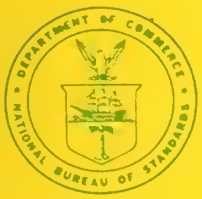
TECHNICAL ASSOCIATION OF THE
PULP AND PAPER INDUSTRY

COLLABORATIVE REFERENCE PROGRAM FOR PAPER

REPORTNO. 50S



U.S. DEPARTMENT OF COMMERCE
National Bureau of Standards

TECHNICAL ASSOCIATION OF THE
PULP AND PAPER INDUSTRY

COLLABORATIVE REFERENCE PROGRAM FOR PAPER

Report No. 50S

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U. S. DEPARTMENT OF COMMERCE
National Bureau of Standards

NBSIR 78-1330

INTRODUCTION

Reports 50S and 50G comprise the second set of reports for the 77-78 program year. Participants in tests which involve strength properties of paper will receive only the S report; those in tests which measure other properties will receive only the G report.

Please note that some changes have been made in the computer-generated plots. These changes should aid participants in familiarizing themselves with the International System of Units (SI) as it applies to TAPPI test methods. Wherever possible, Grand Means in SI units have been added at the top of the plots, and scales in SI units have been added to the axes allowing the reader to compare means and variability in common units and SI units for the same data. On all plots, sample codes and unit of test have been shifted to new positions.

Notes and comments for individual laboratories and "Best Values" applicable to a particular method are given following Table 1 for each method. See page 4 of this report for an explanation of "Best Values." Please do not confuse these best values with provisional values included with the samples to detect serious discrepancies at the time of test. NBS results, identified as L502 in the optical tests are included in some of the tables.

If there are any questions on the notes, the analyses, or the reports in general, contact Edwin B. Randall, Robert G. Powell, or Jeffrey Horlick on 301/921-2946.

Edwin B. Randall, Jr., Administrator
TAPPI Collaborative Reference Program
Laboratory Evaluation Technology Section

February 10, 1978

BACKGROUND AND PURPOSE

In 1969, the National Bureau of Standards and the Technical Association of the Pulp and Paper Industry established a collaborative reference program to provide a participating laboratory with a means to check periodically the level and uniformity of its testing in comparison with that of other laboratories.

The interchange of paper and board products and of the raw materials for these products requires agreement among raw material suppliers, paper and board producers, converters, distributors, retailers, commercial testing laboratories, user organizations and the ultimate consumer as to the meaning of test results, an agreement that cannot be achieved without accurate and precise testing. This program is designed to help assure agreement.

HOW THE PROGRAM WORKS

Participants Select the Tests in which they wish to participate. This choice is made on joining the program, but additional tests may be added at any time. Also new participants may enter the program at any time.

Test Samples are Distributed Bimonthly; i.e. every 2 months.

Provisional Values are Provided with the Samples for one or both of the test levels, depending on method. The provisional values permit serious discrepancies to be detected without delay. (It is left to the discretion of the laboratory supervisor as to whether these values should be known to the operator.)

Each Participant Tests the Samples, following instructions provided for each test method. The full check on a single instrument should normally take no more than 30 minutes. The test results are then sent to NBS for analysis. The participant is also asked to report other information relevant to an accurate analysis, such as test conditions and the instruments used.

Industry Means, Best Values and Other Statistics are developed from the data by NBS. The best values are estimates based on a careful examination of all data, both current and past, with special attention to results obtained by the National Bureau of Standards and other recognized reference laboratories in this and other countries.

A Quick Report is Prepared for each participating laboratory reporting data on time. This report shows the industry mean values, and the deviations of the laboratory's results from these values for each test method.

A Longer Summary Report, Showing the Data from all Participants, is also prepared. In the summary report, of which this report is an example, each laboratory is identified by a code number so that the information is maintained on a confidential basis. However, instruments are identified by type so participants can compare their results with those obtained on similar instruments of different manufacture. This report includes test averages, best values and standard deviations for individual participants and for the group as a whole. A participant should be able to readily determine the level and variability of his results in comparison with those of the other laboratories.

Repeatability and Reproducibility Statements such as Contained in ASTM, TAPPI and ISO Standards are included at the end of the report. Participants can check their performance level against the precision statement given in the test method or specification.

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TABLE OF CONTENTS

Analyses In This Report

Analyses In The G Report

TABLE OF CONVERSION FACTORS TO METRIC (SI) UNITS

Physical Quantity	To Convert From	To	Multiply by
Bursting strength	psi	kPa	6.895
	kg/cm^2	kPa	98.07
	bar	kPa	100.00
Tearing strength	g	mN	9.807
Tensile strength	lb/in.	kN/m	.1751
	lb/0.5 in.	kN/m	.3502
	lb/15 mm	kN/m	.2965
	kg/15 mm	kN/m	.6538
	kg/25 mm	kN/m	.3923
	kg/mm	kN/m	9.807
Tensile energy absorption	$ft\text{-}lb/ft^2$	J/m^2	14.59
	$in.\text{-}lb/in.^2$	J/m^2	175.1
	$kg\text{-}m/m^2$	J/m^2	9.807
Bending stiffness	g·cm	μN·m	98.07
Flat-crush strength (Concora)	lb	N	4.448
Ring-crush (TAPPI)	lb	N	4.448
(ISO)	lb/6.00 in.	kN/m	0.0292
Thickness	mil	μm	25.40

KEY TO TABLES AND GRAPHS

MEAN - The average of individual TEST DETERMINATIONS. The number of TEST DETERMINATIONS in the mean is given in the upper right corner of the first table (TEST D.) and again at the bottom of this table.

GRAND MEAN - (GR. MEAN) The average of the individual laboratory MEANS, excluding laboratories flagged (see column F) with an X, # , or +. The GRAND MEAN is given in US customary units and, where applicable, in SI metric units.

SD OF MEANS - (SD MEANS) The standard deviation of the laboratory MEANS about the GRAND MEAN; an index of the among-laboratory precision.

DEV - The deviation or difference of the laboratory MEAN from the GRAND MEAN.

N. DEV - The normal deviate or ratio of the DEV to the SD OF MEANS; an indication of the degree of divergence of the laboratory MEAN from the GRAND MEAN. A N. DEV of more than 2 or less than -2 may indicate that the participant is not following the procedure considered standard for this analysis.

SDR - The standard deviation of repeated measurements; that is, of individual test determinations about their MEAN.

AVERAGE SDR - The average of the individual laboratory SDR's; an index of the within-laboratory precision of repeated measurements.

R. SDR - The relative standard deviation of repeated measurements; that is, the ratio of the SDR to the AVERAGE SDR: an indication of the ability of a participant to repeat his measurements relative to the average ability. The greater the number of TEST DETERMINATIONS the closer the R. SDR should be to unity. If R. SDR is outside the limits given below, the participant may not be following the procedure considered standard for this analysis:

No. of test Determinations	Lower limit for R. SDR	Upper limit for R. SDR
3	0.09	2.58
5	0.27	2.06
8	0.40	1.77
10	0.46	1.67
15	0.56	1.53
20	0.61	1.45
25	0.65	1.39

VAR - Code for instrument type or variation in condition, see second table.

F - Flag, with following meaning:

+ - Excluded from grand means because VAR non-standard for this analysis

- Excluded because data were not understood or because of a non-coded variation reported by the laboratory. (See NOTES following Table 1 for each method.)

M - Excluded because data for one sample are missing

X - Excluded because plotted point would fall outside of the 99% error ellipse, (see below for explanation of Graph)

* - Included in grand means but plotted point falls outside of the 95% error ellipse. The participant should take this as a warning to reexamine his testing procedure

S - Included in grand mean but only after omission of one of more 'wild' values; that is, test determinations more than 3 times AVERAGE SDR from the laboratory's MEAN. Not more than 20% of the test determination may be excluded in this manner without rejecting the laboratory.

0 - Included in grand mean and inside 95% error ellipse.

COORDINATES - Distances along major and minor axes of error ellipse. If special additive or concurrent model of the measuring process applies to this method, the distance along the minor axis represents the random error within a laboratory while that along the major axis also includes a systematic laboratory component of error.

95% ELLIPSE - Lengths of the major and minor axes of the ellipse and the angle that the major axis makes with the horizontal axis.

AVG R. SDR - Average of the R. SDR for the two samples; an indication of the laboratory's precision of repeated measurements.

Graph - For each laboratory the MEAN for the second sample is plotted against the MEAN for the first sample, with each point representing a laboratory. The horizontal and vertical lines are the GRAND MEANS. The dashed line is drawn at 45°. The solid sloping line, which may or may not lie close to the 45° line, is along the major axis of the error ellipse. The ellipse is drawn so that , on the average, it will include 95% of the points representing the laboratories.

Plotted symbols are as explained above (under F), except that an 'S' is plotted as an 'O'. A participant whose plotted point falls outside of the ellipse should carefully reexamine the testing procedure he is following.

The graph is plotted with an ellipse when there are 20 or more laboratories in the analysis. When there are 10 through 19 laboratories in the analysis the graph is plotted but the ellipse is omitted. When there are fewer than 10 laboratories retained in the analysis the graph is not plotted.

The International System of Units (SI) is used on the plots wherever possible to aid participants in familiarizing themselves with SI. Grand means in SI units are given at the top of the plot, and supplementary scales in SI units are drawn along the axes allowing the reader to compare means and variability in common units and SI units for the same data.

Summary - (At end of report) — In addition to several quantities already defined above the summary shows the following values for each test method:

REPL CRP - The number of replicate test determinations used in this Collaborative Reference Program.

REPL TAPPI - The number of replicate test determinations in a test result required by the applicable TAPPI Standard or assumed here if there is no TAPPI Standard. This quantity is needed in the computation of TAPPI repeatability and reproducibility from the SD OF MEANS and the AVER SDR. See TAPPI Standard T1206 for definitions and computations.

REPEAT - TAPPI repeatability, a measure of the within-laboratory precision of a test result.

REPROD - TAPPI reproducibility, a measure of the between-laboratory precision of a test result.

Best values - Given at the end of Table 1 for each method for which sufficient information is available. These best values are estimates based on a careful examination of all data, both current and past, with special attention to results obtained by the National Bureau of Standards and other recognized reference laboratories in this and other countries. All participants using equipment that is standard for the analysis should be able to achieve results within the plus-minus (±) limits, when these are shown along with the best values.

