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Report No.H-1015

NAVY DEPARTMENT  
BUREAU OF ENGINEERING

Supplement to  
Report  
on  
Photoelastic Test of  
Bureau of Construction and Repair  
Weld Models 54-a, 54-b, 54-c, and 56-g.

NAVAL RESEARCH LABORATORY  
ANACOSTIA STATION  
WASHINGTON, D. C.

Number of Pages: Text - 2. Tables - 4. Plates - 8.  
Authorization: BuEng 1st end.CP/Welding(5-18-Da) of 25 May 1933 .  
Date of Test: From November 10 to December 20, 1933.  
Reported by: \_\_\_\_\_  
R. B. Carleton, Laboratorian  
Approved by: \_\_\_\_\_  
H. R. Greenlee, Captain, U.S.N., Director.  
Distribution: BuC&R (2)  
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Public Release

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AUTHORIZATION

This test was authorized by Bureau of Engineering 1st endorsement CP/Welding (5-18-De) of 25 May 1933.

REFERENCES

- (a) BuC&R letter CP/W&C-5-(2); LI/NPLA(F) of 19 April 1932.
- (b) NRL Report on the "Photoelastic Test of the Influence of Size of Fillet Welds on the Strength of Single-strapped Butt Joints", dated 11 April 1933.
- (c) BuC&R letter CP/W&C-(5)-(2)(DF) of 18 May 1933.
- (d) NRL Report on Photoelastic Test to "Determine the Influence of Varying the Ratio of Strap Thickness to Plate Thickness on the Strength of Single-strapped Butt Joints with Equal Full Welds", dated 15 Sept. 1933.

OBJECT

The purpose of this supplementary test was to obtain stress values at certain points on the models previously studied so as to permit a direct comparison of the different models.

RESULTS OF TEST

The difference of the principal stresses (P-Q) was measured at each of the points indicated in Plates 1-4. These values are shown in Tables 1-4 and are shown in the curves of Plates 5-8.

The following errors were found to exist in the previous report, ref.(d):

Page 2 - last line	- should be	100 lbs.
3 - Point d-1	" "	440 "
3 - " e-1	" "	460 "
3 - " g-1	" "	500 "
3 - " i-1	" "	580 "
3 - " j-1	" "	540 "
3 - " k-1	" "	500 "
3 - " l-1	" "	480 "
3 - " m-1	" "	460 "

The notation of the weld models used by the Bureau of Construction and Repair is used. Therefore, the model designated as 54-a in the previous report (ref.d) should be designated as 54-c.

EXPERIMENTAL DETAILS

In order to make a comparison of the several models, all the models were made of the same material and of uniform thickness. This was done by machining a large sheet of bakelite to a uniform thickness,

repolishing, and then annealing.

In all models, "b" and "c" (Figs.1-4) are sections normal to the direction of the applied force at the midpoints of the straps. Section "a" (Figs.1-4) is at a constant distance from the notch formed by the junction of the plate and fillet.

Table 1

Values of P-Q in lbs/sq.in.

Weld Type 54-a

<u>Point</u>	<u>(P-Q)</u>	<u>Point</u>	<u>(P-Q)</u>
Edge Stress #1	500	Edge Stress #17	480
2	480	18	480
3	440	19	440
4	440	20	440
5	440	21	420
6	440	22	160
7	380	23	160
8	380	24	160
9	380	25	160
10	400	26	180
11	440	27	200
12	440	28	200
13	480	29	200
14	500	30	280
15	480	31	420
16	480		
a-1	400	d-1	200
2	400	2	240
3	400	3	300
4	400	4	380
		5	400
b-1	260	6	440
2	280	e-1	300
3	300	2	300
4	340	3	320
5	380	4	380
6	400	5	420
c-1	180	6	460
2	220	f-1	280
		2	420
		g-1	260

Table 3

Values of (P-Q) in lbs./sq.in.

