.627	48.6	29.0	1.22	5.31		16.7	15.8	28.5	.543
.041	.630	48.4	29.1	1.20	10.54	(1.580)	17.4	16.2	28.9	.277
.041	.617	47.8	28.8	1.22	15.86		19.2	17.6	28.6	.182
.042	.657	50.0	28.8	1.20	25.94		15.4	15.4	21.9	.086
			(40)							
.042	.653	49.9	38.5	1.20	6.73		15.3	15.3	24.9	.395
.042	.671	50.4	38.2	1.20	13.61	(1.670)	15.8	16.0	24.6	.194
.041	.640	50.0	39.1	1.18	20.29		15.5	15.5	24.3	.128
.042	.668	50.2	38.0	1.20	33.81		--	--	22.5	.071
			(60)							
.041	.646	49.4	58.0	1.20	10.07		9.9	9.4	19.0	.219
.041	.670	52.0	58.4	1.20	20.21	(1.813)	10.2	9.6	18.8	.108
.041	.661	51.6	58.2	1.21	30.29		11.3	10.9	18.4	.071
.042	.674	51.4	56.2	1.22	50.48		10.3	9.3	17.4	.040
		(75)	(20)							
.039	.600	75.0	20.5	1.20	3.62		11.0	11.0	26.0	.623
.039	.601	74.5	20.4	1.20	5.95	(1.355)	10.0	9.9	25.3	.368
.039	.600	73.8	20.5	1.18	9.63		9.6	9.3	23.8	.214
.039	.598	74.0	20.6	1.18	14.39		8.5	8.3	18.7	.113
			(30)							
.040	.611	74.4	29.8	1.23	6.06		7.7	7.6	25.7	.392
.039	.608	74.6	30.6	1.20	10.16	(1.446)	10.0	9.9	24.4	.222
.039	.610	74.4	31.8	1.15	16.18		8.5	8.4	24.0	.137
.039	.613	74.2	30.6	1.20	24.32		11.0	10.8	19.7	.075
			(40)							
.040	.604	71.8	41.0	1.18	8.73		8.8	8.1	21.9	.245
.040	.608	72.8	40.1	1.20	14.51	(1.525)	9.1	8.6	21.9	.148
.040	.620	75.0	40.0	1.20	23.20		8.0	8.0	21.4	.090
.040	.606	73.0	40.4	1.20	34.78		10.5	10.0	18.6	.052
			(60)							
.040	.635	76.8	60.2	1.20	13.97		9.4	9.9	17.3	.131
.039	.614	75.2	61.5	1.20	23.25	(1.656)	8.9	9.0	16.3	.074
.039	.604	73.8	61.4	1.20	37.46		8.6	8.3	17.3	.049
.039	.612	74.2	60.4	1.20	55.73		8.8	8.6	14.2	.027

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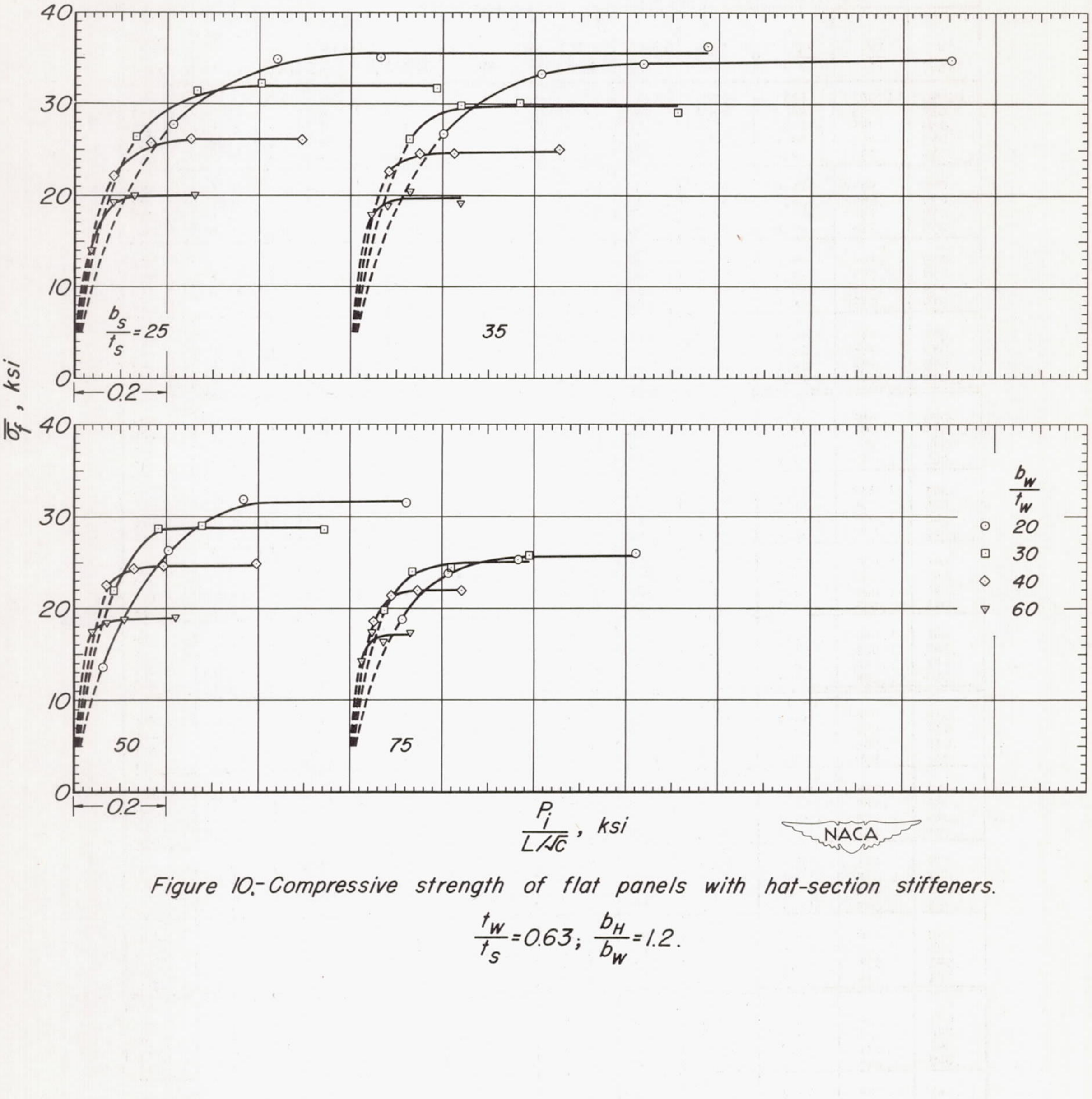

Figure 10.- Compressive strength of flat panels with hat-section stiffeners.

$\frac{t_w}{t_s} = 0.63; \ \frac{b_H}{b_w} = 1.2.$

TABLE 9

TEST DATA FOR FLAT PANELS WITH HAT-SECTION STIFFENERS WITH $\frac{t_W}{t_S} = 1.00$, $\frac{b_H}{b_W} = 0.6$

[Nominal proportions are given in parentheses]

Proportions of test specimens							Test data			
							σ_{cr} (ksi)			
t_W (in.)	$\frac{t_W}{t_S}$	$\frac{b_S}{t_S}$	$\frac{b_W}{t_W}$	$\frac{b_H}{b_W}$	$\frac{L}{\sqrt{c}}$ (in.)	$\frac{\bar{t}}{t_S}$	Observed	Adjusted	$\bar{\sigma}_f$ (ksi)	$\frac{P_1}{L/\sqrt{c}}$ (ksi)
(0.040)	(1.00)	(25)	(20)	(0.6)						
.039	.953	24.2	20.0	.61	4.23	(2.449)	37.0	35.5	39.7	0.918
.039	.944	24.2	20.2	.58	7.03		38.4	37.6	39.1	.545
.039	.952	24.4	20.2	.63	11.20		31.7	30.7	32.9	.288
.039	.935	24.0	20.4	.62	16.78		--	--	20.0	.117
			(30)							
.040	.944	24.6	30.2	.60	6.81	(2.751)	--	--	36.3	.586
.039	.956	24.8	30.6	.59	11.33		--	--	35.9	.349
.039	.954	24.6	30.9	.60	18.20		--	--	32.6	.197
.039	.914	24.6	30.9	.60	27.16		17.7	17.0	20.3	.082
			(40)							
.039	.944	24.6	40.8	.60	9.37	(2.995)	28.6	29.5	30.7	.392
.039	.947	24.9	40.8	.60	15.68		25.3	26.2	30.8	.235
.039	.941	25.3	40.4	.62	25.02		27.9	28.4	30.4	.145
.039	.936	24.8	40.7	.60	37.54		19.2	17.4	21.7	.069
			(60)							
.038	.943	25.4	62.6	.61	14.49	(3.369)	14.8	16.1	23.6	.219
.039	.953	25.6	61.5	.60	24.05		13.4	14.1	23.9	.134
.039	.932	24.6	62.0	.61	38.50		13.2	14.1	22.4	.078
.039	.942	24.8	60.9	.61	57.73		11.8	12.2	17.9	.042
		(35)	(20)							
.039	.982	32.4	20.8	.56	4.07	(2.212)	29.1	25.8	37.1	.806
.039	.994	32.7	20.3	.56	6.88		29.0	25.9	35.7	.459
.041	.976	31.1	20.0	.54	10.91		30.6	25.4	31.6	.256
.041	1.033	32.0	19.3	.59	16.37		19.7	16.4	20.4	.110
			(30)							
.041	1.032	32.6	29.8	.58	6.71	(2.491)	28.0	25.1	33.2	.493
.040	.974	31.0	30.0	.60	11.19		30.6	25.1	32.0	.285
.040	1.004	32.2	30.2	.60	17.88		30.4	26.6	31.1	.174
.042	1.030	31.4	28.6	.60	26.89		22.0	17.7	22.9	.085
			(40)							
.040	1.007	32.4	41.2	.58	9.30	(2.722)	26.7	23.4	28.4	.332
.040	.994	32.2	39.8	.60	15.49		25.6	22.2	28.2	.198
.041	1.026	32.4	38.8	.60	24.85		26.3	23.1	28.2	.124
.041	1.035	32.3	38.8	.61	37.23		22.5	26.2	23.3	.068
			(60)							
.041	1.040	32.8	58.3	.60	14.42	(3.091)	13.8	13.1	22.1	.190
.041	1.028	33.2	58.7	.59	23.98		14.9	14.2	22.3	.115
.041	1.018	32.6	59.0	.60	38.40		15.2	14.7	21.4	.069
.040	1.028	33.6	60.8	.60	57.57		16.0	16.4	19.9	.043
		(50)	(20)							
.038	.970	51.2	20.9	.61	3.96	(1.974)	18.0	18.9	33.6	.671
.038	.952	50.4	21.0	.59	6.63		19.4	19.7	34.2	.408
.038	.965	50.7	20.6	.60	10.66		21.1	21.8	29.8	.221
.039	.949	49.2	20.6	.58	15.95		20.2	19.6	20.9	.104
			(30)							
.040	.986	49.8	29.8	.63	6.61	(2.219)	17.2	17.1	32.0	.430
.039	.989	51.2	30.8	.58	11.00		17.8	18.8	31.2	.252
.040	1.018	50.4	30.0	.60	17.54		20.1	20.5	29.7	.150
.041	1.032	51.2	29.2	.62	26.34		19.8	20.7	21.4	.072
			(40)							
.039	.971	50.7	41.0	.58	9.19	(2.430)	17.9	18.4	27.5	.291
.041	1.035	50.6	38.7	.59	15.34		18.4	18.9	28.8	.182
.038	.956	49.0	41.8	.60	24.53		19.1	18.4	26.0	.103
.042	1.049	50.2	38.2	.62	36.71		20.3	20.5	22.2	.059
			(60)							
.040	1.020	50.7	58.6	.62	14.40	(2.780)	14.9	14.2	22.6	.175
.040	1.007	50.6	60.0	.61	23.94		14.8	14.8	22.0	.102
.041	1.028	50.6	60.6	.58	38.18		15.1	14.4	21.8	.064
.041	1.032	51.8	60.0	.60	57.20		14.4	13.4	18.6	.036
		(75)	(20)							
.041	1.029	76.1	19.4	.62	3.78	(1.733)	8.2	8.4	30.3	.555
.040	1.023	76.7	18.7	.65	6.34		11.5	12.0	29.7	.325
.041	1.032	75.3	19.6	.60	10.11		11.4	11.5	28.1	.193
.042	1.048	76.0	19.6	.58	15.04		9.5	9.7	19.7	.091
			(30)							
.041	1.042	76.8	29.3	.58	6.40	(1.935)	10.4	10.9	30.0	.363
.043	1.091	77.2	28.2	.58	10.63		10.3	10.9	31.0	.225
.041	1.045	76.8	29.2	.60	16.98		8.9	9.3	27.9	.127
.042	1.072	77.5	28.6	.59	25.38		14.4	15.4	19.3	.059
			(40)							
.041	1.038	76.4	38.8	.59	8.88	(2.115)	12.7	13.2	27.2	.259
.041	1.048	78.0	39.2	.60	15.00		9.6	10.5	26.8	.151
.043	1.082	76.6	37.5	.58	23.80		11.5	12.0	27.5	.098
.041	1.053	77.9	38.6	.58	35.86		10.9	11.8	19.8	.047
			(60)							
.041	1.047	77.3	59.0	.59	14.03	(2.423)	16.5	17.5	21.6	.149
.041	1.050	76.8	57.7	.60	23.54		11.8	12.4	21.6	.089
.042	1.052	76.6	57.4	.59	37.68		9.7	10.2	21.3	.055
.042	1.064	77.7	57.6	.60	56.55		13.6	14.6	17.6	.030

