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NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

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DIRECT-READING DESIGN CHARTS FOR 24S-T ALUMINUM-ALLOY FLAT COMPRESSION PANELS HAVING LONGITUDINAL FORMED Z-SECTION STIFFENERS

By Norris F. Dow and Albert S. Keevil, Jr.

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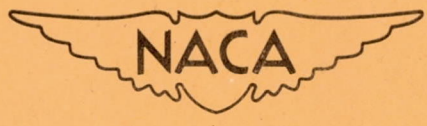

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SUMMARY

Direct-reading design charts are presented for 24S-T aluminum-alloy flat compression panels having longitudinal formed Z-section stiffeners. These charts make possible the direct determination of the stress and all the panel proportions required to carry a given intensity of loading with a given skin thickness and effective length of panel.

INTRODUCTION

Design charts for wing compression panels have been presented in several different forms. (See references 1 and 2.) In reference 3, a form was developed which permitted the direct selection of proportions for given values of the principal design conditions - intensity of loading, skin thickness, and effective length of panel. This form also made possible the ready determination of the proportions having minimum weight to meet these conditions. The charts presented in reference 3 covered 75S-T aluminum-alloy flat compression panels having longitudinal straight-web Y-section stiffeners. Similar charts for 24S-T aluminum-alloy panels with extruded, straight-web Y-section stiffeners are presented in reference 4, and direct-reading design charts for 24S-T aluminum-alloy panels with formed Z-section stiffeners are presented herein.

SYMBOLS

The symbols used for the panel dimensions are given in figure 1. In addition, the following symbols are used:

c coefficient of end fixity as used in Euler column formula

d rivet diameter, inches

L length of panel, inches

p rivet pitch, inches

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

ρ radius of gyration, inches

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

σ_{cr} stress for local buckling of sheet, ksi

σ_{cy} compressive yield stress, ksi

DIRECT-READING DESIGN CHARTS

Direct-reading design charts for 24S-T aluminum-alloy flat compression panels with longitudinal formed Z-section stiffeners having the properties and proportions given in tables 1 to 5 are presented in two forms in figures 2 to 9. In the first form (figs. 2 to 5), the design conditions of intensity of loading, effective length of panel, and skin thickness are incorporated in the ordinate P_i/t_s and the abscissa $\frac{P_i}{L/\sqrt{c}}$. This form, having the design conditions incorporated in the ordinate and abscissa, is the more useful for most design purposes because the curves are more widely spaced and interpolation is more straightforward. In the second (alternate) form (figs. 6 to 9), the average stress at failure $\bar{\sigma}_f$ is plotted against P_i/t_s as was done in the summary plots of reference 5. This alternate form, having the stress – an inverse measure of weight for a given load – as ordinate, is the more useful for making generalizations and comparisons of structural efficiency because it shows how nearly the stress actually carried approaches the upper limit corresponding to the stress that would be achieved by a pure shell construction if a pure shell could carry the load without failure. This upper limit of stress is represented by the lines for $\bar{\sigma}_f = \frac{P_i}{t_s}$ (infinite stiffener spacing) in figures 6 to 9.

Values of the ratios of stiffener thickness to skin thickness t_w/t_s, spacing of rivet lines to skin thickness S/t_s (because there is one rivet line associated with each Z-section, the stiffener spacing b_s is equal to S, the spacing of rivet lines), and height of stiffener to stiffener thickness H/t_w, which will satisfy the design conditions, may be found directly from these charts, and the corresponding section properties $\bar{t}/t_s$, $\bar{h}/t_s$, and ρ/t_s may be found from tables 2 to 5. In

the first form of design chart (figs. 2 to 5) dashed lines are used to indicate values of average stress at failure $\bar{\sigma}_f$; whereas, on the alternate form of design chart (figs. 6 to 9) dashed lines are used to indicate values of $\frac{P_i}{L/\sqrt{c}}$. In both forms the value of $\bar{\sigma}_f$ corresponding to the point at which each curve is cut by a short heavy line is the value of the stress for local buckling σ_{cr} for the proportions represented by the curves. For example, the value of σ_{cr} for $\frac{H}{t_W} = 21$ and $\frac{S}{t_S} = 35$ in figure 2 is approximately 29 ksi. (Only a short panel of these proportions would buckle before failure – one having a value of $\frac{P_i}{L/\sqrt{c}} \geqq 0.27$.) If the value of σ_{cr} is so low that the short heavy line would fall outside the boundaries of the chart, a numerical value of σ_{cr} is given and is associated with the proper proportions by a leader to the curve. The panel proportions which have minimum weight are indicated on both forms of these charts by the use of colors as follows:

(1) If the proportions correspond to a blue region, they are the proportions which give the lightest possible 24S-T Z-stiffened panel which will meet the design conditions

(2) If the proportions correspond to a red region, they are the lightest possible at the ratio of stiffener thickness to skin thickness given by that particular chart, but some other thickness ratio would give a lighter design

(3) If the proportions correspond to a white region, the proportions meet the design conditions, but they are not the lightest which will meet the conditions

Because in many cases the proportions may be varied somewhat from those indicated by the red and blue regions with little change in the value of the stress that can be carried, too much importance should not be attached to the exact proportions indicated by the colors to have minimum weight. In any particular case for which a deviation from the minimum-weight proportions is made, however, caution dictates that the weight penalty associated with this deviation be determined.

The direct-reading design charts presented herein were developed in the manner described in reference 3 from the test data and resulting curves given in reference 2.

USE OF THE DIRECT-READING DESIGN CHARTS

The manner of using the direct-reading design charts depends in some measure on the desired degree of precision of interpolation among the curves. For many purposes, interpolation by inspection is of adequate accuracy, and the use of the charts requires only the calculation of the values of the design parameters P_i/t_s and $\frac{P_i}{L/\sqrt{c}}$ to permit the desired proportions to be read directly from the curves. The proportions for minimum weight, moreover, may be found directly as those corresponding to the blue region on the curves.

If more accurate interpolation is desired, a plot can readily be made of H/t_w, $\bar{\sigma}_f$, and σ_{cr} against S/t_s at the given values of P_i/t_s and $\frac{P_i}{L/\sqrt{c}}$ and the proportions can be picked from it. (This plot is similar to that which results from the use of the minimum-weight design procedure with the previously available design charts as illustrated in reference 2.) On a plot of this type, the proportions for minimum weight correspond to those associated with the highest value of $\bar{\sigma}_f$.

As a check on the accuracy of interpolation, the cross-sectional area per inch of width of the design may be determined from the values of $\bar{t}/t_s$ given in tables 2 to 5 and the value of the intensity of loading P_i that can be carried on this cross-sectional area per inch at the value of $\bar{\sigma}_f$ given by the charts may then be compared with the design value of P_i.

ILLUSTRATIVE EXAMPLE

In order to illustrate the use of the direct reading design charts and the simplicity of the computations associated with them, a panel will be designed for minimum weight to meet the same principal design conditions used to illustrate the design procedures in reference 2, namely:

(1) Intensity of loading $P_i = 3.0$ kips per inch

(2) Skin thickness $t_s = 0.064$ inch

(3) Effective length $L/\sqrt{c} = 20$ inches

First the values of P_i/t_S and $\frac{P_i}{L/\sqrt{c}}$ are calculated

$$\frac{P_i}{t_S} = \frac{3.0}{0.064}$$

$$= 46.9 \text{ ksi}$$

$$\frac{P_i}{L/\sqrt{c}} = \frac{3.0}{20/\sqrt{1}}$$

$$= 0.15 \text{ ksi}$$

Then a trial value of t_W/t_S is assumed (for the example $\frac{t_W}{t_S} = 0.79$ will be used). In the chart for this value of t_W/t_S (fig. 4) the points corresponding to the design values of P_i/t_S and $\frac{P_i}{L/\sqrt{c}}$ lie on the red line at $\frac{H}{t_W} = 26$ $\left(\text{or } \frac{b_W}{t_W} = 25\right)$. Accordingly, the value of H/t_W for minimum weight for $\frac{t_W}{t_S} = 0.79$ is 26, and because the value is established by a red line, not a blue line, some value of t_W/t_S other than 0.79 will give less weight. Inspection of the charts for other values of t_W/t_S reveals that at the given design values of P_i/t_S and $\frac{P_i}{L/\sqrt{c}}$ the blue region lies between $\frac{H}{t_W} = 26$ and $\frac{H}{t_W} = 31$ on the chart for $\frac{t_W}{t_S} = 0.63$.

By interpolation, the panel proportions corresponding to this blue region are found to be $\frac{H}{t_W} \approx 29.5$ $\left(\frac{b_W}{t_W} \approx 28.5\right)$ and $\frac{S}{t_S} = \frac{b_S}{t_S} \approx 35$, and for these proportions $\bar{\sigma}_f \approx 30.5$ ksi and $\sigma_{cr} \approx 30.5$ ksi, which are the values for minimum weight. The actual panel dimensions can be calculated from these proportions as

$$t_W = \frac{t_W}{t_S} t_S$$

$$= 0.63(0.064)$$

$$= 0.0403 \text{ inch}$$

$$H = \frac{H}{t_W} t_W$$

$$= 29.5\ (0.040)$$

$$= 1.18 \text{ inches}$$

$$S = \frac{S}{t_S} t_S$$

$$= 35(0.064)$$

$$= 2.24 \text{ inches}$$

and the section properties can be determined from table 3 as

$$\bar{h} = \frac{\bar{h}}{t_S} t_S$$

$$= 3.92(0.064)$$

$$= 0.251 \text{ inch}$$

$$\rho = \frac{\rho}{t_S} t_S$$

$$= 6.02(0.064)$$

$$= 0.385 \text{ inch}$$

In order to illustrate the use of the direct-reading design charts when more accuracy than that corresponding to interpolation by inspection is desired, a plot has been made (fig. 10) of the values of $\bar{\sigma}_f$, σ_{cr}, and H/t_W given by the charts at the design values of P_i/t_S and $\frac{P_i}{L/\sqrt{c}}$. The proportions which give the highest value of $\bar{\sigma}_f$ can be readily selected from a plot of this kind. (For the example these proportions are so nearly the same as were obtained by inspection that the values will not be repeated.)

As a check on the accuracy of interpolation, the magnitude of $\bar{t}/t_s$ for these proportions can be determined from table 3 and multiplied by the values of t_s and $\bar{\sigma}_f$ for the design. This product should be equa to the design value of P_i. For the example

$$\bar{\sigma}_f = 30.5 \text{ ksi}$$

$$\frac{\bar{t}}{t_s} = 1.538$$

and

$$P_i = \bar{\sigma}_f \bar{t}$$

$$= \bar{\sigma}_f \frac{\bar{t}}{t_s} t_s$$

$$= 30.5(1.538)(0.064)$$

$$= 3.0 \text{ kips per inch}$$

which agrees with the design value of P_i originally assumed.

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

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TABLE 1.- MATERIAL PROPERTIES OF 24S-T ALUMINUM-ALLOY PANELS HAVING FORMED Z-SECTION STIFFENERS

	Aluminum alloy	σ_{cy} (ksi)
Sheet	24S-T bare	44.0
Stiffeners	24S-T bare sheet before forming	44.0

TABLE 2.- Z-PANEL PROPERTIES $\left[\frac{t_W}{t_S} = 0.51;\ \frac{b_A}{t_W} = 11.4;\ \frac{b_F}{b_W} = 0.4;\ \frac{r_A}{t_W} = 3;\ \frac{r_F}{t_S} = 4;\ \frac{d}{t_S} = 1.50;\ \frac{p}{t_S} = 10.0\right]$

$\frac{b_S}{t_S}$ \ $\frac{b_W}{t_W}$		20	21	22	23	24	25	26	27	28	29	30	31	32
25	$\frac{t}{t_S}$	1.374	1.389	1.403	1.418	1.432	1.447	1.462	1.476	1.491	1.505	1.520	1.535	1.549
26		1.360	1.374	1.388	1.402	1.416	1.430	1.444	1.458	1.472	1.486	1.500	1.514	1.528
27		1.346	1.360	1.373	1.387	1.400	1.414	1.427	1.441	1.454	1.468	1.481	1.495	1.508
28		1.334	1.347	1.360	1.373	1.386	1.399	1.412	1.425	1.438	1.451	1.464	1.477	1.490
29		1.323	1.335	1.348	1.360	1.373	1.385	1.398	1.410	1.423	1.436	1.448	1.461	1.473
30		1.312	1.324	1.336	1.348	1.360	1.373	1.385	1.397	1.409	1.421	1.433	1.445	1.457
31		1.302	1.313	1.325	1.337	1.349	1.360	1.372	1.384	1.396	1.407	1.419	1.431	1.443
32		1.292	1.304	1.315	1.326	1.338	1.349	1.361	1.372	1.383	1.395	1.406	1.418	1.429
33		1.283	1.294	1.306	1.317	1.328	1.339	1.350	1.361	1.372	1.383	1.394	1.405	1.416
34		1.275	1.286	1.297	1.307	1.318	1.329	1.339	1.350	1.361	1.372	1.382	1.393	1.404
35		1.267	1.278	1.288	1.298	1.309	1.319	1.330	1.340	1.350	1.361	1.371	1.382	1.392
36		1.260	1.270	1.280	1.290	1.300	1.310	1.321	1.331	1.341	1.351	1.361	1.371	1.381
37		1.253	1.263	1.272	1.282	1.292	1.302	1.312	1.322	1.332	1.341	1.351	1.361	1.371
38		1.246	1.256	1.265	1.275	1.285	1.294	1.304	1.313	1.323	1.332	1.342	1.352	1.361
39		1.240	1.249	1.259	1.268	1.277	1.287	1.296	1.305	1.315	1.324	1.333	1.343	1.352
40		1.234	1.243	1.252	1.261	1.270	1.279	1.288	1.298	1.307	1.316	1.325	1.334	1.343
42		1.223	1.231	1.240	1.249	1.257	1.266	1.275	1.283	1.292	1.301	1.309	1.318	1.327
44		1.213	1.221	1.229	1.237	1.246	1.254	1.262	1.271	1.279	1.287	1.295	1.304	1.312
46		1.203	1.211	1.219	1.227	1.235	1.243	1.251	1.259	1.267	1.275	1.283	1.290	1.298
48		1.195	1.202	1.210	1.218	1.225	1.233	1.240	1.248	1.256	1.263	1.271	1.279	1.286
50		1.187	1.194	1.202	1.209	1.216	1.224	1.231	1.238	1.245	1.253	1.260	1.267	1.274
52		1.180	1.187	1.194	1.201	1.208	1.215	1.222	1.229	1.236	1.243	1.250	1.257	1.264
54		1.173	1.180	1.187	1.193	1.200	1.207	1.214	1.220	1.227	1.234	1.241	1.248	1.254
56		1.167	1.174	1.180	1.187	1.193	1.200	1.206	1.213	1.219	1.226	1.232	1.239	1.245
58		1.161	1.168	1.174	1.180	1.186	1.193	1.199	1.205	1.212	1.218	1.224	1.231	1.237
60		1.156	1.162	1.168	1.174	1.180	1.186	1.192	1.198	1.204	1.211	1.217	1.223	1.229
65		1.144	1.150	1.155	1.161	1.166	1.172	1.178	1.183	1.189	1.194	1.200	1.206	1.211
70		1.134	1.139	1.144	1.149	1.154	1.160	1.165	1.170	1.175	1.180	1.186	1.191	1.196
75		1.125	1.130	1.134	1.139	1.144	1.149	1.154	1.159	1.164	1.169	1.173	1.178	1.183
25	$\frac{h}{t_S}$	1.942	2.068	2.199	2.333	2.473	2.614	2.759	2.910	3.062	3.220	3.379	3.541	3.708
26		1.901	2.024	2.151	2.283	2.418	2.557	2.700	2.846	2.995	3.149	3.305	3.464	3.627
27		1.863	1.983	2.108	2.235	2.368	2.503	2.643	2.786	2.933	3.082	3.236	3.395	3.551
28		1.826	1.944	2.065	2.190	2.320	2.452	2.589	2.729	2.872	3.019	3.169	3.322	3.478
29		1.791	1.906	2.024	2.148	2.273	2.404	2.537	2.675	2.814	2.957	3.105	3.254	3.408
30		1.758	1.871	1.987	2.107	2.231	2.356	2.487	2.622	2.759	2.900	3.045	3.192	3.342
31		1.727	1.838	1.951	2.068	2.188	2.314	2.442	2.573	2.707	2.846	2.987	3.130	3.277
32		1.698	1.805	1.916	2.032	2.149	2.272	2.396	2.525	2.658	2.792	2.931	3.071	3.217
33		1.670	1.775	1.883	1.995	2.111	2.231	2.354	2.480	2.609	2.742	2.878	3.017	3.158
34		1.643	1.745	1.846	1.962	2.076	2.192	2.314	2.437	2.564	2.693	2.828	2.964	3.102
35		1.617	1.717	1.822	1.931	2.041	2.157	2.274	2.396	2.522	2.648	2.780	2.912	3.050
36		1.592	1.691	1.793	1.899	2.009	2.122	2.236	2.356	2.478	2.604	2.733	2.864	2.999
37		1.568	1.665	1.766	1.870	1.977	2.088	2.201	2.318	2.438	2.563	2.689	2.817	2.949
38		1.546	1.645	1.740	1.841	1.946	2.055	2.166	2.282	2.405	2.522	2.645	2.771	2.902
39		1.516	1.618	1.714	1.814	1.918	2.024	2.134	2.247	2.362	2.482	2.604	2.728	2.856
40		1.503	1.595	1.690	1.788	1.890	1.995	2.103	2.213	2.327	2.444	2.564	2.687	2.812
42		1.464	1.553	1.644	1.739	1.838	1.938	2.042	2.150	2.260	2.373	2.490	2.608	2.729
44		1.428	1.513	1.602	1.694	1.788	1.886	1.987	2.090	2.197	2.307	2.420	2.534	2.652
46		1.395	1.478	1.563	1.651	1.743	1.838	1.935	2.035	2.139	2.245	2.353	2.467	2.581
48		1.363	1.444	1.526	1.611	1.701	1.792	1.888	1.985	2.084	2.188	2.293	2.400	2.512
50		1.335	1.412	1.491	1.575	1.661	1.749	1.842	1.937	2.034	2.133	2.236	2.342	2.450
52		1.307	1.382	1.460	1.541	1.624	1.710	1.800	1.891	1.986	2.083	2.183	2.285	2.390
54		1.282	1.355	1.430	1.509	1.590	1.673	1.760	1.850	1.942	2.036	2.132	2.231	2.335
56		1.258	1.328	1.402	1.477	1.557	1.639	1.723	1.809	1.899	1.990	2.086	2.182	2.284
58		1.236	1.303	1.375	1.450	1.527	1.605	1.688	1.772	1.858	1.948	2.041	2.134	2.231
60		1.214	1.281	1.350	1.423	1.497	1.575	1.655	1.737	1.822	1.908	1.998	2.090	2.185
65		1.166	1.228	1.294	1.361	1.432	1.504	1.578	1.657	1.736	1.819	1.902	1.990	2.078
70		1.124	1.183	1.244	1.308	1.374	1.442	1.513	1.586	1.661	1.714	1.817	1.900	1.984
75		1.087	1.142	1.201	1.261	1.323	1.388	1.454	1.523	1.594	1.668	1.744	1.821	1.900
25	$\frac{p}{t_S}$	2.949	3.163	3.378	3.594	3.812	4.030	4.249	4.470	4.690	4.913	5.135	5.357	5.582
26		2.917	3.129	3.343	3.557	3.773	3.990	4.208	4.427	4.647	4.868	5.089	5.311	5.533
27		2.886	3.097	3.309	3.522	3.737	3.952	4.169	4.386	4.605	4.824	5.045	5.267	5.487
28		2.856	3.065	3.275	3.487	3.700	3.914	4.130	4.346	4.563	4.782	5.001	5.221	5.441
29		2.827	3.034	3.243	3.453	3.664	3.873	4.091	4.308	4.523	4.739	4.958	5.176	5.397
30		2.798	3.004	3.211	3.420	3.630	3.841	4.054	4.268	4.483	4.699	4.916	5.134	5.352
31		2.771	2.975	3.181	3.388	3.598	3.807	4.018	4.230	4.444	4.659	4.875	5.091	5.308
32		2.744	2.946	3.151	3.357	3.563	3.772	3.982	4.193	4.405	4.619	4.834	5.049	5.266
33		2.718	2.919	3.121	3.325	3.531	3.738	3.947	4.157	4.368	4.581	4.794	5.009	5.224
34		2.693	2.892	3.096	3.296	3.500	3.706	3.914	4.122	4.332	4.543	4.756	4.969	5.183
35		2.679	2.865	3.075	3.267	3.470	3.675	3.880	4.088	4.296	4.507	4.719	4.930	5.144
36		2.644	2.840	3.033	3.238	3.440	3.644	3.848	4.054	4.262	4.471	4.681	4.892	5.105
37		2.620	2.815	3.012	3.211	3.411	3.613	3.816	4.021	4.227	4.437	4.645	4.855	5.066
38		2.597	2.793	2.986	3.183	3.382	3.583	3.785	3.990	4.194	4.401	4.609	4.817	5.028
39		2.579	2.767	2.967	3.157	3.355	3.554	3.755	3.958	4.161	4.367	4.574	4.784	4.991
40		2.553	2.744	2.937	3.131	3.328	3.526	3.726	3.927	4.130	4.334	4.540	4.747	4.955
42		2.511	2.699	2.889	3.081	3.276	3.471	3.668	3.868	4.068	4.270	4.474	4.679	4.884
44		2.471	2.656	2.844	3.034	3.225	3.419	3.614	3.810	4.009	4.209	4.410	4.612	4.817
46		2.433	2.616	2.801	2.988	3.177	3.368	3.561	3.755	3.951	4.149	4.348	4.550	4.752
48		2.396	2.577	2.760	2.944	3.132	3.320	3.511	3.703	3.897	4.093	4.290	4.488	4.688
50		2.361	2.540	2.720	2.903	3.088	3.273	3.462	3.653	3.845	4.038	4.233	4.430	4.629
52		2.327	2.504	2.682	2.862	3.045	3.229	3.416	3.604	3.794	3.985	4.179	4.373	4.569
54		2.296	2.469	2.645	2.824	3.005	3.187	3.371	3.558	3.745	3.935	4.126	4.318	4.515
56		2.265	2.436	2.611	2.787	2.965	3.145	3.328	3.512	3.698	3.886	4.075	4.266	4.460
58		2.235	2.405	2.577	2.751	2.928	3.106	3.287	3.469	3.653	3.839	4.027	4.215	4.407
60		2.206	2.372	2.545	2.717	2.892	3.068	3.247	3.427	3.610	3.793	3.979	4.166	4.355
65		2.140	2.302	2.469	2.636	2.807	2.978	3.152	3.329	3.506	3.687	3.868	4.051	4.236
70		2.079	2.235	2.399	2.563	2.729	2.896	3.066	3.238	3.412	3.600	3.765	3.944	4.125
75		2.023	2.178	2.336	2.496	2.658	2.820	2.986	3.154	3.324	3.497	3.670	3.845	4.022