ANALYSIS 710-1 TABLE 1

BURSTING STRENGTH, PSI

TAPPI STANDARD T403 OS-76, BURSTING STRENGTH OF PAPER - PERKINS MODEL C

LAB CODE	SAMPLE H05 MEAN	PRINTING 89 GRAMS PER SQUARE METER DEV	N.DEV	SDR	S.SDR	SAMPLE H62 MEAN	PRINTING 77 GRAMS PER SQUARE METER DEV	N.DEV	SDR	S.SDR	TEST D.F 15 VAR	F	LAB
L107	32.87	.38	.17	1.41	.92	18.20	1.13	.62	1.08	.97	10C	ó	L107
L121	32.71	.22	.10	1.58	1.04	15.20	-1.87	-1.03	1.10	.98	10C	ó	L121
L131	29.73	-2.76	-1.24	1.83	1.20	15.73	-1.34	-.74	.80	.72	10C	ó	L131
L134	31.70	-.79	-.35	1.35	.88	15.70	-1.37	-.76	.41	.37	10C	ó	L134
L150	35.03	2.54	1.14	1.64	1.08	17.47	.40	.22	1.08	.96	10C	ó	L150
L153	34.17	1.68	.75	1.44	.94	18.40	1.33	.73	1.07	.96	10C	ó	L153
L158	34.60	2.11	.95	1.35	.89	18.33	1.26	.70	.98	.87	10C	ó	L158
L162	27.40	-5.09	-2.29	1.99	1.31	12.00	-5.07	-2.80	1.13	1.02	10C	*	L162
L167	31.62	-.87	-.39	1.12	.73	17.41	.34	.19	.65	.58	10C	ó	L167
L183	29.90	-2.59	-1.16	1.55	1.02	15.90	-1.17	-.65	.97	.87	10C	ó	L183
L191	28.70	-3.79	-1.70	1.60	1.05	14.43	-2.64	-1.46	1.18	1.06	10C	ó	L191
L203A	34.57	2.08	.93	1.70	1.12	16.23	-.84	-.46	.84	.75	10C	ó	L203A
L203B	31.27	-1.22	-.55	1.50	.98	15.57	-1.50	-.83	1.36	1.22	10C	ó	L203B
L212	32.12	-.37	-.17	2.08	1.36	17.08	.01	.01	.94	.84	10C	ó	L212
L223A	36.42	3.94	1.77	1.51	.99	18.97	1.90	1.05	1.08	.97	10C	ó	L223A
L225	33.60	1.11	.50	1.26	.82	18.27	1.20	.66	1.91	1.71	10C	ó	L225
L232	32.87	.38	.17	1.29	.85	16.27	-.80	-.44	.80	.72	10C	ó	L232
L237A	32.17	-.32	-.15	1.03	.68	16.37	-.70	-.39	1.16	1.04	10C	ó	L237A
L237B	32.27	-.22	-.10	.96	.63	17.98	.91	.50	1.05	.94	10C	ó	L237B
L243	31.83	-.66	-.29	1.45	.95	18.23	1.16	.64	1.08	.97	10C	ó	L243
L248	31.90	-.59	-.26	1.18	.77	17.00	-.07	-.04	1.41	1.26	10E	ó	L248
L249	28.91	-3.58	-1.61	2.06	1.35	14.08	-2.99	-1.65	1.12	1.00	10C	ó	L249
L261	30.78	-1.71	-.77	1.84	1.21	16.59	-.48	-.26	1.02	.92	10C	ó	L261
L264	32.60	.11	.05	1.12	.74	16.93	-.14	-.08	.70	.63	10C	ó	L264
L274	31.83	-.66	-.29	1.41	.93	15.03	-2.04	-1.13	.69	.62	10C	ó	L274
L279	30.87	-1.62	-.73	1.43	.94	16.47	-.60	-.33	1.70	1.52	10C	ó	L279
L299	33.10	.61	.27	2.07	1.36	19.53	2.46	1.36	.97	.87	10C	ó	L299
L305	31.50	-.99	-.44	1.54	1.01	17.30	.23	.13	.92	.83	10C	ó	L305
L311	35.40	2.91	1.31	1.28	.84	19.03	1.96	1.08	1.38	1.24	10C	ó	L311
L312	29.37	-3.12	-1.40	1.04	.68	17.67	.60	.33	.96	.86	10C	ó	L312
L315	35.63	3.14	1.41	1.75	1.15	18.67	1.60	.88	1.44	1.29	10C	ó	L315
L321	43.33	10.84	4.87	4.01	2.63	18.60	1.53	.84	2.41	2.16	10C	X	L321
L322	35.07	2.58	1.16	1.91	1.25	18.05	.98	.54	1.15	1.03	10C	ó	L322
L326	32.83	.34	.15	1.93	1.27	16.93	-.14	-.08	1.52	1.36	10C	ó	L326
L330	33.57	1.08	.48	1.86	1.22	17.88	.81	.45	.81	.72	10C	ó	L330
L331	35.00	2.51	1.13	1.89	1.24	16.93	-.14	-.08	1.53	1.37	10C	ó	L331
L333	29.80	-2.69	-1.21	4.07	2.67	18.67	1.60	.88	1.18	1.05	10C	*	L333
L339	31.22	-1.27	-.57	1.57	1.03	14.99	-2.08	-1.15	1.67	1.49	10C	ó	L339
L344	29.27	-3.22	-1.45	1.47	.97	12.77	-4.30	-2.38	1.65	1.47	10C	ó	L344
L356	31.83	-.66	-.29	1.33	.87	17.55	.48	.26	1.26	1.13	10C	ó	L356
L358	37.77	5.28	2.37	1.40	.92	21.39	4.32	2.39	.97	.87	10C	ó	L358
L360	31.78	-.71	-.32	1.54	1.01	16.92	-.15	-.08	.96	.86	10C	ó	L360
L390	34.10	1.61	.72	1.52	1.00	17.55	.48	.26	1.36	1.22	10C	ó	L390
L561	35.43	2.94	1.32	1.62	1.07	20.60	3.53	1.95	1.33	1.19	10C	ó	L561
L568	34.05	1.56	.70	1.55	1.02	17.85	.78	.43	1.30	1.17	10C	ó	L568
L599	32.88	.39	.18	1.54	1.01	18.03	.96	.53	.66	.59	10C	ó	L599

GR. MEAN = 32.49 PSI — GRAND MEAN = 17.07 PSI — TEST DETERMINATIONS = 15

SD MEANS = 2.23 PSI — SD OF MEANS = 1.81 PSI — 45 LABS IN GRAND MEANS

AVERAGE SDR = 1.52 PSI — AVERAGE SDR = 1.12 PSI

GR. MEAN = 224.0 KILOPASCAL — GRAND MEAN = 117.7 KILOPASCAL

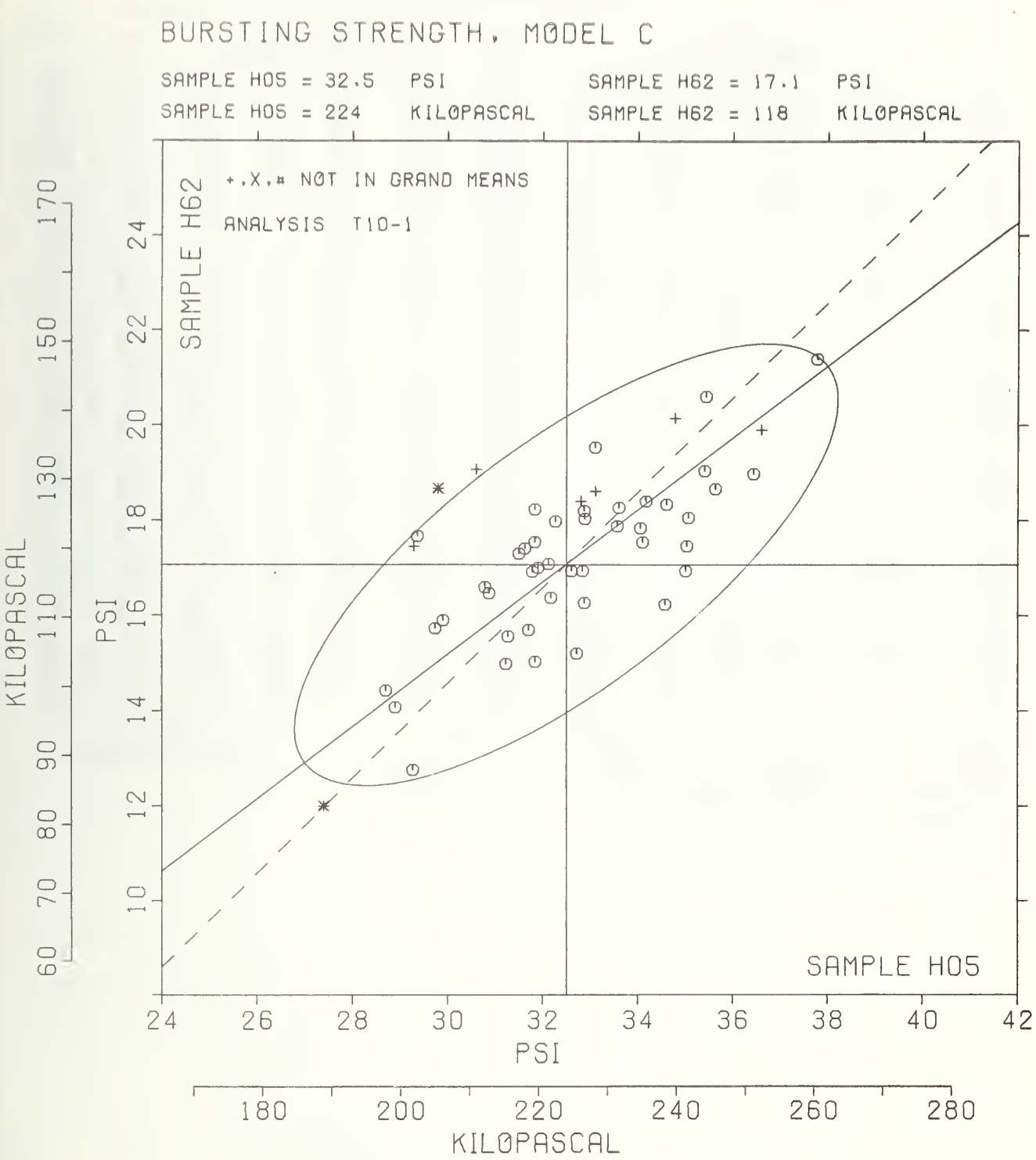
L128	32.80	.31	.14	1.37	.90	18.40	1.33	.73	1.12	1.00	10B	*	L128
L242	34.78	2.29	1.03	1.18	.77	20.15	3.07	1.70	1.11	.99	10T	*	L242
L250L	29.29	-3.20	-1.44	1.42	.93	17.45	.38	.21	1.04	.93	10N	*	L250L
L251	33.11	.62	.28	1.39	.91	18.61	1.54	.85	1.05	.94	10T	*	L251
L269	36.60	4.11	1.85	1.51	.99	19.90	2.83	1.56	1.93	1.73	10A	*	L269
L484	30.60	-1.89	-.85	2.03	1.33	19.07	2.00	1.10	1.10	.99	10M	*	L484

TOTAL NUMBER OF LABORATORIES REPORTING = 52

Best Values: H05 32.5 ± 3.5 psi
H62 17.2 ± 2.3 psi

ANALYSIS T10-1 TABLE 2
HURSTING STRENGTH, PSI
TAPPI STANDARD T403 OS-76, BURSTING STRENGTH OF PAPER - PERKINS MODEL C

LAB CODE	F	MEANS H05	MEANS H62	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L162	*	27.40	12.00	-7.12	-.97	1.16	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L191	O	28.70	14.43	-4.61	.19	1.05	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L249	O	28.91	14.08	-4.66	-.22	1.18	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L344	O	29.27	12.77	-5.17	-1.48	1.22	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L250L	*	29.29	17.45	-2.32	2.23	.93	10N	BURSTING STRENGTH UP TO 45 PSI,LHOMARGY,MAN.CLAMP, 20C,65%RH
L312	O	29.37	17.67	-2.13	2.36	.77	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L131	O	29.73	15.73	-3.00	.60	.96	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L333	*	29.80	18.67	-1.18	2.90	1.86	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L183	O	29.90	15.90	-2.77	.63	.94	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L484	*	30.60	19.07	-.30	2.73	1.16	10M	BURSTING STRENGTH UP TO 45 PSI,REGMED MT/MOT,MANUAL CLAMP
L261	O	30.78	16.59	-1.65	.65	1.06	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L279	O	30.87	16.47	-1.66	.50	1.23	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L339	O	31.22	14.99	-2.27	-.89	1.26	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L203H	O	31.27	15.57	-1.88	-.46	1.10	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L305	O	31.50	17.30	-.65	.78	.92	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L167	O	31.62	17.41	-.49	.80	.66	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L134	O	31.70	15.70	-1.46	-.61	.63	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L360	O	31.78	16.92	-.66	.31	.93	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L356	O	31.83	17.55	-.24	.78	1.00	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L274	O	31.83	15.03	-1.75	-1.23	.77	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L243	O	31.83	18.23	.18	1.32	.96	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L248	O	31.90	17.00	-.51	.30	1.02	10E	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L212	O	32.12	17.08	-.29	.24	1.10	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L237A	O	32.17	16.37	-.68	-.37	.86	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L237B	O	32.27	17.98	.37	.86	.79	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L264	O	32.60	16.93	.01	-.18	.68	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L121	O	32.71	15.20	-.96	-1.62	1.01	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L128	*	32.80	18.40	1.05	.87	.95	10H	BURSTING STRENGTH UP TO 45 PSI, PERKINS H, MANUAL CLAMP
L326	O	32.83	16.93	.19	-.32	1.32	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L232	O	32.87	16.27	-.19	-.87	.78	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L107	O	32.87	18.20	.98	.67	.95	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L599	O	32.88	18.03	.89	.53	.80	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L299	O	33.10	19.53	1.97	1.59	1.12	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L251	*	33.11	18.61	1.42	.85	.93	10T	BURSTING STRENGTH UP TO 45 PSI, L*W,MANUAL CLAMP
L330	O	33.57	17.88	1.35	-.01	.97	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L225	O	33.60	18.27	1.61	.28	1.27	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L568	O	34.05	17.85	1.71	-.33	1.09	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L390	O	34.10	17.55	1.57	-.59	1.11	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L153	O	34.17	18.40	2.14	.05	.95	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L203A	O	34.57	16.23	1.15	-1.92	.94	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L158	O	34.60	18.33	2.44	-.27	.88	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L242	*	34.78	20.15	3.68	1.07	.88	10T	BURSTING STRENGTH UP TO 45 PSI, L*W,MANUAL CLAMP
L331	O	35.00	16.93	1.92	-1.63	1.31	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L150	O	35.03	17.47	2.27	-1.22	1.02	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L322	O	35.07	18.05	2.65	-.77	1.14	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L311	O	35.40	19.03	3.51	-.19	1.04	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L561	O	35.43	20.60	4.48	1.03	1.13	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L315	O	35.63	18.67	3.47	-.63	1.22	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L223A	O	36.43	18.97	4.29	-.87	.98	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L269	*	36.60	19.90	4.98	-.23	1.35	10A	BURSTING STRENGTH UP TO 45 PSI, PERKINS A, MANUAL CLAMP
L358	O	37.77	21.39	6.82	.25	.89	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L321	X	43.33	18.60	9.57	-5.33	2.40	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
GMEANS:		32.49	17.07			1.00		
		95% ELLIPSE:		6.90	2.58	WITH GAMMA = 37 DEGREES		