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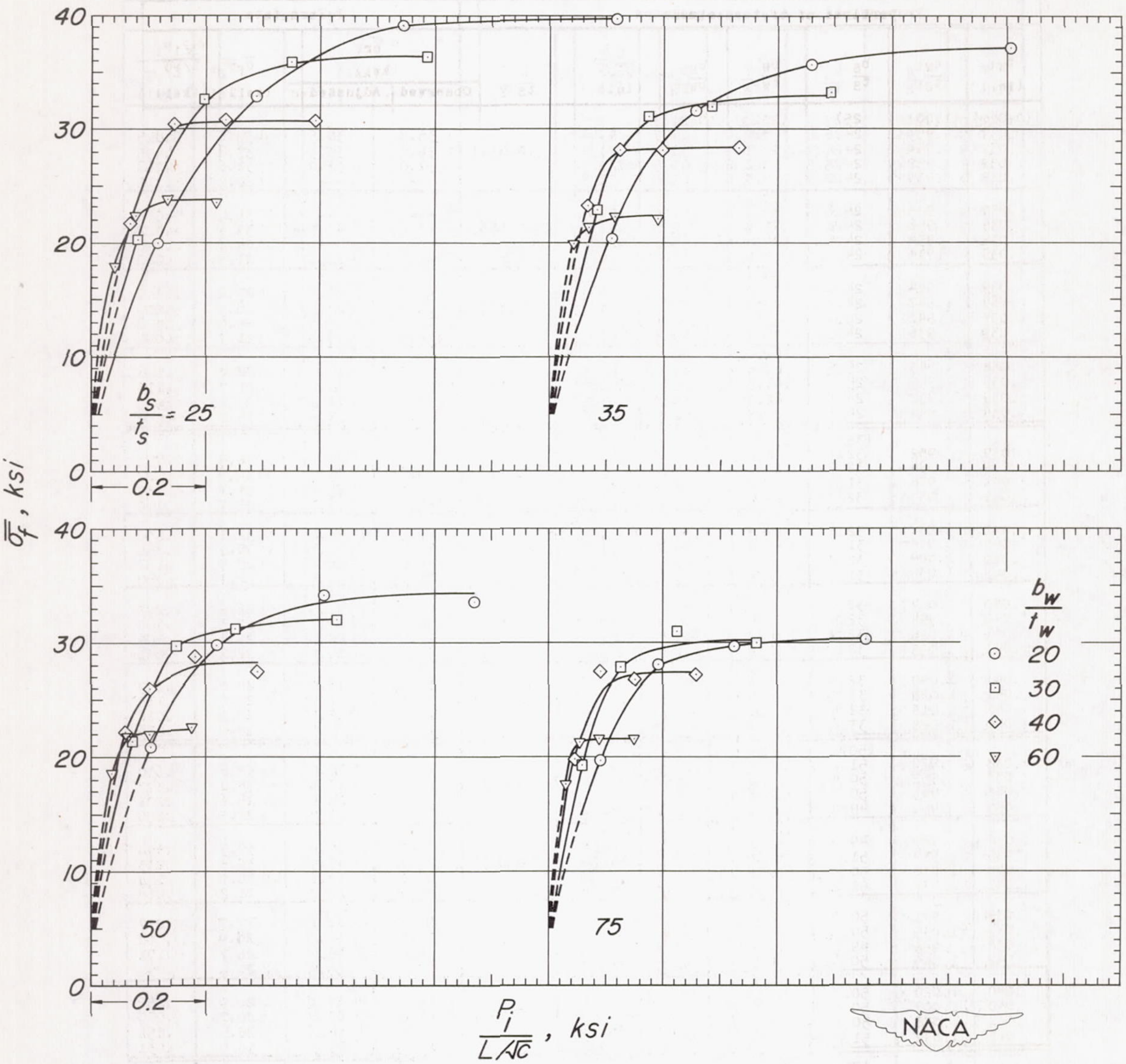

Figure 11.– Compressive strength of flat panels with hat-section stiffeners.

$\frac{t_W}{t_S} = 1.00; \ \frac{b_H}{b_W} = 0.6.$

TABLE 10

TEST DATA FOR FLAT PANELS WITH HAT SECTION STIFFENERS WITH $\frac{t_W}{t_S} = 1.00$, $\frac{b_H}{b_W} = 0.8$

[Nominal proportions are given in parentheses]