TABLE 2.- Z-PANEL PROPERTIES - Concluded $\left[\frac{t_W}{t_S} = 0.51;\ \frac{b_A}{t_W} = 11.4;\ \frac{b_F}{b_W} = 0.4;\ \frac{r_A}{t_W} = 3;\ \frac{r_F}{t_S} = 4;\ \frac{d}{t_S} = 1.50;\ \frac{p}{t_S} = 10.0\right]$

$\frac{b_S}{t_S}$ \ $\frac{b_W}{t_W}$		33	34	35	36	37	38	39	40	41	42	43	44	45
25	$\frac{t_F}{t_S}$ = 1	1.564	1.578	1.593	1.607	1.622	1.636	1.651	1.665	1.680	1.695	1.710	1.724	1.739
26		1.542	1.556	1.570	1.584	1.598	1.612	1.626	1.640	1.654	1.668	1.682	1.696	1.710
27		1.522	1.535	1.549	1.562	1.576	1.589	1.603	1.616	1.630	1.643	1.657	1.670	1.684
28		1.503	1.516	1.529	1.542	1.555	1.568	1.581	1.594	1.607	1.620	1.633	1.646	1.659
29		1.486	1.498	1.511	1.523	1.536	1.549	1.561	1.574	1.586	1.599	1.612	1.624	1.637
30		1.469	1.482	1.493	1.506	1.517	1.530	1.543	1.555	1.567	1.579	1.591	1.603	1.615
31		1.455	1.466	1.479	1.490	1.502	1.513	1.525	1.537	1.549	1.560	1.572	1.584	1.596
32		1.441	1.452	1.464	1.474	1.486	1.497	1.509	1.520	1.532	1.543	1.554	1.565	1.577
33		1.427	1.438	1.449	1.460	1.471	1.482	1.493	1.504	1.515	1.526	1.537	1.548	1.559
34		1.415	1.425	1.436	1.446	1.457	1.468	1.479	1.489	1.500	1.511	1.522	1.532	1.543
35		1.403	1.413	1.424	1.434	1.445	1.455	1.465	1.475	1.486	1.496	1.507	1.517	1.528
36		1.391	1.401	1.411	1.422	1.432	1.442	1.452	1.462	1.472	1.482	1.493	1.503	1.513
37		1.381	1.391	1.401	1.410	1.420	1.430	1.440	1.450	1.460	1.469	1.479	1.489	1.499
38		1.371	1.380	1.390	1.399	1.409	1.419	1.429	1.438	1.448	1.457	1.467	1.476	1.486
39		1.362	1.371	1.380	1.389	1.399	1.408	1.418	1.427	1.436	1.445	1.455	1.464	1.474
40		1.352	1.361	1.370	1.380	1.389	1.398	1.407	1.416	1.425	1.434	1.443	1.452	1.462
42		1.336	1.344	1.353	1.361	1.370	1.379	1.388	1.396	1.405	1.413	1.422	1.431	1.440
44		1.321	1.328	1.337	1.345	1.354	1.362	1.370	1.378	1.387	1.395	1.403	1.411	1.420
46		1.306	1.314	1.322	1.330	1.338	1.346	1.354	1.362	1.370	1.377	1.385	1.393	1.401
48		1.294	1.301	1.309	1.316	1.324	1.331	1.339	1.347	1.355	1.362	1.370	1.377	1.385
50		1.281	1.289	1.297	1.304	1.311	1.318	1.326	1.333	1.340	1.347	1.355	1.362	1.369
52		1.271	1.278	1.285	1.292	1.299	1.306	1.313	1.320	1.327	1.334	1.341	1.348	1.355
54		1.261	1.268	1.274	1.281	1.288	1.295	1.302	1.308	1.315	1.322	1.329	1.335	1.342
56		1.252	1.258	1.265	1.271	1.278	1.284	1.291	1.297	1.304	1.310	1.317	1.323	1.330
58		1.244	1.249	1.256	1.262	1.268	1.274	1.281	1.287	1.293	1.299	1.305	1.312	1.318
60		1.235	1.241	1.247	1.253	1.259	1.265	1.271	1.277	1.283	1.289	1.295	1.302	1.308
65		1.217	1.222	1.228	1.234	1.239	1.245	1.250	1.256	1.262	1.267	1.273	1.278	1.284
70		1.201	1.206	1.211	1.217	1.222	1.227	1.233	1.238	1.243	1.248	1.253	1.258	1.264
75		1.188	1.193	1.198	1.202	1.208	1.212	1.217	1.222	1.227	1.232	1.237	1.241	1.246
25	$\frac{t_F}{t_S}$ = 2	3.876	4.049	4.223	4.402	4.581	4.766	4.950	5.140	5.329	5.520	5.713	5.913	6.110
26		3.792	3.961	4.132	4.306	4.483	4.663	4.844	5.028	5.216	5.405	5.597	5.790	5.986
27		3.712	3.878	4.045	4.217	4.389	4.566	4.744	4.926	5.108	5.295	5.482	5.674	5.865
28		3.637	3.799	3.963	4.131	4.301	4.474	4.649	4.827	5.007	5.190	5.375	5.562	5.751
29		3.563	3.723	3.884	4.049	4.215	4.384	4.557	4.731	4.909	5.087	5.268	5.453	5.638
30		3.495	3.649	3.811	3.970	4.137	4.301	4.468	4.640	4.814	4.991	5.170	5.351	5.535
31		3.426	3.581	3.733	3.894	4.054	4.220	4.385	4.553	4.723	4.899	5.074	5.251	5.430
32		3.362	3.513	3.665	3.824	3.980	4.142	4.303	4.470	4.637	4.808	4.982	5.159	5.334
33		3.303	3.451	3.601	3.754	3.909	4.067	4.228	4.391	4.556	4.724	4.894	5.067	5.241
34		3.244	3.390	3.537	3.689	3.841	3.995	4.152	4.315	4.476	4.641	4.807	4.979	5.149
35		3.188	3.331	3.475	3.623	3.772	3.926	4.082	4.241	4.399	4.563	4.726	4.894	5.061
36		3.136	3.276	3.419	3.562	3.710	3.861	4.014	4.169	4.327	4.487	4.647	4.811	4.978
37		3.083	3.220	3.360	3.505	3.650	3.797	3.947	4.099	4.254	4.414	4.573	4.741	4.898
38		3.034	3.170	3.307	3.449	3.591	3.735	3.882	4.034	4.185	4.342	4.498	4.659	4.820
39		2.985	3.119	3.248	3.394	3.533	3.677	3.821	3.970	4.121	4.275	4.428	4.586	4.743
40		2.941	3.072	3.206	3.340	3.478	3.620	3.763	3.910	4.058	4.209	4.362	4.517	4.671
42		2.852	2.980	3.109	3.243	3.376	3.512	3.650	3.794	3.937	4.085	4.232	4.381	4.533
44		2.771	2.896	3.020	3.149	3.278	3.338	3.547	3.685	3.823	3.965	4.110	4.258	4.404
46		2.697	2.816	2.938	3.062	3.189	3.318	3.449	3.582	3.718	3.859	3.999	4.141	4.285
48		2.625	2.742	2.860	2.982	3.104	3.231	3.358	3.487	3.618	3.754	3.889	4.030	4.169
50		2.561	2.675	2.786	2.904	3.025	3.147	3.270	3.397	3.527	3.659	3.790	3.926	4.064
52		2.497	2.607	2.719	2.833	2.950	3.069	3.190	3.313	3.439	3.567	3.696	3.828	3.962
54		2.439	2.545	2.655	2.766	2.879	2.995	3.112	3.234	3.356	3.480	3.606	3.736	3.866
56		2.383	2.488	2.593	2.702	2.812	2.926	3.040	3.159	3.277	3.400	3.522	3.649	3.775
58		2.329	2.433	2.535	2.642	2.750	2.861	2.972	3.087	3.204	3.324	3.445	3.566	3.691
60		2.281	2.380	2.482	2.585	2.691	2.799	2.909	3.021	3.135	3.251	3.369	3.486	3.608
65		2.169	2.263	2.358	2.454	2.555	2.656	2.761	2.865	2.972	3.083	3.194	3.309	3.423
70		2.070	2.159	2.249	2.340	2.435	2.531	2.628	2.728	2.831	2.935	3.041	3.149	3.257
75		1.981	2.065	2.150	2.239	2.326	2.419	2.512	2.607	2.704	2.802	2.902	3.007	3.110
25	$\frac{t_F}{t_S}$ = 3	5.805	6.030	6.255	6.481	6.706	6.932	7.158	7.385	7.611	7.837	8.064	8.291	8.517
26		5.757	5.981	6.205	6.429	6.655	6.880	7.105	7.334	7.557	7.790	8.010	8.236	8.463
27		5.709	5.933	6.155	6.380	6.603	6.829	7.053	7.279	7.504	7.730	7.955	8.182	8.408
28		5.663	5.885	6.107	6.330	6.554	6.778	7.002	7.227	7.452	7.677	7.902	8.128	8.354
29		5.616	5.838	6.059	6.282	6.504	6.727	6.951	7.175	7.400	7.624	7.848	8.074	8.299
30		5.572	5.791	6.013	6.234	6.457	6.679	6.900	7.124	7.347	7.572	7.796	8.021	8.246
31		5.526	5.746	5.965	6.186	6.406	6.629	6.851	7.074	7.297	7.521	7.744	7.968	8.192
32		5.483	5.701	5.919	6.141	6.360	6.581	6.802	7.024	7.246	7.469	7.693	7.917	8.140
33		5.441	5.658	5.876	6.095	6.315	6.534	6.755	6.976	7.198	7.420	7.643	7.866	8.089
34		5.398	5.615	5.832	6.051	6.269	6.488	6.707	6.929	7.149	7.370	7.592	7.815	8.037
35		5.357	5.573	5.788	6.006	6.223	6.442	6.661	6.881	7.101	7.322	7.542	7.736	7.986
36		5.313	5.532	5.748	5.963	6.180	6.397	6.616	6.832	7.054	7.275	7.494	7.715	7.937
37		5.278	5.491	5.705	5.921	6.137	6.353	6.570	6.788	7.007	7.228	7.447	7.663	7.888
38		5.239	5.452	5.665	5.880	6.094	6.309	6.525	6.743	6.960	7.180	7.399	7.619	7.839
39		5.200	5.412	5.621	5.838	6.052	6.267	6.482	6.699	6.916	7.135	7.352	7.572	7.790
40		5.164	5.375	5.586	5.797	6.011	6.225	6.440	6.656	6.872	7.089	7.307	7.526	7.743
42		5.091	5.200	5.509	5.720	5.931	6.143	6.356	6.571	6.785	6.930	7.218	7.434	7.651
44		5.021	5.229	5.435	5.644	5.853	6.105	6.260	6.489	6.701	6.915	7.112	7.346	7.561
46		4.955	5.159	5.365	5.571	5.779	5.988	6.198	6.408	6.620	6.833	7.047	7.260	7.475
48		4.889	5.093	5.296	5.501	5.707	5.915	6.123	6.331	6.540	6.752	6.963	7.176	7.389
50		4.828	5.027	5.229	5.433	5.637	5.843	6.048	6.264	6.465	6.675	6.884	7.045	7.308
52		4.767	4.966	5.166	5.368	5.570	5.774	5.979	6.184	6.397	6.599	6.807	7.017	7.227
54		4.709	4.906	5.105	5.304	5.505	5.706	5.909	6.114	6.219	6.525	6.732	6.941	7.149
56		4.652	4.848	5.044	5.243	5.441	5.642	5.843	6.046	6.250	6.455	6.659	6.867	7.073
58		4.597	4.792	4.986	5.183	5.381	5.580	5.779	5.980	6.183	6.359	6.591	6.795	7.001
60		4.546	4.737	4.931	5.126	5.322	5.519	5.717	5.917	6.118	6.319	6.523	6.724	6.928
65		4.421	4.610	4.799	4.989	5.181	5.374	5.569	5.764	5.960	6.159	6.353	6.559	6.759
70		4.307	4.491	4.677	4.863	5.051	5.241	5.430	5.624	5.902	6.011	6.207	6,404	6.600
75		4.200	4.380	4.562	4.746	4.929	5.116	5.303	5.491	5.768	5.871	6.063	6.258	6.452

NACA

TABLE 3.- Z-PANEL PROPERTIES $\left[\frac{t_W}{t_S} = 0.63;\ \frac{b_A}{t_W} = 10.9;\ \frac{b_F}{b_W} = 0.4;\ \frac{r_A}{t_W} = 3;\ \frac{r_F}{t_W} = 4;\ \frac{d}{t_S} = 1.84;\ \frac{p}{t_S} = 12.3\right]$

$\frac{b_S}{t_S}$ \ $\frac{b_W}{t_W}$		20	21	22	23	24	25	26	27	28	29	30	31	32
25	$\frac{t_1}{t_S}$	1.563	1.585	1.608	1.630	1.652	1.674	1.696	1.719	1.741	1.763	1.785	1.808	1.830
26		1.541	1.563	1.584	1.606	1.627	1.648	1.670	1.691	1.712	1.734	1.755	1.777	1.798
27		1.521	1.542	1.563	1.583	1.604	1.624	1.645	1.665	1.686	1.707	1.727	1.748	1.768
28		1.503	1.523	1.542	1.562	1.582	1.602	1.622	1.642	1.662	1.681	1.701	1.721	1.741
29		1.485	1.505	1.524	1.543	1.562	1.581	1.600	1.620	1.639	1.658	1.677	1.696	1.715
30		1.469	1.488	1.506	1.525	1.543	1.562	1.580	1.599	1.617	1.636	1.654	1.673	1.692
31		1.454	1.472	1.490	1.508	1.526	1.544	1.562	1.580	1.598	1.615	1.633	1.651	1.669
32		1.440	1.457	1.475	1.492	1.509	1.527	1.544	1.561	1.579	1.596	1.614	1.631	1.648
33		1.427	1.443	1.460	1.477	1.494	1.511	1.528	1.544	1.561	1.578	1.595	1.612	1.629
34		1.414	1.430	1.447	1.463	1.479	1.496	1.512	1.528	1.545	1.561	1.577	1.594	1.610
35		1.402	1.418	1.434	1.450	1.466	1.482	1.497	1.513	1.530	1.545	1.561	1.577	1.593
36		1.391	1.406	1.422	1.437	1.453	1.468	1.484	1.499	1.515	1.530	1.545	1.561	1.576
37		1.380	1.395	1.411	1.426	1.441	1.456	1.471	1.486	1.501	1.516	1.531	1.546	1.561
38		1.370	1.385	1.400	1.414	1.429	1.444	1.458	1.473	1.487	1.502	1.517	1.532	1.546
39		1.361	1.375	1.389	1.404	1.418	1.432	1.446	1.461	1.475	1.489	1.503	1.518	1.532
40		1.352	1.366	1.380	1.394	1.408	1.421	1.435	1.449	1.463	1.477	1.491	1.505	1.519
42		1.335	1.348	1.362	1.375	1.388	1.401	1.415	1.428	1.441	1.454	1.467	1.481	1.494
44		1.320	1.333	1.345	1.358	1.370	1.383	1.396	1.408	1.421	1.434	1.446	1.459	1.471
46		1.306	1.318	1.330	1.342	1.354	1.366	1.379	1.391	1.403	1.415	1.427	1.439	1.451
48		1.293	1.305	1.316	1.328	1.340	1.351	1.363	1.374	1.386	1.397	1.409	1.421	1.432
50		1.282	1.293	1.304	1.315	1.326	1.337	1.348	1.359	1.370	1.382	1.393	1.404	1.415
52		1.271	1.281	1.292	1.303	1.313	1.324	1.335	1.346	1.356	1.367	1.378	1.389	1.399
54		1.261	1.271	1.281	1.292	1.302	1.312	1.322	1.333	1.343	1.353	1.364	1.374	1.384
56		1.251	1.261	1.271	1.281	1.291	1.301	1.311	1.321	1.331	1.341	1.351	1.361	1.370
58		1.243	1.252	1.262	1.271	1.281	1.291	1.300	1.310	1.319	1.329	1.339	1.349	1.358
60		1.235	1.244	1.253	1.262	1.272	1.281	1.290	1.299	1.309	1.318	1.327	1.337	1.346
65		1.217	1.225	1.234	1.242	1.251	1.259	1.268	1.276	1.285	1.294	1.302	1.311	1.319
70		1.201	1.209	1.217	1.225	1.233	1.241	1.249	1.257	1.265	1.273	1.280	1.288	1.296
75		1.188	1.195	1.203	1.210	1.217	1.225	1.232	1.240	1.247	1.254	1.262	1.270	1.277
25	$\frac{t_1}{t_S}$	2.843	3.043	3.246	3.457	3.673	3.894	4.120	4.348	4.583	4.822	5.066	5.311	5.562
26		2.785	2.979	3.180	3.385	3.597	3.815	4.034	4.261	4.492	4.725	4.965	5.206	5.454
27		2.729	2.920	3.116	3.319	3.525	3.739	3.955	4.179	4.404	4.633	4.870	5.107	5.352
28		2.675	2.862	3.057	3.255	3.458	3.666	3.879	4.097	4.319	4.547	4.778	5.012	5.251
29		2.626	2.808	2.998	3.192	3.393	3.598	3.807	4.019	4.239	4.462	4.689	4.921	5.156
30		2.577	2.757	2.943	3.133	3.331	3.531	3.738	3.947	4.163	4.381	4.606	4.832	5.062
31		2.531	2.708	2.890	3.077	3.270	3.467	3.669	3.876	4.087	4.305	4.525	4.749	4.976
32		2.487	2.661	2.836	3.024	3.214	3.406	3.606	3.811	4.017	4.230	4.445	4.666	4.891
33		2.444	2.616	2.791	2.972	3.158	3.348	3.543	3.746	3.950	4.161	4.371	4.588	4.808
34		2.404	2.572	2.744	2.922	3.106	3.292	3.485	3.683	3.883	4.089	4.300	4.512	4.731
35		2.366	2.530	2.699	2.874	3.054	3.238	3.429	3.623	3.818	4.023	4.229	4.439	4.654
36		2.328	2.490	2.656	2.829	3.005	3.187	3.372	3.564	3.758	3.959	4.163	4.369	4.582
37		2.293	2.452	2.614	2.783	2.957	3.136	3.320	3.507	3.698	3.896	4.097	4.301	4.510
38		2.259	2.414	2.575	2.743	2.913	3.088	3.270	3.454	3.645	3.838	4.035	4.235	4.442
39		2.225	2.379	2.538	2.700	2.869	3.043	3.221	3.402	3.589	3.781	3.976	4.173	4.376
40		2.193	2.344	2.500	2.661	2.826	2.999	3.174	3.353	3.537	3.724	3.916	4.112	4.311
42		2.133	2.230	2.430	2.586	2.748	2.914	3.082	3.257	3.436	3.620	3.807	3.996	4.191
44		2.076	2.217	2.365	2.516	2.674	2.834	2.998	3.169	3.342	3.519	3.702	3.887	4.078
46		2.024	2.145	2.304	2.452	2.604	2.760	2.919	3.084	3.253	3.427	3.604	3.785	3.970
48		1.975	2.108	2.243	2.390	2.537	2.690	2.846	3.007	3.171	3.341	3.513	3.688	3.869
50		1.628	2.058	2.193	2.332	2.476	2.625	2.777	2.934	3.094	3.257	3.425	3.597	3.773
52		1.835	2.013	2.143	2.278	2.419	2.563	2.711	2.862	3.020	3.180	3.343	3.510	3.683
54		1.844	1.968	2.096	2.227	2.364	2.505	2.650	2.797	2.950	3.108	3.266	3.431	3.599
56		1.807	1.927	2.051	2.180	2.312	2.449	2.590	2.735	2.884	3.037	3.193	3.353	3.519
58		1.770	1.887	2.008	2.135	2.264	2.397	2.535	2.676	2.823	2.971	3.123	3.279	3.440
60		1.735	1.850	1.963	2.091	2.217	2.348	2.483	2.622	2.763	2.909	3.059	3.210	3.368
65		1.657	1.765	1.876	1.992	2.111	2.236	2.362	2.494	2.628	2.765	2.908	3.052	3.201
70		1.589	1.690	1.796	1.905	2.018	2.135	2.255	2.379	2.507	2.638	2.774	2.912	3.053
75		1.527	1.624	1.723	1.828	1.936	2.046	2.161	2.278	2.400	2.526	2.653	2.782	2.918
25	$\frac{p}{t_S}$	4.017	4.299	4.581	4.863	5.146	5.430	5.713	5.996	6.280	6.564	6.848	7.131	7.414
26		3.934	4.264	4.538	4.825	5.108	5.391	5.673	5.956	6.239	6.522	6.805	7.088	7.371
27		3.951	4.229	4.509	4.790	5.070	5.352	5.633	5.915	6.198	6.480	6.763	7.045	7.329
28		3.918	4.196	4.475	4.753	5.033	5.313	5.594	5.875	6.157	6.439	6.721	7.003	7.285
29		3.887	4.163	4.440	4.717	4.996	5.276	5.556	5.835	6.116	6.398	6.679	6.961	7.243
30		3.856	4.130	4.406	4.682	4.960	5.238	5.518	5.797	6.077	6.357	6.638	6.919	7.200
31		3.825	4.099	4.373	4.648	4.924	5.201	5.479	5.757	6.037	6.317	6.597	6.877	7.158
32		3.795	4.068	4.342	4.614	4.889	5.165	5.442	5.720	5.998	6.277	6.556	6.836	7.116
33		3.766	4.037	4.308	4.580	4.854	5.129	5.405	5.682	5.960	6.240	6.516	6.795	7.074
34		3.737	4.007	4.276	4.548	4.821	5.095	5.370	5.645	5.921	6.199	6.477	6.755	7.034
35		3.709	3.977	4.245	4.516	4.787	5.060	5.334	5.608	5.883	6.160	6.437	6.715	6.993
36		3.681	3.943	4.215	4.482	4.751	5.025	5.298	5.572	5.847	6.122	6.399	6.676	6.953
37		3.654	3.919	4.182	4.452	4.722	4.992	5.264	5.535	5.811	6.084	6.360	6.636	6.912
38		3.628	3.890	4.155	4.422	4.689	4.959	5.230	5.501	5.775	6.048	6.322	6.600	6.873
39		3.601	3.863	4.127	4.391	4.658	4.927	5.197	5.466	5.739	6.012	6.285	6.559	6.834
40		3.575	3.836	4.098	4.361	4.627	4.895	5.164	5.430	5.704	5.975	6.247	6.521	6.796
42		3.526	3.784	4.043	4.304	4.567	4.833	5.098	5.366	5.635	5.905	6.176	6.445	6.720
44		3.477	3.732	3.990	4.249	4.510	4.772	5.036	5.302	5.563	5.826	6.106	6.376	6.648
46		3.431	3.684	3.939	4.195	4.453	4.715	4.975	5.233	5.503	5.769	6.037	6.305	6.575
48		3.387	3.637	3.890	4.144	4.398	4.657	4.917	5.173	5.441	5.706	5.971	6.237	6.505
50		3.343	3.591	3.841	4.093	4.350	4.603	4.860	5.120	5.331	5.642	5.905	6.170	6.437
52		3.302	3.548	3.795	4.044	4.284	4.550	4.806	5.061	5.321	5.581	5.842	6.105	6.370
54		3.262	3.505	3.750	3.996	4.246	4.498	4.752	5.006	5.263	5.522	5.781	6.043	6.306
56		3.224	3.464	3.707	3.951	4.199	4.448	4.699	4.952	5.207	5.464	5.722	5.981	6.243
58		3.186	3.424	3.664	3.903	4.152	4.399	4.649	4.900	5.154	5.408	5.664	5.921	6.181
60		3.149	3.385	3.624	3.864	4.106	4.353	4.601	4.850	5.100	5.353	5.603	5.863	6.121
65		3.064	3.295	3.525	3.763	4.000	4.242	4.484	4.729	4.975	5.223	5.474	5.725	5.973
70		2.985	3.211	3.439	3.669	3.901	4.138	4.376	4.615	4.858	5.101	5.346	5.596	5.845
75		2.911	3.132	3.355	3.581	3.811	4.041	4.275	4.510	4.748	4.989	5.230	5.472	5.718