BURSTING STRENGTH, MODEL C
SAMPLE H05 = 32.5 PSI
SAMPLE H05 = 224 KILOPASCAL
SAMPLE H62 = 17.1 PSI
SAMPLE H62 = 118 KILOPASCAL
+,X,* NOT IN GRAND MEANS
ANALYSIS T10-1
SAMPLE H62
PSI
KILOPASCAL
SAMPLE H05
PSI
KILOPASCAL

ANALYSIS T10-2 TABLE 1
BURSTING STRENGTH, PSI
TAPPI STANDARD T403 OS-76, BURSTING STRENGTH OF PAPER - PERKINS MODEL C-A OR C WITH AIR OR HYDRAULIC CLAMPS

LAB CODE	SAMPLE H05 MEAN	PRINTING 85 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE H62 MEAN	PRINTING 77 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.F 15 VAR	F	LAB
L100	32.24	-.26	-.17	1.40	.93	19.05	1.32	1.08	.56	.53	10D	G	L100
L115	32.13	-.37	-.23	.99	.66	17.53	-.20	-.16	1.14	1.08	10D	G	L115
L122	33.60	1.10	.70	1.50	1.00	19.27	1.54	1.26	1.33	1.26	10F	G	L122
L125	41.63	9.13	5.82	6.48	4.31	13.77	-3.96	-3.24	3.61	3.41	10D	#	L125
L141	32.40	-.10	-.06	1.46	.97	17.48	-.25	-.20	1.20	1.13	10D	G	L141
L148	33.33	.83	.53	1.99	1.32	18.60	.87	.71	1.06	1.00	10D	G	L148
L157	35.23	2.73	1.74	.98	.65	19.50	1.77	1.45	.82	.78	10D	G	L157
L159	28.07	-4.43	-2.82	1.65	1.09	15.35	-2.38	-1.95	1.08	1.02	10D	*	L159
L163	34.30	1.80	1.15	2.34	1.55	18.37	.64	.52	.90	.85	10D	G	L163
L166	32.90	.40	.25	1.85	1.23	17.83	.10	.09	.77	.73	10D	G	L166
L176	32.47	-.03	-.02	1.36	.90	19.33	1.60	1.31	.90	.85	10D	G	L176
L185	32.53	.03	.02	1.51	1.00	18.33	.60	.49	1.29	1.22	10D	G	L185
L190C	32.53	.03	.02	1.84	1.22	18.13	.40	.33	1.17	1.11	10D	G	L190C
L190R	31.20	-1.30	-.83	1.79	1.19	17.53	-.20	-.16	1.04	.98	10D	G	L190R
L202	31.00	-1.50	-.96	1.50	1.00	18.32	.59	.48	.64	.60	10D	G	L202
L217	29.80	-2.70	-1.72	1.90	1.26	17.60	-.13	-.11	1.23	1.16	10D	G	L217
L224	33.93	1.43	.91	1.80	1.20	18.00	.27	.22	1.88	1.78	10D	G	L224
L226B	32.29	-.21	-.13	1.91	1.27	17.77	.04	.04	.98	.93	10D	G	L226B
L226C	29.67	-2.83	-1.80	1.60	1.06	14.80	-2.93	-2.40	1.22	1.15	10D	G	L226C
L241	33.23	.73	.47	1.71	1.14	16.17	-1.56	-1.28	1.42	1.34	10D	G	L241
L255	30.53	-1.97	-1.25	.99	.66	16.93	-.80	-.65	.96	.91	10D	G	L255
L257A	32.47	-.03	-.02	1.30	.86	18.27	.54	.44	.80	.75	10D	G	L257A
L257B	32.80	.30	.19	1.70	1.13	18.47	.74	.60	.99	.93	10D	G	L257B
L257C	33.13	.63	.40	1.06	.70	18.53	.80	.66	1.06	1.00	10D	G	L257C
L262	32.63	.13	.08	1.58	1.05	16.90	-.83	-.68	1.11	1.04	10D	G	L262
L275	31.77	-.73	-.46	2.40	1.59	14.72	-3.01	-2.46	1.91	1.80	10D	*	L275
L280	36.27	3.77	2.40	.99	.66	19.30	1.57	1.29	1.28	1.21	10D	G	L280
L285	35.80	3.30	2.10	1.25	.83	15.51	-2.22	-1.82	1.35	1.27	10D	X	L285
L309	31.41	-1.09	-.69	1.67	1.11	16.83	-.90	-.73	.95	.90	10D	G	L309
L341	32.75	.25	.16	1.11	.74	17.62	-.11	-.09	.60	.57	10D	G	L341
L378	33.27	.77	.49	.70	.47	19.07	1.34	1.09	1.10	1.04	10D	G	L378
L567	32.07	-.43	-.28	1.50	1.00	16.32	-1.41	-1.15	.92	.87	10D	G	L567
L575	33.77	1.27	.81	1.53	1.02	17.84	.11	.09	1.37	1.29	10D	G	L575
L581	33.37	.87	.55	1.37	.91	17.60	-.13	-.11	1.14	1.07	10D	G	L581
L587	33.40	.90	.57	1.75	1.17	17.70	-.03	-.02	1.00	.94	10D	G	L587

GR. MEAN = 32.50 PSI GRAND MEAN = 17.73 PSI TEST DETERMINATIONS = 15
SD MEANS = 1.57 PSI SD OF MEANS = 1.22 PSI 33 LABS IN GRAND MEANS
AVERAGE SDR = 1.51 PSI AVERAGE SDR = 1.06 PSI
GR. MEAN = 224.1 KILOPASCAL GRAND MEAN = 122.2 KILOPASCAL
TOTAL NUMBER OF LABORATORIES REPORTING = 35

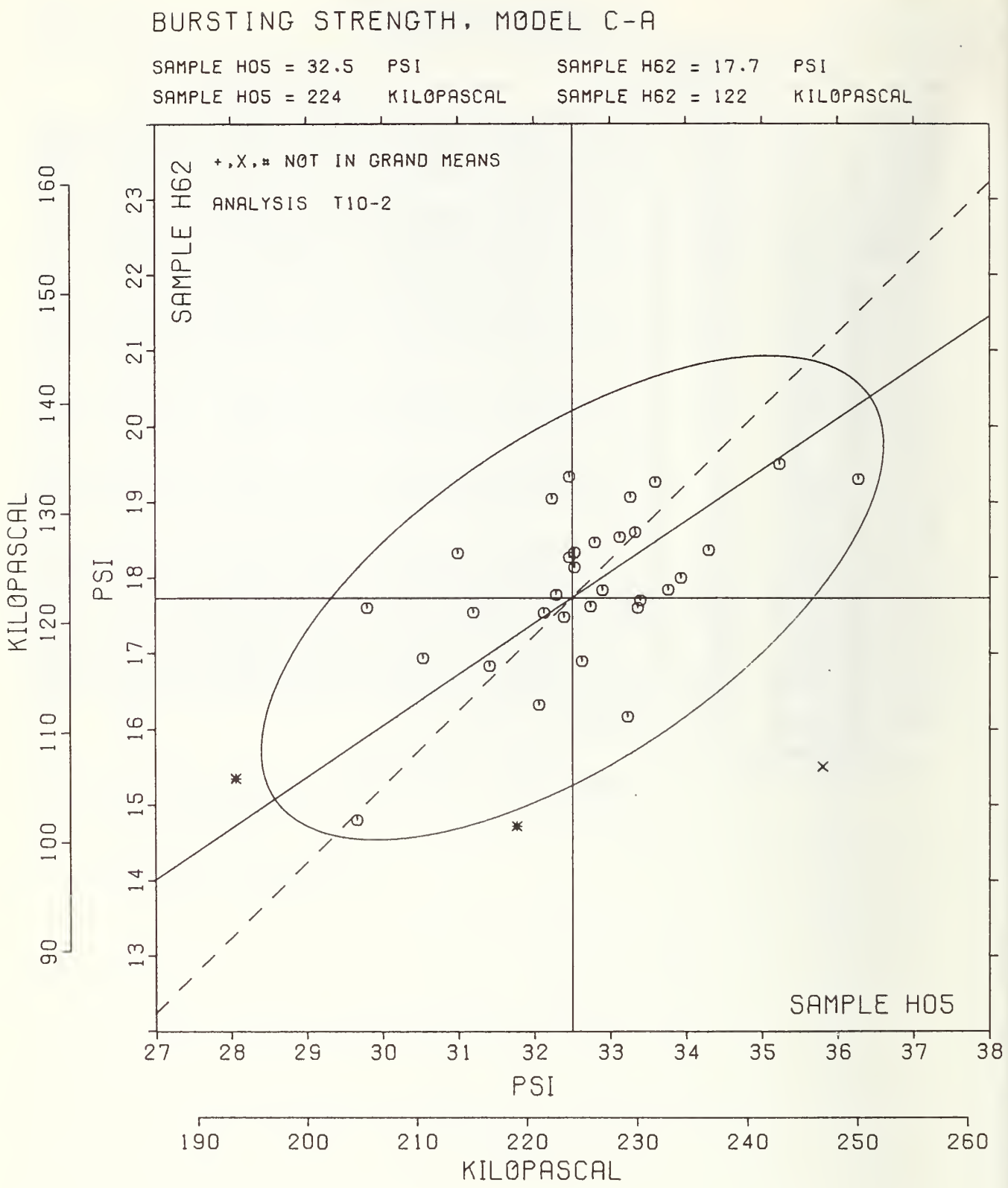
Best Values: H05 32.5 ± 2.8 psi
H62 18.0 ± 2.2 psi

The following laborstories were omitted from the grand means becsuse of extreme test results: 125.

ANALYSIS T10-2 TABLE 2
BURSTING STRENGTH, PSI

TAPPI STANDARD T403 OS-76, BURSTING STRENGTH OF PAPER - PERKINS MODEL C-A OR C WITH AIR OR HYDRAULIC CLAMPS

LAB CODE	P	MEANS H05	MEANS H62	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L159	*	28.07	15.35	-5.01	.51	1.06 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L226C	O	29.67	14.80	-3.99	-.84	1.11 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L217	O	29.80	17.60	-2.31	1.41	1.21 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L255	O	30.53	16.93	-2.08	.44	.78 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L202	O	31.00	18.32	-.91	1.33	.80 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L190R	O	31.20	17.53	-1.19	.57	1.09 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L309	O	31.41	16.83	-1.40	-.13	1.00 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L275	*	31.77	14.72	-2.29	-2.09	1.70 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L567	O	32.07	16.32	-1.15	-.92	.93 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L115	O	32.13	17.53	-.41	.04	.87 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L100	O	32.24	19.05	.52	1.24	.73 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L226B	O	32.29	17.77	-.15	.15	1.10 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L141	O	32.40	17.48	-.22	-.15	1.05 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L176	O	32.47	19.33	.87	1.35	.87 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L257A	O	32.47	18.27	.27	.46	.81 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L190C	O	32.53	18.13	.25	.32	1.16 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L185	O	32.53	18.33	.37	.48	1.11 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L262	O	32.63	16.90	-.35	-.76	1.04 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L341	O	32.75	17.62	.14	-.23	.66 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L257B	O	32.80	18.47	.66	.44	1.03 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L166	O	32.90	17.83	.39	-.14	.98 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L257C	O	33.13	18.53	.97	.31	.85 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L241	O	33.23	16.17	-.27	-1.71	1.24 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L378	O	33.27	19.07	1.38	.68	.75 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L148	O	33.33	18.60	1.18	.25	1.16 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L581	O	33.37	17.60	.65	-.59	.99 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L587	O	33.40	17.70	.73	-.53	1.05 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L122	O	33.60	19.27	1.77	.66	1.13 10P	BURSTING STRENGTH UP TO 45 PSI,PERKINS C, H.CLAMP,TRANSDUCER
L575	O	33.77	17.84	1.11	-.62	1.16 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L224	O	33.93	18.00	1.34	-.58	1.49 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L163	O	34.30	18.37	1.85	-.48	1.20 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L157	O	35.23	19.50	3.26	-.07	.71 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L285	X	35.80	15.51	1.49	-3.69	1.05 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L280	O	36.27	19.30	4.01	-.81	.93 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L125	#	41.63	13.77	5.34	-8.40	3.86 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
GMEANS:		32.50	17.73			1.00	
		95% ELLIPSE:		4.73	2.14	WITH GAMMA = 34 DEGREES	