Proportions of test specimens							Test data			
t_W (in.)	$\frac{t_W}{t_S}$	$\frac{b_S}{t_S}$	$\frac{b_W}{t_W}$	$\frac{b_H}{b_W}$	$\frac{L}{\sqrt{c}}$ (in.)	$\frac{\bar{t}}{t_S}$	σ_{cr} (ksi) Observed	σ_{cr} (ksi) Adjusted	$\bar{\sigma}_f$ (ksi)	$\frac{P_1}{L/\sqrt{c}}$ (ksi)
(0.040)	(1.00)	(25)	(20)	(0.8)		(2.416)				
.039	.932	25.4	20.8	.77	4.42		35.8	36.5	38.6	0.845
.039	.952	24.7	20.3	.78	7.37		36.9	36.3	37.8	.495
.039	.929	25.5	21.2	.75	11.75		31.0	32.0	32.6	.268
.039	.929	24.7	21.0	.80	17.73		--	--	20.4	.111
			(30)			(2.680)				
.039	.942	24.6	32.0	.76	7.05		--	--	35.4	.538
.039	.932	24.5	30.6	.79	11.78		33.4	30.7	35.3	.322
.039	.943	24.8	30.0	.81	18.74		--	--	34.6	.198
.039	.926	24.6	30.6	.82	28.29		19.6	16.1	21.5	.082
			(40)			(2.885)				
.039	.921	24.1	41.4	.78	9.71		27.3	29.0	29.2	.347
.038	.934	25.0	41.2	.81	16.21		26.1	27.4	28.9	.206
.039	.942	25.2	40.8	.80	25.96		27.4	25.8	29.0	.128
.039	.942	24.9	40.4	.80	38.94		20.6	18.8	21.7	.064
			(60)			(3.180)				
.038	.938	25.0	61.6	.82	14.86		13.3	14.0	22.0	.188
.039	.931	25.2	62.4	.80	24.87		13.5	14.6	21.7	.111
.039	.925	24.0	62.2	.80	39.85		12.4	13.4	20.2	.064
.039	.932	25.0	60.2	.82	59.70		11.8	12.6	15.1	.032
		(35)	(20)			(2.199)				
.040	1.010	33.2	20.2	.78	4.32		32.1	29.5	36.9	.751
.040	.990	32.6	20.0	.77	7.18		28.8	25.7	34.8	.427
.039	.974	31.4	20.6	.85	11.54		30.6	25.7	31.3	.239
.040	1.012	32.9	20.2	.80	17.33		20.6	18.3	21.7	.110
			(30)			(2.450)				
.040	1.000	31.8	30.3	.78	6.99		28.5	24.4	32.1	.450
.040	1.013	33.0	30.3	.80	11.70		26.1	23.7	30.3	.254
.040	.997	31.5	29.8	.80	18.67		26.6	30.6	28.9	.152
.041	1.021	32.2	29.3	.80	27.98		21.7	18.5	22.9	.080
			(40)			(2.652)				
.041	1.023	31.7	39.2	.80	9.62		19.9	21.3	26.6	.293
.040	1.010	33.4	39.6	.80	16.09		24.9	27.7	27.3	.180
.040	1.024	33.2	40.8	.79	25.73		23.7	26.8	26.4	.109
.041	1.036	32.4	38.4	.83	38.64		21.5	24.4	22.4	.061
			(60)			(2.956)				
.040	1.029	33.2	59.6	.81	14.86		11.2	13.0	20.0	.159
.041	1.020	32.4	58.6	.80	21.97		13.1	12.5	21.0	.113
.041	1.024	32.0	58.2	.78	39.69		12.8	12.1	20.1	.060
.041	1.033	31.2	58.6	.80	59.49		13.7	13.1	18.0	.036
		(50)	(20)			(1.975)				
.038	.956	50.8	21.1	.76	4.24		21.2	22.0	33.8	.630
.041	1.030	50.6	19.6	.78	6.99		19.2	19.6	33.4	.377
.038	.958	51.0	21.5	.76	11.22		19.9	20.6	28.6	.201
.041	1.031	51.0	20.1	.76	16.85		19.9	20.7	21.3	.100
			(30)			(2.204)				
.040	.988	49.9	31.2	.77	6.88		19.1	19.0	30.7	.394
.038	.980	50.8	31.4	.81	11.46		17.3	17.9	30.3	.233
.039	.954	48.0	30.8	.80	18.34		19.1	17.6	30.0	.144
.039	.984	50.2	30.3	.81	27.54		20.0	20.2	21.2	.068
			(40)			(2.395)				
.041	1.033	50.6	39.2	.80	9.58		17.7	18.1	27.7	.277
.042	1.018	48.8	38.2	.80	15.92		20.0	19.0	28.0	.168
.041	1.041	50.0	38.9	.78	25.46		18.6	18.7	26.7	.101
.041	1.018	49.4	39.2	.80	38.13		20.4	19.9	21.4	.054
			(60)			(2.695)				
.040	1.088	53.7	58.0	.80	14.84		14.1	13.1	20.9	.152
.040	1.036	52.1	58.8	.82	24.68		13.6	13.0	20.7	.090
.041	1.026	51.3	59.8	.78	39.52		14.5	14.4	20.4	.056
.041	.984	48.8	57.8	.79	59.19		14.3	13.3	16.9	.031
		(75)	(20)			(1.743)				
.041	1.044	75.9	19.6	.81	4.04		11.0	11.3	31.1	.537
.041	1.047	77.2	19.6	.80	6.71		12.0	12.7	30.2	.314
.041	1.048	76.7	19.6	.80	10.74		11.9	12.4	27.6	.179
.041	1.060	76.7	18.9	.82	16.11		10.1	10.6	20.0	.087
			(30)			(1.882)				
.041	1.030	75.6	29.2	.78	6.71		11.2	11.4	28.8	.324
.044	1.104	77.0	27.6	.78	11.12		11.8	12.4	30.0	.203
.041	1.045	77.4	29.2	.79	17.77		9.6	10.2	26.6	.113
.043	1.092	77.2	28.5	.77	26.66		9.6	10.2	20.6	.058
			(40)			(2.107)				
.041	1.032	77.1	39.2	.78	9.38		11.9	12.6	25.6	.230
.041	.996	74.1	39.1	.79	15.50		11.5	11.3	25.2	.137
.041	1.062	77.3	39.0	.78	24.91		8.5	9.0	25.5	.086
.041	1.052	77.8	38.9	.78	37.35		11.8	12.7	20.4	.046
			(60)			(2.386)				
.042	1.052	76.4	57.6	.80	14.52		9.8	10.1	20.6	.135
.042	1.058	76.4	57.2	.80	24.39		13.0	13.5	20.6	.080
.041	1.038	76.6	59.2	.80	39.06		11.8	12.3	19.1	.047
.042	1.052	76.2	57.8	.79	58.48		13.6	14.0	15.8	.026

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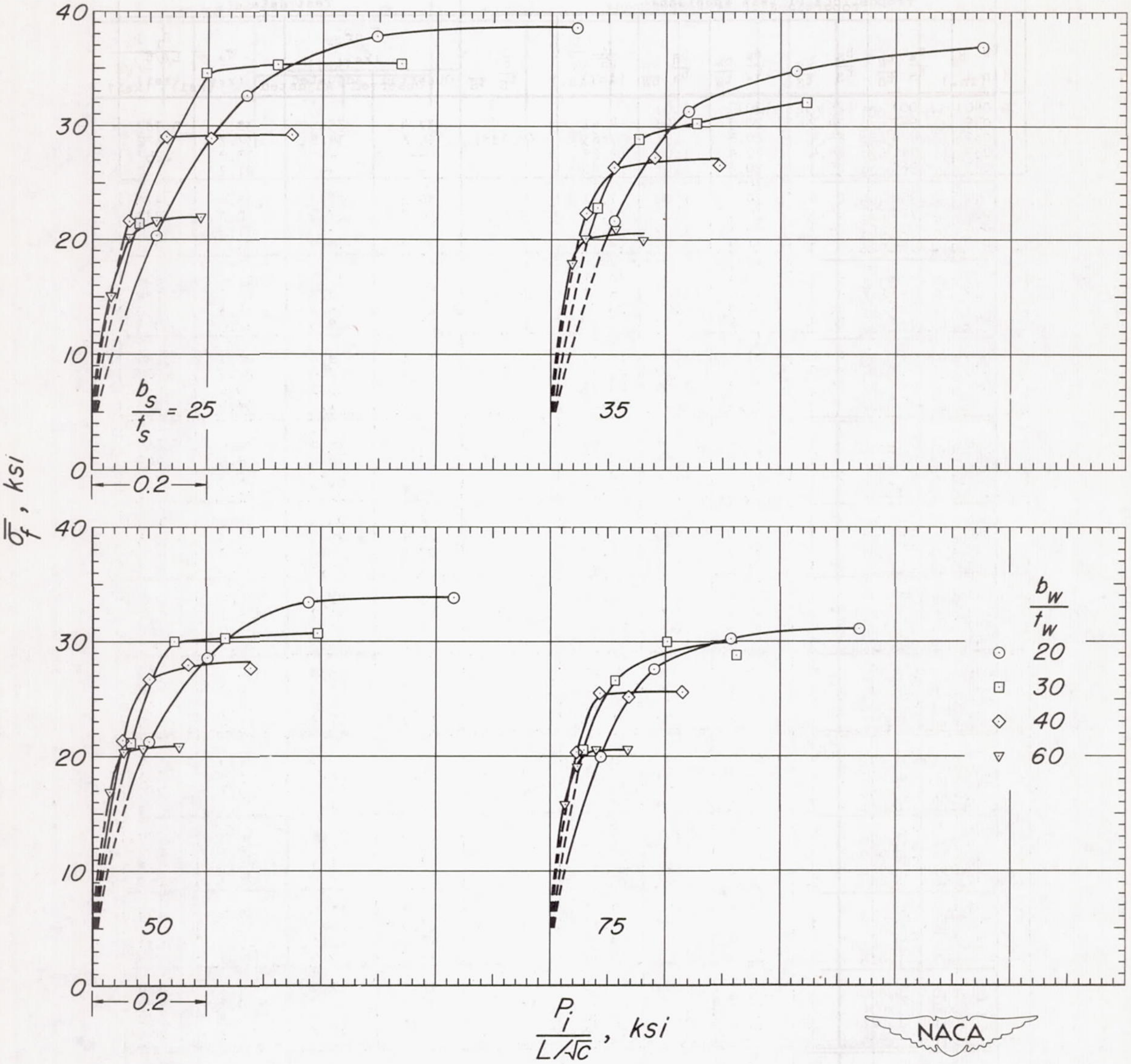

Figure 12.- Compressive strength of flat panels with hat-section stiffeners. $\frac{t_W}{t_S} = 1.00$; $\frac{b_H}{b_W} = 0.8$.

TABLE 11

TEST DATA FOR FLAT PANELS WITH HAT-SECTION STIFFENERS WITH $\frac{t_W}{t_S} = 1.00$, $\frac{b_H}{b_W} = 1.0$

[Nominal proportions are given in parentheses]