Weld Model 54-c

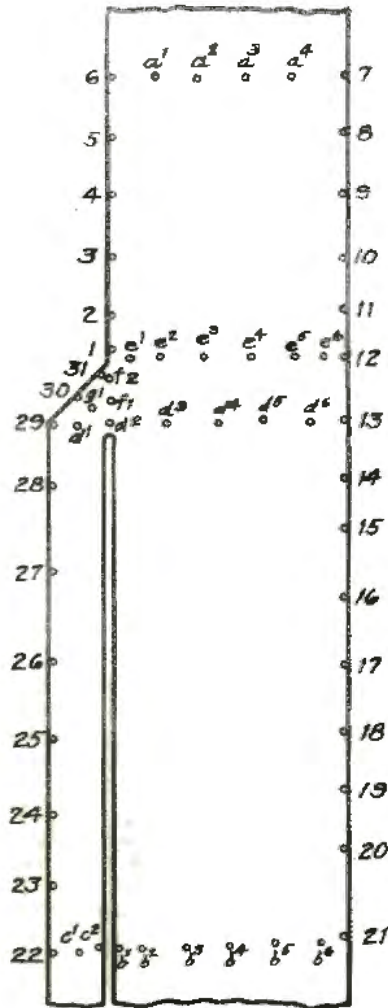
<u>Point</u>	<u>(P-Q)</u>	<u>Point</u>	<u>(P-Q)</u>
Edge Stress #1	600	Edge Stress #18	480
2	520	19	460
3	480	20	440
4	460	21	420
5	460	22	420
6	460	23	420
7	360	24	-60
8	360	25	-60
9	380	26	-40
10	380	27	-40
11	400	28	-40
12	420	29	-40
13	460	30	-40
14	480	31	-20
15	500	32	-120
16	540	33	-200
17	500	34	300
		35	440
a-1	400	d-1	-20
2	380	2	0
3	380	3	60
4	360	4	180
		5	240
b-1	160	6	300
2	200	7	340
3	240	8	400
4	300		
5	360	e-1	300
6	400	2	300
		3	340
c-1	0	4	380
2	20	5	400
3	60	6	420
4	80		
5	120	f-1	200
		2	240
		3	260
		g-1	40
		2	40

Table 4

Values of (P-Q) in lbs./sq.in.

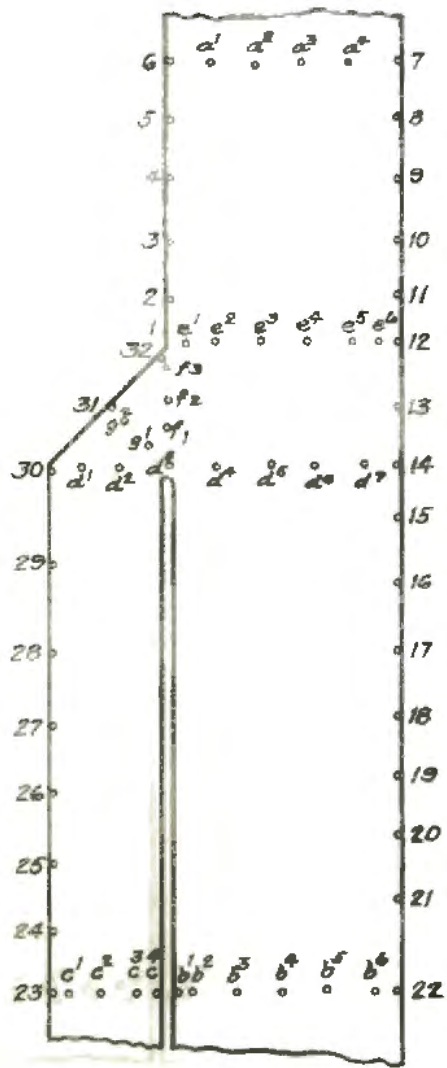
Model 56-G

<u>Point</u>	<u>(P-Q)</u>	<u>Point</u>	<u>(P-Q)</u>
Edge Stress #1	640	Edge Stress #20	500
2	500	21	500
3	480	22	480
4	480	23	460
5	460	24	460
6	460	25	-80
7	380	26	-80
8	380	27	-60
9	380	28	-60
10	400	29	-60
11	400	30	-60
12	440	31	-60
13	460	32	-60
14	500	33	-60
15	520	34	-40
16	580	35	-140
17	560	36	-140
18	540	37	-40
19	520	38	0
		39	540
a-1	420	d-1	-100
2	400	2	-60
3	400	3	-20
4	400	4	120
		5	160
b-1	200	6	240
2	220	7	340
3	240	8	400
4	300	9	460
5	360	e-1	320
6	380	2	320
7	400	3	360
c-1	-60	4	400
2	-40	5	400
3	0	6	420
4	100	f-1	200
5	140	2	220
6	160	3	200
7	180	4	260
		g-1	140
		2	140
		3	0



MODEL 54 - a  
POINTS AT WHICH  
(P-Q) WAS MEASURED.