BURSTING STRENGTH, MODEL C-A
SAMPLE H05 = 32.5 PSI
SAMPLE H05 = 224 KILOPASCAL
SAMPLE H62 = 17.7 PSI
SAMPLE H62 = 122 KILOPASCAL
+,X,* NOT IN GRAND MEANS
ANALYSIS T10-2
SAMPLE H62
SAMPLE H05
PSI
KILOPASCAL
13 14 15 16 17 18 19 20 21 22 23
90 100 110 120 130 140 150 160
27 28 29 30 31 32 33 34 35 36 37 38
190 200 210 220 230 240 250 260

ANALYSIS T11-1 TABLE 1

BURSTING STRENGTH, HIGH RANGE, PSI

TAPPI STANDARD T403 OS-76, BURSTING STRENGTH OF PAPER - PERKINS MODEL C OR C-A

LAB CODE	SAMPLE B08 MEAN	KRAFT 149 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE B40 MEAN	PRINTING 151 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.= 15 VAR	F	LAB
L100	75.9	-3.3	-.74	5.6	.84	53.2	-1.2	-.47	2.3	.95	11D		L100
L103	84.4	5.2	1.18	4.0	.60	54.8	.4	.16	1.4	.56	11C		L103
L107	80.7	1.5	.34	6.0	.90	59.3	4.8	1.89	2.3	.94	11C		L107
L122	75.4	-3.8	-.85	8.8	1.31	55.7	1.3	.51	3.5	1.40	11F		L122
L128	79.7	.6	.13	4.7	.71	54.7	.2	.10	3.0	1.21	11D		L128
L141	80.1	.9	.21	8.7	1.30	55.2	.8	.32	3.5	1.42	11D		L141
L148	80.1	.9	.20	7.9	1.19	55.3	.8	.33	2.5	1.01	11D		L148
L159	73.8	-5.3	-1.21	10.3	1.54	48.9	-5.6	-2.16	3.1	1.26	11D		L159
L170	72.1	-7.1	-1.61	2.9	.44	52.7	-1.7	-.67	.7	.29	11C		L170
L174	78.8	-.4	-.08	5.7	.85	55.1	.6	.25	3.3	1.34	11D		L174
L176	69.0	-10.2	-2.30	5.8	.87	51.7	-2.7	-1.05	2.2	.89	11D		L176
L182	79.3	.2	.04	4.7	.71	54.5	.1	.04	2.2	.90	11D		L182
L218	85.8	6.7	1.51	5.9	.89	56.6	2.1	.84	2.9	1.19	11D		L218
L232	84.6	5.5	1.24	5.4	.81	56.0	1.5	.60	2.5	1.03	11C		L232
L237A	79.4	.2	.05	5.7	.85	54.2	-.2	-.09	2.0	.81	11C		L237A
L2378	83.9	4.8	1.08	7.2	1.08	55.9	1.5	.59	2.2	.89	11C		L237B
L238A	83.8	4.6	1.05	6.5	.98	49.1	-5.4	-2.08	2.5	1.02	11Y	*	L238A
L243	76.3	-2.8	-.64	5.2	.77	53.9	-.6	-.22	2.6	1.06	11C		L243
L248	78.9	-.2	-.05	7.1	1.06	53.7	-.7	-.26	2.5	1.02	11E		L248
L279	79.8	.6	.14	2.7	.40	55.5	1.0	.41	2.7	1.09	11C		L279
L280	79.6	.5	.10	10.1	1.51	58.7	4.2	1.65	3.4	1.37	11D		L280
L294	86.3	7.1	1.61	10.4	1.56	55.7	1.2	.49	1.6	.64	11C		L294
L303	71.4	-7.7	-1.75	6.6	.98	53.7	-.7	-.27	2.6	1.05	11C		L303
L330	76.3	-2.9	-.66	9.1	1.37	56.5	2.1	.82	2.5	.99	11C		L330
L331	86.3	7.1	1.61	12.2	1.83	56.5	2.0	.80	3.2	1.29	11C		L331
L333	78.1	-1.1	-.25	9.6	1.44	46.9	-7.5	-2.91	5.1	2.08	11C	*	L333
L334	80.5	1.3	.30	7.3	1.09	56.9	2.4	.95	1.6	.66	11D		L334
L344	86.1	7.0	1.58	7.5	1.12	52.4	-2.1	-.80	2.8	1.14	11C		L344
L356	80.9	1.7	.39	9.5	1.43	52.8	-1.6	-.63	1.9	.76	11C		L356
L362	78.3	-.8	-.19	5.4	.81	53.5	-1.0	-.37	2.0	.81	11D		L362
L378	77.8	-1.4	-.31	2.3	.34	54.9	.4	.17	1.8	.72	11D		L378
L565	73.2	-5.9	-1.34	3.2	.47	53.5	-.9	-.36	1.8	.72	11D		L565
L567	75.2	-4.0	-.91	8.0	1.20	55.2	.8	.30	2.8	1.15	11D		L567
L575	79.7	.6	.13	7.9	1.18	57.3	2.9	1.12	3.5	1.43	11D		L575

GR. MEAN = 79.2 PSI — GRAND MEAN = 54.4 PSI — TEST DETERMINATIONS = 15

SD MEANS = 4.4 PSI — SD OF MEANS = 2.6 PSI — 34 LABS IN GRAND MEANS

AVERAGE SDR = 6.7 PSI — AVERAGE SDR = 2.5 PSI

GR. MEAN = 545.8 KILOPASCAL — GRAND MEAN = 375.2 KILOPASCAL

L242	94.4	15.3	3.46	12.5	1.87	61.3	6.9	2.67	4.0	1.50	11T	*	L242
L250L	75.6	-3.5	-.80	4.5	.68	51.8	-2.6	-1.01	1.9	.77	11N	*	L250L
L251	74.9	-4.3	-.97	9.5	1.42	51.2	-3.2	-1.26	3.3	1.33	11T	*	L251
L274	78.5	-.6	-.14	1.6	.23	54.9	.4	.17	1.8	.72	11H	*	L274
L290	80.9	1.8	.40	5.1	.76	59.1	4.6	1.81	1.4	.58	11A	*	L290
L393	78.9	-.3	-.07	5.0	.75	56.5	2.0	.80	5.1	2.06	11H	*	L393
L394	94.1	15.0	3.39	3.7	.55	64.4	10.0	3.88	1.5	.61	11B	*	L394
L570	83.8	4.6	1.05	6.8	1.01	64.1	9.6	3.75	3.5	1.40	11B	*	L570
L576	78.9	-.3	-.07	5.8	.87	56.2	1.8	.69	2.0	.83	11P	*	L576
L593	91.7	12.5	2.83	9.3	1.40	62.1	7.7	3.00	2.9	1.17	11J	*	L593

TOTAL NUMBER OF LABORATORIES REPORTING = 44

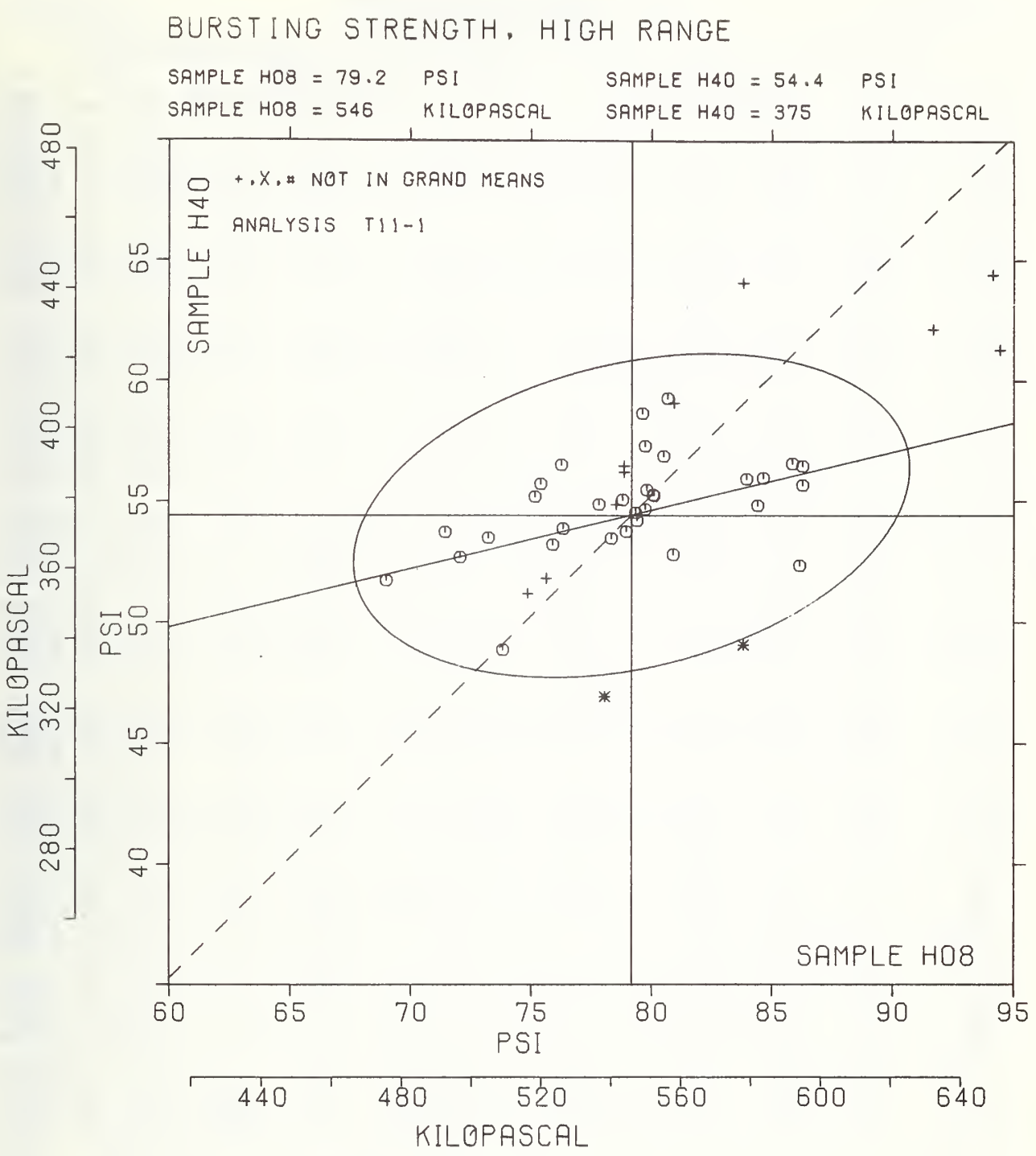
Best Values: H08 79 ± 7 psi
H40 55 ± 5 psi