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TABLE 3.- Z-PANEL PROPERTIES - Concluded $\left[\frac{t_W}{t_S} = 0.63;\ \frac{b_A}{t_W} = 10.9;\ \frac{b_F}{b_W} = 0.4;\ \frac{r_A}{t_W} = 3;\ \frac{r_F}{t_W} = 4;\ \frac{d}{t_S} = 1.84;\ \frac{p}{t_S} = 12.3\right]$

$\frac{b_S}{t_S}$ \ $\frac{b_W}{t_W}$		33	34	35	36	37	38	39	40	41	42	43	44	45
25	$\frac{r_F}{t_S}$	1.853	1.874	1.897	1.919	1.941	1.963	1.986	2.008	2.030	2.052	2.075	2.097	2.119
26		1.820	1.841	1.862	1.883	1.905	1.926	1.948	1.969	1.991	2.012	2.033	2.054	2.076
27		1.789	1.810	1.831	1.851	1.871	1.892	1.913	1.933	1.954	1.974	1.995	2.015	2.036
28		1.761	1.781	1.801	1.820	1.840	1.860	1.880	1.900	1.920	1.939	1.959	1.979	1.999
29		1.734	1.754	1.773	1.792	1.811	1.830	1.850	1.869	1.888	1.907	1.926	1.945	1.965
30		1.711	1.729	1.748	1.766	1.785	1.803	1.822	1.840	1.859	1.877	1.896	1.914	1.933
31		1.687	1.705	1.723	1.741	1.759	1.777	1.795	1.813	1.831	1.848	1.866	1.884	1.902
32		1.665	1.683	1.701	1.718	1.736	1.753	1.770	1.787	1.805	1.822	1.839	1.857	1.874
33		1.646	1.662	1.679	1.696	1.713	1.730	1.747	1.763	1.780	1.797	1.814	1.831	1.848
34		1.627	1.643	1.660	1.676	1.692	1.708	1.725	1.741	1.758	1.774	1.790	1.806	1.823
35		1.609	1.624	1.640	1.656	1.672	1.688	1.704	1.720	1.736	1.752	1.768	1.783	1.799
36		1.592	1.607	1.623	1.638	1.654	1.669	1.685	1.700	1.716	1.731	1.747	1.762	1.777
37		1.576	1.591	1.606	1.621	1.636	1.651	1.666	1.681	1.696	1.711	1.726	1.741	1.756
38		1.561	1.575	1.590	1.604	1.619	1.634	1.649	1.663	1.678	1.692	1.707	1.721	1.736
39		1.547	1.560	1.575	1.589	1.603	1.617	1.632	1.646	1.660	1.674	1.689	1.703	1.717
40		1.533	1.546	1.560	1.574	1.588	1.602	1.616	1.630	1.644	1.658	1.672	1.685	1.699
42		1.508	1.520	1.534	1.547	1.560	1.573	1.587	1.600	1.613	1.626	1.640	1.653	1.666
44		1.484	1.497	1.510	1.522	1.535	1.547	1.560	1.573	1.586	1.598	1.611	1.623	1.636
46		1.463	1.475	1.487	1.499	1.511	1.523	1.536	1.548	1.560	1.572	1.584	1.596	1.608
48		1.444	1.455	1.467	1.479	1.491	1.502	1.514	1.525	1.537	1.548	1.560	1.571	1.583
50		1.426	1.437	1.448	1.459	1.471	1.482	1.493	1.504	1.515	1.526	1.537	1.548	1.560
52		1.410	1.420	1.431	1.442	1.453	1.463	1.474	1.484	1.495	1.506	1.517	1.527	1.538
54		1.394	1.405	1.415	1.425	1.436	1.446	1.457	1.467	1.477	1.487	1.498	1.508	1.518
56		1.380	1.390	1.400	1.410	1.420	1.430	1.440	1.450	1.460	1.470	1.480	1.490	1.500
58		1.368	1.377	1.387	1.396	1.406	1.415	1.425	1.434	1.444	1.453	1.463	1.473	1.483
60		1.356	1.364	1.374	1.383	1.392	1.401	1.411	1.420	1.429	1.438	1.448	1.457	1.466
65		1.328	1.336	1.345	1.353	1.362	1.370	1.379	1.388	1.397	1.405	1.414	1.422	1.431
70		1.304	1.312	1.320	1.328	1.336	1.344	1.352	1.360	1.368	1.376	1.384	1.392	1.400
75		1.285	1.291	1.299	1.306	1.314	1.321	1.329	1.336	1.343	1.351	1.359	1.366	1.373
25	$\frac{r_F}{t_S}$	5.814	6.076	6.335	6.603	6.869	7.141	7.412	7.690	7.971	8.254	8.536	8.825	9.116
26		5.702	5.957	6.216	6.477	6.740	7.008	7.276	7.551	7.824	8.104	8.387	8.672	8.956
27		5.597	5.845	6.097	6.356	6.618	6.875	7.152	7.416	7.686	7.963	8.239	8.522	8.803
28		5.493	5.738	5.987	6.244	6.499	6.758	7.020	7.285	7.552	7.827	8.100	8.376	8.654
29		5.396	5.635	5.882	6.132	6.385	6.641	6.897	7.159	7.425	7.693	7.964	8.237	8.509
30		5.296	5.536	5.777	6.024	6.271	6.525	6.779	7.039	7.298	7.564	7.829	8.100	8.370
31		5.207	5.442	5.681	5.923	6.168	6.416	6.668	6.922	7.179	7.444	7.707	7.973	8.241
32		5.121	5.350	5.584	5.823	6.063	6.310	6.559	6.812	7.064	7.323	7.601	7.844	8.111
33		5.032	5.263	5.494	5.729	5.967	6.209	6.453	6.704	6.955	7.208	7.464	7.723	7.984
34		4.950	5.176	5.403	5.636	5.872	6.112	6.352	6.598	6.843	7.095	7.350	7.607	7.864
35		4.871	5.096	5.321	5.550	5.779	6.016	6.254	6.496	6.740	6.987	7.237	7.493	7.749
36		4.795	5.015	5.236	5.463	5.690	5.924	6.157	6.398	6.637	6.883	7.128	7.380	7.635
37		4.722	4.938	5.157	5.380	5.606	5.835	6.068	6.303	6.542	6.783	7.028	7.275	7.525
38		4.650	5.865	5.080	5.302	5.524	5.749	5.977	6.212	6.446	6.687	6.927	7.174	7.419
39		4.580	4.794	5.005	5.223	5.444	5.668	5.892	6.123	6.356	6.593	6.829	7.071	7.316
40		4.515	4.724	4.935	5.149	5.366	5.586	5.809	6.036	6.265	6.498	6.733	6.975	7.216
42		4.387	4.592	4.795	5.004	5.217	5.433	5.649	5.871	6.097	6.325	6.552	6.786	7.023
44		4.270	4.466	4.665	4.870	5.076	5.288	5.500	5.715	5.933	6.157	6.381	6.611	6.840
46		4.158	4.350	4.546	4.744	4.947	5.152	5.357	5.569	5.783	6.001	6.221	6.445	6.671
48		4.052	4.240	4.430	4.622	4.818	5.020	5.222	5.431	5.639	5.853	6.067	6.288	6.507
50		3.953	4.136	4.322	4.512	4.702	4.898	5.097	5.300	5.505	5.713	5.932	6.139	6.351
52		3.857	4.038	4.219	4.403	4.590	4.783	4.978	5.178	5.377	5.579	5.785	5.996	6.207
54		3.771	3.943	4.122	4.303	4.485	4.674	4.862	5.056	5.254	5.454	5.653	5.859	6.068
56		3.686	3.856	4.030	4.207	4.387	4.570	4.756	4.945	5.137	5.332	5.530	5.730	5.933
58		3.602	3.771	3.940	4.115	4.290	4.471	4.652	4.840	5.027	5.220	5.413	5.608	5.806
60		3.525	3.692	3.857	4.027	4.200	4.377	4.554	4.736	4.922	5.111	5.298	5.492	5.689
65		3.352	3.508	3.665	3.828	3.991	4.160	4.329	4.501	4.675	4.856	5.036	5.222	5.407
70		3.220	3.344	3.495	3.648	3.805	3.964	4.126	4.291	4.459	4.630	4.803	4.979	5.157
75		3.054	3.198	3.340	3.488	3.636	3.790	3.943	4.102	4.264	4.426	4.590	4.760	4.932
25	$\frac{d}{t_S}$	7.697	7.981	8.263	8.544	8.829	9.106	9.391	9.673	9.954	10.23	10.51	10.79	11.07
26		7.654	7.937	8.220	8.503	8.784	9.067	9.348	9.630	9.910	10.19	10.47	10.75	11.03
27		7.611	7.893	8.175	8.458	8.741	9.027	9.306	9.586	9.867	10.15	10.43	10.71	10.99
28		7.567	7.850	8.132	8.414	8.697	8.979	9.260	9.542	9.823	10.10	10.39	10.67	10.95
29		7.525	7.806	8.088	8.371	8.653	8.935	9.215	9.497	9.779	10.06	10.34	10.62	10.90
30		7.482	7.763	8.044	8.328	8.607	8.890	9.171	9.453	9.745	10.02	10.30	10.58	10.86
31		7.439	7.720	8.001	8.283	8.564	8.845	9.137	9.408	9.689	9.971	10.25	10.53	10.81
32		7.397	7.677	7.957	8.239	8.519	8.801	9.083	9.364	9.645	9.926	10.21	10.49	10.77
33		7.354	7.635	7.915	8.196	8.476	8.757	9.038	9.320	9.600	9.881	10.16	10.44	10.72
34		7.312	7.593	7.872	8.152	8.433	8.714	8.994	9.275	9.555	9.836	10.12	10.40	10.68
35		7.271	7.551	7.830	8.110	8.391	8.670	8.950	9.230	9.511	9.791	10.07	10.35	10.63
36		7.230	7.509	7.787	8.067	8.346	8.626	8.905	9.186	9.466	9.747	10.03	10.31	10.59
37		7.190	7.467	7.746	8.024	8.300	8.583	8.862	9.142	9.422	9.702	9.983	10.26	10.54
38		7.149	7.427	7.704	7.983	8.261	8.540	8.818	9.099	9.378	9.658	9.938	10.22	10.50
39		7.109	7.388	7.663	7.941	8.220	8.498	8.776	9.055	9.335	9.615	9.893	10.17	10.45
40		7.065	7.348	7.624	7.901	8.178	8.455	8.734	9.002	9.281	9.570	9.849	10.13	10.41
42		6.993	7.269	7.543	7.819	8.096	8.373	8.649	8.916	9.205	9.484	9.765	10.04	10.32
44		6.928	7.175	7.465	7.740	8.014	8.291	8.566	8.832	9.119	9.397	9.675	9.954	10.23
46		6.845	7.103	7.389	7.663	7.936	8.211	8.484	8.760	9.036	9.313	9.590	9.867	10.15
48		6.774	7.044	7.314	7.585	7.857	8.131	8.404	8.679	8.954	9.230	9.505	9.783	10.06
50		6.704	6.973	7.242	7.512	7.782	8.054	8.327	8.600	8.874	9.149	9.428	9.700	9.974
52		6.636	6.903	7.171	7.439	7.708	7.980	8.250	8.522	8.795	9.067	9.342	9.617	9.892
54		6.569	6.833	7.101	7.366	7.636	7.905	8.174	8.445	8.717	8.990	9.262	9.536	9.810
56		6.506	6.768	7.034	7.299	7.566	7.833	8.102	8.371	8.641	8.912	9.184	9.456	9.729
58		6.441	6.704	6.966	7.231	7.497	7.763	8.030	8.299	8.567	8.838	9.108	9.378	9.649
60		6.379	6.641	6.902	7.165	7.429	7.695	7.959	8.227	8.495	8.764	9.032	9.302	9.574
65		6.233	6.491	6.748	7.007	7.267	7.529	7.791	8.054	8.317	8.584	8.849	9.117	9.384
70		6.084	6.349	6.602	6.857	7.114	7.372	7.631	7.891	8.152	8.414	8.677	8.941	9.206
75		5.947	6.209	6.464	6.717	6.969	7.224	7.478	7.736	7.995	8.253	8.511	8.773	9.037

NACA

TABLE 4.– Z-PANEL PROPERTIES $\left[\frac{t_W}{t_S} = 0.79;\ \frac{b_A}{t_W} = 9.8;\ \frac{b_F}{b_W} = 0.4;\ \frac{r_A}{t_W} = 3;\ \frac{r_F}{t_W} = 4;\ \frac{d}{t_S} = 1.93;\ \frac{p}{t_S} = 12.3\right]$

$\frac{b_S}{t_S}$ \ $\frac{b_W}{t_W}$		20	21	22	23	24	25	26	27	28	29	30	31	32
25	$\frac{h}{t_S}$	1.858	1.893	1.928	1.963	1.998	2.033	2.068	2.103	2.138	2.172	2.207	2.242	2.277
26		1.825	1.859	1.892	1.926	1.959	1.993	2.027	2.060	2.094	2.127	2.161	2.195	2.228
27		1.794	1.827	1.859	1.891	1.924	1.956	1.989	2.021	2.053	2.086	2.118	2.151	2.183
28		1.766	1.797	1.828	1.860	1.891	1.922	1.953	1.984	2.016	2.047	2.078	2.109	2.140
29		1.740	1.770	1.800	1.830	1.860	1.890	1.920	1.950	1.981	2.011	2.041	2.071	2.101
30		1.715	1.744	1.773	1.802	1.831	1.861	1.890	1.919	1.948	1.977	2.006	2.035	2.064
31		1.692	1.720	1.748	1.776	1.805	1.833	1.861	1.889	1.917	1.946	1.974	2.002	2.030
32		1.670	1.698	1.725	1.752	1.779	1.807	1.834	1.861	1.889	1.916	1.943	1.971	1.998
33		1.650	1.676	1.703	1.729	1.756	1.782	1.809	1.835	1.862	1.888	1.915	1.942	1.968
34		1.631	1.657	1.682	1.708	1.734	1.759	1.785	1.811	1.836	1.862	1.888	1.915	1.939
35		1.613	1.638	1.663	1.688	1.713	1.738	1.763	1.788	1.812	1.837	1.862	1.887	1.912
36		1.596	1.620	1.644	1.669	1.693	1.717	1.741	1.766	1.790	1.814	1.838	1.863	1.887
37		1.580	1.603	1.627	1.650	1.674	1.698	1.721	1.745	1.769	1.792	1.816	1.840	1.863
38		1.564	1.587	1.610	1.633	1.656	1.679	1.702	1.725	1.748	1.771	1.794	1.817	1.840
39		1.550	1.572	1.595	1.617	1.640	1.662	1.684	1.707	1.729	1.752	1.774	1.797	1.819
40		1.536	1.558	1.580	1.602	1.624	1.645	1.667	1.689	1.711	1.733	1.755	1.777	1.798
42		1.511	1.531	1.552	1.573	1.594	1.615	1.635	1.656	1.677	1.698	1.719	1.740	1.760
44		1.487	1.507	1.527	1.547	1.567	1.587	1.607	1.626	1.646	1.666	1.686	1.706	1.726
46		1.466	1.485	1.504	1.523	1.542	1.561	1.580	1.599	1.618	1.637	1.656	1.675	1.694
48		1.447	1.465	1.483	1.501	1.520	1.538	1.556	1.574	1.592	1.611	1.629	1.647	1.665
50		1.429	1.446	1.464	1.481	1.499	1.516	1.534	1.551	1.569	1.586	1.604	1.622	1.639
52		1.412	1.429	1.446	1.463	1.480	1.496	1.513	1.530	1.547	1.564	1.580	1.597	1.614
54		1.397	1.413	1.430	1.446	1.462	1.478	1.494	1.510	1.527	1.543	1.559	1.575	1.591
56		1.383	1.399	1.414	1.430	1.445	1.461	1.477	1.492	1.508	1.523	1.539	1.555	1.570
58		1.370	1.385	1.400	1.415	1.430	1.445	1.460	1.475	1.490	1.505	1.520	1.536	1.551
60		1.357	1.372	1.387	1.401	1.416	1.430	1.445	1.459	1.474	1.489	1.503	1.518	1.532
65		1.330	1.343	1.357	1.370	1.384	1.397	1.411	1.424	1.438	1.451	1.464	1.478	1.491
70		1.306	1.319	1.331	1.344	1.356	1.369	1.381	1.394	1.406	1.419	1.431	1.444	1.456
75		1.286	1.298	1.309	1.321	1.333	1.344	1.356	1.368	1.379	1.391	1.402	1.414	1.426
25	$\frac{h}{t_S}$	4.313	4.395	4.941	5.264	5.595	5.932	6.274	6.622	6.976	7.337	7.700	8.067	8.439
26		4.233	4.314	4.851	5.170	5.497	5.828	6.165	6.510	6.858	7.213	7.571	7.932	8.302
27		4.156	4.237	4.764	5.080	5.399	5.728	6.059	6.399	6.744	7.091	7.447	7.803	8.167
28		4.081	4.164	4.682	4.990	5.307	5.630	5.959	6.294	6.631	6.977	7.327	7.683	8.042
29		4.010	4.091	4.600	4.906	5.218	5.537	5.862	6.192	6.525	6.866	7.211	7.562	7.917
30		3.942	4.023	4.524	4.825	5.133	5.445	5.765	6.091	6.423	6.759	7.101	7.447	7.798
31		3.876	3.957	4.450	4.747	5.048	5.359	5.674	5.997	6.324	6.654	6.992	7.334	7.681
32		3.814	3.892	4.377	4.671	4.971	5.274	5.586	5.905	6.226	6.555	6.889	7.225	7.568
33		3.753	3.833	4.308	4.598	4.892	5.195	5.501	5.815	6.133	6.459	6.786	7.118	7.458
34		3.694	3.772	4.243	4.527	4.817	5.116	5.419	5.727	6.045	6.364	6.688	7.018	7.355
35		3.637	3.715	4.177	4.458	4.745	5.038	5.338	5.644	5.958	6.274	6.596	6.922	7.254
36		3.582	3.660	4.116	4.392	4.676	4.966	5.263	5.563	5.871	6.185	6.504	6.824	7.152
37		3.529	3.608	4.055	4.330	4.609	4.894	5.188	5.485	5.788	6.099	6.412	6.730	7.056
38		3.480	3.557	3.999	4.268	4.545	4.827	5.116	5.411	5.711	6.016	6.327	6.643	6.964
39		3.430	3.507	3.941	4.208	4.479	4.759	5.046	5.335	5.633	5.933	6.242	6.552	6.870
40		3.383	3.458	3.887	4.149	4.418	4.696	4.977	5.265	5.557	5.855	6.158	6.467	6.784
42		3.291	3.367	3.784	4.039	4.302	4.570	4.848	5.128	5.414	5.706	6.002	6.304	6.614
44		3.207	3.280	3.686	3.935	4.192	4.454	4.722	4.999	5.279	5.565	5.855	6.151	6.451
46		3.126	3.198	3.594	3.838	4.088	4.345	4.608	4.876	5.150	5.430	5.715	6.005	6.299
48		3.050	3.121	3.507	3.746	3.988	4.240	4.497	4.761	5.030	5.301	5.581	5.865	6.155
50		2.979	3.050	3.424	3.658	3.896	4.142	4.392	4.651	4.912	5.182	5.453	5.730	6.015
52		2.912	2.981	3.346	3.574	3.807	4.049	4.295	4.546	4.803	5.065	5.335	5.608	5.885
54		2.848	2.916	3.272	3.495	3.723	3.959	4.201	4.448	4.697	4.955	5.219	5.487	5.760
56		2.786	2.853	3.203	3.419	3.645	3.875	4.109	4.353	4.599	4.853	5.109	5.371	5.640
58		2.729	2.795	3.136	3.349	3.569	3.794	4.026	4.263	4.505	4.753	5.006	5.261	5.524
60		2.675	2.739	3.072	3.282	3.496	3.718	3.943	4.177	4.414	4.655	4.905	5.157	5.417
65		2.549	2.612	2.927	3.126	3.329	3.541	3.755	3.977	4.203	4.436	4.675	4.915	5.163
70		2.437	2.496	2.797	2.985	3.182	3.381	3.588	3.799	4.017	4.237	4.396	4.696	4.934
75		2.336	2.393	2.680	2.860	3.046	3.239	3.435	3.637	3.847	4.058	4.278	4.500	4.726
25	$\frac{p}{t_S}$	5.454	5.932	6.183	6.546	6.908	7.269	7.629	7.988	8.345	8.702	9.133	9.412	9.765
26		5.424	5.957	6.153	6.516	6.877	7.238	7.597	7.957	8.314	8.672	9.027	9.381	9.736
27		5.395	5.921	6.121	6.484	6.845	7.206	7.565	7.925	8.283	8.640	8.996	9.351	9.705
28		5.364	5.885	6.090	6.451	6.813	7.173	7.533	7.892	8.250	8.607	8.964	9.319	9.674
29		5.334	5.849	6.059	6.420	6.781	7.141	7.501	7.860	8.217	8.575	8.931	9.287	9.642
30		5.305	5.815	6.027	6.388	6.749	7.108	7.467	7.826	8.184	8.542	8.898	9.254	9.610
31		5.275	5.780	5.996	6.357	6.715	7.075	7.434	7.793	8.151	8.508	8.865	9.221	9.576
32		5.245	5.745	5.965	6.325	6.684	7.042	7.401	7.760	8.117	8.476	8.832	9.187	9.543
33		5.216	5.711	5.934	6.293	6.651	7.010	7.368	7.726	8.084	8.441	8.797	9.153	9.509
34		5.187	5.677	5.903	6.261	6.618	6.977	7.335	7.692	8.050	8.407	8.763	9.119	9.475
35		5.158	5.644	5.872	6.229	6.587	6.944	7.301	7.658	8.016	8.373	8.729	9.085	9.441
36		5.130	5.611	5.842	6.198	6.555	6.912	7.269	7.625	7.982	8.339	8.696	9.051	9.407
37		5.102	5.579	5.812	6.168	6.524	6.880	7.236	7.592	7.948	8.305	8.661	9.016	9.372
38		5.074	5.547	5.782	6.137	6.492	6.848	7.203	7.559	7.915	8.271	8.627	8.982	9.337
39		5.046	5.515	5.752	6.106	6.460	6.815	7.171	7.526	7.881	8.236	8.592	8.947	9.302
40		4.998	5.483	5.723	6.075	6.429	6.784	7.138	7.493	7.848	8.203	8.557	8.912	9.268
42		4.965	5.423	5.665	6.016	6.368	6.720	7.074	7.428	7.782	8.135	8.489	8.843	9.198
44		4.913	5.363	5.608	5.957	6.307	6.658	7.009	7.363	7.715	8.068	8.421	8.775	9.128
46		4.861	5.305	5.552	5.899	6.248	6.598	6.948	7.299	7.650	8.002	8.354	8.707	9.060
48		4.811	5.248	5.499	5.843	6.189	6.537	6.886	7.236	7.586	7.936	8.288	8.640	8.992
50		4.762	5.193	5.444	5.788	6.132	6.479	6.825	7.174	7.522	7.869	8.222	8.572	8.924
52		4.715	5.139	5.392	5.733	6.076	6.421	6.767	7.113	7.459	7.809	8.158	8.508	8.858
54		4.668	5.087	5.341	5.680	6.021	6.364	6.708	7.053	7.398	7.746	8.094	8.442	8.792
56		4.623	5.036	5.292	5.628	5.969	6.309	6.650	6.995	7.339	7.685	8.031	8.378	8.727
58		4.577	4.987	5.243	5.578	5.915	6.254	6.595	6.937	7.280	7.626	7.969	8.314	8.661
60		4.535	4.939	5.195	5.529	5.864	6.202	6.540	6.880	7.221	7.564	7.909	8.253	8.599
65		4.433	4.825	5.081	5.410	5.740	6.073	6.407	6.744	7.080	7.420	7.761	8.102	8.445
70		4.335	4.716	4.974	5.297	5.624	5.951	6.282	6.613	6.947	7.282	7.660	7.957	8.297
75		4.242	4.615	4.872	5.191	5.512	5.836	6.161	6.489	6.803	7.153	7.485	7.819	8.154