Proportions of test specimens							Test data			
t_W (in.)	$\frac{t_W}{t_S}$	$\frac{b_S}{t_S}$	$\frac{b_W}{t_W}$	$\frac{b_H}{b_W}$	$\frac{L}{\sqrt{c}}$ (in.)	$\frac{\bar{t}}{t_S}$	σ_{cr} (ksi) Observed	σ_{cr} (ksi) Adjusted	$\bar{\sigma}_f$ (ksi)	$\frac{P_1}{L/\sqrt{c}}$ (ksi)
(0.040)	(1.00)	(25)	(20)	(1.0)						
.039	.942	24.2	20.3	.98	4.61		37.4	35.9	38.0	0.787
.039	.934	24.4	20.8	.96	7.63	(2.388)	35.8	34.8	37.7	.472
.039	.941	24.4	20.4	1.00	12.28		--	--	33.0	.257
.039	.960	25.3	20.8	.98	18.40		--	--	21.2	.110
			(30)							
.040	.950	25.0	30.0	1.00	7.31		30.2	27.7	33.4	.478
.039	.928	24.3	30.8	1.00	12.16	(2.620)	30.8	27.9	32.8	.283
.040	.956	24.4	30.1	1.00	19.44		--	--	31.5	.170
.038	.922	24.4	31.0	1.00	29.25		20.6	18.9	22.1	.079
			(40)							
.039	.938	24.8	40.0	1.01	10.01		24.8	22.3	27.4	.306
.039	.943	25.2	41.0	1.00	16.68	(2.795)	21.0	16.7	27.5	.184
.039	1.026	27.6	40.8	1.00	26.71		22.0	26.2	26.2	.110
.039	.948	24.8	40.2	1.00	39.97		21.0	19.3	22.5	.063
			(60)							
.039	.944	25.2	61.2	1.00	15.31		11.8	12.4	20.7	.164
.039	.938	24.0	61.1	1.00	25.49	(3.038)	12.1	12.6	21.0	.100
.039	.944	25.2	61.8	1.00	40.77		11.4	12.1	19.0	.057
.039	.942	24.4	60.2	1.02	61.14		11.0	11.7	14.4	.028
		(35)	(20)							
.039	.976	32.0	21.3	.96	4.52		30.4	26.4	34.5	.669
.041	1.023	32.5	19.8	.98	7.51	(2.188)	30.0	26.2	34.5	.402
.040	.986	31.0	21.6	.92	12.07		--	--	30.9	.224
.041	1.030	32.2	19.5	.98	18.09		20.0	17.0	21.3	.103
			(30)							
.040	1.024	32.7	30.4	.98	7.24		26.4	23.6	30.2	.404
.040	.998	32.7	31.2	.96	12.07	(2.416)	28.1	25.2	29.3	.235
.040	1.042	33.8	30.3	.98	19.33		27.6	26.0	29.0	.145
.041	1.038	31.8	29.1	1.02	28.95		21.6	25.2	22.5	.075
			(40)							
.041	1.020	32.3	38.8	1.00	9.95		19.3	21.5	25.5	.263
.039	.994	33.0	40.4	1.00	16.61	(2.595)	19.3	21.7	25.1	.157
.041	1.020	33.0	39.2	1.00	26.50		18.4	20.3	25.0	.098
.041	1.022	31.0	38.5	1.03	39.74		20.1	23.1	21.1	.055
			(60)							
.039	.949	31.8	62.0	.98	15.25		10.6	10.4	19.0	.142
.041	1.032	32.0	57.9	1.00	25.46	(2.851)	10.7	11.6	19.8	.089
.040	1.021	32.4	59.2	1.00	40.72		10.0	10.9	18.2	.051
.041	1.038	31.8	58.9	1.00	61.00		11.7	11.2	15.6	.029
		(50)	(20)							
.039	.966	51.0	21.0	.97	4.43		18.2	19.0	32.5	.580
.039	.975	50.0	21.8	.94	7.31	(1.976)	21.4	21.5	33.4	.361
.039	.968	50.5	21.1	.96	11.71		19.1	19.5	29.7	.200
.040	1.014	50.6	20.2	.96	17.64		20.5	21.1	22.1	.099
			(30)							
.041	1.032	50.6	29.0	1.00	7.15		17.0	17.4	30.8	.377
.039	.978	50.0	30.8	1.00	11.87	(2.191)	19.7	19.7	29.8	.220
.038	.966	50.6	31.2	.98	18.97		18.2	18.7	27.7	.128
.039	.938	48.4	30.7	.98	28.45		20.1	18.8	22.4	.069
			(40)							
.041	1.032	51.3	39.4	1.00	9.87		16.7	17.6	25.5	.244
.041	1.044	50.3	38.8	1.02	16.37	(2.364)	18.0	18.3	25.4	.146
.041	1.019	49.4	39.0	1.00	26.18		18.2	17.8	25.3	.091
.040	1.000	50.8	39.4	1.02	39.37		19.2	19.8	20.3	.049
			(60)							
.040	1.004	51.4	61.1	.98	15.20		12.7	12.9	19.7	.136
.041	1.038	49.8	58.2	1.02	25.34	(2.628)	13.1	12.7	20.0	.083
.041	1.044	50.4	57.9	1.00	40.50		13.1	12.2	19.2	.050
.041	1.036	50.6	58.5	.99	60.72		12.6	11.8	15.2	.026
		(75)	(20)							
.042	1.061	77.6	19.7	.94	4.23		11.0	11.8	31.1	.515
.041	1.054	77.5	19.6	.97	7.05	(1.753)	10.5	11.2	29.3	.291
.042	1.077	76.8	19.1	.97	11.23		11.3	11.9	27.9	.174
.041	1.056	77.4	19.5	.98	16.56		11.1	11.8	20.4	.086
			(30)							
.043	1.106	77.8	28.2	.98	7.00		10.2	10.9	28.8	.319
.041	1.046	76.8	28.8	1.00	11.54	(1.938)	10.2	10.7	26.9	.181
.043	1.092	77.8	28.0	1.00	18.46		11.7	12.6	26.9	.113
.043	1.086	76.4	28.4	.98	27.65		11.6	12.1	21.0	.059
			(40)							
.039	1.004	76.8	40.7	1.00	9.65		10.3	10.8	23.3	.203
.042	1.062	77.6	37.6	1.00	16.00	(2.100)	8.8	9.4	23.9	.126
.041	1.055	77.3	39.2	.99	25.71		10.1	10.8	24.2	.079
.042	1.046	76.0	38.0	1.01	38.52		10.8	11.2	19.5	.042
			(60)							
.041	1.060	78.4	58.0	1.00	15.05		9.2	10.1	19.6	.123
.042	1.064	76.4	60.7	1.01	25.08	(2.355)	10.6	10.8	19.4	.073
.042	1.066	76.8	56.3	1.00	40.18		9.9	10.4	17.8	.042
.041	1.054	76.8	56.9	1.01	60.11		14.2	14.8	14.3	.022

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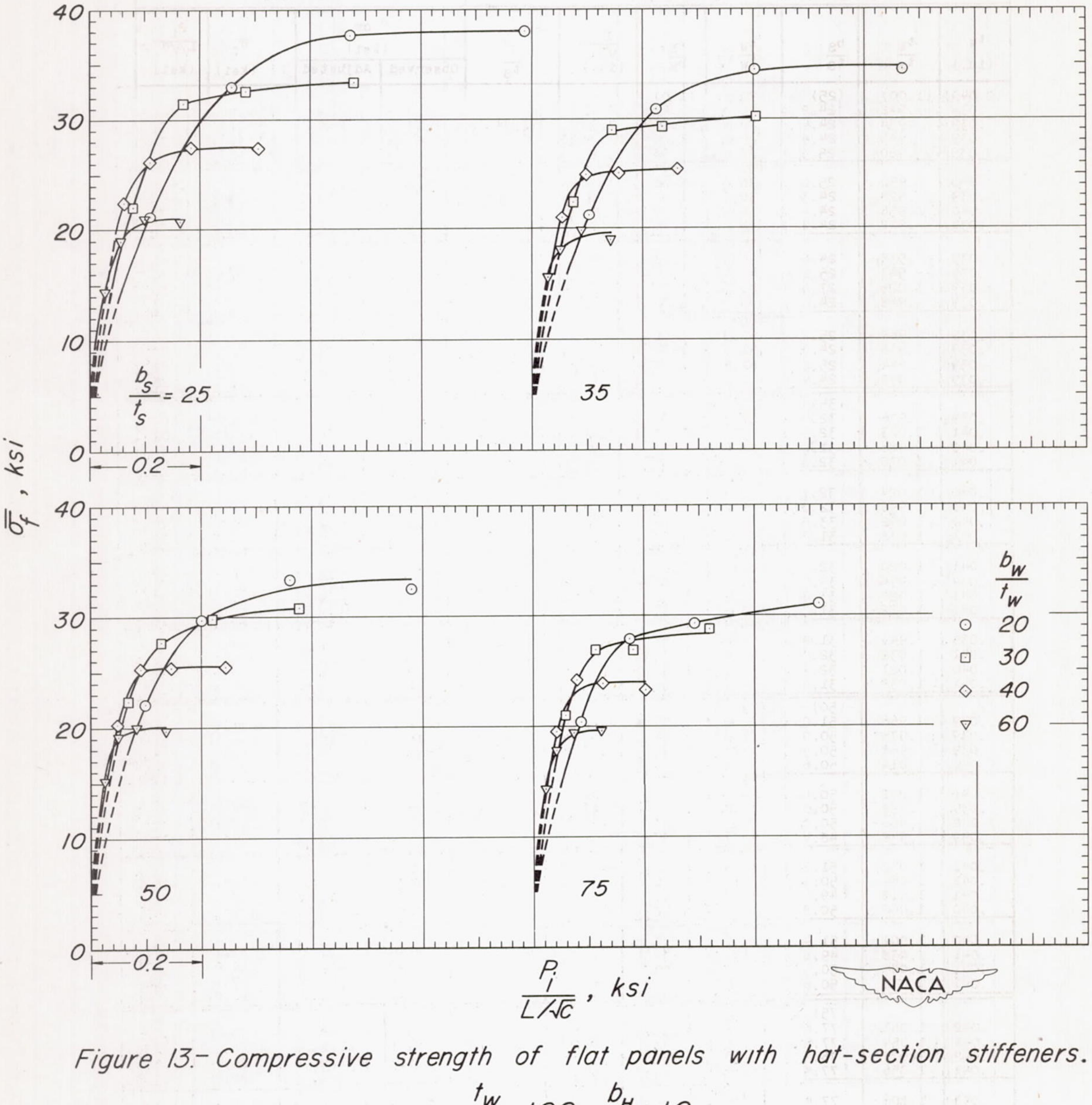

Figure 13.- Compressive strength of flat panels with hat-section stiffeners.
$\frac{t_W}{t_S} = 1.00$; $\frac{b_H}{b_W} = 1.0$.

TABLE 12

TEST DATA FOR FLAT PANELS WITH HAT-SECTION STIFFENERS WITH $\frac{t_W}{t_S} = 1.00$, $\frac{b_H}{b_W} = 1.2$

[Nominal proportions are given in parentheses]