ANALYSIS T11-1 TABLE 2

BURSTING STRENGTH, HIGH RANGE, PSI

TAPPI STANDARD T403 OS-76, BURSTING STRENGTH OF PAPER - PERKINS MODEL C OR C-A

LAB CODE	F	MEANS B08	MEANS H40	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L176	O	69.0	51.7	-10.5	-.2	.88	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L303	O	71.4	53.7	-7.7	1.2	1.01	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L170	O	72.1	52.7	-7.3	-.0	.37	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L565	O	73.2	53.5	-6.0	.5	.60	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L159	O	73.8	48.9	-6.5	-4.1	1.40	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L251	*	74.9	51.2	-4.9	-2.1	1.37	11T	BURSTING STRENGTH 40 - 100 PSI, L*W,MANUAL CLAMP
L567	O	75.2	55.2	-3.7	1.7	1.17	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L122	O	75.4	55.7	-3.4	2.2	1.36	11F	BURSTING STRENGTH 40 - 100 PSI,PERKINS C, H.CLAMP,TRANSDUCER
L250L	*	75.6	51.8	-4.0	-1.7	.73	11N	BURSTING STRENGTH 40 - 100 PSI,LHOMARGY,MAN.CLAMP, 20C,65%RH
L100	O	75.9	53.2	-3.5	-.4	.89	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L330	O	76.3	56.5	-2.3	2.7	1.18	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L243	O	76.3	53.9	-2.9	.1	.91	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L378	O	77.8	54.9	-1.2	.8	.53	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L333	*	78.1	46.9	-2.8	-7.0	1.76	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L362	O	78.3	53.5	-1.0	-.7	.81	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L274	*	78.5	54.9	-.5	.6	.47	11H	BURSTING STRENGTH 40 - 100 PSI, PERKINS AH, HYDRAULIC CLAMP
L174	O	78.8	55.1	-.2	.7	1.10	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L576	*	78.9	56.2	.1	1.8	.85	11P	BURSTING STRENGTH 40 - 100 PSI, PERKINS LC, MANUAL CLAMP
L393	*	78.9	56.5	.2	2.1	1.40	11H	BURSTING STRENGTH 40 - 100 PSI, PERKINS AH, HYDRAULIC CLAMP
L248	O	78.9	53.7	-.4	-.6	1.04	11E	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L182	O	79.3	54.5	.2	.1	.81	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L237A	O	79.4	54.2	.2	-.3	.83	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L280	O	79.6	58.7	1.4	4.0	1.44	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L575	O	79.7	57.3	1.2	2.7	1.31	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L128	O	79.7	54.7	.6	.1	.96	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L279	O	79.8	55.5	.9	.9	.75	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L148	O	80.1	55.3	1.1	.6	1.10	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L141	O	80.1	55.2	1.1	.6	1.36	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L334	O	80.5	56.9	1.9	2.1	.87	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L107	O	80.7	59.3	2.6	4.4	.92	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L356	O	80.9	52.8	1.3	-2.0	1.09	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L290	*	80.9	59.1	2.8	4.1	.67	11A	BURSTING STRENGTH 40 - 100 PSI, PERKINS A, MANUAL CLAMP
L570	*	83.8	64.1	6.8	8.3	1.21	11H	BURSTING STRENGTH 40 - 100 PSI, PERKINS AH, HYDRAULIC CLAMP
L238A	*	83.8	49.1	3.3	-6.3	1.00	11Y	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L237B	O	83.9	55.9	5.0	.4	.99	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L103	O	84.4	54.8	5.2	-.8	.58	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L232	O	84.6	56.0	5.7	.2	.92	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L218	O	85.8	56.6	7.0	.5	1.04	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L344	O	86.1	52.4	6.3	-3.6	1.13	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L294	O	86.3	55.7	7.2	-.5	1.10	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L331	O	86.3	56.5	7.4	.3	1.56	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L593	*	91.7	62.1	14.0	4.6	1.28	11J	BURSTING STRENGTH 40 - 100 PSI, PERKINS JUMBO,HAND DRIVEN
L394	*	94.1	64.4	16.9	6.2	.58	11H	BURSTING STRENGTH 40 - 100 PSI, PERKINS AH, HYDRAULIC CLAMP
L242	*	94.4	61.3	16.5	3.1	1.74	11T	BURSTING STRENGTH 40 - 100 PSI, L*W,MANUAL CLAMP
GMEANS:		79.2	54.4			1.00		
		95% ELLIPSE:		11.7	6.3	WITH GAMMA = 13 DEGREES		


BURSTING STRENGTH, HIGH RANGE
SAMPLE H08 = 79.2 PSI
SAMPLE H08 = 546 KILOPASCAL
SAMPLE H40 = 54.4 PSI
SAMPLE H40 = 375 KILOPASCAL
+,X,* NOT IN GRAND MEANS
ANALYSIS T11-1
SAMPLE H40
SAMPLE H08
PSI
KILOPASCAL
60 65 70 75 80 85 90 95
40 45 50 55 60 65
280 320 360 400 440 480
440 480 520 560 600 640

ANALYSIS TIS-1 TABLE 1
TEARING STRENGTH, GRAMS
TAPPI STANDARD T414 TS-65, ANY MAKE ELMENDORF WITH DEEP CUTOUT IS STANDARD FOR THIS ANALYSIS

LAB CODE	SAMPLE H04 PRINTING 85 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	SAMPLE H21 PRINTING 106 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	TEST D.= 15 VAR	F	LAB
L100	61.7	-.8	-.27	2.4	1.17	62.2	-3.5	-.91	2.3	1.10	15M	@	L100
L103	59.7	-2.8	-.88	1.1	.53	63.1	-2.6	-.68	1.3	.63	15T	@	L103
L107	62.8	.3	.10	2.1	1.03	65.2	-.5	-.12	2.0	.92	15T	@	L107
L115	67.7	5.2	1.66	2.1	1.04	70.3	4.7	1.23	3.4	1.60	15C	@	L115
L121	59.6	-2.9	-.92	2.2	1.05	62.5	-3.1	-.82	1.8	.83	15T	@	L121
L122	58.4	-4.1	-1.31	1.3	.61	62.5	-3.2	-.84	2.1	.97	15C	@	L122
L124	61.9	-.6	-.20	1.6	.78	64.5	-1.1	-.30	2.4	1.15	15T	@	L124
L126	62.6	.1	.03	2.2	1.07	66.6	.9	.25	3.0	1.41	15T	@	L126
L128	60.9	-1.6	-.52	1.0	.48	61.7	-4.0	-1.05	2.0	.95	15T	@	L128
L134	69.5	7.0	2.23	2.1	1.02	71.7	6.1	1.60	1.8	.84	15T	@	L134
L139	63.7	1.2	.37	1.0	.47	67.3	1.7	.44	1.2	.58	15T	@	L139
L141	63.2	.7	.22	2.0	.96	65.4	-.3	-.07	2.2	1.01	15T	@	L141
L148	55.2	-7.3	-2.32	2.2	1.09	61.9	-3.8	-1.00	3.0	1.39	15T	*	L148
L150	55.9	-6.6	-2.10	1.5	.73	59.2	-6.5	-1.70	2.7	1.25	15T	@	L150
L151	77.7	15.2	4.84	3.5	1.68	81.3	15.7	4.13	2.7	1.26	15C	#	L151
L153	63.9	1.4	.46	1.2	.59	66.6	.9	.25	1.5	.73	15C	@	L153
L157	59.8	-2.7	-.86	1.7	.85	64.0	-1.7	-.44	2.0	.94	15T	@	L157
L158	59.6	-2.9	-.92	3.6	1.73	64.8	-.9	-.23	2.9	1.36	15R	@	L158
L159	67.5	5.0	1.60	3.3	1.59	69.6	4.0	1.05	2.3	1.09	15L	@	L159
L162	60.5	-2.0	-.62	1.4	.66	63.9	-1.8	-.47	.8	.38	15T	@	L162
L163	59.5	-3.0	-.94	3.7	1.81	64.1	-1.6	-.42	2.9	1.34	15T	@	L163
L166	61.4	-1.1	-.35	2.3	1.10	65.2	-.5	-.12	2.1	.99	15T	@	L166
L167	63.3	.8	.27	1.3	.63	67.3	1.6	.42	1.2	.57	15C	@	L167
L170	58.2	-4.3	-1.36	.6	.27	58.5	-7.1	-1.88	.5	.24	15T	@	L170
L173B	63.1	.6	.18	1.0	.50	59.6	-6.1	-1.61	1.1	.54	15T	*	L173B
L174S	58.7	-3.8	-1.22	2.5	1.20	58.9	-6.7	-1.77	3.8	1.80	15T	@	L174S
L176	61.3	-1.2	-.37	2.1	1.02	63.3	-2.3	-.61	2.8	1.31	15T	@	L176
L182A	61.5	-1.0	-.33	2.1	1.04	65.7	.1	.02	2.0	.93	15A	@	L182A
L182T	66.0	3.5	1.11	1.9	.94	67.0	1.3	.35	1.3	.59	15T	@	L182T
L183	61.9	-.6	-.20	1.3	.63	63.6	-2.1	-.54	2.1	.97	15T	@	L183
L185	58.1	-4.4	-1.41	2.6	1.25	59.2	-6.5	-1.70	2.9	1.36	15T	@	L185
L189	64.4	1.9	.60	2.0	.99	66.7	1.0	.27	1.3	.60	15T	@	L189
L190C	58.1	-4.4	-1.38	1.6	.75	63.6	-2.1	-.54	1.5	.70	15T	@	L190C
L190R	63.7	1.2	.37	2.0	.98	67.1	1.5	.39	1.4	.66	15C	@	L190R
L191	65.9	3.4	1.07	1.4	.68	69.7	4.1	1.07	1.8	.86	15T	@	L191
L195	64.4	1.9	.60	1.7	.84	68.5	2.8	.74	1.6	.75	15C	@	L195
L206	64.9	2.4	.76	2.4	1.14	66.8	1.1	.29	2.3	1.08	15R	@	L206
L212	59.9	-2.6	-.83	2.8	1.37	62.3	-3.3	-.88	1.7	.79	15T	@	L212
L213	62.8	.3	.10	1.0	.49	66.7	1.0	.27	2.5	1.16	15T	@	L213
L217	68.0	5.5	1.76	2.4	1.17	71.6	6.0	1.57	1.4	.66	15T	@	L217
L223	61.8	-.7	-.21	1.6	.77	64.5	-1.1	-.29	1.9	.90	15R	@	L223
L224	59.1	-3.4	-1.09	2.2	1.08	61.3	-4.3	-1.14	2.0	.95	15T	@	L224
L225	64.7	2.2	.69	1.5	.73	71.8	6.1	1.62	3.3	1.57	15T	@	L225
L226B	60.4	-2.1	-.67	3.2	1.57	66.9	1.3	.34	3.5	1.66	15T	@	L226B
L226C	55.0	-7.5	-2.38	1.0	.49	64.8	-.9	-.23	1.1	.54	15T	X	L226C
L228	66.1	3.6	1.13	1.5	.72	74.9	9.2	2.43	1.6	.75	15T	*	L228
L230	57.5	-5.0	-1.60	2.9	1.41	60.5	-5.2	-1.37	5.9	2.75	15R	@	L230
L232	59.3	-3.2	-1.00	1.2	.60	62.9	-2.7	-.72	3.8	1.80	15T	@	L232
L236	58.7	-3.8	-1.22	2.6	1.25	62.8	-2.9	-.75	2.2	1.05	15T	@	L236
L237A	60.5	-2.0	-.64	2.0	.99	61.3	-4.3	-1.14	1.3	.60	15T	@	L237A
L237B	63.6	1.1	.34	1.1	.56	65.4	-.3	-.07	1.4	.63	15T	@	L237B
L238A	55.4	-7.1	-2.25	2.1	1.02	59.9	-5.8	-1.53	2.1	.98	15T	@	L238A
L241	68.7	6.2	1.96	2.0	.95	74.5	8.9	2.34	2.1	.98	15T	@	L241
L243	61.9	-.6	-.18	2.9	1.39	66.3	.7	.18	3.5	1.62	15T	@	L243
L244	60.5	-2.0	-.64	1.7	.84	62.2	-3.5	-.91	1.3	.62	15C	@	L244
L248	66.7	4.2	1.33	2.0	.99	68.6	2.9	.77	1.7	.82	15J	@	L248
L249	64.3	1.8	.57	1.3	.62	71.2	5.5	1.46	5.0	2.34	15T	@	L249
L251	62.5	-.0	-.01	2.3	1.11	65.1	-.5	-.14	1.7	.79	15L	@	L251
L254	65.5	3.0	.94	2.1	1.00	68.3	2.6	.69	2.0	.93	15T	@	L254
L255	62.2	-.3	-.09	1.7	.82	62.4	-3.3	-.86	1.5	.73	15T	@	L255
L257A	63.7	1.2	.39	1.7	.81	65.5	-.2	-.05	1.8	.83	15C	@	L257A
L257B	62.9	.4	.14	1.5	.72	65.7	.1	.02	1.8	.86	15C	@	L257B
L257C	63.2	.7	.22	2.4	1.15	65.2	-.5	-.12	1.7	.78	15C	@	L257C
L259	64.7	2.2	.69	2.7	1.32	69.1	3.4	.90	2.2	1.01	15T	@	L259
L261	59.6	-2.9	-.92	2.1	1.04	61.9	-3.8	-1.00	2.3	1.08	15T	@	L261

ANALYSIS T1S-1 TABLE 1
TEARING STRENGTH, GRAMS
TAPPI STANDARD T414 TS-65, ANY MAKE ELMENDORF WITH DEEP CUTOUT IS STANDARD FOR THIS ANALYSIS