TABLE 4.- Z-PANEL PROPERTIES - Concluded $\left[\frac{t_W}{t_S} = 0.79;\ \frac{b_A}{t_W} = 9.8;\ \frac{b_F}{b_W} = 0.4;\ \frac{r_A}{t_W} = 3;\ \frac{r_F}{t_W} = 4;\ \frac{d}{t_S} = 1.93;\ \frac{p}{t_S} = 12.3\right]$

$\frac{b_S}{t_S}$ \ $\frac{b_W}{t_W}$		33	34	35	36	37	38	39	40	41	42	43	44	45
25	$\frac{I}{t_S^4}$	2.312	2.347	2.382	2.417	2.452	2.487	2.522	2.557	2.592	2.627	2.662	2.697	2.732
26		2.262	2.295	2.329	2.363	2.397	2.430	2.464	2.497	2.531	2.564	2.598	2.631	2.665
27		2.216	2.247	2.280	2.312	2.345	2.377	2.410	2.442	2.474	2.506	2.539	2.571	2.604
28		2.171	2.203	2.234	2.265	2.297	2.328	2.359	2.390	2.422	2.453	2.484	2.515	2.546
29		2.131	2.161	2.191	2.222	2.252	2.282	2.312	2.342	2.372	2.402	2.433	2.463	2.493
30		2.093	2.123	2.152	2.181	2.210	2.239	2.268	2.297	2.327	2.356	2.385	2.414	2.443
31		2.058	2.086	2.115	2.143	2.171	2.199	2.228	2.256	2.284	2.312	2.340	2.368	2.397
32		2.026	2.053	2.080	2.107	2.135	2.162	2.189	2.216	2.243	2.271	2.299	2.326	2.353
33		1.995	2.021	2.048	2.074	2.101	2.127	2.153	2.179	2.206	2.232	2.259	2.285	2.312
34		1.965	1.991	2.017	2.042	2.068	2.093	2.119	2.145	2.171	2.196	2.222	2.248	2.274
35		1.937	1.962	1.987	2.012	2.037	2.062	2.087	2.112	2.137	2.162	2.187	2.212	2.237
36		1.912	1.936	1.960	1.984	2.009	2.033	2.057	2.081	2.106	2.130	2.154	2.178	2.203
37		1.887	1.910	1.934	1.957	1.981	2.005	2.029	2.052	2.076	2.099	2.123	2.146	2.170
38		1.863	1.886	1.909	1.932	1.955	1.978	2.001	2.024	2.047	2.070	2.093	2.116	2.139
39		1.842	1.864	1.886	1.908	1.931	1.953	1.976	1.998	2.021	2.043	2.066	2.088	2.110
40		1.820	1.842	1.864	1.886	1.908	1.929	1.951	1.973	1.995	2.017	2.039	2.060	2.082
42		1.781	1.802	1.823	1.844	1.865	1.885	1.906	1.927	1.948	1.968	1.989	2.010	2.031
44		1.746	1.765	1.785	1.805	1.825	1.845	1.865	1.885	1.905	1.924	1.944	1.964	1.984
46		1.713	1.732	1.751	1.770	1.789	1.808	1.827	1.846	1.865	1.884	1.903	1.922	1.941
48		1.683	1.702	1.720	1.738	1.756	1.774	1.793	1.811	1.829	1.847	1.866	1.884	1.902
50		1.657	1.674	1.692	1.709	1.726	1.743	1.761	1.778	1.796	1.813	1.831	1.848	1.866
52		1.631	1.648	1.665	1.681	1.698	1.715	1.732	1.748	1.765	1.782	1.799	1.816	1.833
54		1.607	1.624	1.640	1.656	1.672	1.688	1.705	1.721	1.737	1.753	1.770	1.786	1.802
56		1.586	1.601	1.617	1.633	1.649	1.664	1.680	1.695	1.711	1.726	1.742	1.757	1.773
58		1.567	1.581	1.596	1.611	1.626	1.641	1.656	1.671	1.686	1.701	1.716	1.731	1.746
60		1.547	1.561	1.576	1.590	1.605	1.620	1.635	1.649	1.664	1.678	1.693	1.707	1.722
65		1.505	1.518	1.532	1.545	1.559	1.572	1.586	1.599	1.613	1.626	1.640	1.653	1.666
70		1.469	1.481	1.494	1.506	1.519	1.531	1.544	1.556	1.569	1.581	1.594	1.606	1.619
75		1.438	1.449	1.461	1.472	1.484	1.496	1.508	1.519	1.531	1.542	1.554	1.566	1.578
25	$\frac{J}{t_S^4}$	8.815	9.195	9.578	9.965	10.36	10.75	11.15	11.55	11.95	12.35	12.75	13.17	13.59
26		8.672	9.050	9.448	9.809	10.19	10.59	10.98	11.38	11.77	12.18	12.58	12.99	13.40
27		8.532	8.909	9.282	9.662	10.04	10.43	10.82	11.21	11.61	12.01	12.40	12.81	13.21
28		8.406	8.770	9.142	9.518	9.893	10.28	10.66	11.05	11.44	11.84	12.23	12.63	13.04
29		8.277	8.641	9.008	9.376	9.751	10.13	10.51	10.90	11.29	11.68	12.07	12.46	12.86
30		8.154	8.510	8.873	9.241	9.612	9.987	10.37	10.75	11.13	11.52	11.91	12.30	12.70
31		8.033	8.389	8.745	9.109	9.477	9.848	10.22	10.60	10.98	11.36	11.75	12.14	12.53
32		7.913	8.265	8.622	8.983	9.343	9.711	10.08	10.46	10.84	11.21	11.59	11.98	12.37
33		7.800	8.149	8.499	8.856	9.213	9.579	9.948	10.32	10.69	11.07	11.45	11.83	12.22
34		7.694	8.036	8.383	8.738	9.092	9.455	9.817	10.18	10.55	10.93	11.30	11.68	12.06
35		7.589	7.929	8.274	8.622	8.974	9.330	9.690	10.05	10.42	10.79	11.16	11.54	11.92
36		7.482	7.819	8.161	8.507	8.853	9.207	9.564	9.926	10.29	10.65	11.02	11.40	11.77
37		7.383	7.719	8.055	8.399	8.742	9.090	9.441	9.800	10.16	10.52	10.89	11.26	11.63
38		7.289	7.619	7.953	8.291	8.633	8.979	9.328	9.681	10.04	10.40	10.76	11.13	11.50
39		7.190	7.518	7.850	8.186	8.522	8.867	9.210	9.562	9.913	10.27	10.63	10.99	11.36
40		7.102	7.424	7.751	8.081	8.416	8.759	9.102	9.448	9.797	10.15	10.51	10.87	11.23
42		6.925	7.241	7.561	7.885	8.214	8.549	8.885	9.225	9.568	9.919	10.27	10.62	10.98
44		6.756	7.070	7.384	7.702	8.034	8.350	8.680	9.014	9.351	9.697	10.04	10.39	10.74
46		6.599	6.903	7.212	7.524	7.841	8.162	8.487	8.815	9.148	9.483	9.823	10.17	10.51
48		6.449	6.745	7.048	7.356	7.668	7.984	8.300	8.623	8.951	9.282	9.612	9.950	10.29
50		6.301	6.595	6.890	7.193	7.501	7.812	8.124	8.443	8.762	9.089	9.414	9.748	10.08
52		6.167	6.453	6.744	7.043	7.342	7.646	7.953	8.269	8.584	8.902	9.224	9.549	9.878
54		6.038	6.317	6.604	6.896	7.192	7.491	7.791	8.098	8.410	8.725	9.038	9.360	9.686
56		5.911	6.156	6.450	6.754	7.042	7.339	7.635	7.939	8.243	8.555	8.866	9.185	9.503
58		5.788	6.063	6.340	6.621	6.906	7.196	7.489	7.786	8.087	8.392	8.700	9.012	9.327
60		5.678	5.947	6.217	6.495	6.774	7.056	7.320	7.591	7.907	8.233	8.534	8.844	9.151
65		5.413	5.670	5.929	6.195	6.462	6.737	7.011	7.294	7.576	7.866	8.156	8.453	8.754
70		5.174	5.421	5.669	5.925	6.182	6.446	6.711	6.983	7.255	7.535	7.814	8.101	8.387
75		4.956	5.194	5.434	5.681	5.928	6.180	6.435	6.698	6.961	7.232	7.502	7.776	8.052
25	$\frac{Q}{t_S^2}$	10.12	10.47	10.82	11.17	11.51	11.86	12.21	12.55	12.89	13.23	13.57	13.91	14.25
26		10.19	10.44	10.79	11.14	11.49	11.83	12.18	12.53	12.87	13.21	13.56	13.90	14.24
27		10.06	10.41	10.76	11.11	11.46	11.81	12.16	12.50	12.85	13.19	13.53	13.88	14.22
28		10.03	10.38	10.73	11.08	11.43	11.78	12.13	12.48	12.82	13.17	13.51	13.85	14.20
29		9.996	10.35	10.70	11.05	11.40	11.75	12.10	12.45	12.80	13.14	13.49	13.83	14.17
30		9.964	10.32	10.67	11.02	11.37	11.72	12.07	12.42	12.77	13.11	13.46	13.81	14.15
31		9.931	10.29	10.64	10.99	11.34	11.69	12.04	12.39	12.74	13.09	13.43	13.78	14.12
32		9.897	10.25	10.61	10.96	11.31	11.66	12.01	12.36	12.71	13.06	13.40	13.75	14.10
33		9.864	10.22	10.57	10.93	11.27	11.63	11.98	12.33	12.68	13.03	13.38	13.72	14.07
34		9.830	10.18	10.54	10.89	11.24	11.60	11.95	12.30	12.65	13.00	13.35	13.69	14.04
35		9.796	10.15	10.50	10.86	11.21	11.56	11.92	12.27	12.62	12.97	13.31	13.66	14.01
36		9.761	10.12	10.47	10.82	11.18	11.53	11.88	12.23	12.58	12.93	13.28	13.63	13.98
37		9.727	10.08	10.44	10.79	11.14	11.50	11.85	12.20	12.55	12.90	13.25	13.60	19.95
38		9.693	10.05	10.40	10.76	11.11	11.46	11.81	12.17	12.52	12.87	13.21	13.57	13.92
39		9.657	10.01	10.37	10.72	11.07	11.43	11.78	12.13	12.48	12.84	13.19	13.54	13.89
40		9.623	9.977	10.33	10.69	11.04	11.39	11.75	12.10	12.45	12.80	13.15	13.50	13.85
42		9.553	9.907	10.26	10.61	10.97	11.32	11.68	12.03	12.38	12.73	13.08	13.43	13.79
44		9.482	9.837	10.19	10.54	10.89	11.25	11.60	11.96	12.32	12.66	13.01	13.36	13.72
46		9.414	9.767	10.12	10.47	10.83	11.18	11.53	11.89	12.24	12.59	12.94	13.30	13.65
48		9.345	9.697	10.10	10.40	10.76	11.11	11.46	11.81	12.17	12.52	12.87	13.22	13.58
50		9.275	9.627	9.979	10.33	10.69	11.04	11.39	11.74	12.10	12.45	12.80	13.15	13.50
52		9.208	9.559	9.910	10.26	10.61	10.97	11.32	11.67	12.02	12.38	12.73	13.08	13.43
54		9.142	9.491	9.841	10.19	10.54	10.90	11.25	11.60	11.95	12.30	12.65	13.01	13.36
56		9.075	9.410	9.766	10.12	10.47	10.83	11.17	11.53	11.88	12.23	12.58	12.94	13.29
58		9.007	9.358	9.707	10.06	10.41	10.76	11.11	11.46	11.81	12.16	12.51	12.86	13.22
60		8.945	9.294	9.641	9.990	10.34	10.69	11.03	11.37	11.72	12.09	12.44	12.79	13.14
65		8.788	9.133	9.478	9.825	10.17	10.52	10.87	11.22	11.56	11.91	12.26	12.61	12.96
70		8.618	8.979	9.321	9.665	10.01	10.35	10.70	11.05	11.39	11.74	12.09	12.44	12.79
75		8.491	8.831	9.170	9.512	9.853	10.20	10.54	10.88	11.23	11.58	11.92	12.27	12.61

NACA

TABLE 5.- Z-PANEL PROPERTIES $\left[\frac{t_W}{t_S} = 1.00;\ \frac{b_A}{t_W} = 8.6;\ \frac{b_F}{b_W} = 0.4;\ \frac{r_A}{t_W} = 3;\ \frac{r_F}{t_W} = 4;\ \frac{d}{t_S} = 1.95;\ \frac{p}{t_S} = 11.7\right]$