Proportions of test specimens							Test data			
t_W (in.)	$\frac{t_W}{t_S}$	$\frac{b_S}{t_S}$	$\frac{b_W}{t_W}$	$\frac{b_H}{b_W}$	$\frac{L}{\sqrt{c}}$ (in.)	$\frac{\bar{t}}{t_S}$	σ_{cr} (ksi) Observed	σ_{cr} (ksi) Adjusted	$\bar{\sigma}_f$ (ksi)	$\frac{P_1}{L/\sqrt{c}}$ (ksi)
(0.040)	(1.00)	(25)	(20)	(1.2)						
.038	.914	24.2	21.2	1.16	4.76	(2.364)	35.0	33.6	36.7	0.729
.039	.934	24.5	21.8	1.12	7.89		34.6	33.0	35.7	.428
.039	.928	24.2	21.6	1.12	12.68		31.7	30.1	32.6	.243
.038	.948	24.8	20.6	1.23	18.92		18.6	18.6	20.2	.101
.039	.930	25.0	(30) 32.2	1.15	7.49	(2.572)	27.0	25.1	31.6	.434
.039	.943	25.7	30.8	1.19	12.50		24.9	23.1	31.1	.256
.039	.946	25.5	30.4	1.22	19.95		--	--	29.3	.151
.039	.938	24.6	30.4	1.22	29.86		--	--	22.5	.077
.038	.934	25.0	(40) 40.8	1.24	10.21	(2.722)	18.0	16.5	25.1	.268
.039	.944	26.5	41.2	1.20	17.06		19.0	17.7	25.7	.164
.039	.940	25.6	40.8	1.20	27.23		17.0	15.6	23.1	.092
.039	.947	25.4	41.0	1.18	40.91		18.0	18.3	19.1	.051
.039	.931	24.8	(60) 61.2	1.20	15.57	(2.926)	10.3	10.7	19.7	.148
.039	.935	25.2	61.9	1.20	25.97		8.2	7.6	19.4	.088
.039	.946	24.0	61.6	1.20	41.60		8.3	8.9	18.2	.051
.039	.946	24.4	60.7	1.22	62.39		8.7	9.3	13.3	.025
.040	1.015	(35) 31.6	(20) 20.6	1.18	4.68	(2.178)	28.9	24.4	33.4	.622
.039	.997	32.2	20.3	1.18	7.75		28.5	24.9	32.6	.367
.040	.994	31.8	21.3	1.12	12.43		28.7	24.7	29.4	.206
.040	1.000	31.4	20.1	1.19	18.62		22.5	18.4	23.3	.109
.039	.992	32.6	(30) 30.8	1.18	7.43	(2.387)	20.6	23.4	28.9	.371
.040	1.000	33.1	32.2	1.08	12.41		21.5	23.8	28.3	.218
.040	1.001	33.2	30.0	1.20	19.81		20.2	23.0	27.4	.132
.041	1.028	32.7	29.4	1.20	29.73		21.4	24.2	22.4	.072
.040	.994	31.0	(40) 41.2	1.18	10.17	(2.545)	14.5	14.0	24.1	.241
.039	.984	32.6	40.8	1.19	16.92		15.5	17.1	23.1	.139
.041	1.025	32.6	39.6	1.19	27.15		16.3	18.2	23.2	.087
.041	1.018	32.4	39.2	1.20	40.72		19.1	18.5	19.6	.049
.040	1.004	33.1	(60) 60.1	1.19	15.58	(2.767)	6.0	6.4	18.2	.129
.041	1.040	33.0	58.5	1.19	25.98		8.9	9.7	18.6	.079
.041	1.025	32.2	59.0	1.20	41.56		9.4	9.2	17.7	.047
.041	1.024	31.0	58.6	1.20	62.24		8.2	9.0	14.3	.025
.038	.976	(50) 51.6	(20) 21.0	1.18	4.58	(1.977)	18.0	19.2	31.9	.551
.038	.973	51.6	22.2	1.12	7.59		19.8	21.0	32.0	.334
.038	.954	50.4	21.4	1.17	12.18		16.7	17.0	30.1	.196
.039	.978	49.9	20.3	1.19	18.28		19.5	19.5	22.5	.097
.041	1.014	50.2	(30) 28.8	1.22	7.35	(2.180)	17.9	17.5	29.9	.354
.041	1.020	50.2	30.6	1.14	12.08		18.6	18.8	29.5	.213
.038	.954	49.5	31.0	1.20	19.56		18.1	17.7	27.2	.121
.039	.930	48.2	31.0	1.20	29.28		20.7	19.2	21.2	.063
.040	.980	49.0	(40) 40.2	1.20	10.13	(2.338)	20.2	19.4	24.0	.222
.040	.942	47.4	40.5	1.22	16.82		17.4	15.7	23.7	.132
.039	.978	49.6	40.8	1.20	26.85		17.0	16.8	23.0	.080
.041	.966	47.3	39.0	1.22	40.21		18.4	16.5	19.2	.045
.041	.986	48.3	(60) 58.9	1.20	15.53	(2.572)	11.5	11.1	19.1	.127
.040	1.022	50.2	59.8	1.20	25.83		9.8	9.8	19.0	.076
.041	1.036	50.3	60.7	1.18	41.38		9.2	8.6	17.2	.043
.041	1.036	51.4	60.1	1.16	62.00		9.8	9.2	14.0	.023
.041	1.052	(75) 77.8	(20) 19.6	1.15	4.10	(1.762)	9.6	10.4	30.5	.524
.042	1.058	77.0	19.3	1.20	7.27		13.1	13.8	29.2	.283
.041	1.058	77.2	19.4	1.21	11.77		9.3	9.9	28.3	.169
.041	1.052	77.2	19.4	1.18	17.51		8.7	9.2	20.5	.083
.042	1.066	76.9	(30) 28.6	1.20	7.17	(1.941)	8.7	9.2	28.1	.304
.041	1.047	76.7	29.7	1.18	11.88		10.5	11.0	27.7	.181
.042	1.062	76.3	28.6	1.20	19.00		11.4	11.8	25.2	.103
.041	1.052	77.4	29.0	1.20	28.57		11.2	11.9	19.0	.052
.042	1.068	77.5	(40) 38.6	1.18	9.87	(2.094)	11.0	11.8	23.2	.196
.042	1.060	77.4	38.5	1.18	16.41		8.4	9.0	22.9	.117
.041	1.040	76.3	38.6	1.19	26.43		8.5	8.8	22.4	.071
.041	1.049	77.8	38.8	1.18	39.58		10.3	11.1	17.4	.037
.042	1.049	77.4	(60) 57.5	1.18	15.41	(2.329)	8.4	9.0	18.6	.112
.040	1.015	77.0	60.2	1.20	25.55		8.5	9.0	17.8	.065
.041	1.040	75.2	56.8	1.22	40.97		9.0	9.1	17.4	.040
.042	1.056	76.2	57.7	1.20	61.43		7.1	6.8	12.3	.019

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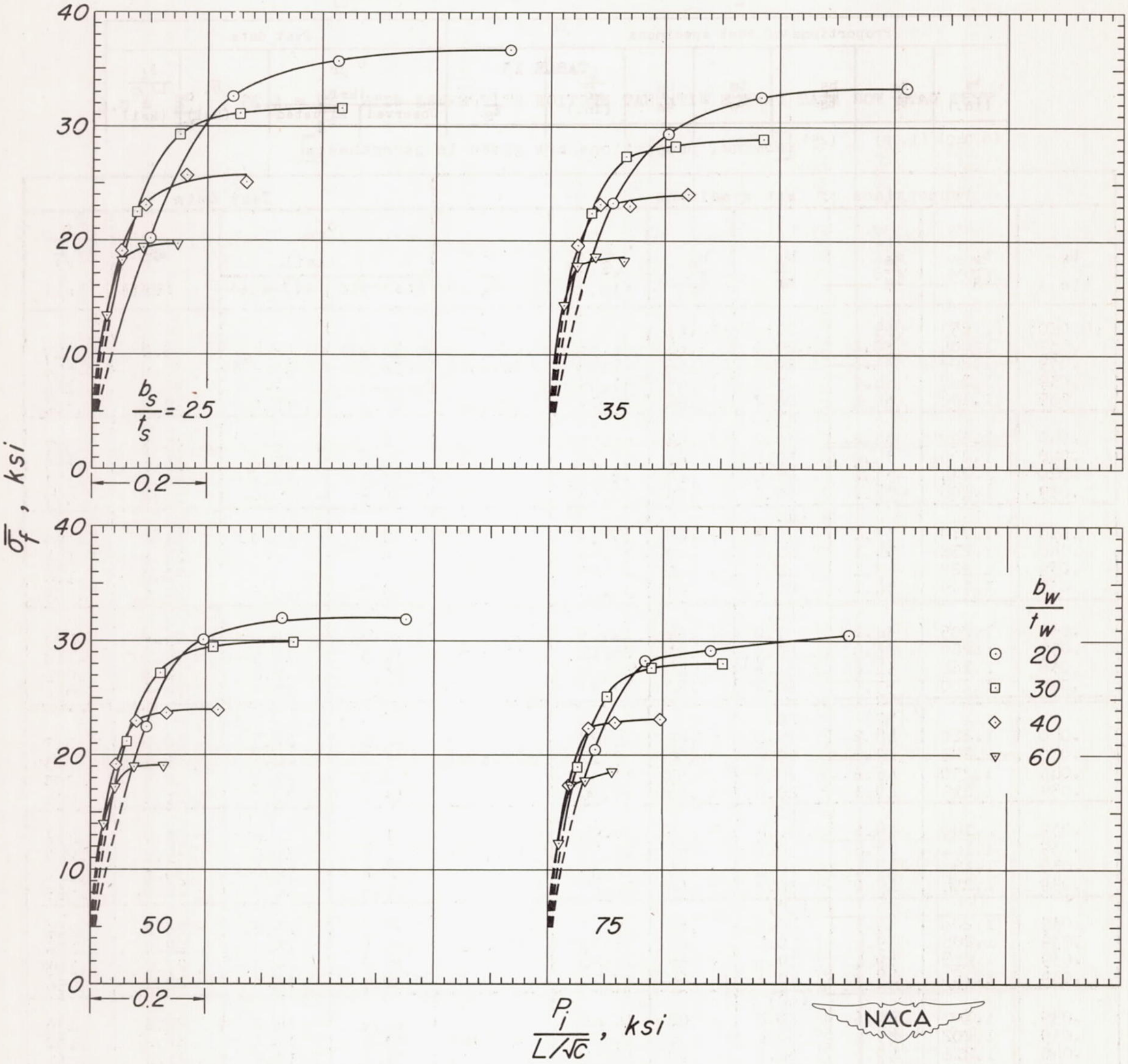

Figure 14.- Compressive strength of flat panels with hat-section stiffeners. $\frac{t_W}{t_S} = 1.00$; $\frac{b_H}{b_W} = 1.2$.