LAB CODE	SAMPLE H04 MEAN	PRINTING 89 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE H21 MEAN	PRINTING 106 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.= 15 VAR	F	LAB
L262	63.2	.7	.22	.9	.46	68.2	2.5	.67	1.4	.67	15T	@	L262
L264	65.9	3.4	1.07	2.1	1.00	81.9	16.2	4.27	2.1	.97	15T	#	L264
L265	97.2	34.7	11.01	10.1	4.88	112.7	47.0	12.39	7.2	3.35	15T	#	L265
L274	63.7	1.2	.39	1.3	.62	65.1	-.6	-.16	1.0	.48	15T	@	L274
L275	66.1	3.6	1.15	1.3	.63	68.3	2.6	.69	1.3	.63	15T	@	L275
L277	64.4	1.9	.60	1.9	.91	67.1	1.4	.37	2.1	.99	15T	@	L277
L278	64.9	2.4	.77	3.7	1.79	66.7	1.1	.28	2.9	1.35	15T	@	L278
L279	62.5	.0	.01	2.3	1.13	67.6	1.9	.51	2.4	1.13	15T	@	L279
L280	61.7	-.8	-.26	1.2	.60	64.5	-1.1	-.30	1.8	.85	15L	@	L280
L281	59.9	-2.6	-.81	2.0	.98	58.6	-7.1	-1.86	3.1	1.46	15T	@	L281
L285	63.1	.6	.18	2.6	1.26	66.5	.9	.23	2.3	1.09	15T	@	L285
L288	66.9	4.4	1.39	2.1	1.03	75.4	9.7	2.57	1.6	.75	15Q	*	L288
L290	64.8	2.3	.73	2.0	.97	69.2	3.5	.93	2.5	1.19	15T	@	L290
L291	60.0	-2.5	-.79	2.1	1.04	62.1	-3.5	-.93	1.3	.61	15A	@	L291
L299	67.6	5.1	1.62	3.9	1.88	69.7	4.1	1.07	2.3	1.05	15T	@	L299
L301	63.1	.6	.20	2.0	.99	66.0	.3	.09	1.8	.85	15T	@	L301
L303	57.6	-4.9	-1.55	1.8	.88	59.3	-6.4	-1.68	1.6	.74	15L	@	L303
L305	63.2	.7	.22	1.7	.80	66.7	1.0	.27	1.7	.79	15T	@	L305
L309	62.3	-.2	-.07	2.5	1.24	65.1	-.5	-.14	1.6	.73	15T	@	L309
L311	56.0	-6.5	-2.06	2.1	1.01	62.9	-2.7	-.72	2.3	1.08	15T	*	L311
L312	62.5	.0	.01	1.2	.58	65.1	-.6	-.16	1.5	.70	15T	@	L312
L315	63.9	1.4	.46	2.5	1.21	67.2	1.5	.41	3.0	.92	15T	@	L315
L321	56.3	-6.2	-1.98	3.1	1.51	58.8	-6.9	-1.81	4.3	2.03	15T	@	L321
L328	64.0	1.5	.48	.6	.29	72.7	7.0	1.85	.7	.33	15T	*	L328
L331	55.8	-6.7	-2.12	3.4	1.65	59.5	-6.1	-1.61	4.2	1.97	15T	@	L331
L334	58.9	-4.0	-1.28	2.3	1.11	61.1	-4.5	-1.19	2.0	.95	15T	@	L334
L336	63.4	.9	.29	1.7	.82	65.7	.1	.02	1.4	.67	15T	@	L336
L344	64.5	2.0	.65	2.7	1.30	67.5	1.8	.48	2.4	1.15	15C	@	L344
L345	65.4	2.9	.92	1.7	.84	66.0	.3	.09	1.6	.77	15T	@	L345
L360	64.6	2.1	.66	1.6	.80	69.5	3.8	1.00	2.8	1.32	15T	@	L360
L362	59.9	-2.6	-.83	3.6	1.77	63.6	-2.1	-.54	2.0	.95	15T	@	L362
L376	62.7	.2	.08	1.9	.93	65.7	.1	.02	2.0	.93	15T	@	L376
L378	69.6	7.1	2.25	1.7	.84	72.4	6.7	1.78	1.1	.53	15T	@	L378
L382	64.9	2.4	.75	2.0	.99	71.5	5.9	1.55	3.7	1.73	15T	@	L382
L390	62.9	.5	.14	1.5	.71	64.8	-.8	-.22	1.9	.90	15T	@	L390
L392	62.1	-.4	-.12	2.1	1.00	63.5	-2.2	-.58	2.1	.97	15T	@	L392
L396M	37.9	-24.6	-7.82	6.4	3.10	42.0	-23.7	-6.24	9.7	4.55	15T	#	L396M
L442	66.2	3.7	1.18	1.1	.56	69.7	4.0	1.07	1.5	.72	15R	@	L442
L484	65.9	3.4	1.09	2.1	1.00	71.5	5.8	1.53	1.8	.85	15T	@	L484
L561	67.7	5.2	1.66	2.3	1.14	68.5	2.9	.76	1.7	.81	15T	@	L561
L562	62.3	-.2	-.05	6.7	3.23	62.9	-2.7	-.72	3.0	1.40	15T	@	L562
L565	63.8	1.3	.41	2.4	1.15	67.8	2.1	.56	1.5	.69	15T	@	L565
L567	60.9	-1.6	-.50	2.4	1.15	66.1	.5	.13	2.2	1.03	15C	@	L567
L575	62.9	.4	.11	1.6	.79	63.9	-1.8	-.47	1.6	.76	15L	@	L575
L576	67.3	4.8	1.51	1.8	.85	71.0	5.3	1.41	2.3	1.08	15T	@	L576
L580	63.1	.6	.20	1.1	.51	63.7	-2.0	-.52	1.0	.46	15T	@	L580
L581	63.6	1.1	.35	2.2	1.09	66.5	.9	.23	1.6	.76	15Q	@	L581
L587	61.6	-.9	-.28	1.9	.91	63.2	-2.5	-.65	2.1	.99	15T	@	L587
L599	62.2	-.3	-.09	1.6	.76	71.5	5.8	1.53	3.4	1.57	15T	*	L599

GR. MEAN = 62.5 GRAMS GRAND MEAN = 65.7 GRAMS TEST DETERMINATIONS = 15
SD MEANS = 3.2 GRAMS SD OF MEANS = 3.8 GRAMS 109 LABS IN GRAND MEANS
AVERAGE SDR = 2.1 GRAMS AVERAGE SDR = 2.1 GRAMS
GR. MEAN = 612.9 MILLINEWTON GRAND MEAN = 643.9 MILLINEWTON

L211	65.3	2.8	.90	3.6	1.75	64.7	-1.0	-.26	2.7	1.26	15V	*	L211
L242	69.3	6.8	2.17	2.5	1.20	70.5	4.8	1.27	2.0	.92	15U	*	L242
L250L	69.9	7.4	2.35	2.3	1.10	72.8	7.1	1.88	2.5	1.18	15H	*	L250L
L531	57.3	-5.2	-1.64	2.5	1.20	60.0	-5.7	-1.49	2.6	1.23	15E	*	L531

TOTAL NUMBER OF LABORATORIES REPORTING = 118

Best Values: H04 63 ± 5 grams
H21 66 ± 6 grams

The following laboratories were omitted from the grand means because of extreme test results: 151, 264, 265, 396.
Data from the following laboratories appeared to be off by a multiplicative factor: 211. Code 15V was assigned temporarily to put in a factor of 2.

Please see the diagram on the inside of the back cover of this report which shows how to distinguish between an Elmendorf tear tester with DEEP CUTOUT and an older model tester with NO CUTOUT.

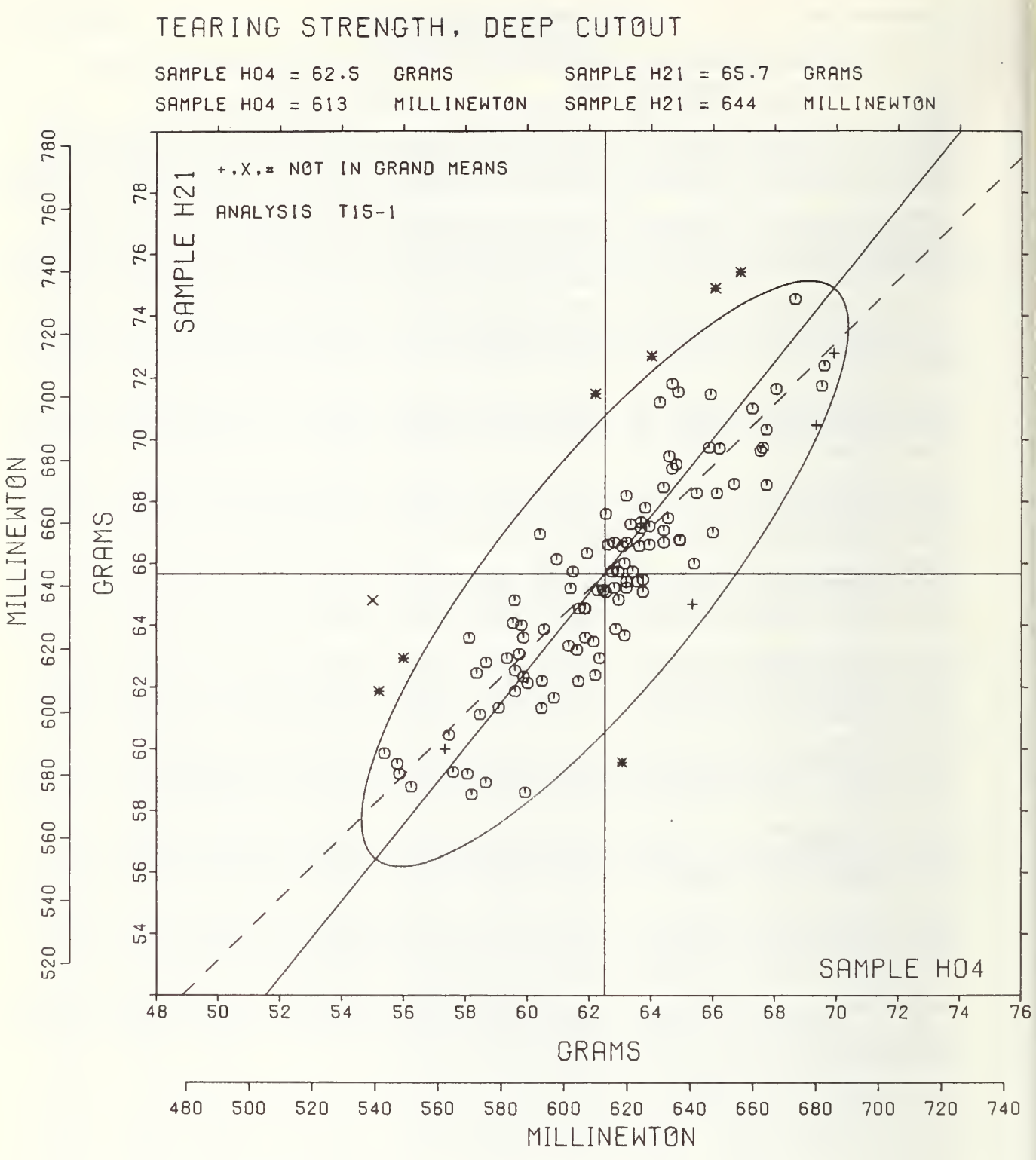
ANALYSIS T15-1 TABLE 2
TEARING STRENGTH, GRAMS
TAPPI STANDARD T414 TS-65, ANY MAKE ELMENDORF WITH DEEP CUTOUT IS STANDARD FOR THIS ANALYSIS