PLATE 1



MODEL 54 - B  
POINTS AT WHICH  
(P-Q) WAS MEASURED

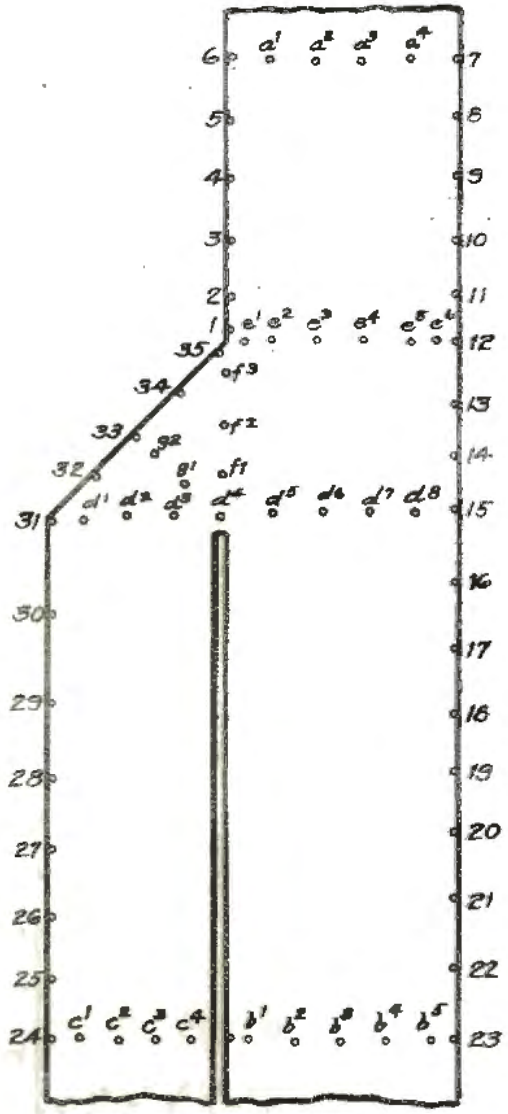
PLATE 2

Table 2

Values of P-Q in lbs/sq.in.