$\frac{b_S}{t_S}$ \ $\frac{b_W}{t_W}$		20	21	22	23	24	25	26	27	28	29	30	31	32
25	$\frac{t_F}{t_S}$	2.327	2.383	2.439	2.495	2.551	2.607	2.663	2.719	2.775	2.831	2.887	2.943	2.999
26		2.276	2.330	2.383	2.437	2.491	2.545	2.599	2.653	2.706	2.760	2.814	2.868	2.922
27		2.228	2.280	2.332	2.384	2.436	2.488	2.540	2.591	2.643	2.695	2.747	2.799	2.851
28		2.185	2.235	2.285	2.335	2.385	2.435	2.485	2.535	2.585	2.635	2.685	2.735	2.785
29		2.144	2.192	2.240	2.289	2.337	2.385	2.433	2.482	2.530	2.578	2.626	2.675	2.723
30		2.106	2.152	2.198	2.246	2.292	2.339	2.386	2.432	2.479	2.526	2.572	2.619	2.666
31		2.070	2.115	2.160	2.205	2.251	2.296	2.341	2.386	2.432	2.476	2.522	2.567	2.612
32		2.036	2.080	2.124	2.168	2.211	2.255	2.299	2.343	2.386	2.430	2.474	2.517	2.561
33		2.005	2.048	2.090	2.132	2.175	2.217	2.260	2.302	2.344	2.387	2.429	2.472	2.514
34		1.975	2.017	2.058	2.099	2.140	2.181	2.223	2.264	2.305	2.346	2.387	2.429	2.470
35		1.948	1.988	2.028	2.068	2.108	2.148	2.188	2.228	2.268	2.308	2.348	2.388	2.428
36		1.921	1.960	1.999	2.038	2.077	2.116	2.155	2.194	2.232	2.271	2.310	2.349	2.388
37		1.896	1.934	1.972	2.010	2.048	2.086	2.123	2.161	2.199	2.237	2.275	2.313	2.350
38		1.873	1.910	1.946	1.983	2.020	2.057	2.094	2.131	2.168	2.204	2.241	2.278	2.315
39		1.850	1.886	1.922	1.958	1.994	2.030	2.066	2.102	2.138	2.174	2.209	2.245	2.281
40		1.829	1.864	1.899	1.934	1.969	2.004	2.039	2.074	2.109	2.144	2.179	2.214	2.249
42		1.790	1.823	1.856	1.890	1.923	1.956	1.990	2.023	2.056	2.090	2.123	2.157	2.190
44		1.754	1.786	1.817	1.849	1.881	1.913	1.945	1.976	2.008	2.040	2.072	2.104	2.136
46		1.721	1.751	1.782	1.812	1.843	1.873	1.904	1.934	1.964	1.995	2.025	2.056	2.086
48		1.691	1.720	1.749	1.778	1.808	1.837	1.866	1.895	1.924	1.953	1.983	2.012	2.041
50		1.663	1.691	1.719	1.747	1.775	1.803	1.831	1.859	1.887	1.915	1.943	1.971	1.999
52		1.638	1.665	1.692	1.719	1.746	1.772	1.799	1.826	1.853	1.880	1.907	1.934	1.961
54		1.614	1.640	1.666	1.692	1.718	1.744	1.770	1.796	1.822	1.848	1.873	1.899	1.925
56		1.592	1.617	1.642	1.667	1.692	1.717	1.742	1.767	1.792	1.817	1.842	1.867	1.892
58		1.572	1.596	1.620	1.644	1.668	1.693	1.717	1.741	1.765	1.789	1.813	1.837	1.861
60		1.553	1.576	1.599	1.623	1.646	1.669	1.693	1.716	1.739	1.763	1.786	1.810	1.833
65		1.510	1.532	1.553	1.575	1.596	1.618	1.639	1.661	1.683	1.704	1.726	1.748	1.769
70		1.474	1.494	1.514	1.534	1.554	1.574	1.594	1.614	1.634	1.654	1.674	1.694	1.714
75		1.442	1.461	1.480	1.498	1.517	1.536	1.554	1.573	1.592	1.610	1.629	1.648	1.666
25	$\frac{t_F}{t_S}$	6.576	7.044	7.519	8.003	8.493	8.990	9.493	10.00	10.52	11.03	11.56	12.09	12.62
26		6.473	6.935	7.408	7.886	8.371	8.862	9.360	9.863	10.38	10.89	11.41	11.93	12.46
27		6.376	6.833	7.298	7.770	8.250	8.737	9.230	9.732	10.24	10.75	11.26	11.78	12.30
28		6.278	6.729	7.190	7.658	8.133	8.615	9.104	9.599	10.10	10.61	11.12	11.63	12.15
29		6.185	6.633	7.089	7.550	8.021	8.500	8.985	9.473	9.970	10.47	10.98	11.49	12.01
30		6.095	6.539	6.988	7.445	7.914	8.385	8.864	9.352	9.843	10.34	10.84	11.35	11.86
31		6.008	6.446	6.892	7.346	7.805	8.274	8.750	9.232	9.716	10.21	10.71	11.21	11.72
32		5.926	6.357	6.797	7.246	7.705	8.168	8.638	9.114	9.600	10.09	10.58	11.08	11.59
33		5.842	6.268	6.706	7.152	7.602	8.063	8.527	9.003	9.483	9.965	10.46	10.95	11.45
34		5.764	6.185	6.617	7.057	7.506	7.962	8.421	8.890	9.366	9.848	10.33	10.82	11.32
35		5.684	6.103	6.530	6.966	7.409	7.860	8.318	8.782	9.253	9.730	10.21	10.70	11.19
36		5.611	6.025	6.448	6.879	7.317	7.764	8.217	8.677	9.147	9.620	10.10	10.58	11.07
37		5.539	5.948	6.366	6.793	7.227	7.669	8.122	8.578	9.040	9.508	9.982	10.46	10.95
38		5.466	5.871	6.288	6.711	7.141	7.579	8.024	8.476	8.934	9.402	9.873	10.35	10.83
39		5.399	5.800	6.210	6.628	7.055	7.489	7.930	8.378	8.833	9.294	9.765	10.24	10.71
40		5.332	5.729	6.135	6.549	6.972	7.403	7.840	8.285	8.736	9.194	9.657	10.13	10.60
42		5.202	5.592	5.991	6.395	6.811	7.235	7.663	8.101	8.547	8.994	9.451	9.910	10.38
44		5.080	5.461	5.854	6.252	6.659	7.074	7.500	7.929	8.364	8.807	9.255	9.709	10.17
46		4.965	5.340	5.721	6.115	6.513	6.922	7.335	7.760	8.191	8.625	9.069	9.514	9.970
48		4.855	5.222	5.593	5.984	6.374	6.775	7.184	7.600	8.024	8.454	8.885	9.328	9.775
50		4.751	5.111	5.480	5.858	6.244	6.638	7.040	7.449	7.864	8.287	8.716	9.151	9.592
52		4.650	5.003	5.365	5.735	6.114	6.505	6.900	7.302	7.711	8.127	8.549	8.977	9.411
54		4.556	4.902	5.253	5.622	5.995	6.375	6.764	7.159	7.562	7.971	8.392	8.814	9.242
56		4.465	4.805	5.155	5.513	5.880	6.255	6.637	7.027	7.424	7.828	8.238	8.654	9.077
58		4.377	4.711	5.055	5.408	5.769	6.135	6.513	6.896	7.287	7.686	8.090	8.502	8.919
60		4.293	4.623	4.961	5.306	5.662	6.026	6.394	6.773	7.159	7.548	7.948	8.350	8.762
65		4.101	4.415	4.740	5.071	5.414	5.761	6.120	6.482	6.851	7.232	7.614	8.003	8.403
70		3.926	4.228	4.539	4.858	5.186	5.522	5.865	6.217	6.575	6.940	7.311	7.689	8.074
75		3.768	4.058	4.356	4.665	4.980	5.303	5.637	5.974	6.319	6.675	7.033	7.397	7.773
25	$\frac{t_F}{t_S}$	7.258	7.720	8.178	8.634	9.086	9.535	9.982	10.43	10.87	11.31	11.74	12.18	12.61
26		7.239	7.701	8.161	8.616	9.069	9.519	9.967	10.41	10.85	11.29	11.73	12.17	12.60
27		7.219	7.682	8.141	8.598	9.051	9.502	9.950	10.40	10.84	11.28	11.72	12.16	12.59
28		7.199	7.661	8.121	8.578	9.032	9.484	9.933	10.38	10.82	11.27	11.71	12.14	12.58
29		7.178	7.641	8.101	8.558	9.013	9.465	9.915	10.36	10.80	11.25	11.69	12.13	12.57
30		7.156	7.619	8.079	8.537	8.992	9.445	9.896	10.34	10.79	11.23	11.68	12.12	12.55
31		7.134	7.597	8.058	8.516	8.971	9.423	9.876	10.33	10.77	11.22	11.66	12.10	12.54
32		7.111	7.574	8.035	8.493	8.949	9.404	9.855	10.30	10.75	11.20	11.64	12.08	12.52
33		7.088	7.551	8.012	8.471	8.926	9.381	9.833	10.28	10.73	11.18	11.62	12.07	12.51
34		7.066	7.527	7.989	8.447	8.904	9.359	9.811	10.26	10.71	11.16	11.60	12.05	12.49
35		7.041	7.504	7.965	8.423	8.880	9.335	9.788	10.24	10.69	11.14	11.58	12.03	12.47
36		7.019	7.480	7.941	8.400	8.856	9.311	9.765	10.22	10.67	11.12	11.56	12.01	12.45
37		6.994	7.457	7.917	8.375	8.832	9.287	9.742	10.19	10.64	11.09	11.54	11.99	12.43
38		6.970	7.432	7.893	8.351	8.807	9.263	9.717	10.17	10.62	11.07	11.52	11.96	12.41
39		6.946	7.408	7.868	8.326	8.782	9.238	9.692	10.15	10.60	11.05	11.49	11.94	12.39
40		6.922	7.383	7.843	8.301	8.758	9.214	9.668	10.12	10.57	11.02	11.47	11.92	12.36
42		6.873	7.334	7.793	8.250	8.707	9.163	9.617	10.07	10.52	10.97	11.42	11.87	12.32
44		6.825	7.284	7.743	8.200	8.656	9.111	9.565	10.02	10.47	10.92	11.37	11.82	12.27
46		6.777	7.235	7.692	8.149	8.604	9.057	9.461	9.967	10.42	10.87	11.32	11.77	12.22
48		6.728	7.185	7.642	8.098	8.552	9.006	9.461	9.914	10.37	10.82	11.27	11.72	12.17
50		6.681	7.136	7.592	8.046	8.501	8.954	9.408	9.861	10.31	10.77	11.22	11.67	12.13
52		6.633	7.087	7.541	7.994	8.448	8.902	9.355	9.808	10.26	10.71	11.17	11.61	12.06
54		6.586	7.039	7.491	7.943	8.396	8.849	9.303	9.761	10.21	10.66	11.11	11.56	12.01
56		6.540	6.991	7.442	7.894	8.345	8.797	9.249	9.701	10.15	10.60	11.05	11.50	11.95
58		6.493	6.943	7.392	7.844	8.294	8.744	9.195	9.646	10.10	10.55	11.00	11.45	11.90
60		6.448	6.896	7.345	7.793	8.243	8.693	9.143	9.593	10.04	10.49	10.94	11.39	11.84
65		6.338	6.781	7.226	7.671	8.118	8.565	9.013	9.461	9.909	10.36	10.81	11.25	11.70
70		6.230	6.668	7.110	7.552	7.995	8.439	8.885	9.331	9.777	10.22	10.67	11.12	11.57
75		6.128	6.562	6.998	7.433	7.877	8.318	8.761	9.203	9.647	10.09	10.54	10.98	11.43

TABLE 5.- Z-PANEL PROPERTIES - Concluded $\left[\frac{t_W}{t_S} = 1.00;\ \frac{b_A}{t_W} = 8.6;\ \frac{b_F}{b_W} = 0.4;\ \frac{r_A}{t_W} = 3;\ \frac{r_F}{t_W} = 4;\ \frac{d}{t_S} = 1.95;\ \frac{p}{t_S} = 11.7\right]$

$\frac{b_S}{t_S}$ \ $\frac{b_W}{t_W}$		33	34	35	36	37	38	39	40	41	42	43	44	45
25	$\frac{I_F}{t_S^4}$	3.055	3.111	3.167	3.223	3.279	3.335	3.391	3.447	3.503	3.559	3.615	3.671	3.727
26		2.976	3.030	3.084	3.137	3.191	3.245	3.299	3.353	3.407	3.460	3.514	3.568	3.622
27		2.903	2.954	3.006	3.058	3.110	3.162	3.214	3.265	3.317	3.369	3.421	3.473	3.525
28		2.835	2.885	2.935	2.985	3.035	3.085	3.135	3.185	3.235	3.285	3.335	3.385	3.435
29		2.773	2.820	2.868	2.916	2.965	3.013	3.061	3.109	3.158	3.206	3.254	3.302	3.351
30		2.713	2.759	2.806	2.852	2.899	2.946	2.993	3.039	3.086	3.132	3.179	3.226	3.273
31		2.656	2.702	2.747	2.792	2.838	2.883	2.928	2.973	3.018	3.063	3.109	3.154	3.199
32		2.604	2.649	2.693	2.736	2.780	2.824	2.868	2.911	2.955	2.999	3.043	3.086	3.130
33		2.557	2.599	2.642	2.684	2.727	2.769	2.811	2.854	2.896	2.938	2.981	3.023	3.066
34		2.512	2.552	2.593	2.634	2.676	2.717	2.758	2.799	2.840	2.881	2.923	2.964	3.005
35		2.468	2.508	2.548	2.588	2.628	2.668	2.708	2.748	2.788	2.828	2.868	2.908	2.948
36		2.427	2.466	2.505	2.544	2.583	2.621	2.660	2.699	2.738	2.777	2.816	2.855	2.894
37		2.388	2.426	2.464	2.502	2.540	2.578	2.616	2.653	2.691	2.729	2.767	2.805	2.843
38		2.352	2.389	2.426	2.462	2.499	2.536	2.573	2.610	2.647	2.683	2.720	2.757	2.794
39		2.317	2.353	2.389	2.425	2.461	2.497	2.533	2.568	2.604	2.640	2.676	2.712	2.748
40		2.284	2.319	2.354	2.389	2.424	2.459	2.494	2.529	2.564	2.599	2.634	2.669	2.704
42		2.224	2.256	2.290	2.323	2.357	2.390	2.423	2.456	2.490	2.523	2.557	2.590	2.623
44		2.168	2.199	2.231	2.263	2.295	2.327	2.359	2.390	2.422	2.454	2.486	2.517	2.549
46		2.117	2.147	2.178	2.208	2.239	2.269	2.300	2.330	2.361	2.391	2.421	2.451	2.482
48		2.070	2.099	2.129	2.158	2.187	2.216	2.245	2.274	2.304	2.333	2.362	2.391	2.420
50		2.027	2.055	2.083	2.111	2.139	2.167	2.195	2.223	2.251	2.279	2.307	2.335	2.362
52		1.988	2.015	2.042	2.069	2.096	2.122	2.149	2.176	2.203	2.230	2.257	2.284	2.311
54		1.951	1.977	2.003	2.029	2.055	2.081	2.107	2.133	2.160	2.185	2.211	2.236	2.262
56		1.917	1.942	1.967	1.992	2.017	2.042	2.067	2.092	2.117	2.142	2.168	2.192	2.217
58		1.885	1.910	1.934	1.958	1.982	2.006	2.031	2.055	2.079	2.103	2.127	2.151	2.175
60		1.857	1.879	1.903	1.926	1.950	1.973	1.997	2.020	2.043	2.066	2.090	2.113	2.137
65		1.791	1.812	1.834	1.855	1.877	1.898	1.920	1.941	1.963	1.984	2.006	2.027	2.049
70		1.734	1.754	1.774	1.794	1.814	1.834	1.854	1.874	1.894	1.914	1.934	1.954	1.974
75		1.685	1.704	1.723	1.741	1.758	1.778	1.796	1.816	1.835	1.853	1.872	1.890	1.909
25	$\frac{I_A}{t_S^4}$	13.16	13.70	14.24	14.79	15.34	15.89	16.45	17.01	17.57	18.14	18.71	19.28	19.85
26		12.99	13.53	14.07	14.62	15.16	15.71	16.27	16.82	17.38	17.95	18.51	19.07	19.64
27		12.83	13.37	13.91	14.44	14.99	15.53	16.08	16.64	17.20	17.75	18.31	18.88	19.44
28		12.68	13.21	13.74	14.28	14.82	15.36	15.91	16.45	17.01	17.56	18.12	18.68	19.24
29		12.52	13.05	13.58	14.12	14.65	15.19	15.73	16.28	16.77	17.38	17.94	18.49	19.05
30		12.38	12.90	13.42	13.96	14.49	15.02	15.56	16.11	16.65	17.20	17.75	18.30	18.86
31		12.24	12.75	13.28	13.80	14.35	14.86	15.40	15.94	16.48	17.03	17.57	18.12	18.68
32		12.10	12.61	13.13	13.65	14.18	14.70	15.23	15.77	16.31	16.85	17.40	17.95	18.50
33		11.96	12.47	12.98	13.50	14.02	14.55	15.08	15.61	16.15	16.69	17.23	17.77	18.32
34		11.82	12.33	12.84	13.36	13.87	14.39	14.92	15.45	15.98	16.52	17.06	17.60	18.14
35		11.69	12.19	12.70	13.21	13.73	14.24	14.77	15.29	15.82	16.36	16.89	17.43	17.97
36		11.56	12.06	12.56	13.07	13.58	14.10	14.62	15.14	15.67	16.20	16.73	17.27	17.80
37		11.44	11.94	12.43	12.94	13.44	13.96	14.47	15.00	15.52	16.04	16.57	17.10	17.64
38		11.32	11.81	12.30	12.81	13.31	13.82	14.33	14.85	15.39	15.89	16.42	16.95	17.48
39		11.20	11.69	12.18	12.67	13.18	13.68	14.19	14.71	15.22	15.74	16.27	16.79	17.32
40		11.08	11.57	12.05	12.55	13.05	13.55	14.06	14.57	15.08	15.60	16.12	16.64	17.17
42		10.85	11.33	11.81	12.30	12.79	13.29	13.79	14.29	14.80	15.31	15.82	16.34	16.86
44		10.63	11.11	11.58	12.06	12.55	13.04	13.53	14.03	14.53	15.03	15.54	16.06	16.57
46		10.43	10.89	11.36	11.84	12.31	12.80	13.28	13.78	14.27	14.77	15.27	15.78	16.29
48		10.23	10.69	11.15	11.62	12.09	12.57	13.05	13.54	14.02	14.51	15.01	15.51	16.02
50		10.04	10.49	10.95	11.41	11.87	12.35	12.82	13.30	13.78	14.27	14.76	15.26	15.79
52		9.851	10.30	10.75	11.20	11.66	12.13	12.60	13.07	13.55	14.03	14.52	15.01	15.50
54		9.675	10.11	10.56	11.01	11.46	11.92	12.39	12.85	13.32	13.80	14.28	14.77	15.26
56		9.505	9.938	10.38	10.82	11.27	11.72	12.18	12.65	13.11	13.58	14.05	14.54	15.02
58		9.342	9.766	10.20	10.64	11.08	11.53	11.98	12.44	12.90	13.37	13.84	14.31	14.79
60		9.176	9.605	10.03	10.46	10.90	11.34	11.79	12.23	12.70	13.16	13.62	14.09	14.56
65		8.803	9.215	9.627	10.05	10.47	10.90	11.34	11.78	12.22	12.67	13.12	13.58	14.00
70		8.464	8.860	9.261	9.668	10.08	10.50	10.92	11.35	11.78	12.21	12.65	13.10	13.55
75		8.149	8.531	8.919	9.318	9.727	10.13	10.54	10.95	11.36	11.79	12.22	12.66	13.09
25	$\frac{d}{t_S}$	13.04	13.46	13.89	14.31	14.73	15.15	15.57	15.99	16.40	16.81	17.22	17.63	18.04
26		13.03	13.46	13.89	14.31	14.73	15.15	15.57	15.99	16.41	16.82	17.23	17.64	18.05
27		13.02	13.45	13.88	14.31	14.73	15.15	15.57	15.99	16.41	16.83	17.24	17.65	18.06
28		13.01	13.45	13.87	14.30	14.73	15.15	15.57	15.99	16.41	16.83	17.25	17.66	18.07
29		13.00	13.44	13.87	14.30	14.72	15.15	15.57	15.99	16.41	16.83	17.25	17.66	18.08
30		12.99	13.42	13.86	14.29	14.71	15.14	15.57	15.99	16.41	16.83	17.25	17.67	18.08
31		12.98	13.41	13.85	14.28	14.71	15.13	15.56	15.98	16.41	16.83	17.25	17.67	18.08
32		12.96	13.40	13.83	14.27	14.70	15.12	15.55	15.98	16.40	16.82	17.25	17.67	18.08
33		12.95	13.38	13.82	14.25	14.68	15.11	15.54	15.97	16.40	16.82	17.24	17.66	18.08
34		12.93	13.37	13.80	14.24	14.67	15.10	15.53	15.96	16.39	16.81	17.24	17.66	18.08
35		12.91	13.35	13.79	14.22	14.66	15.09	15.52	15.95	16.38	16.80	17.23	17.65	18.07
36		12.89	13.33	13.77	14.21	14.64	15.08	15.51	15.94	16.37	16.80	17.22	17.64	18.07
37		12.87	13.31	13.75	14.19	14.63	15.06	15.49	15.92	16.35	16.78	17.21	17.63	18.06
38		12.85	13.29	13.73	14.17	14.61	15.04	15.48	15.91	16.34	16.77	17.20	17.62	18.05
39		12.83	13.27	13.71	14.15	14.59	15.03	15.46	15.89	16.33	16.76	17.19	17.61	18.04
40		12.81	13.25	13.69	14.13	14.57	15.01	15.44	15.88	16.31	16.74	17.17	17.60	18.03
42		12.76	13.21	13.65	14.09	14.53	14.97	15.41	15.84	16.28	16.71	17.14	17.57	18.00
44		12.71	13.16	13.60	14.05	14.49	14.93	15.37	15.80	16.24	16.67	17.11	17.54	17.97
46		12.67	13.11	13.56	14.00	14.44	14.88	15.32	15.76	16.20	16.64	17.07	17.51	17.92
48		12.62	13.06	13.51	13.95	14.39	14.84	15.28	15.72	16.16	16.59	17.03	17.47	17.90
50		12.56	13.01	13.46	13.90	14.35	14.79	15.23	15.67	16.11	16.55	16.99	17.43	17.87
52		12.51	12.96	13.40	13.85	14.30	14.74	15.18	15.62	16.07	16.51	16.94	17.38	17.82
54		12.46	12.90	13.35	13.80	14.24	14.69	15.13	15.57	16.02	16.46	16.90	17.34	17.78
56		12.40	12.85	13.30	13.75	14.19	14.64	15.08	15.52	15.97	16.41	16.85	17.29	17.73
58		12.35	12.80	13.24	13.69	14.14	14.58	15.03	15.47	15.92	16.36	16.80	17.24	17.68
60		12.29	12.74	13.19	13.64	14.08	14.53	14.97	15.42	15.86	16.31	16.75	17.19	17.63
65		12.15	12.60	13.05	13.50	13.94	14.39	14.84	15.28	15.73	16.17	16.62	17.06	17.50
70		12.01	12.46	12.91	13.36	13.80	14.25	14.70	15.14	15.59	16.04	16.48	16.92	17.37
75		11.88	12.32	12.77	13.22	13.67	14.11	14.56	15.00	15.45	15.89	16.34	16.79	17.23

NACA

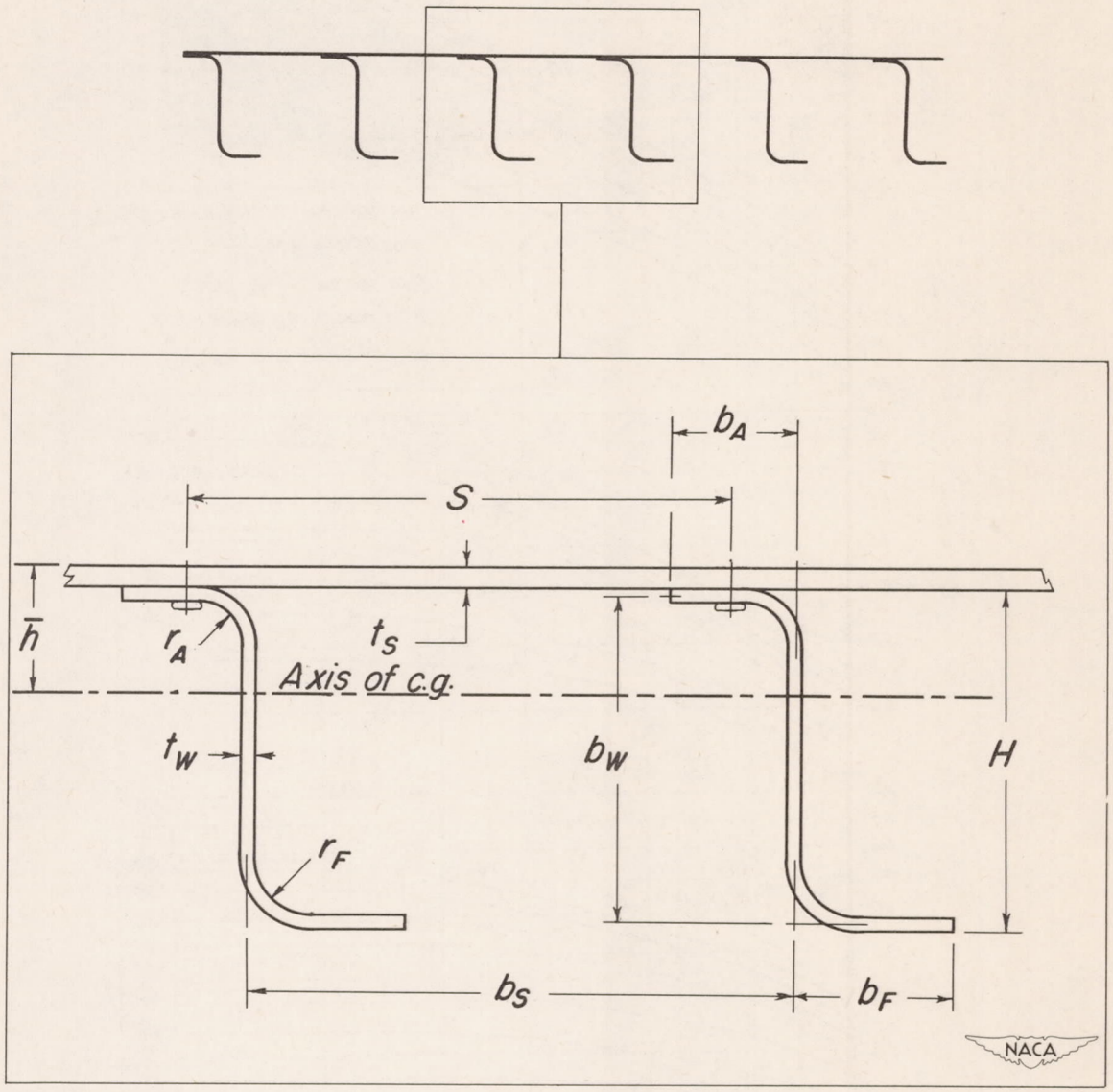

Figure I. - Symbols for panel dimensions.