LAB CODE	F	MEANS H04	H21	COORDINATES MAJOR	MINOR	AVG R.SDE	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L396M	#	37.9	42.0	-33.9	4.4	3.83	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L226C	X	55.0	64.8	-5.4	5.3	.51	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L148	*	55.2	61.9	-7.5	3.3	1.24	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L238A	O	55.4	59.9	-9.0	1.9	1.00	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L331	O	55.8	59.5	-9.0	1.4	1.81	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L150	O	55.9	59.2	-9.2	1.1	.99	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L311	*	56.0	62.9	-6.2	3.4	1.04	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L321	O	56.3	58.8	-9.2	.6	1.77	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L531	+	57.3	60.0	-7.6	.5	1.21	1SE	TEARING STRENGTH, STANDARD, THWING-ELMENDORF,AMBIENT COND.
L230	O	57.5	60.5	-7.2	.7	2.08	1SR	TEARING STRENGTH, STANDARD,THWING-ELMENDORF,DIGITAL READOUT
L303	O	57.6	59.3	-8.0	-.2	.81	1SL	TEARING STRENGTH, STANDARD, LORENTZ-WETTRES
L185	O	58.1	59.2	-7.8	-.6	1.31	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L190C	O	58.1	63.6	-4.3	2.1	.73	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L170	O	58.2	58.5	-8.2	-1.1	.26	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L122	O	58.4	62.5	-5.1	1.2	.79	1SC	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L334	O	58.5	61.1	-6.1	.3	1.03	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L236	O	58.7	62.8	-4.6	1.2	1.15	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L174S	O	58.7	58.9	-7.6	-1.2	1.50	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L224	O	59.1	61.3	-5.5	-.0	1.01	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L232	O	59.3	62.9	-4.1	.8	1.20	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L163	O	59.5	64.1	-3.1	1.3	1.57	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L121	O	59.6	62.5	-4.2	.3	.94	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L261	O	59.6	61.9	-4.8	-.1	1.06	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L158	O	59.6	64.8	-2.5	1.7	1.55	1SR	TEARING STRENGTH, STANDARD,THWING-ELMENDORF,DIGITAL READOUT
L103	O	59.7	63.1	-3.8	.5	.58	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L157	O	59.8	64.0	-3.0	1.1	.89	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L362	O	59.9	63.6	-3.3	.8	1.36	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L212	O	59.9	62.3	-4.2	-.0	1.08	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L281	O	59.9	58.6	-7.1	-2.4	1.22	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L291	O	60.0	62.1	-4.3	-.3	.82	1SA	TEARING STRENGTH, STANDARD, APPITA
L226B	O	60.4	66.9	-.3	2.4	1.61	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L244	O	60.5	62.2	-4.0	-.6	.73	1SC	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L237A	O	60.5	61.3	-4.6	-1.1	.80	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L162	O	60.5	63.9	-2.6	.4	.52	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L128	O	60.9	61.7	-4.1	-1.2	.71	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L567	O	60.9	66.1	-.6	1.5	1.09	1SC	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L176	O	61.3	63.3	-2.5	-.5	1.16	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L166	O	61.4	65.2	-1.0	.6	1.04	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L182A	O	61.5	65.7	-.6	.9	.98	1SA	TEARING STRENGTH, STANDARD, APPITA
L587	O	61.6	63.2	-2.5	-.8	.95	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L100	O	61.7	62.2	-3.2	-1.5	1.14	1SM	TEARING STRENGTH, STANDARD, T.W.MIRFIELD(APPITA-ELMENDORF)
L280	O	61.7	64.5	-1.4	-.1	.72	1SL	TEARING STRENGTH, STANDARD, LORENTZ-WETTRES
L223	O	61.8	64.5	-1.3	-.2	.84	1SR	TEARING STRENGTH, STANDARD,THWING-ELMENDORF,DIGITAL READOUT
L124	O	61.9	64.5	-1.3	-.2	.96	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L183	O	61.9	63.6	-2.0	-.8	.80	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L243	O	61.9	66.3	.2	.9	1.51	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L392	O	62.1	63.5	-1.9	-1.1	.99	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L599	*	62.2	71.5	4.3	3.9	1.17	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L255	O	62.2	62.4	-2.7	-1.8	.78	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L309	O	62.3	65.1	-.6	-.1	.98	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L562	O	62.3	62.9	-2.2	-1.6	2.31	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L251	O	62.5	65.1	-.4	-.3	.95	1SL	TEARING STRENGTH, STANDARD, LORENTZ-WETTRES
L312	O	62.5	65.1	-.4	-.4	.64	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L279	O	62.5	67.6	1.5	1.2	1.13	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L126	O	62.6	66.6	.8	.5	1.24	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L376	O	62.7	65.7	.2	-.1	.93	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L213	O	62.8	66.7	1.0	.4	.82	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L107	O	62.8	65.2	-.2	-.5	.97	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L575	O	62.9	63.9	-1.2	-1.4	.78	1SL	TEARING STRENGTH, STANDARD, LORENTZ-WETTRES
L257B	O	62.9	65.7	.3	-.3	.79	1SC	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L390	O	62.9	64.8	-.4	-.9	.81	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L173H	*	63.1	59.6	-4.4	-4.3	.52	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L285	O	63.1	66.5	1.0	.1	1.18	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L580	O	63.1	63.7	-1.2	-1.7	.49	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L301	O	63.1	66.0	.7	-.3	.92	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)

ANALYSIS T15-1 TABLE 2
TEARING STRENGTH, GRAMS

TAPPI STANDARD T414 TS-65, ANY MAKE ELMENDORF WITH DEEP CUTOUT IS STANDARD FOR THIS ANALYSIS

LAB CODE	F	MEANS B04	MEANS H21	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L141	0	63.2	65.4	.2	-.7	.99	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L262	0	63.2	68.2	2.4	1.0	.56	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L305	0	63.2	66.7	1.2	.1	.79	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L257C	0	63.2	65.2	.1	-.8	.96	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L167	0	63.3	67.3	1.8	.4	.60	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L336	0	63.4	65.7	.6	-.7	.75	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L237B	0	63.6	65.4	.5	-1.0	.60	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L581	0	63.6	66.5	1.4	-.3	.92	15Q	TEARING STRENGTH, STANDARD,THWING-ELMENDORF,AIR CLAMP,DIGITL
L190R	0	63.7	67.1	1.9	.0	.82	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L139	0	63.7	67.3	2.0	.1	.53	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L257A	0	63.7	65.5	.6	-1.1	.82	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L274	0	63.7	65.1	.3	-1.3	.55	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L565	0	63.8	67.8	2.5	.3	.92	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L153	0	63.9	66.6	1.6	-.5	.66	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L315	0	63.9	67.2	2.1	-.2	1.07	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L328	*	64.0	72.7	6.4	3.2	.31	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L249	0	64.3	71.2	5.4	2.1	1.48	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L195	0	64.4	68.5	3.4	.3	.79	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L277	0	64.4	67.1	2.3	-.6	.95	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L189	0	64.4	66.7	2.0	-.9	.80	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L344	0	64.5	67.5	2.7	-.5	1.22	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L360	0	64.6	69.5	4.3	.8	1.06	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L259	0	64.7	69.1	4.0	.4	1.16	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L225	0	64.7	71.8	6.1	2.2	1.15	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L290	0	64.8	69.2	4.2	.4	1.08	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L382	0	64.9	71.5	6.1	1.8	1.36	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L206	0	64.9	66.8	2.4	-1.2	1.11	15R	TEARING STRENGTH, STANDARD,THWING-ELMENDORF,DIGITAL READOUT
L278	0	64.9	66.7	2.4	-1.2	1.57	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L211	+	65.3	64.7	1.0	-2.8	1.50	15V	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)X2
L345	0	65.4	66.0	2.1	-2.1	.80	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L254	0	65.5	68.3	3.9	-.7	.97	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L191	0	65.9	69.7	5.3	-.1	.77	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L264	#	65.9	81.9	14.7	7.5	.99	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L484	0	65.9	71.5	6.7	1.0	.92	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L182T	0	66.0	67.0	3.2	-1.9	.76	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L228	*	66.1	74.9	9.4	3.0	.74	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L275	0	66.1	68.3	4.3	-1.2	.63	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L442	0	66.2	69.7	5.5	-.4	.64	15R	TEARING STRENGTH, STANDARD,THWING-ELMENDORF,DIGITAL READOUT
L248	0	66.7	68.6	4.9	-1.4	.90	15J	TEARING STRENGTH, STANDARD, LORENTZ-WETTRES
L288	*	66.9	75.4	10.3	2.7	.89	15Q	TEARING STRENGTH, STANDARD,THWING-ELMENDORF,AIR CLAMP,DIGITL
L576	0	67.3	71.0	7.2	-.4	.96	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L159	0	67.5	69.6	6.3	-1.4	1.34	15L	TEARING STRENGTH, STANDARD, LORENTZ-WETTRES
L299	0	67.6	69.7	6.4	-1.4	1.47	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L561	0	67.7	68.5	5.5	-2.3	.97	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L115	0	67.7	70.3	6.9	-1.2	1.32	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L217	0	68.0	71.6	8.1	-.6	.91	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L241	0	68.7	74.5	10.8	.7	.97	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L242	+	69.3	70.5	8.0	-2.3	1.06	15U	TEARING STRENGTH, STANDARD, AUSTRALIAN OPT. CO.
L134	0	69.5	71.7	9.1	-1.7	.93	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L378	0	69.6	72.4	9.7	-1.3	.68	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L250L	+	69.9	72.8	10.2	-1.3	1.14	15H	TEARING STRENGTH, STANDARD, LHOMARGY, 20 C, 65% RH
L151	#	77.7	81.3	21.8	-2.1	1.47	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L265	#	97.2	112.7	58.4	2.4	4.12	1ST	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
GMEANS:		62.5	65.7			1.00		
		95% ELLIPSE:		11.8	3.4	WITH GAMMA = 51 DEGREES		


TEARING STRENGTH, DEEP CUTOUT
SAMPLE H04 = 62.5 GRAMS
SAMPLE H04 = 613 MILLINEWTON
SAMPLE H21 = 65.7 GRAMS
SAMPLE H21 = 644 MILLINEWTON
+,X,* NOT IN GRAND MEANS
ANALYSIS T1S-1
SAMPLE H21
GRAMS
MILLINEWTON
SAMPLE H04
GRAMS
MILLINEWTON

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ANALYSIS T17-1 TABLE 1

TEARING STRENGTH, GRAMS

TAPPI STANDARD T414 TS-65, THWING-ELMENDORF WITHOUT DEEP CUTOUT IS STANDARD FOR THIS ANALYSIS

LAB CODE	SAMPLE E17 BROWN KRAFT 74 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	SAMPLE E32 BROWN KRAFT 74 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB	TEST D.F = 15
L122	61.9	-1.8	-.47	1.8	.83	82.3	-3.1	-.77	2.5	.87	17N	@	L122	
L148	62.1	-1.5	-.40	3.0	1.34	82.7	-2.7	-.68	3.3	1.15	17N	@	L148	
L174N	63.5	-.2	-.04	3.0	1.34	83.2	-2.2	-.54	2.7	.95	17N	@	L174N	
L231	65.8	2.2	.57	2.3	1.06	89.1	3.7	.90	2.8	.98	17N	@	L231	
L234	66.0	2.4	.63	1.5	.68	89.5	4.1	1.00	2.9	1.01	17N	@	L234	
L267	70.3	6.7	1.77	3.4	1.52	93.1	7.7	1.89	4.1	1.44	17N	@	L267	
L269	65.7	2.1	.56	1.3	.58	88.2	2.8	.69	1.8	.63	17N	@	L269	
L301	60.8	-2.8	-.75	2.3	1.06	81.0	-4.4	-1.09	2.5	.89	17N	@	L301	
L308	67.2	3.6	.94	3.3	1.50	89.4	4.0	.99	4.6	1.62	17N	@	L308	
L324	54.7	-8.9	-2.35	1.9	.88	80.3	-5.1	-1.27	3.4	1.21	17N	*	L324	
L326	60.5	-3.2	-.84	2.1	.93	81.7	-3.7	-.92	1.9	.66	17N	@	L326	
L339	87.6	24.0	6.33	21.5	9.71	110.5	25.1	6.18	26.9	9.47	17N	#	L339	
L341	62.0	-1.6	-.43	1.4	.64	82.3	-3.1	-.77	2.3	.79	17N	@	L341	
L366	66.5	2.9	.77	2.3	1.05	88.4	3.0	.74	3.6	1.26	17N	@	L366	
L372	63.8	.2	.04	1.0	.46	84.7	-.7	-.17	2.1	.74	17N	@	L372	
GR. MEAN = 63.6 GRAMS						GRAND MEAN = 85.4 GRAMS								TEST DETERMINATIONS = 15
SD MEANS = 3.8 GRAMS						SD OF MEANS = 4.1 GRAMS								14 LABS IN GRAND MEANS
			AVERAGE SDR = 2.2 GRAMS					AVERAGE SDR = 2.8 GRAMS						
GR. MEAN = 624.0 MILLINEWTON						GRAND MEAN = 837.5 MILLINEWTON								
L566	66.0	2.4	.63	3.8	1.71	86.5	1.1	.28	2.7	.94	17X	*	L566	

TOTAL NUMBER OF LABORATORIES REPORTING = 16

Best Values: E17 64 ± 5 grams
E32 85 ± 7 grams

The following laboratories were omitted from the grand means because of extreme test results: 339.

Data from the following laboratories were given X codes and omitted from the grand means because the tests were made on DEEP CUTOUT tear testers: 566.

Please see the diagram on the inside of the back cover of this report which shows how to distinguish between an Elmendorf tear tester with DEEP CUTOUT and an older model tester with NO CUTOUT.