TABLE 13

TEST DATA FOR FLAT PANELS WITH HAT SECTION STIFFENERS WITH $\frac{t_W}{t_S} = 1.25$, $\frac{b_H}{b_W} = 0.6$

[Nominal proportions are given in parentheses]

Proportions of test specimens							Test data			
							σ_{cr} (ksi)			
t_W (in.)	$\frac{t_W}{t_S}$	$\frac{b_S}{t_S}$	$\frac{b_W}{t_W}$	$\frac{b_H}{b_W}$	$\frac{L}{\sqrt{c}}$ (in.)	$\frac{\bar{t}}{t_S}$	Observed	Adjusted	$\bar{\sigma}_f$ (ksi)	$\frac{P_1}{L/\sqrt{c}}$ (ksi)
(0.040)	(1.25)	(35)	(20)	(0.6)						
.039	1.204	33.2	20.0	.64	4.36	(2.680)	34.9	32.4	38.2	0.749
.039	1.203	34.0	20.2	.60	7.28		36.7	35.3	38.0	.446
.039	1.207	34.0	19.8	.65	11.59		--	--	33.2	.245
.039	1.198	33.8	20.2	.62	17.37		19.3	18.0	20.8	.102
			(30)							
.040	1.240	35.2	30.2	.62	6.91	(3.062)	--	--	35.7	.507
.040	1.200	34.4	30.2	.61	11.58		34.3	33.6	35.3	.299
.040	1.234	34.6	30.4	.60	18.47		31.3	30.6	32.3	.171
.039	1.208	34.2	30.6	.60	27.53		26.8	27.9	21.6	.077
			(40)							
.040	1.219	33.4	40.3	.60	9.53	(3.375)	30.0	30.0	31.3	.355
.040	1.212	34.1	40.4	.60	15.85		--	--	29.1	.198
.039	1.222	35.1	40.5	.60	25.27		--	--	30.0	.128
.039	1.199	34.2	40.0	.62	37.92		18.7	18.2	20.6	.059
			(60)							
.039	1.205	34.2	61.0	.60	14.46	(3.860)	14.6	15.1	23.2	.198
.039	1.200	33.9	60.4	.61	24.11		14.3	14.5	23.1	.118
.038	1.164	34.6	62.6	.60	38.54		13.9	15.2	22.3	.071
.040	1.200	33.6	60.2	.60	57.85		13.2	13.3	18.3	.039
		(50)	(20)							
.040	1.220	48.2	19.8	.62	4.27	(2.360)	24.1	22.8	36.6	.647
.040	1.223	49.2	19.8	.64	7.11		25.2	24.5	36.1	.383
.040	1.230	48.6	19.6	.63	11.33		28.5	27.1	30.5	.203
.039	1.215	49.1	20.0	.62	17.00		19.4	21.5	21.2	.094
			(30)							
.039	1.188	48.6	30.4	.60	6.94	(2.710)	21.3	21.0	33.0	.412
.039	1.184	48.8	30.6	.60	11.50		24.9	23.9	33.0	.249
.039	1.187	48.4	30.4	.60	18.36		24.2	22.9	30.2	.142
.039	1.204	49.0	30.3	.60	27.40		19.5	18.7	20.6	.065
			(40)							
.039	1.208	49.3	40.3	.60	9.47	(3.000)	23.3	23.2	29.2	.296
.039	1.208	49.4	40.4	.60	15.79		23.6	23.0	28.9	.176
.039	1.218	49.4	39.6	.60	25.22		19.9	19.4	27.2	.103
.039	1.183	48.7	40.2	.60	37.76		20.4	18.9	22.1	.056
			(60)							
.039	1.197	49.6	60.8	.60	14.48	(3.470)	14.4	14.2	22.6	.173
.039	1.202	49.4	60.4	.60	24.13		13.4	13.1	22.2	.102
.040	1.216	49.0	60.6	.60	38.58		14.1	13.5	21.2	.061
.040	1.202	47.6	60.6	.60	57.92		13.6	12.3	18.1	.035

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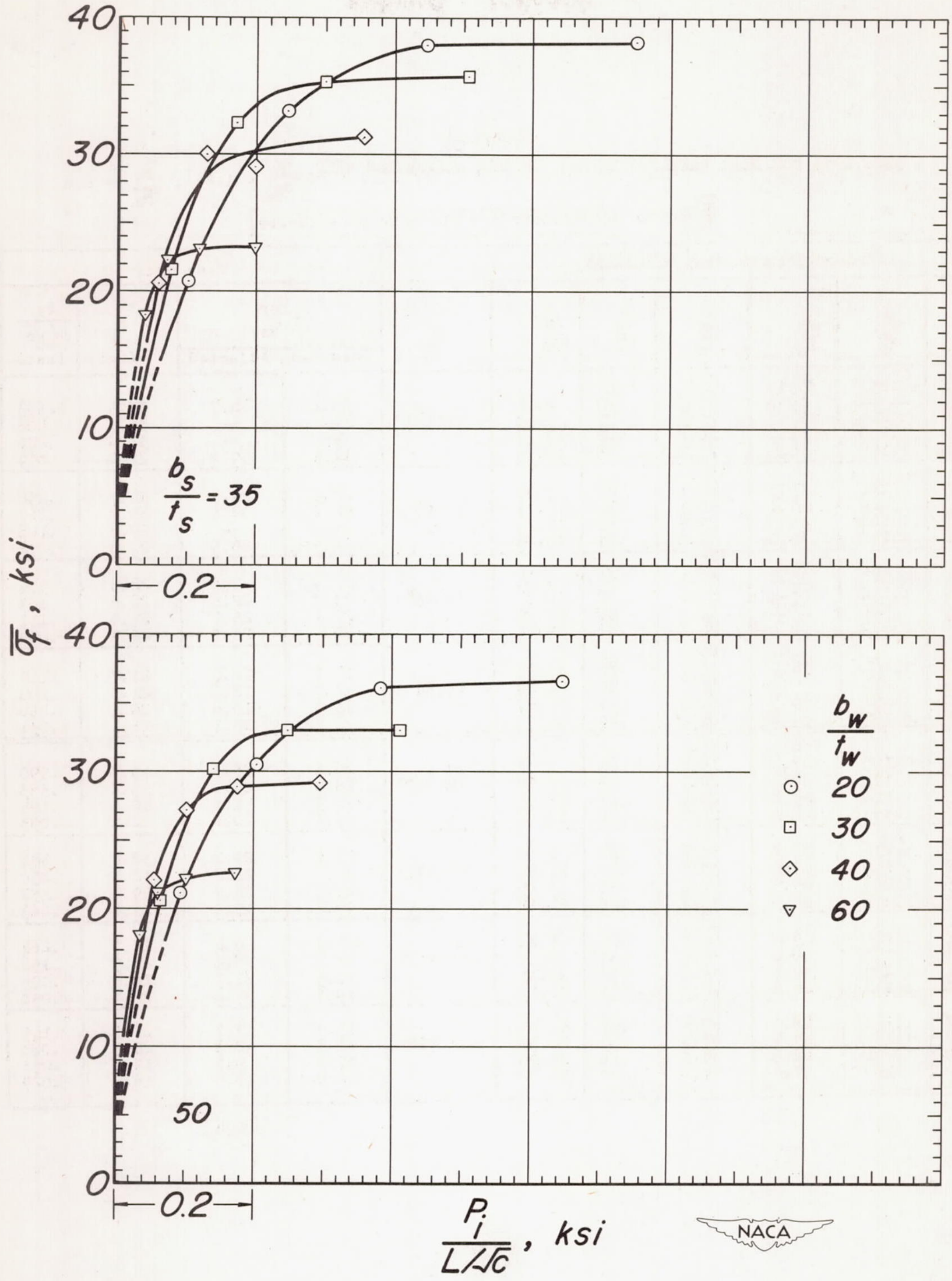

Figure 15.- Compressive strength of flat panels with hat-section stiffeners. $\frac{t_W}{t_S} = 1.25$; $\frac{b_H}{b_W} = 0.6$.

TABLE 14

TEST DATA FOR FLAT PANELS WITH HAT-SECTION STIFFENERS WITH $\frac{t_W}{t_S} = 1.25$, $\frac{b_H}{b_W} = 0.8$

[Nominal proportions are given in parentheses]

Proportions of test specimens							Test data			
t_W (in.)	$\frac{t_W}{t_S}$	$\frac{b_S}{t_S}$	$\frac{b_W}{t_W}$	$\frac{b_H}{b_W}$	$\frac{L}{\sqrt{c}}$ (in.)	$\frac{\bar{t}}{t_S}$	σ_{cr} (ksi) Observed	σ_{cr} (ksi) Adjusted	$\bar{\sigma}_f$ (ksi)	$\frac{P_i}{L/\sqrt{c}}$ (ksi)
(0.040)	(1.25)	(35)	(20)	(0.8)						
.040	1.228	34.6	20.0	.82	4.58	(2.645)	35.2	34.7	37.5	0.693
.039	1.204	34.9	20.2	.77	7.60		--	--	36.4	.406
.039	1.208	34.0	20.2	.82	12.16		--	--	32.5	.226
.039	1.198	34.8	20.6	.78	18.15		19.3	19.2	21.2	.099
			(30)							
.039	1.221	35.2	30.6	.80	7.22	(2.985)	28.8	29.5	34.7	.458
.040	1.220	34.1	30.1	.82	12.05		32.2	32.1	33.7	.267
.039	1.224	34.4	29.8	.82	19.23		--	--	29.8	.148
.040	1.210	35.0	30.2	.81	28.83		26.5	26.5	21.8	.072
			(40)							
.039	1.188	33.3	40.4	.81	9.84	(3.250)	22.9	21.6	28.8	.304
.039	1.190	33.4	40.0	.82	16.38		23.2	22.8	28.8	.183
.039	1.182	33.8	40.3	.82	26.23		27.1	25.7	27.9	.111
.039	1.194	34.2	40.8	.81	39.26		20.6	20.0	22.1	.059
			(60)							
.039	1.184	34.0	60.8	.81	14.91	(3.640)	12.7	12.0	21.7	.169
.039	1.211	35.0	61.0	.80	24.88		12.7	12.6	21.3	.100
.039	1.192	33.5	61.2	.81	39.87		13.3	13.8	20.4	.060
.039	1.199	34.7	61.4	.79	59.75		12.5	13.1	16.1	.031
		(50)	(20)							
.040	1.195	47.4	19.8	.84	4.55	(2.352)	25.5	23.3	35.7	.590
.039	1.174	47.4	20.2	.83	7.50		25.2	23.0	35.2	.353
.039	1.200	48.8	20.4	.81	11.97		32.3	31.1	30.8	.194
.039	1.193	48.6	20.2	.80	17.86		21.2	20.0	22.1	.093
			(30)							
.040	1.216	48.2	30.2	.80	7.19	(2.672)	25.6	25.2	32.4	.386
.040	1.198	47.8	30.9	.80	11.94		26.8	24.8	32.1	.230
.039	1.208	49.6	30.0	.80	19.15		25.2	24.7	29.6	.132
.039	1.199	49.6	30.6	.80	28.62		19.5	19.3	21.0	.063
			(40)							
.039	1.202	49.2	40.8	.80	9.84	(2.930)	20.9	29.4	27.7	.264
.039	1.193	48.4	39.8	.82	16.33		21.1	28.6	27.5	.158
.040	1.227	50.6	39.6	.80	26.11		20.5	21.0	26.5	.095
.039	1.212	49.8	40.2	.81	39.12		19.6	19.4	20.7	.050
			(60)							
.040	1.222	48.9	60.8	.80	14.96	(3.320)	13.7	13.1	21.0	.149
.040	1.189	49.2	60.7	.80	24.92		11.3	10.3	20.7	.088
.039	1.184	48.6	61.1	.80	39.90		10.2	9.8	19.3	.051
.040	1.169	47.3	61.5	.79	59.82		12.0	10.8	16.4	.029