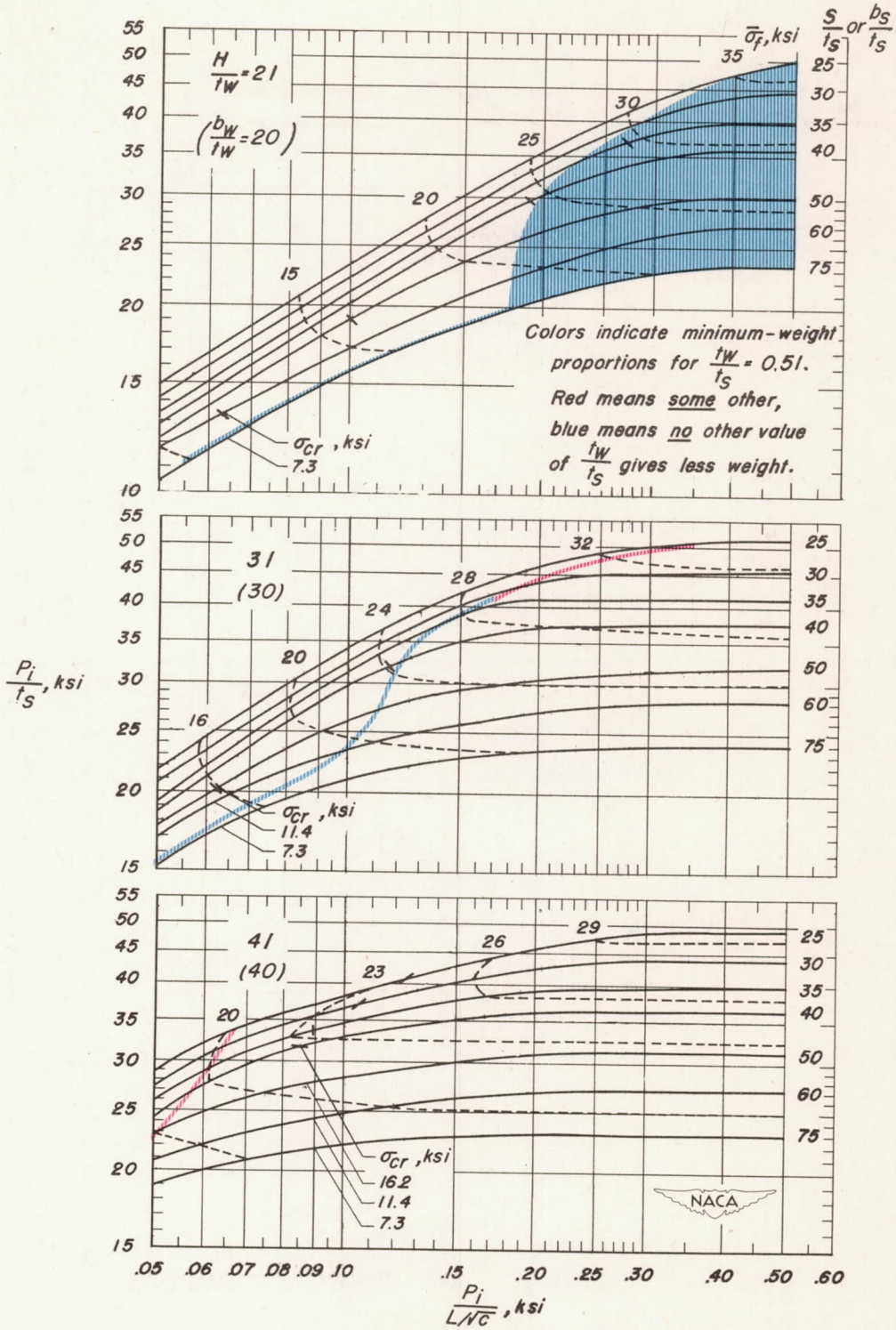

Figure 2.-Direct-reading design charts for 24S-T aluminum-alloy Z-stiffened panels. $\frac{t_W}{t_S}$=0.51.

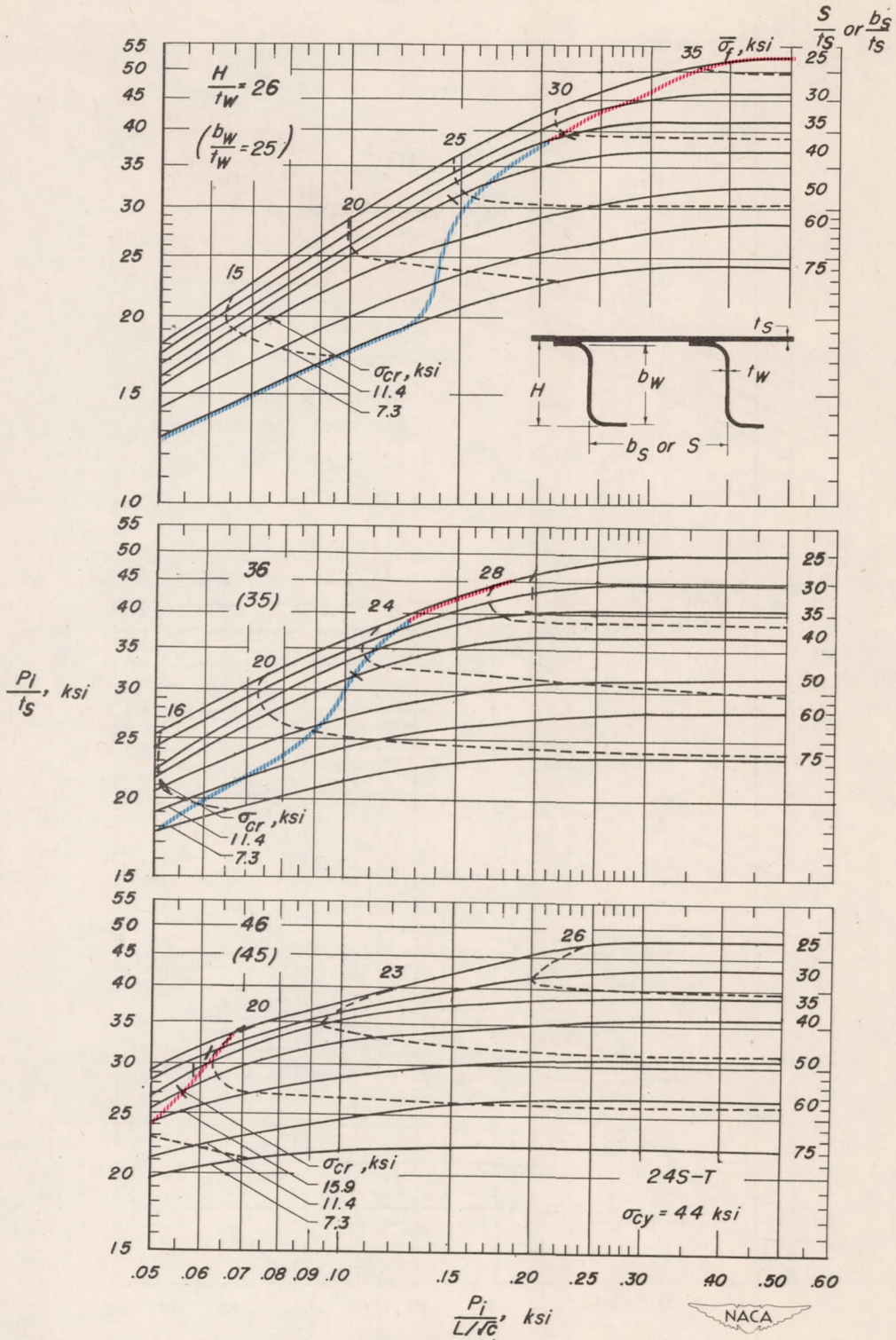

Figure 2.-Concluded. $\frac{t_w}{t_s} = 0.51$.

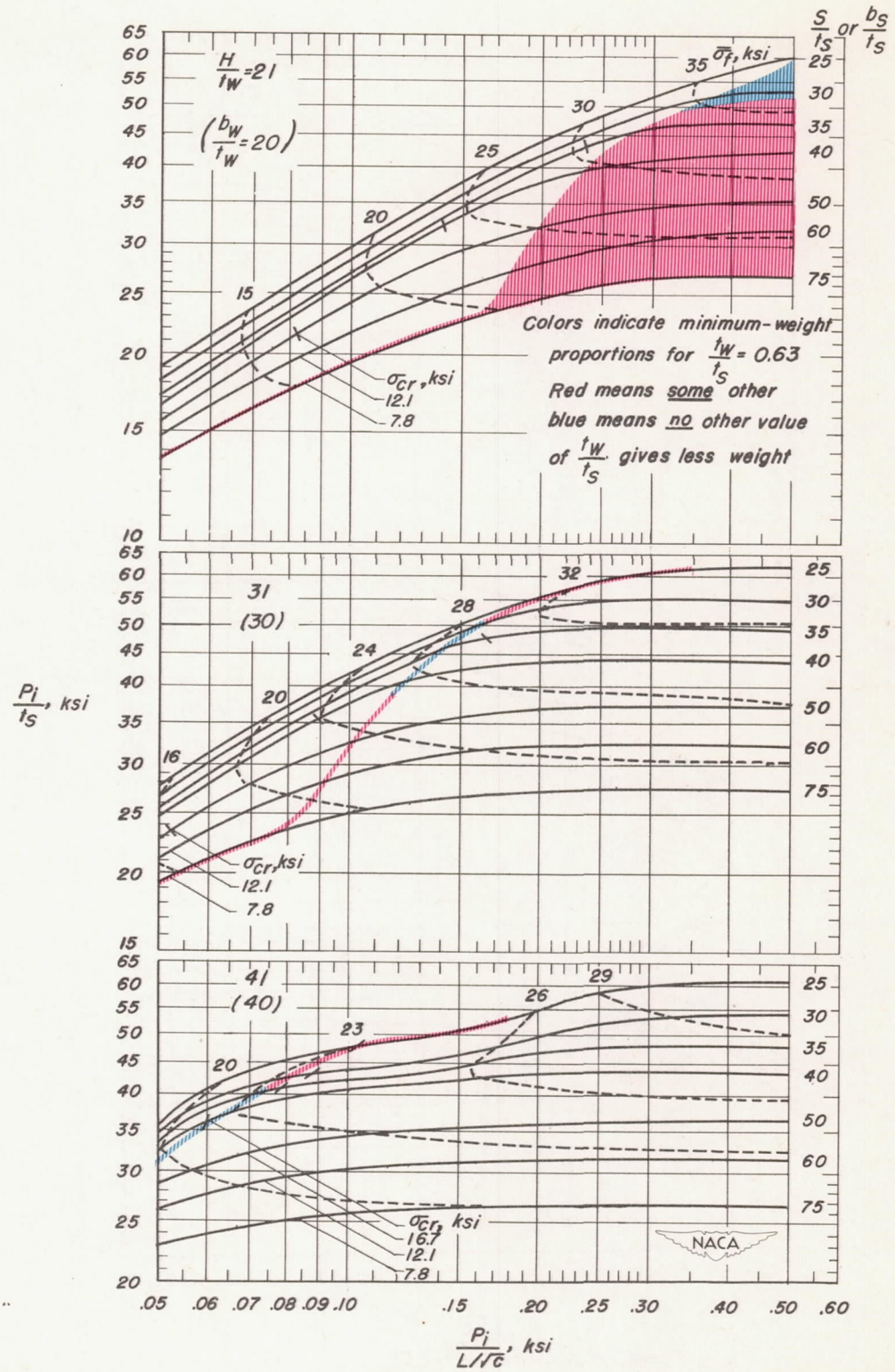

Figure 3.-Direct-reading design chart for 24S-T aluminum-alloy Z-stiffened panels. $\frac{t_w}{t_s}$=0.63.

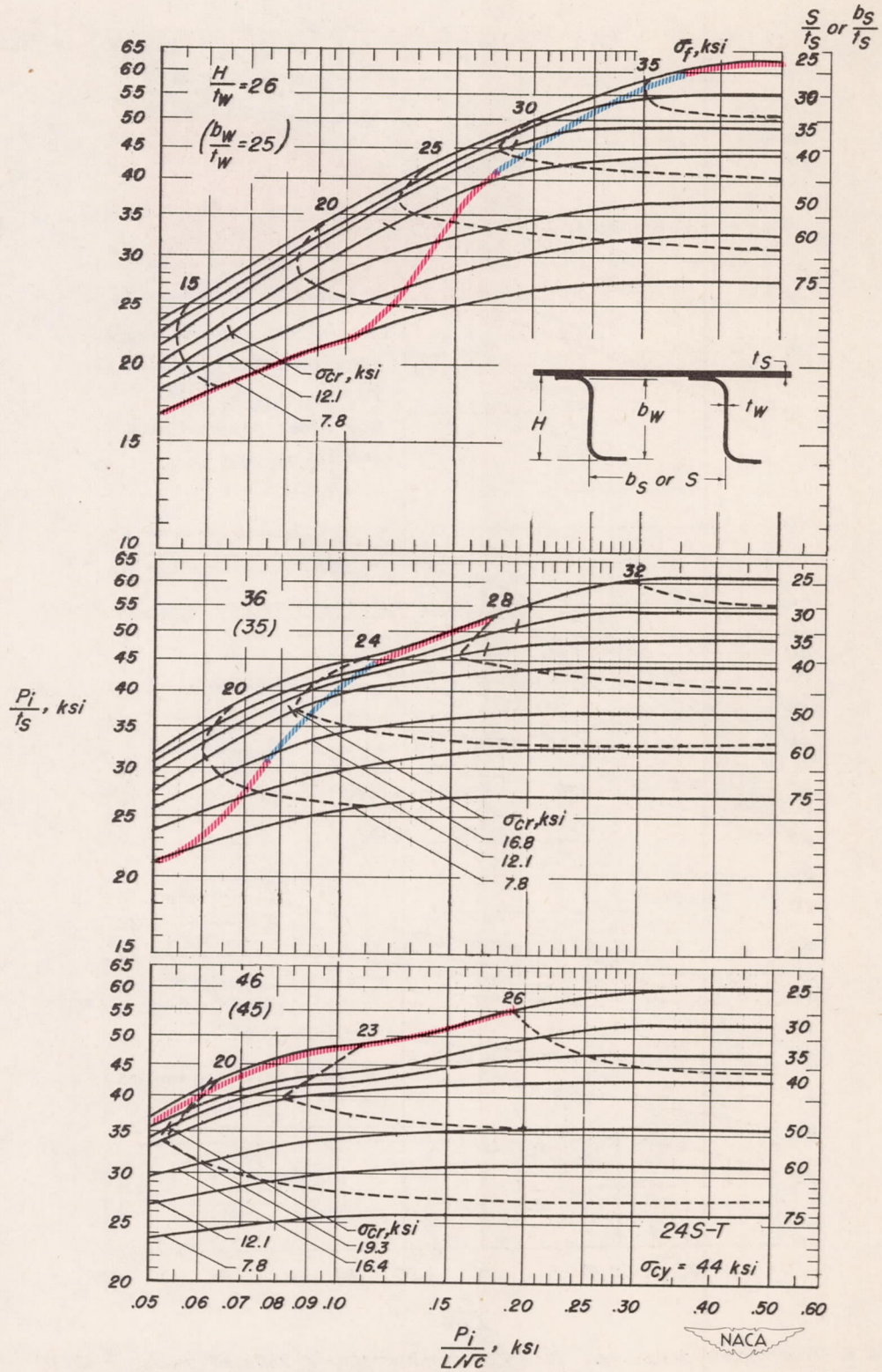

Figure 3-Concluded. $\frac{t_w}{t_s}$ =0.63.

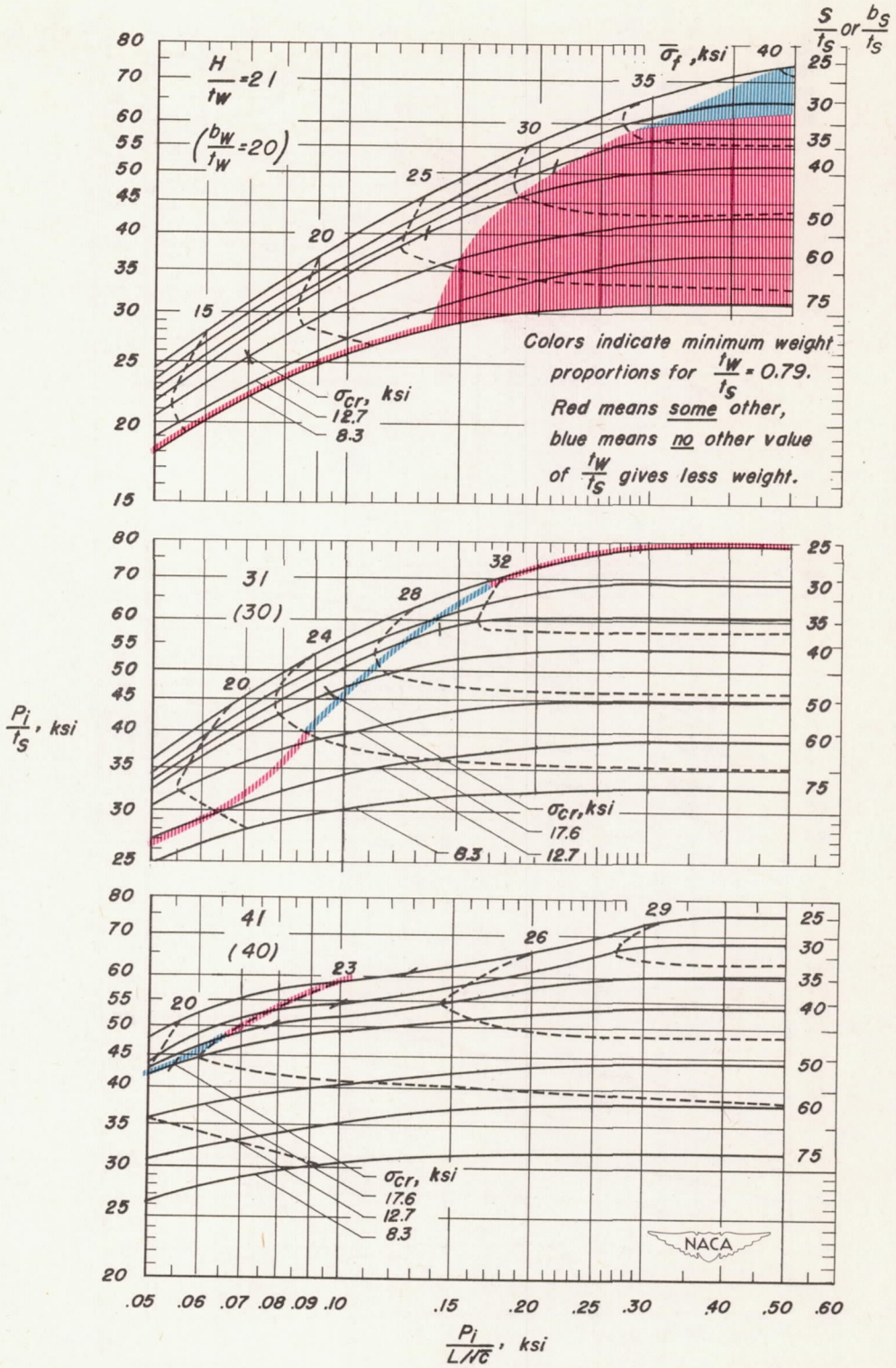

Figure 4.-Direct-reading design chart for 24S-T aluminum-alloy Z-stiffened panels. $\frac{t_w}{t_s}$=0.79.

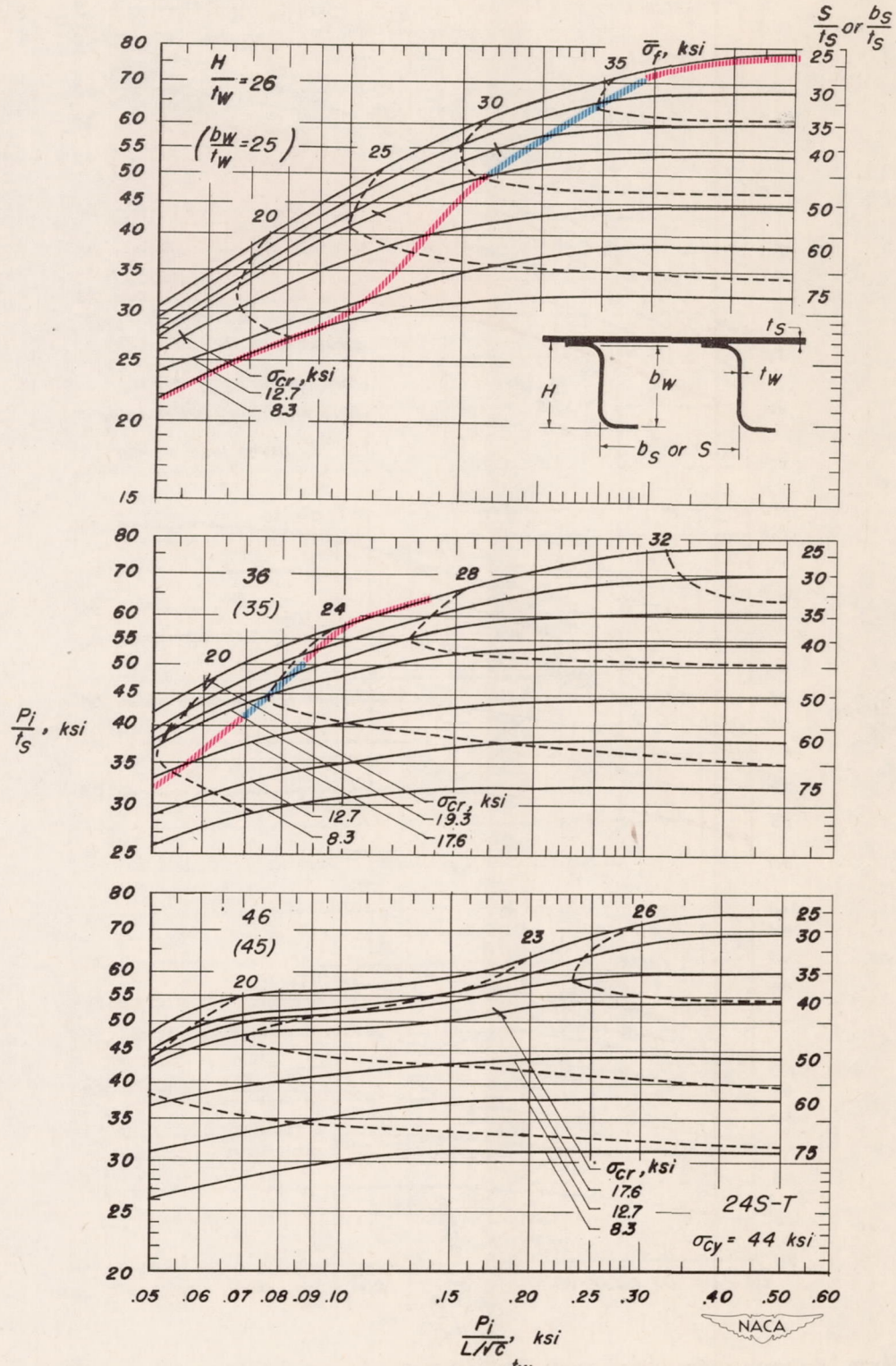

Figure 4. -Concluded. $\frac{t_w}{t_s} = 0.79$.