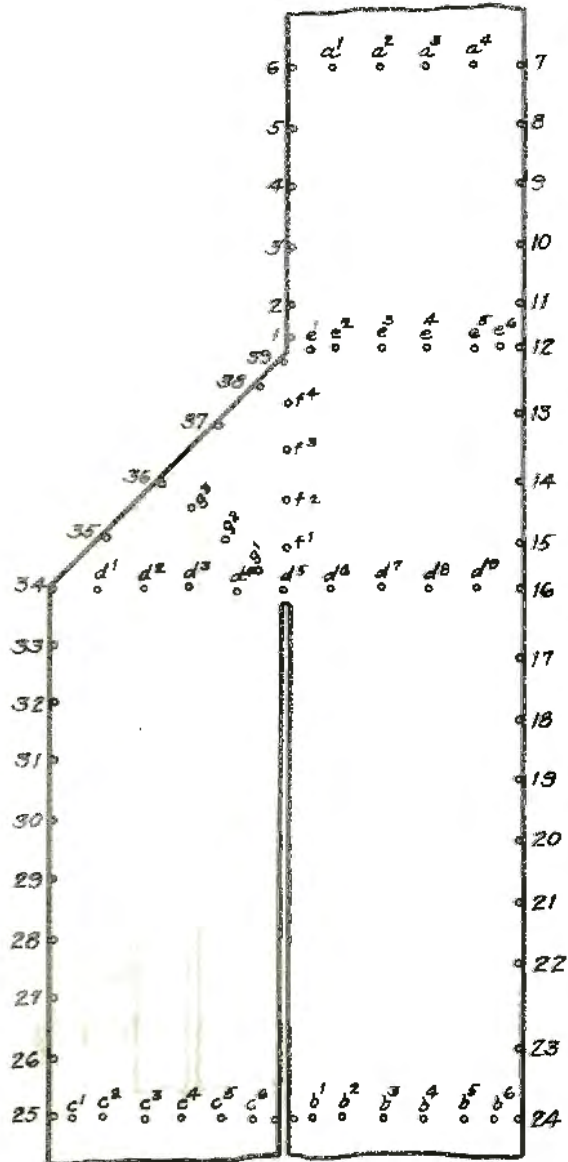
Weld Type 54-b

<u>Point</u>	<u>(P-Q)</u>	<u>Point</u>	<u>(P-Q)</u>
Edge Stress #1	560	Edge Stress #17	480
2	500	18	460
3	460	19	440
4	460	20	440
5	440	21	440
6	440	22	440
7	360	23	-40
8	360	24	-40
9	360	25	-40
10	380	26	-40
11	400	27	-40
12	440	28	-40
13	480	29	-20
14	500	30	-20
15	540	31	+20
16	520	32	+140
a-1	400	d-1	40
2	400	2	120
3	380	3	160
4	360	4	220
b-1	180	5	280
2	240	6	340
3	300	7	420
4	340	e-1	240
5	380	2	240
6	420	3	260
c-1	0	4	320
2	60	5	360
3	100	6	420
4	140	f-1	180
		2	200
		3	360
		g-1	160
		2	0



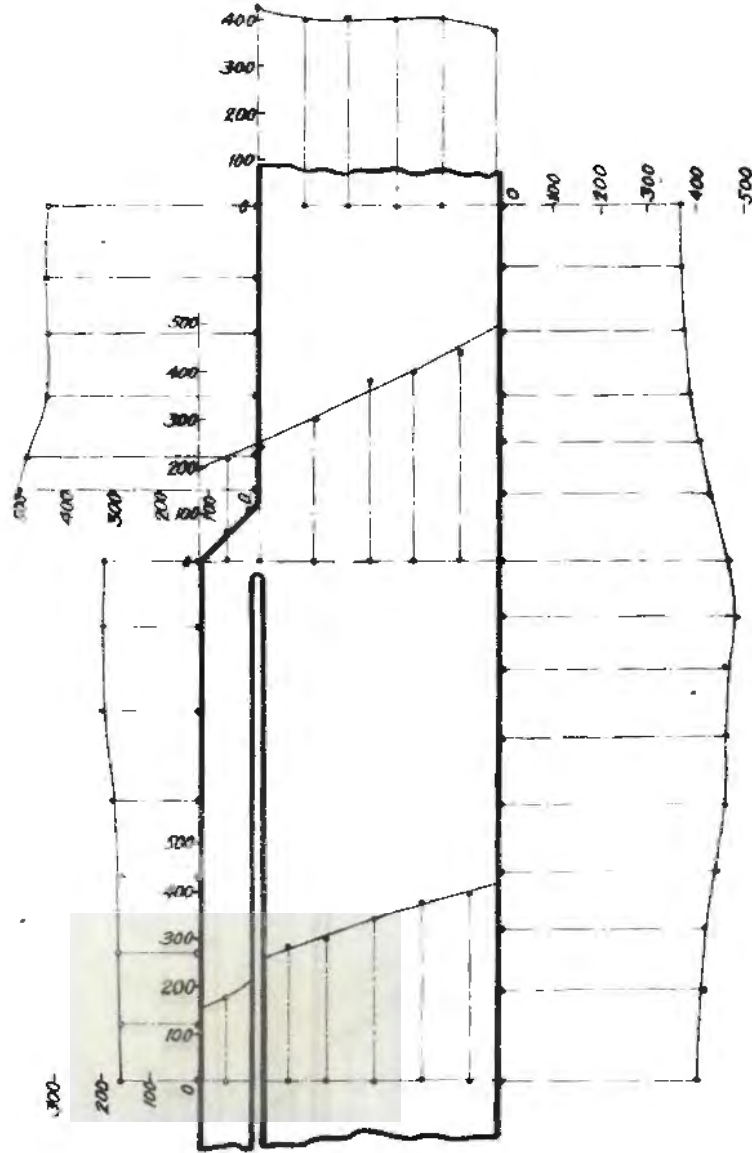
MODEL 54 - C  
 POINTS AT WHICH  
 (P-Q) WAS MEASURED