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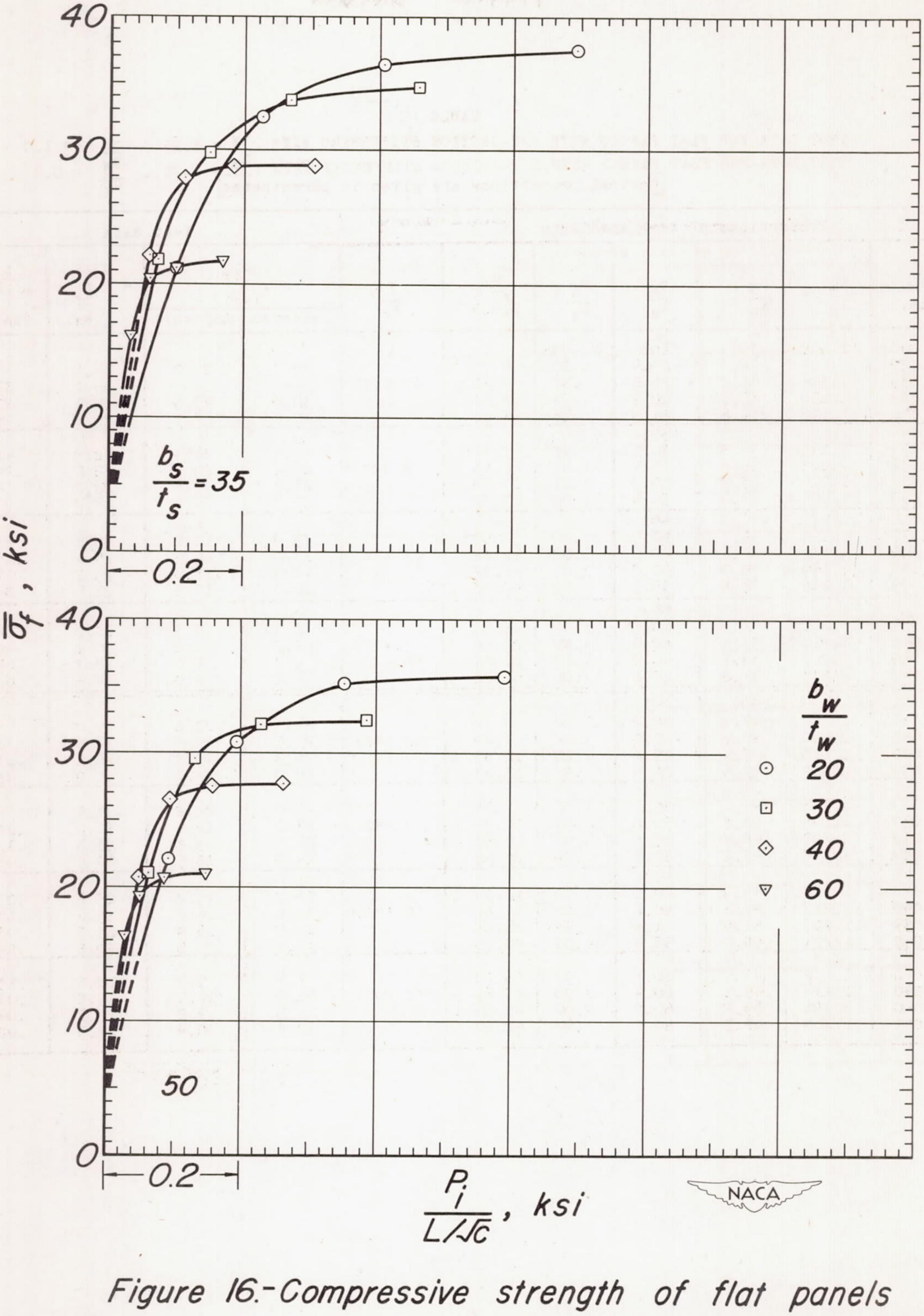

Figure 16.- Compressive strength of flat panels with hat-section stiffeners. $\frac{t_w}{t_s} = 1.25$; $\frac{b_H}{b_w} = 0.8$.

TABLE 15

TEST DATA FOR FLAT PANELS WITH HAT-SECTION STIFFENERS WITH $\frac{t_W}{t_S} = 1.25$, $\frac{b_H}{b_W} = 1.0$

[Nominal proportions are given in parentheses]

Proportions of test specimens							Test data			
t_W (in.)	$\frac{t_W}{t_S}$	$\frac{b_S}{t_S}$	$\frac{b_W}{t_W}$	$\frac{b_H}{b_W}$	$\frac{L}{\sqrt{c}}$ (in.)	$\frac{\bar{t}}{t_S}$	σ_{cr} (ksi) Observed	σ_{cr} (ksi) Adjusted	$\bar{\sigma}_f$ (ksi)	$\frac{P_1}{L/\sqrt{c}}$ (ksi)
(0.040)	(1.25)	(35)	(20)	(1.0)						
.039	1.214	34.3	20.4	1.00	4.74		32.7	33.0	36.6	0.647
.039	1.204	35.1	20.5	.98	7.89	(2.617)	--	--	35.7	.378
.039	1.190	35.0	20.4	.99	12.61		30.8	29.6	32.4	.215
.040	1.198	34.6	21.0	.96	18.87		20.2	18.9	21.2	.094
			(30)							
.039	1.193	34.8	30.6	.98	7.46		27.5	26.3	32.7	.410
.039	1.223	35.1	30.1	1.04	12.44	(2.920)	25.2	26.2	32.8	.247
.039	1.216	35.2	30.3	1.01	19.84		28.3	28.9	29.8	.140
.039	1.201	34.0	30.4	1.00	29.70		20.7	19.6	22.2	.070
			(40)							
.039	1.195	34.4	40.9	1.00	10.07		13.9	13.8	26.6	.266
.039	1.180	34.6	40.6	1.02	16.82	(3.150)	18.0	16.9	26.1	.156
.039	1.193	34.0	40.8	1.01	26.93		17.9	18.0	25.2	.094
.039	1.212	33.8	39.3	1.02	40.38		16.9	16.8	21.5	.054
			(60)							
.039	1.212	34.2	60.6	1.02	15.35		8.3	8.3	20.0	.145
.040	1.210	33.6	60.0	1.00	25.50	(3.472)	8.2	8.0	20.2	.088
.039	1.200	34.2	60.8	1.00	40.82		9.4	9.0	18.7	.051
.040	1.218	34.2	60.1	1.00	61.22		9.2	9.0	14.5	.026
		(50)	(20)							
.039	1.200	48.4	20.2	1.04	4.74		24.1	22.8	34.0	.538
.040	1.210	48.6	20.0	1.04	7.79	(2.348)	25.5	24.4	33.4	.322
.040	1.218	49.4	19.8	1.00	12.43		24.3	23.7	29.1	.176
.039	1.200	49.6	20.5	.97	18.63		19.0	18.4	20.9	.084
			(30)							
.039	1.145	46.6	30.6	1.01	7.44		25.0	22.2	31.4	.356
.039	1.196	48.8	30.6	.99	12.35	(2.640)	23.7	22.5	31.0	.212
.039	1.203	48.8	29.8	1.02	19.68		24.8	23.8	28.3	.122
.039	1.198	48.2	30.8	1.00	29.53		19.8	18.5	20.9	.060
			(40)							
.040	1.228	49.9	40.0	1.00	10.06		16.2	16.2	25.8	.235
.040	1.217	49.1	40.2	1.00	16.82	(2.870)	17.5	16.7	25.6	.140
.039	1.203	51.9	41.4	.97	26.88		17.2	16.4	23.7	.081
.039	1.201	50.0	39.4	1.02	40.30		16.1	15.5	20.8	.047
			(60)							
.040	1.232	49.9	60.7	.99	15.34		9.3	9.2	19.8	.133
.040	1.214	49.1	60.4	1.20	25.60	(3.200)	11.1	16.1	19.8	.079
.040	1.196	49.4	60.2	1.00	40.85		9.5	9.2	18.1	.045
.040	1.204	48.5	60.8	.97	61.30		10.8	10.4	14.5	.024