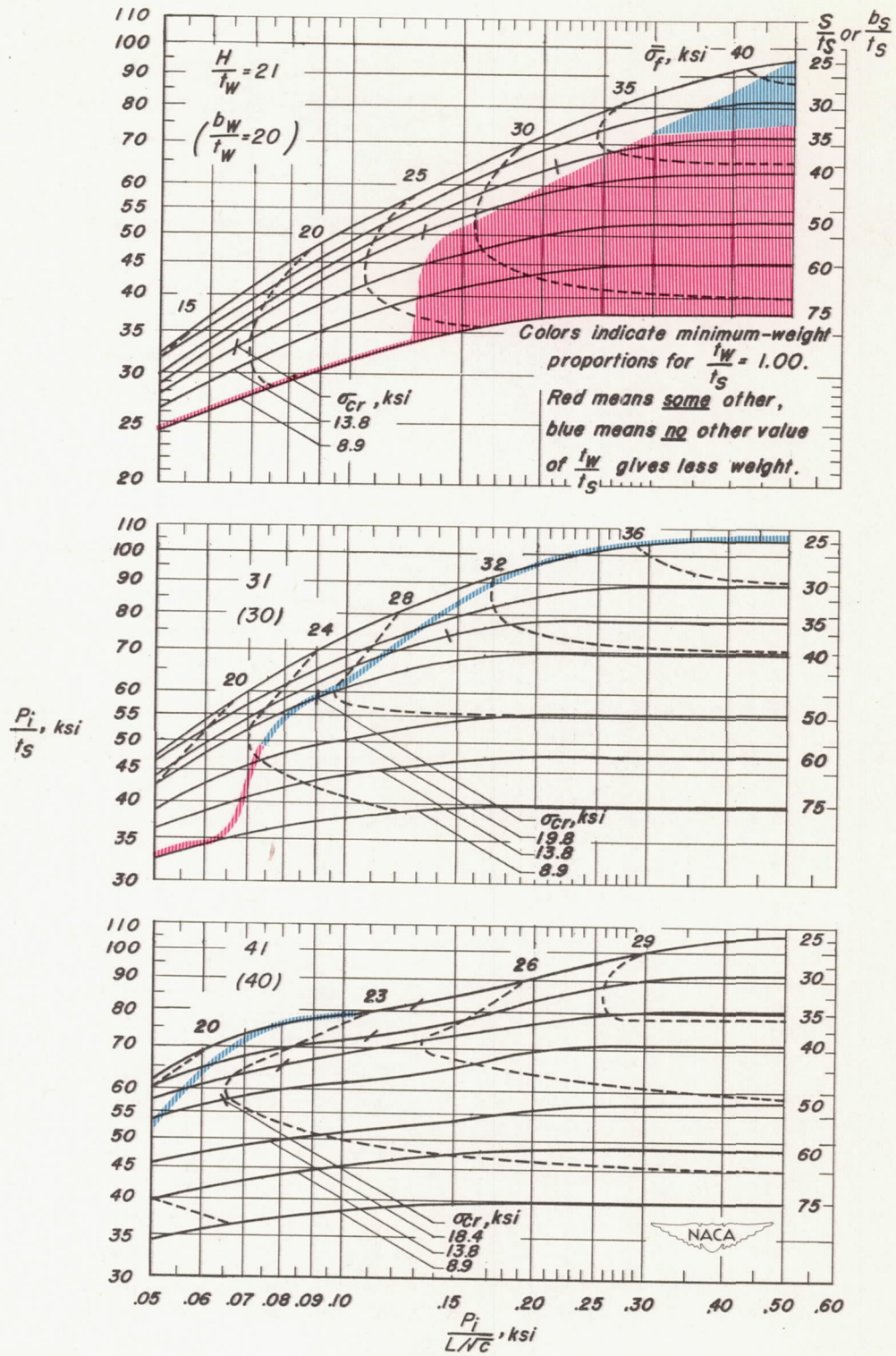

Figure 5.-Direct-reading design chart for 24S-T aluminum-alloy Z-stiffened panels. $\frac{t_w}{t_s}$ = 1.00.

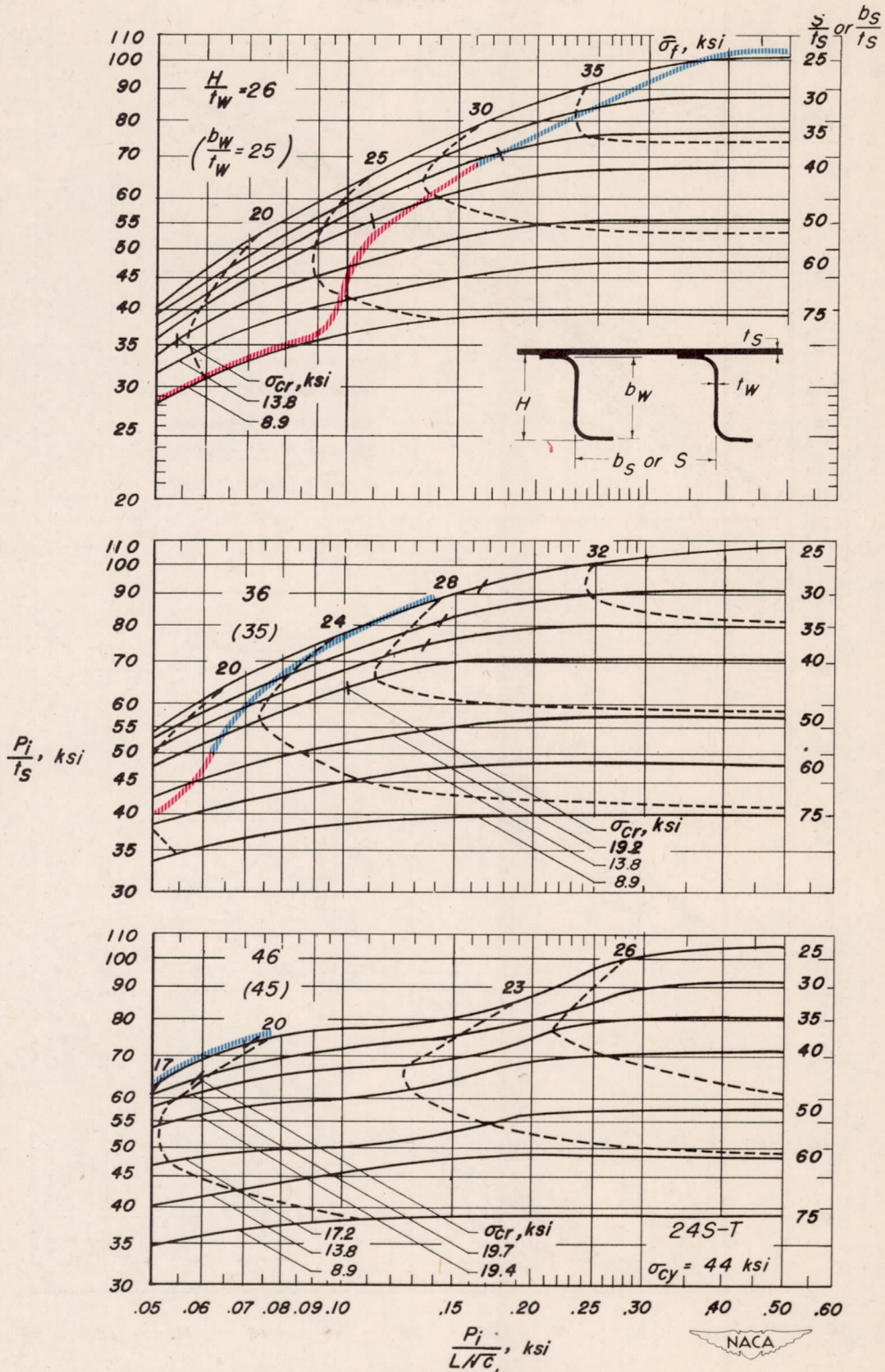

Figure 5.-Concluded. $\frac{l_w}{t_s}=1.00$.

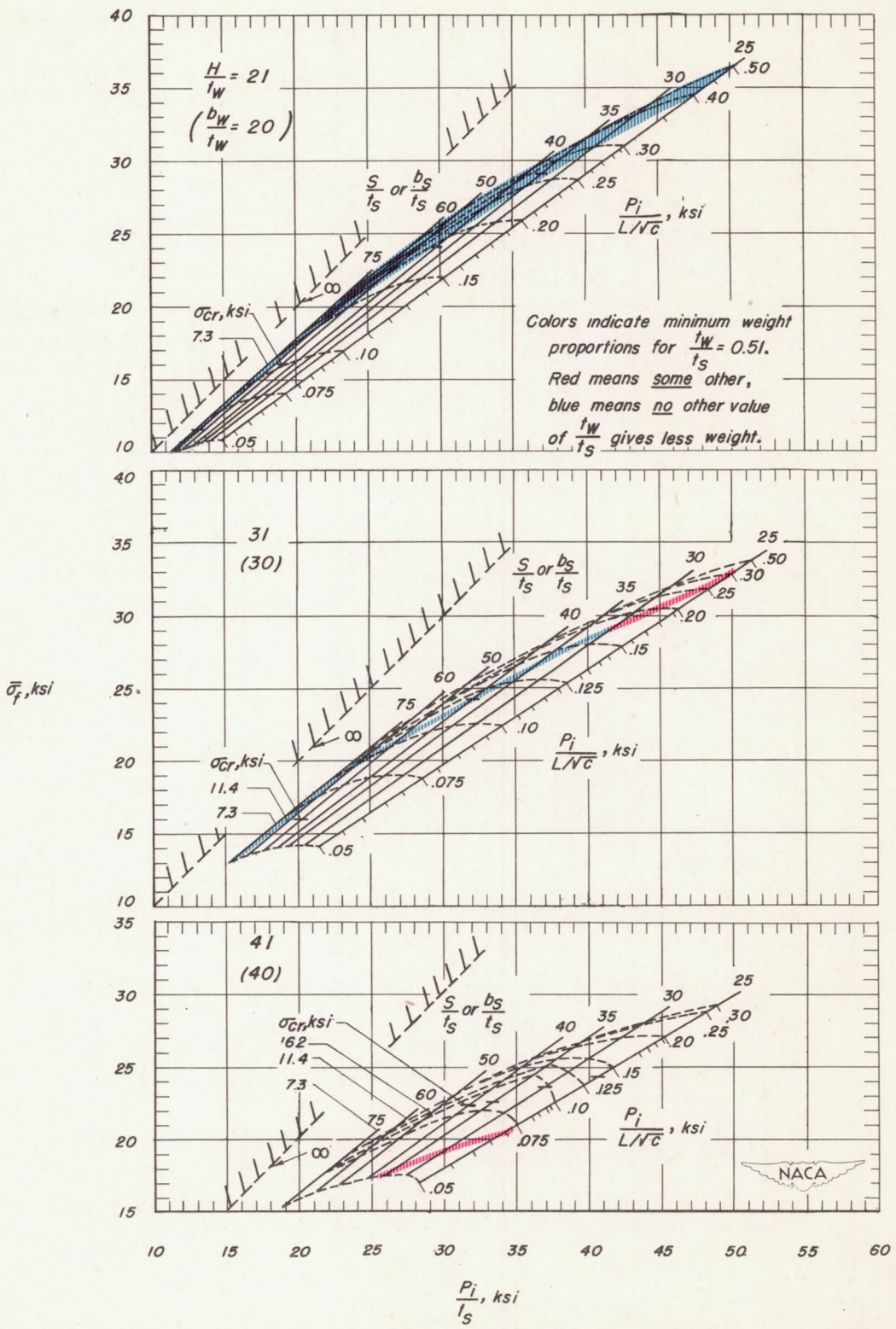

Figure 6.-Direct-reading design chart (alternate form) for 24S-T aluminum-alloy Z-stiffened panels. $\frac{t_w}{t_s} = 0.51$.

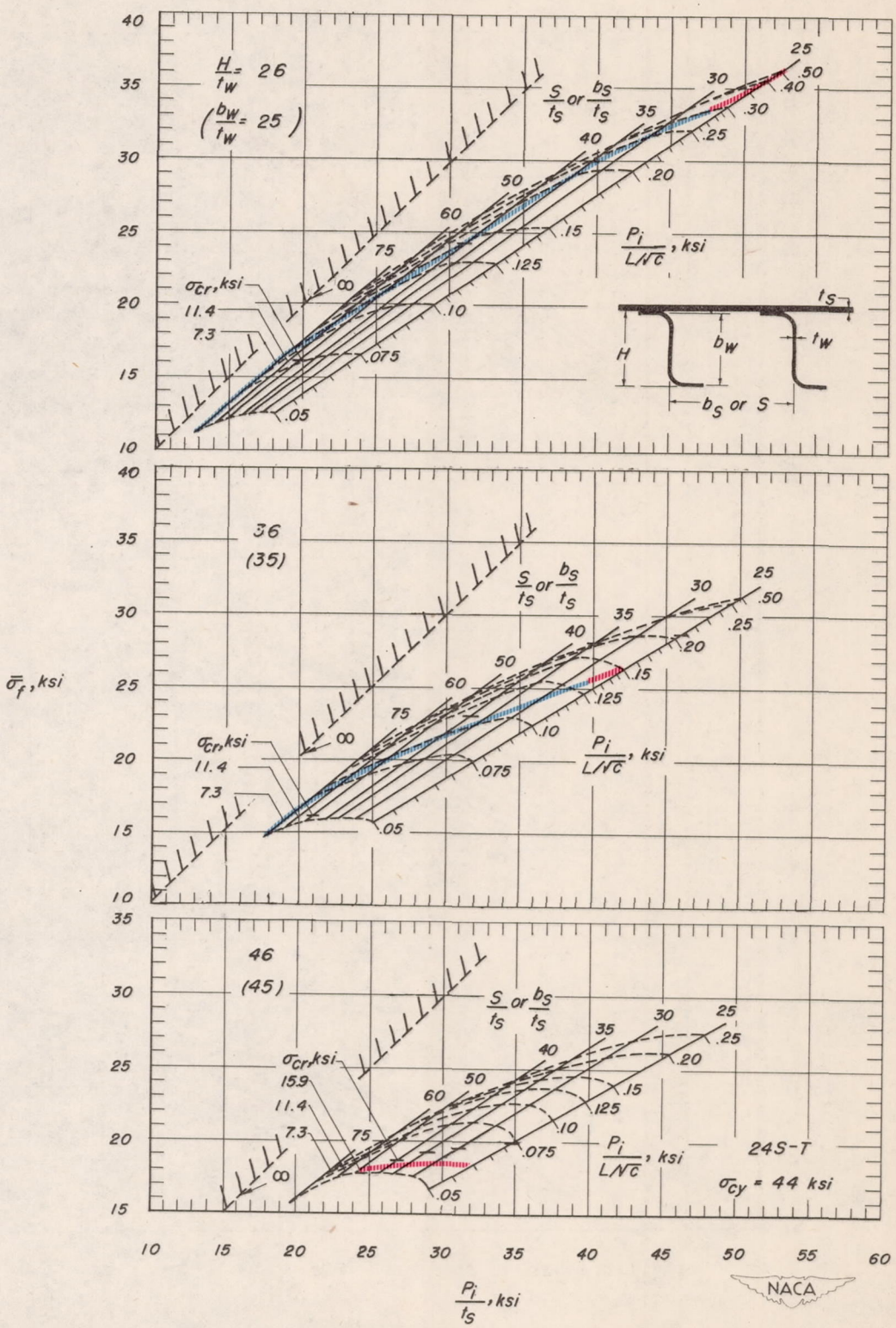

Figure 6.-Concluded. $\frac{t_w}{t_s} = 0.51$.

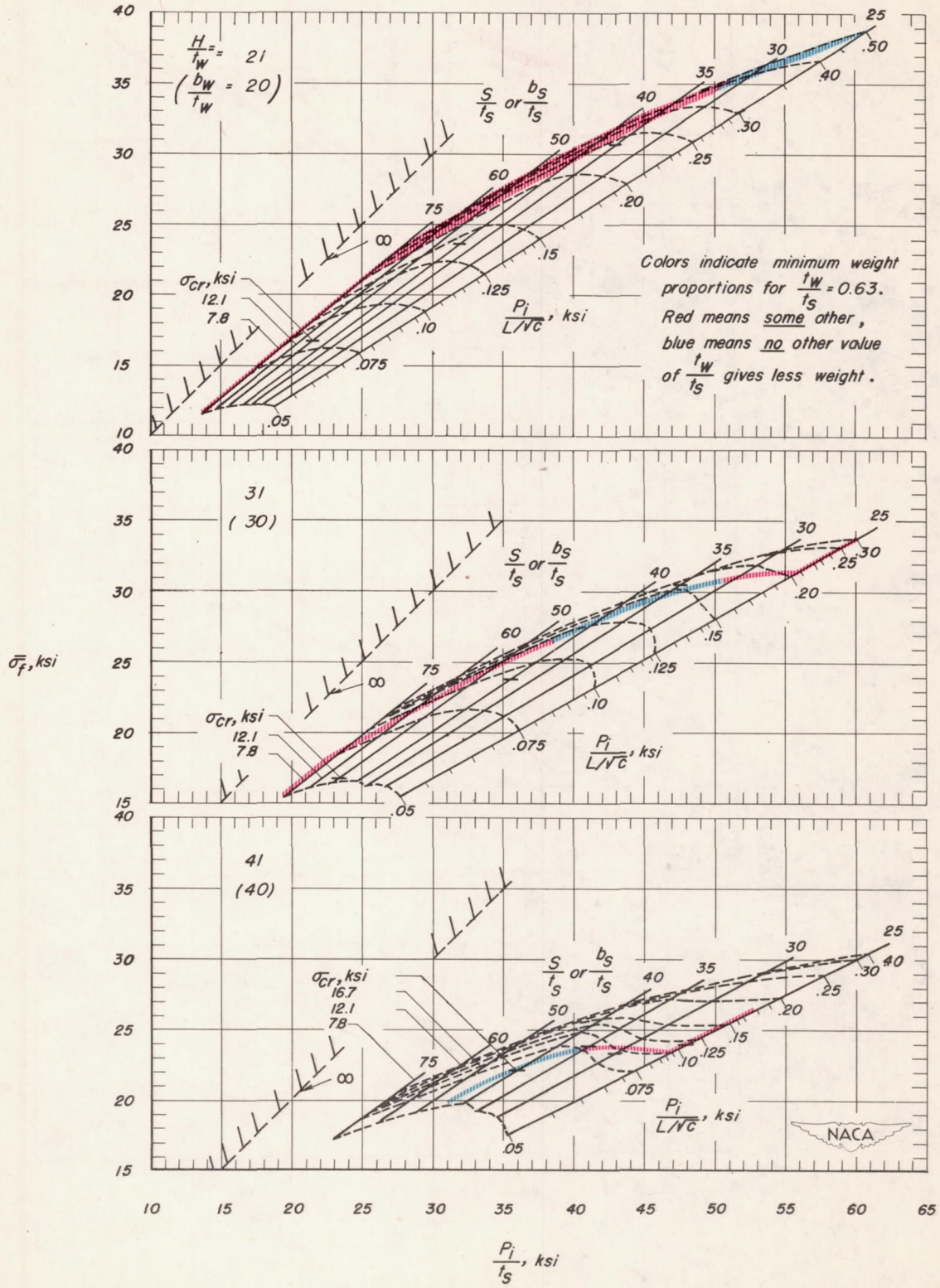

Figure 7.- Direct-reading design chart (alternate form) for 24S-T aluminum-alloy Z-stiffened panels. $\frac{t_w}{t_s}$ = 0.63.