PLATE 3



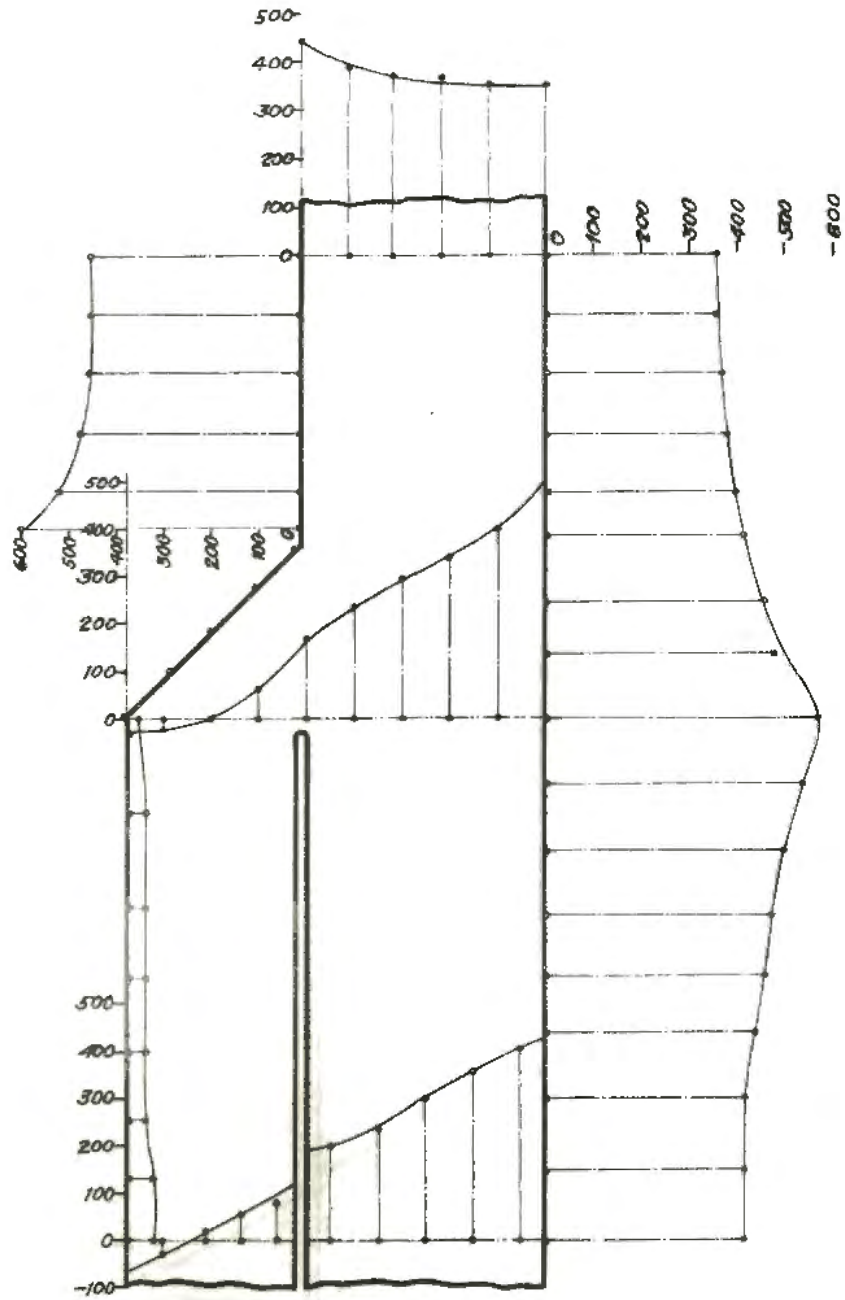
MODEL 56-g  
 POINTS AT WHICH  
 (P-Q) WAS MEASURED.

