

Journal of Paper Science and Technology
General Notes

Distributed at July 8 meeting
(Minneapolis)

TECHNICAL

THE INSTITUTE OF PAPER CHEMISTRY

Appleton, Wisconsin

EVALUATION OF JUMBO MULLEN DIAPHRAGMS
RECEIVED IN MAY, 1971

✓ Project 2694-4

Report Four

A Progress Report

to

TECHNICAL DIVISION
FOURDRINIER KRAFT BOARD INSTITUTE, INC.

July 7, 1971

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SUMMARY

B. F. Perkins, Division of Standard International Corporation, recently submitted twenty-five diaphragms from a production run at the Chicago Rawhide Manufacturing Company to The Institute of Paper Chemistry for evaluation. The results indicated that

1. On the Institute's tester the average diaphragm pressure was 31.6 p.s.i.g. and the maximum and minimum values were 33.6 and 30.0 p.s.i.g., respectively, on the first trial. Thus, the pressures exhibited by this lot of diaphragms tended to slightly exceed the Rule 41 upper limit of 30 p.s.i.g. at 0.375-in. distention. Presumably, a small amount of "working" of the diaphragms or lubrication of the surfaces would be sufficient to lower their pressures to within the Rule 41 specification of 23-30 p.s.i.g.

2. The small spread between maximum and minimum pressure values appears to indicate that the uniformity of the lot is good.

3. Good agreement was obtained in the evaluation using the Institute's and Perkins' testers.

INTRODUCTION

For some time The Institute of Paper Chemistry has cooperatively worked with B. F. Perkins, Division of Standard International Corporation, in the evaluation of Jumbo Mullen diaphragms supplied to the industry.

The basic objective of the project is to assist the manufacturer in the evaluation of diaphragm pressure characteristics in order to insure that diaphragms supplied to the industry meet Rule 41 requirements.

Twenty-five diaphragms from a recent production batch were evaluated by the Institute. The results are summarized herein.

PROCEDURE

The diaphragms were manufactured by the Chicago Rawhide Manufacturing Company. One diaphragm was supplied from each mold cavity. Each diaphragm was evaluated using the following procedure:

1. Attach a 120-p.s.i. gage with rubber coupling to the Mullen tester.
2. Insert the diaphragm in the tester using a clamping force of 1000 lb. when tightening the clamping ring.
3. Adjust the diaphragm so that its top surface is level with the top of the bottom platen.
4. Distend the diaphragm to 0.71 in., ten times.
5. Check the level of the diaphragm and adjust, if necessary.
6. Distend the diaphragm five times to 0.375-inch distention.

Record the reading and average.

Each diaphragm was first evaluated on the Institute's tester following the above procedure and then evaluated on Perkins' tester. A third check of each diaphragm was then carried out using the Institute's tester.

DISCUSSION OF RESULTS

The results obtained are summarized in Table I. The maximum, minimum, and average diaphragm pressures obtained on the three tester trials were as follows:

	I.P.C. Tester (1)	Perkins Tester (2)	I.P.C. Tester (3)
Maximum	33.6	33.3	33.5
Minimum	30.0	29.1	30.1
Average	31.6	31.2	31.6

On the average, the diaphragm pressures exhibited by this lot of diaphragms tended to be slightly greater than the Rule 41 upper limit of 30 p.s.i.g. at 0.375-in. distention. Presumably a small amount of "working" of the diaphragms or lubrication of the diaphragm surfaces would lower the pressures sufficiently to bring them within the Rule 41 specification.

As evidenced by the maximum and minimum values it appears that this lot of diaphragms exhibits fairly uniform pressures - i.e., the variability between diaphragms was not large. It also may be noted that good agreement was obtained between the evaluations carried out on the Institute's and Perkins' testers.

TABLE I
 SUMMARY OF RESULTS ON DIAPHRAGMS

Cavity No.	Diaphragm Pressure, p.s.i.g.					
	I.P.C. Tester (1)	Perkins Tester (2)	Diff., (1)-(2)	I.P.C. Tester (3)	Diff., (1)-(3)	Diff., (3)-(2)
1	31.9	31.2	0.7	31.9	0.0	0.7
2	31.3	31.4	-0.1	31.8	-0.5	0.4
3	32.1	32.1	0.0	32.6	-0.5	0.5
4	30.9	31.5	-0.6	31.7	-0.8	0.2
5	32.0	32.1	-0.1	32.5	-0.5	0.4
6	32.6	31.7	0.9	32.2	0.4	0.5
7	31.2	30.6	0.6	30.8	0.4	0.2
8	32.6	31.7	0.9	32.2	0.4	0.5
9	31.5	31.4	0.1	31.6	-0.1	0.2
10	30.0	29.1	0.9	30.2	-0.2	0.3
11	31.6	31.5	0.1	32.1	-0.5	0.6
12	31.1	31.0	0.1	30.9	0.2	-0.1
13	30.7	30.3	0.4	30.1	0.6	-0.2
14	30.5	30.1	0.4	30.7	-0.2	0.6
15	33.6	33.3	0.3	33.5	0.1	0.2
16	31.3	31.4	-0.1	31.5	-0.2	0.1
17	30.3	29.7	0.6	30.2	0.1	0.5
18	31.5	30.9	0.6	31.7	-0.2	0.8
19	31.0	30.9	0.1	30.8	0.3	-0.1
20	32.6	32.1	0.5	32.3	0.3	0.2
21	31.4	30.6	0.8	31.0	0.4	0.4
22	32.4	32.1	0.3	32.2	0.2	0.1
23	32.7	31.9	0.8	32.7	0.0	0.8
24	30.2	29.7	0.5	30.3	-0.1	0.6
25	32.7	31.8	0.9	32.5	0.2	0.7
Av.	31.6	31.2	0.4	31.6	0.0	0.4