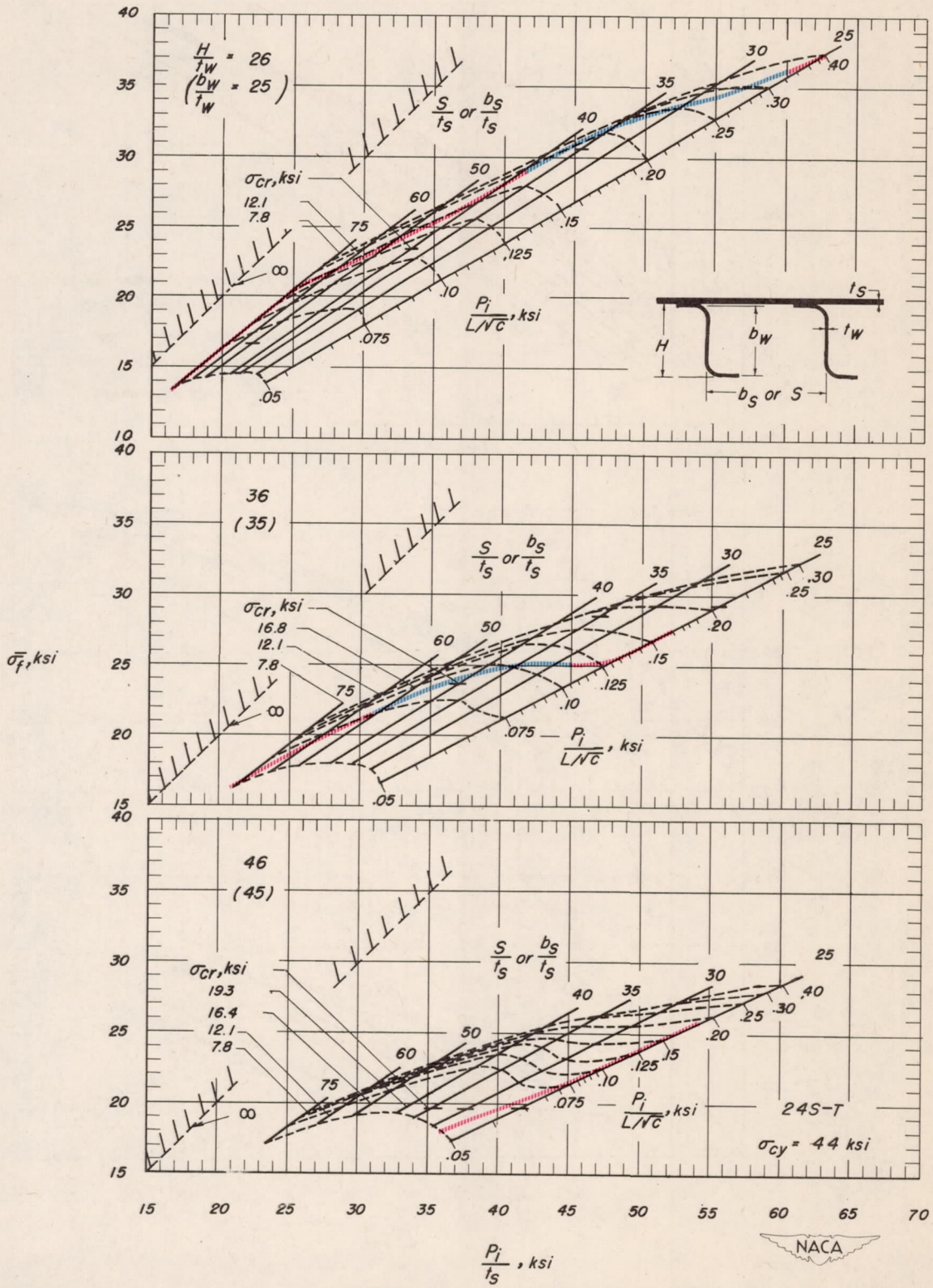

Figure 7.– Concluded. $\frac{t_w}{t_s} = 0.63$.

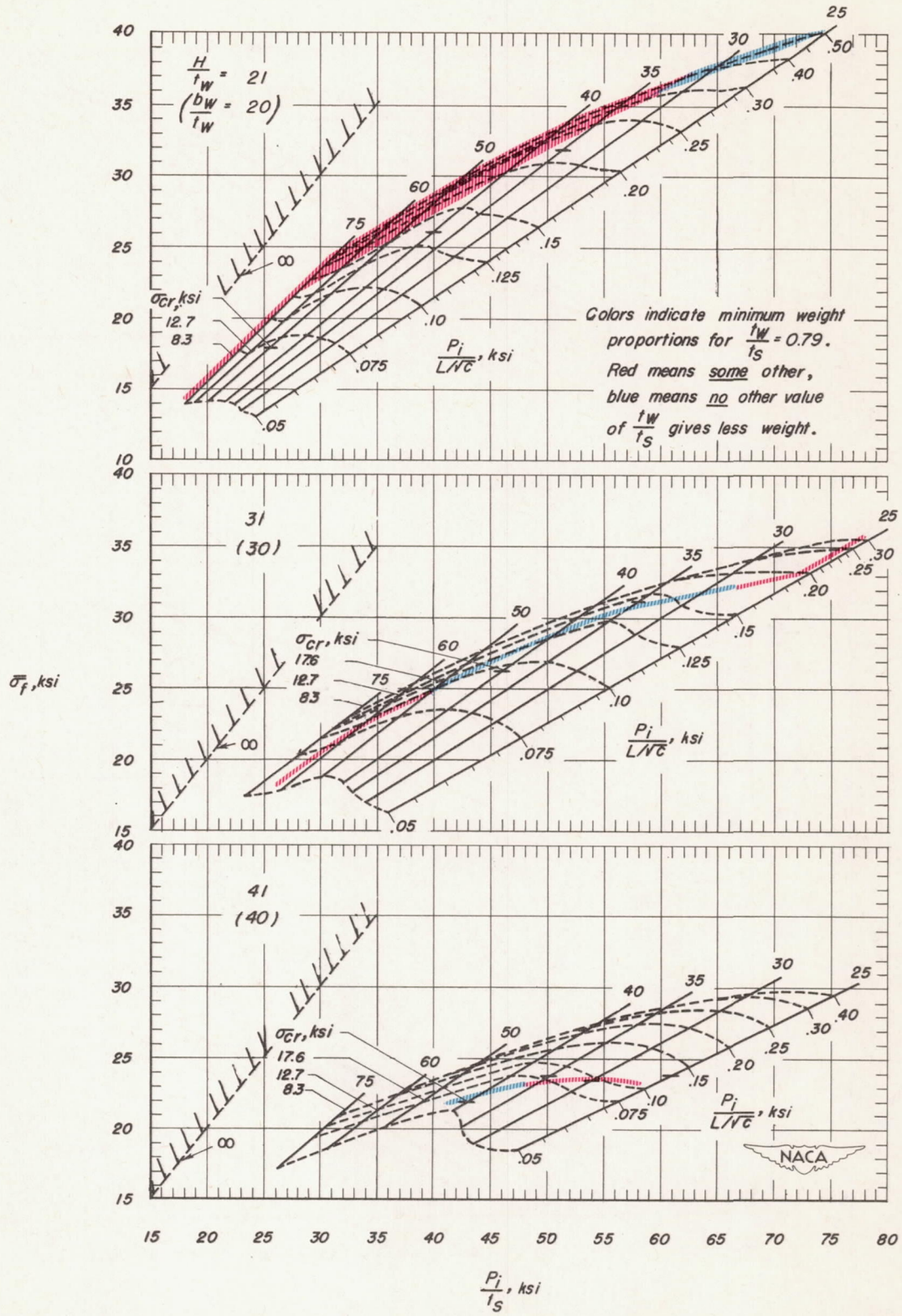

Figure 8.-Direct-reading design chart (alternate form) for 24S-T aluminum-alloy Z-stiffened panels. $\frac{t_w}{t_s}$ = 0.79.

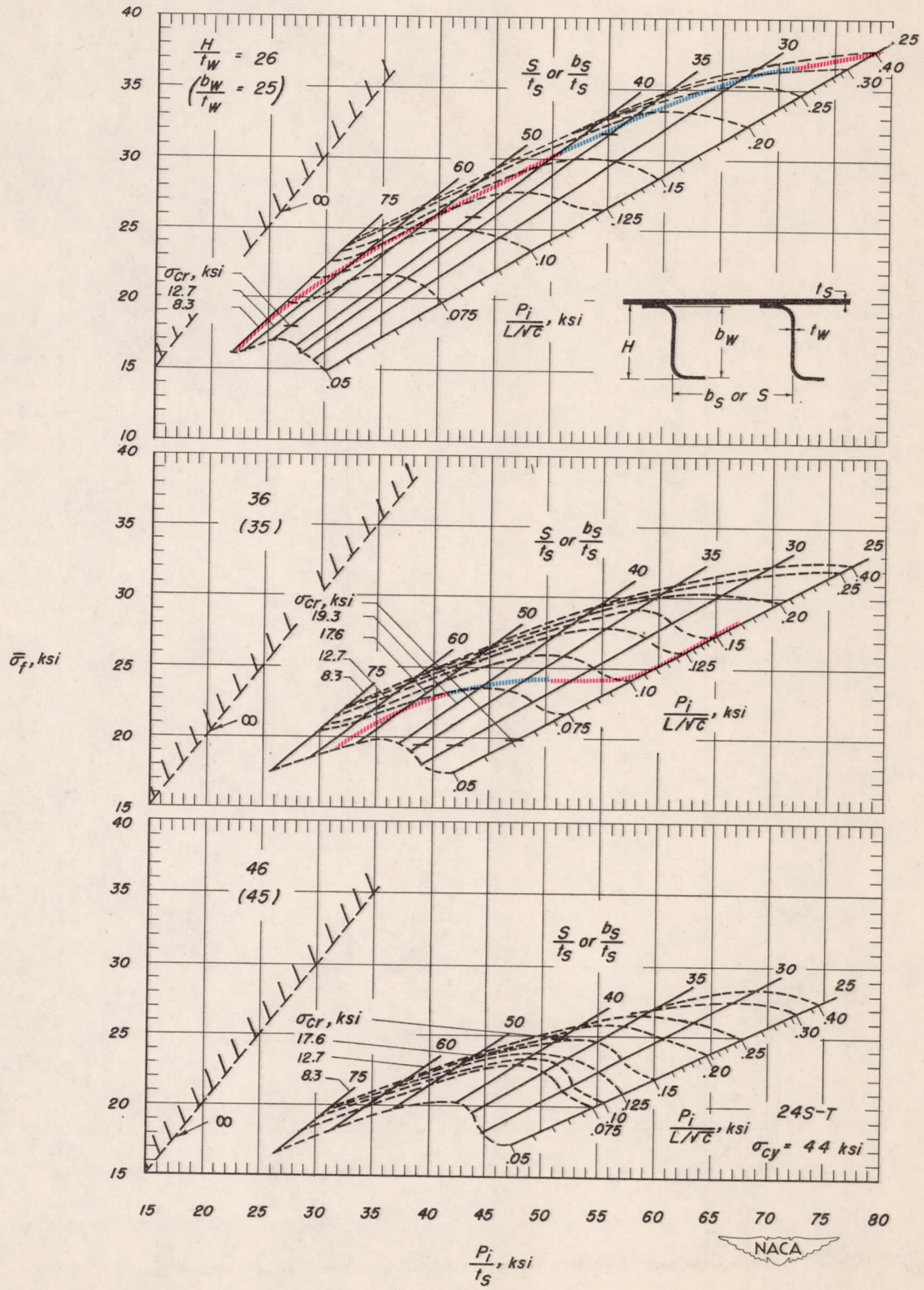

Figure 8.-Concluded. $\frac{t_w}{t_s} = 0.79$.

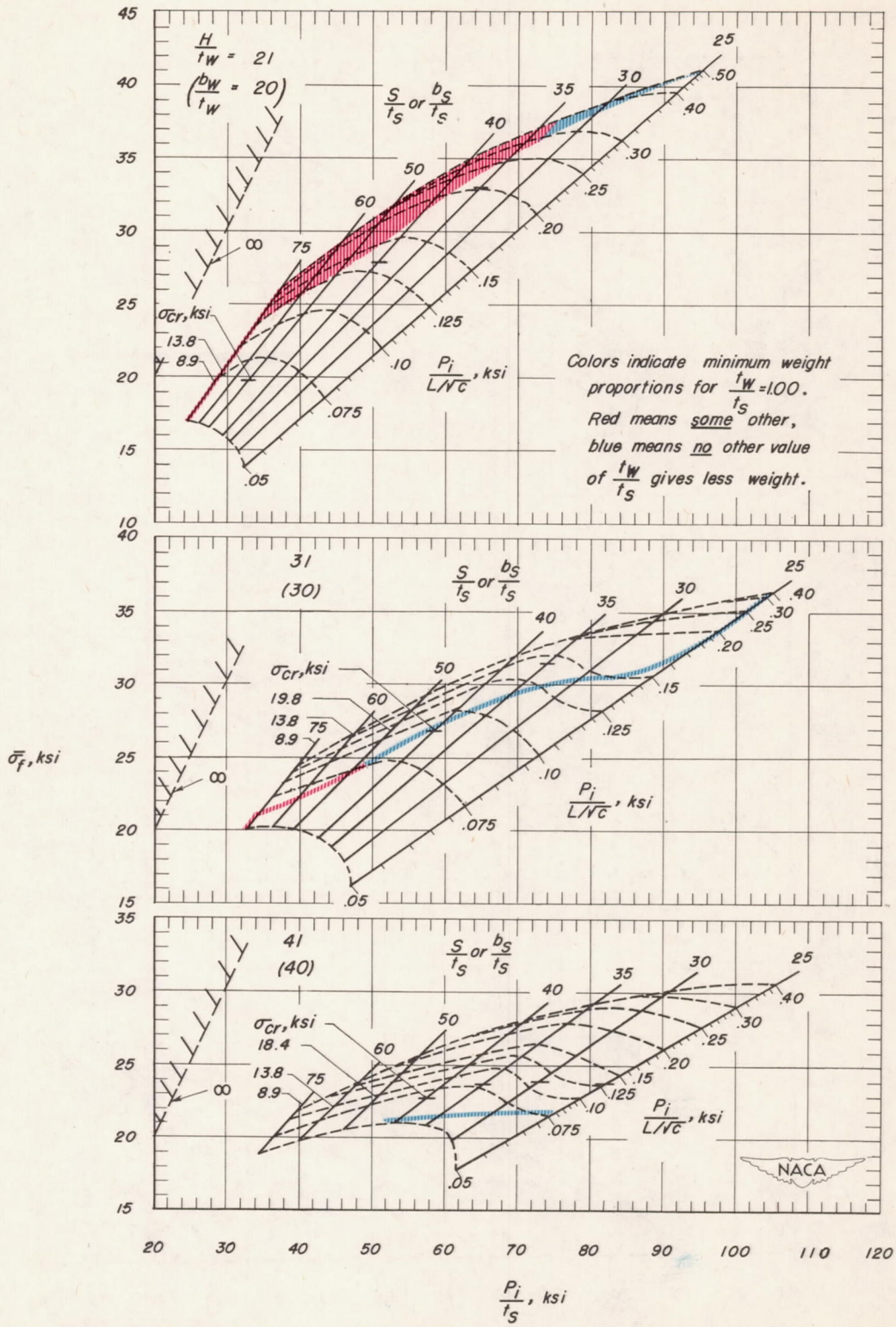

Figure 9.-Direct-reading design chart (alternate form) for 24S-T aluminum-alloy Z-stiffened panels. $\frac{t_w}{t_s} = 1.00$.

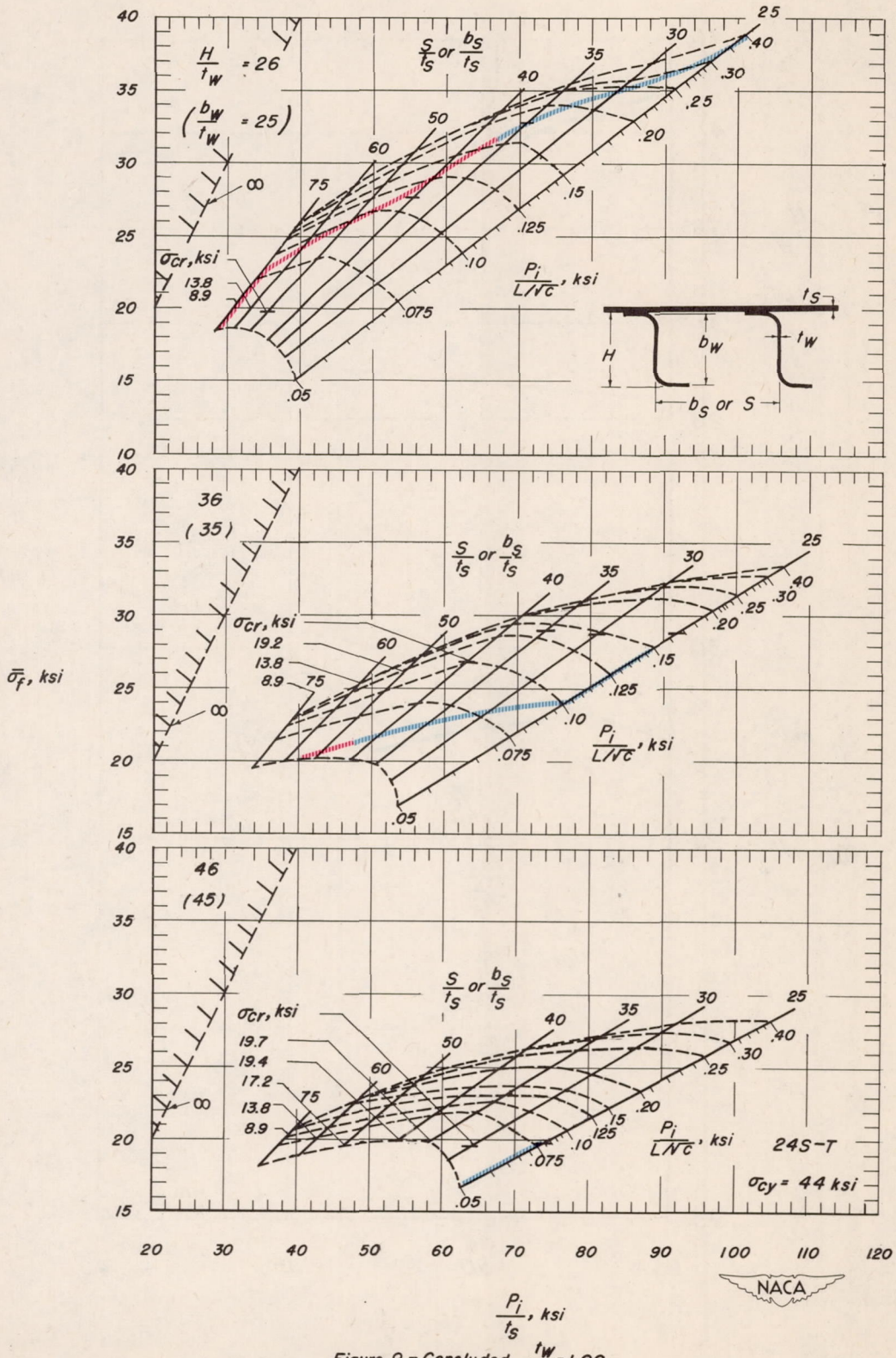

Figure 9.- Concluded. $\frac{t_w}{t_s} = 1.00$.

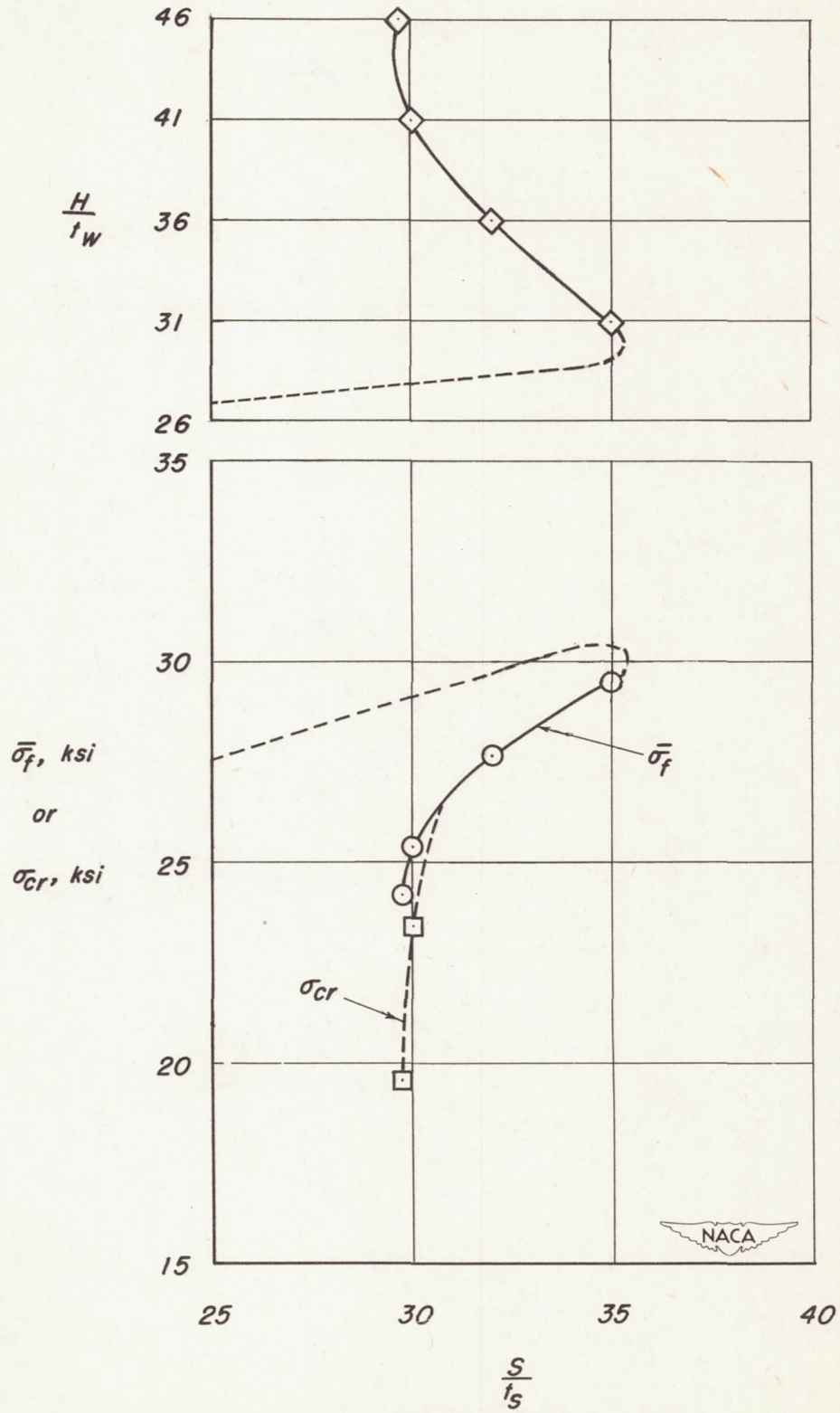

Figure 10.- Plot for obtaining design from design charts.