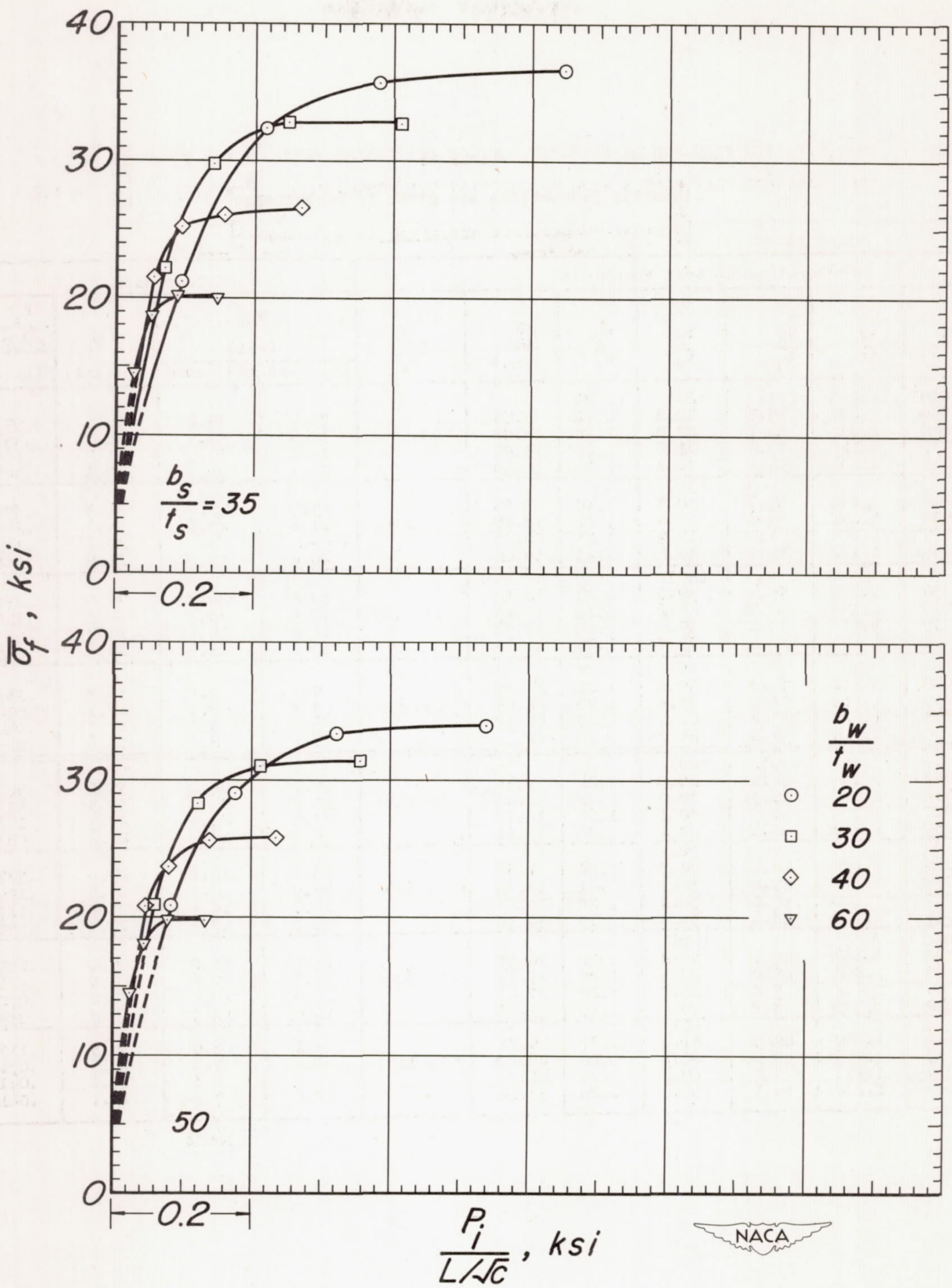

Figure 17.- Compressive strength of flat panels with hat-section stiffeners. $\frac{t_W}{t_S} = 1.25$; $\frac{b_H}{b_W} = 1.0$.

TABLE 16

TEST DATA FOR FLAT PANELS WITH HAT-SECTION STIFFENERS WITH $\frac{t_W}{t_S} = 1.25$, $\frac{b_H}{b_W} = 1.2$

[Nominal proportions are given in parentheses]

Proportions of test specimens							Test data			
t_W (in.)	$\frac{t_W}{t_S}$	$\frac{b_S}{t_S}$	$\frac{b_W}{t_W}$	$\frac{b_H}{b_W}$	$\frac{L}{\sqrt{c}}$ (in.)	$\frac{\bar{t}}{t_S}$	σ_{cr} (ksi) Observed	σ_{cr} (ksi) Adjusted	$\bar{\sigma}_f$ (ksi)	$\frac{P_1}{L/\sqrt{c}}$ (ksi)
(0.040)	(1.25)	(35)	(20)	(1.2)						
.040	1.207	35.0	20.2	1.20	4.89	(2.595)	26.4	25.2	34.8	0.591
.040	1.200	34.7	20.0	1.20	8.08		32.8	31.3	34.7	.357
.037	1.140	34.8	21.5	1.20	13.02		30.6	30.4	31.2	.199
.040	1.204	34.6	20.0	1.21	19.40		21.1	20.5	22.6	.097
			(30)							
.040	1.202	34.8	30.3	1.19	7.65	(2.868)	19.5	18.3	31.3	.376
.039	1.192	33.8	29.8	1.22	12.68		21.6	20.6	31.7	.230
.039	1.190	33.3	29.9	1.23	20.31		--	--	29.6	.134
.039	1.182	33.2	30.4	1.23	30.44		20.4	19.6	21.8	.066
			(40)							
.039	1.188	33.4	39.6	1.24	10.34	(3.070)	19.8	20.7	25.0	.237
.039	1.192	34.5	40.2	1.21	17.23		19.9	20.4	24.6	.140
.039	1.238	35.2	39.8	1.24	27.58		14.0	14.5	23.2	.083
.039	1.193	34.4	39.7	1.23	41.29		14.6	13.5	18.8	.045
			(60)							
.040	1.212	34.2	59.6	1.21	15.65	(3.340)	9.1	9.1	19.2	.131
.039	1.214	33.4	60.6	1.20	26.05		9.2	9.6	19.1	.078
.039	1.222	35.2	61.4	1.18	41.67		8.1	8.2	17.3	.044
.040	1.214	34.6	61.0	1.18	62.44		8.2	8.2	13.6	.023
		(50)	(20)							
.039	1.184	48.4	20.0	1.24	4.85	(2.340)	25.7	24.4	35.0	.541
.039	1.214	48.3	20.0	1.21	8.02		25.8	24.4	33.3	.311
.040	1.194	48.3	20.1	1.19	12.77		25.5	24.2	29.5	.173
.039	1.212	50.1	20.2	1.20	19.21		19.0	18.8	21.2	.083
			(30)							
.039	1.186	48.4	30.7	1.20	7.58	(2.615)	18.7	18.1	29.6	.327
.039	1.198	49.4	30.1	1.21	12.64		19.9	18.5	29.4	.194
.039	1.200	50.0	30.2	1.20	20.23		20.8	19.6	27.3	.113
.039	1.202	48.8	30.6	1.19	30.30		18.6	17.7	20.3	.056
			(40)							
.040	1.182	47.1	40.2	1.20	10.33	(2.820)	11.7	11.0	24.4	.213
.039	1.202	49.0	40.4	1.20	17.19		12.8	12.3	24.0	.126
.040	1.212	49.2	40.0	1.20	27.43		11.0	10.6	22.0	.072
.040	1.178	48.2	40.0	1.20	41.12		14.0	12.5	18.0	.039
			(60)							
.039	1.209	49.5	61.0	1.20	15.71	(3.115)	5.1	5.0	18.3	.116
.039	1.215	49.8	60.6	1.20	26.10		9.6	9.4	18.5	.071
.039	1.211	49.2	60.4	1.20	41.75		7.0	8.3	17.2	.041
.040	1.208	50.3	60.4	1.20	62.46		7.6	7.7	13.1	.021

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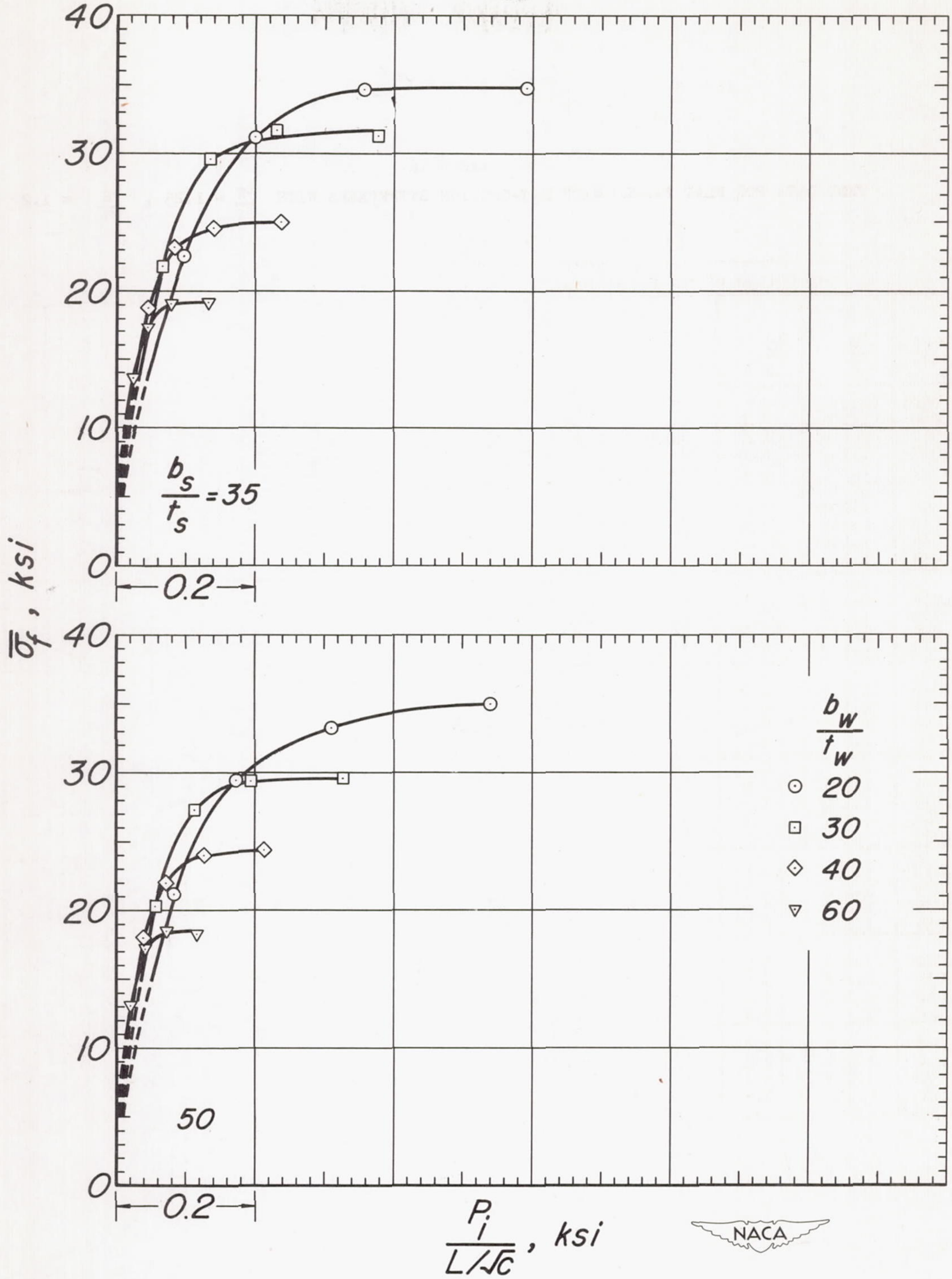

Figure 18.- Compressive strength of flat panels with hat-section stiffeners. $\frac{t_W}{t_S} = 1.25$; $\frac{b_H}{b_W} = 1.2$.