PLATE 4



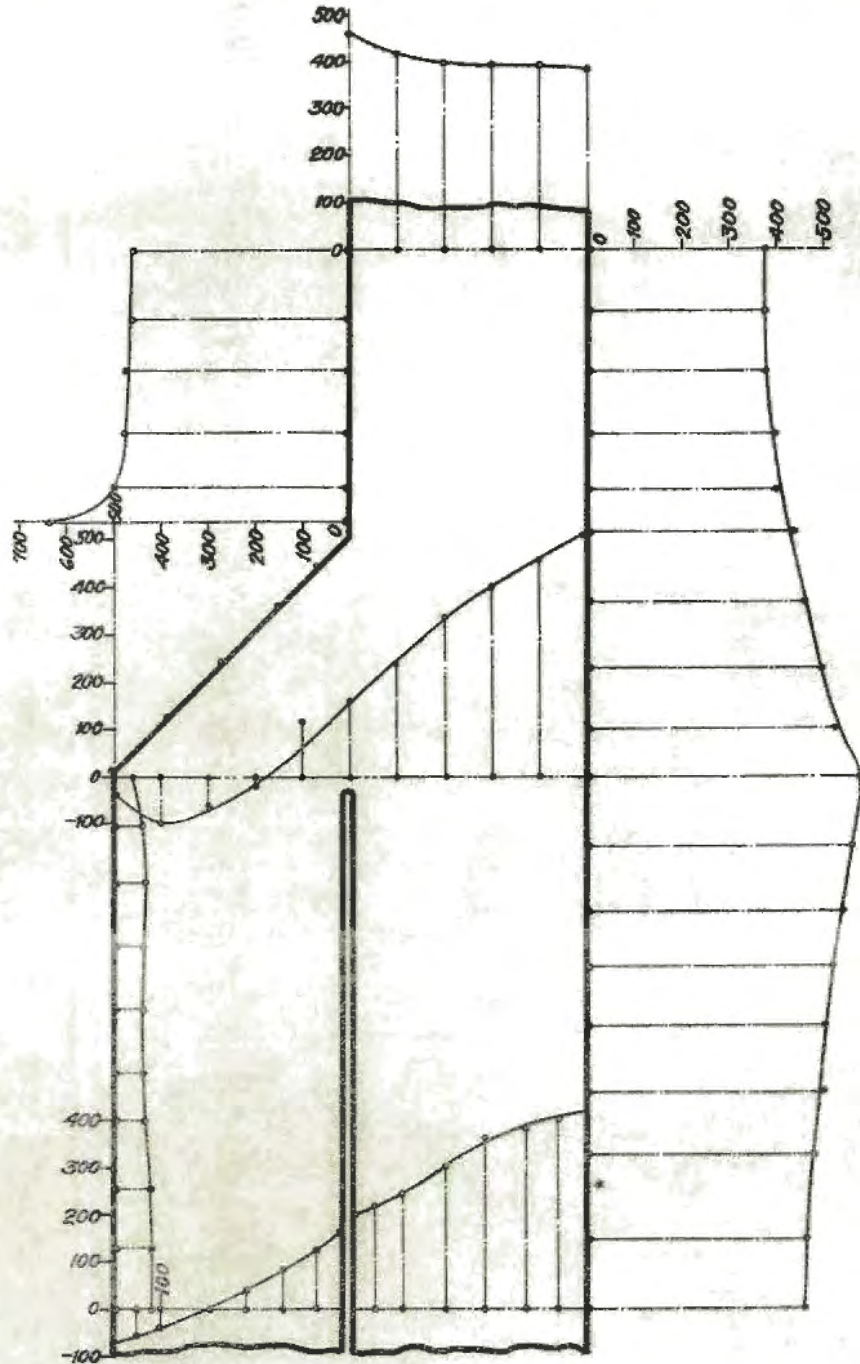
MODEL 54-a  
PLOTTED VALUES OF P-Q IN LBS./IN.<sup>2</sup>  
CROSS SECTION OF MAIN PIECE 1/4 x 1"  
MATERIAL - BAKELITE  
APPLIED LOAD - 100 LBS.

PLATE 5



MODEL 54- C  
 PLOTTED VALUES OF P-Q IN LBS./IN.<sup>2</sup>  
 CROSS SECTION OF MAIN PIECE  $\frac{1}{4} \times 1$ "  
 MATERIAL - BAKELITE  
 APPLIED LOAD - 100 LBS.

PLATE 7



MODEL 56-9  
PLOTTED VALUES OF P-Q IN LBS./IN.<sup>2</sup>  
CROSS SECTION OF MAIN PIECE 1/4" X 1"  
MATERIAL - BAKELITE  
APPLIED LOAD - 100 LBS.

PLATE 8