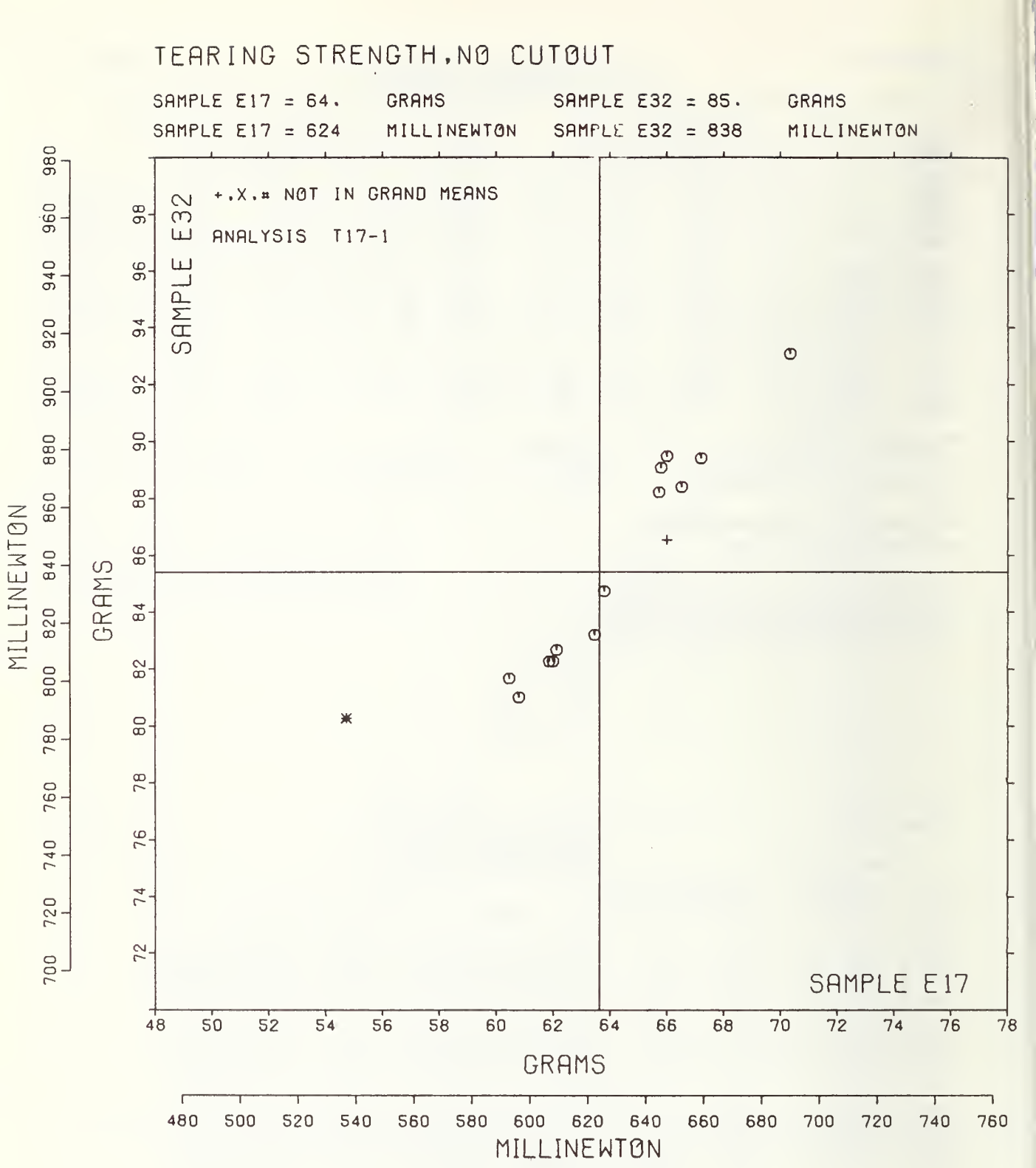
REPORT NO. 505 TAPPI COLLABORATIVE REFERENCE PROGRAM NOVEMBER 1977

ANALYSIS T17-1 TABLE 2

TEARING STRENGTH, GRAMS

TAPPI STANDARD T414 TS-65, THWING-ELMENDORF WITHOUT DEEP CUTOUT IS STANDARD FOR THIS ANALYSIS

LAB CODE	F	MEANS E17	E32	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L324	*	54.7	80.3	-9.8	3.0	1.04	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L326	@	60.5	81.7	-4.5	-.2	.80	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L301	@	60.8	81.0	-5.2	-.9	.97	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L122	@	61.9	82.3	-3.5	-.8	.85	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L341	@	62.0	82.3	-3.4	-.9	.72	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L148	@	62.1	82.7	-3.0	-.8	1.25	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L174N	@	63.5	83.2	-1.7	-1.4	1.15	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L372	@	63.8	84.7	-.4	-.6	.60	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L269	@	65.7	88.2	3.5	.4	.60	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L231	@	65.8	89.1	4.2	.9	1.02	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L566	*	66.0	86.5	2.4	-1.0	1.32	17X	TEARING STRENGTH, NO CUT OUT; GIVE INSTRUMENT MAKE,MODEL
L234	@	66.0	89.5	4.6	1.0	.85	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L366	@	66.5	88.4	4.2	-.1	1.15	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L308	@	67.2	89.4	5.4	.1	1.56	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L267	@	70.3	93.1	10.2	.3	1.48	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L339	#	87.6	110.5	34.7	-.5	9.59	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
GMEANS:		63.6	85.4			1.00		
		95% ELLIPSE:		15.8	3.3	WITH GAMMA = 47 DEGREES		


TEARING STRENGTH,NO CUTOUT
SAMPLE E17 = 64. GRAMS
SAMPLE E17 = 624 MILLINEWTON
SAMPLE E32 = 85. GRAMS
SAMPLE E32 = 838 MILLINEWTON
+,X,* NOT IN GRAND MEANS
ANALYSIS T17-1
SAMPLE E32
GRAMS
MILLINEWTON
SAMPLE E17
GRAMS
MILLINEWTON

ANALYSIS T19-1 TABLE 1

TENSILE BREAKING STRENGTH, KILONEWTONS PER METER - PACKAGING PAPER

TAPPI STANDARDS T404 OS-76 AND T494 OS-70, TENSILE BREAKING STRENGTH, PENDULUM AND CRE TYPES

LAB CODE	SAMPLE H09 KRAFT 147 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	SAMPLE H57 KRAFT 147 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	TEST D.= 20 VAR	F	LAB
L107	7.49	.35	1.15	.54	1.07	10.15	-.10	-.19	.73	1.23	19A	6	L107
L122	6.71	-.42	-1.36	.53	1.05	9.93	-.32	-.61	.82	1.37	19A	6	L122
L126	7.12	-.01	-.03	.60	1.19	10.37	.12	.23	.41	.68	19A	6	L126
L151	6.83	-.30	-.97	.26	.52	9.65	-.70	-1.33	.51	.86	19A	6	L151
L153	7.31	.18	.58	.52	1.03	10.35	.10	.19	.65	1.09	19P	6	L153
L157A	7.06	-.08	-.25	.42	.84	10.65	.40	.76	.49	.82	19P	6	L157A
L157I	6.84	-.30	-.96	.37	.72	9.49	-.76	-1.45	.71	1.18	19A	6	L157I
L167	7.53	.40	1.28	1.03	2.03	11.73	1.48	2.83	.41	.68	19P	*	L167
L174	7.00	-.13	-.43	.49	.97	10.23	-.02	-.04	.56	.93	19A	6	L174
L182I	6.74	-.40	-1.29	.30	.59	9.82	-.43	-.82	.74	1.24	19D	6	L182I
L182L	6.95	-.18	-.59	.44	.87	10.15	-.10	-.19	.60	1.00	19T	6	L182L
L217A	7.02	-.11	-.37	.35	.69	10.04	-.21	-.40	.44	.73	19A	6	L217A
L217P	6.93	-.20	-.64	.38	.75	9.99	-.26	-.50	.40	.66	19P	6	L217P
L224	7.08	-.05	-.18	.64	1.26	10.27	.02	.04	.66	1.10	19A	6	L224
L225	7.27	.14	.45	.70	1.39	10.45	.20	.39	.72	1.21	19P	6	L225
L234L	7.12	-.01	-.04	.51	1.01	9.85	-.40	-.76	.44	.74	19P	6	L234L
L237A	7.39	.26	.84	.74	1.47	11.24	1.00	1.90	.63	1.05	19Q	6	L237A
L237B	7.59	.46	1.49	.51	1.01	11.09	.84	1.60	.74	1.24	19A	6	L237B
L238A	7.20	.07	.23	.61	1.21	10.27	.03	.05	.62	1.03	19T	6	L238A
L243	6.77	-.37	-1.19	.42	.83	10.25	-.00	-.01	.56	.93	19A	6	L243
L251	6.88	-.25	-.80	.59	1.16	9.94	-.31	-.59	.76	1.27	19G	6	L251
L257A	7.26	.13	.42	.36	.71	10.56	.31	.60	.43	.72	19P	6	L257A
L257B	7.35	.21	.69	.42	.84	10.63	.38	.72	.35	.59	19P	6	L257B
L257C	7.30	.17	.55	.30	.59	10.67	.42	.80	.45	.75	19P	6	L257C
L264A	6.66	-.48	-1.54	.84	1.66	10.25	-.00	-.01	.70	1.16	19A	6	L264A
L264P	7.49	.36	1.16	.51	1.01	11.02	.77	1.46	.56	.94	19P	6	L264P
L265	7.12	-.02	-.05	.57	1.13	10.03	-.22	-.41	.66	1.10	19A	6	L265
L267	6.56	-.58	-1.86	.55	1.09	10.00	-.25	-.48	.63	1.06	19A	6	L267
L274	7.12	-.02	-.05	.30	.59	9.75	-.50	-.95	.42	.70	19P	6	L274
L280	6.96	-.18	-.57	.50	.99	9.54	-.71	-1.36	.58	.98	19G	6	L280
L281	7.05	-.08	-.25	.89	1.75	10.61	.36	.69	.44	.74	19G	6	L281
L305	7.20	.07	.22	.32	.64	10.45	.20	.38	.49	.82	19P	6	L305
L312	7.12	-.01	-.04	.55	1.08	9.58	-.67	-1.28	.49	.82	19D	6	L312
L318	6.46	-.67	-2.17	.47	.93	9.33	-.92	-1.75	.71	1.19	19G	6	L318
L324	7.01	-.12	-.39	.33	.64	9.97	-.28	-.53	.64	1.07	19A	6	L324
L334	7.35	.22	.70	.70	1.38	10.63	.38	.72	.62	1.03	19P	6	L334
L336	6.85	-.28	-.92	.39	.78	10.06	-.19	-.36	.72	1.20	19G	6	L336
L356	7.55	.42	1.35	.59	1.17	10.66	.41	.79	.63	1.05	19P	6	L356
L392	7.34	.21	.68	.68	1.35	9.97	-.28	-.54	.69	1.16	19A	6	L392
L561	7.71	.58	1.88	.50	.98	11.08	.83	1.59	.52	.87	19P	6	L561
L562	7.54	.40	1.30	.64	1.26	9.66	-.59	-1.12	.55	.92	19P	*	L562
L565	7.40	.27	.87	.23	.46	9.52	-.73	-1.40	.44	.73	19T	*	L565
L568	7.48	.34	1.11	.60	1.19	10.65	.41	.77	.68	1.14	19P	6	L568
L575	6.97	-.17	-.54	.35	.69	9.97	-.28	-.54	.69	1.16	19D	6	L575
L576	7.10	-.03	-.11	.46	.90	10.42	.17	.32	.63	1.05	19A	6	L576
L580	7.31	.18	.59	.43	.84	10.68	.44	.83	.67	1.12	19G	6	L580
L581	7.72	.59	1.89	.70	1.39	11.01	.76	1.45	.63	1.05	19A	6	L581
L582	6.56	-.57	-1.85	.53	1.05	9.47	-.78	-1.49	.69	1.16	19A	6	L582
GR. MEAN =	7.13 KILONEWTON/M			GRAND MEAN =		10.25 KILONEWTON/M				TEST DETERMINATIONS =			20
SD MEANS =	.31 KILONEWTON/M			SD OF MEANS =		.52 KILONEWTON/M				48 LABS IN GRAND MEANS			
	AVERAGE SDR =			.51 KILONEWTON/M			AVERAGE SDR =			.60 KILONEWTON/M			
GR. MEAN =	40.74 LB/INCH			GRAND MEAN =		58.53 LB/INCH							
L250I	6.18	-.95	-3.07	.44	.87	9.17	-1.08	-2.05	.39	.64	19L	*	L250I

TOTAL NUMBER OF LABORATORIES REPORTING = 49

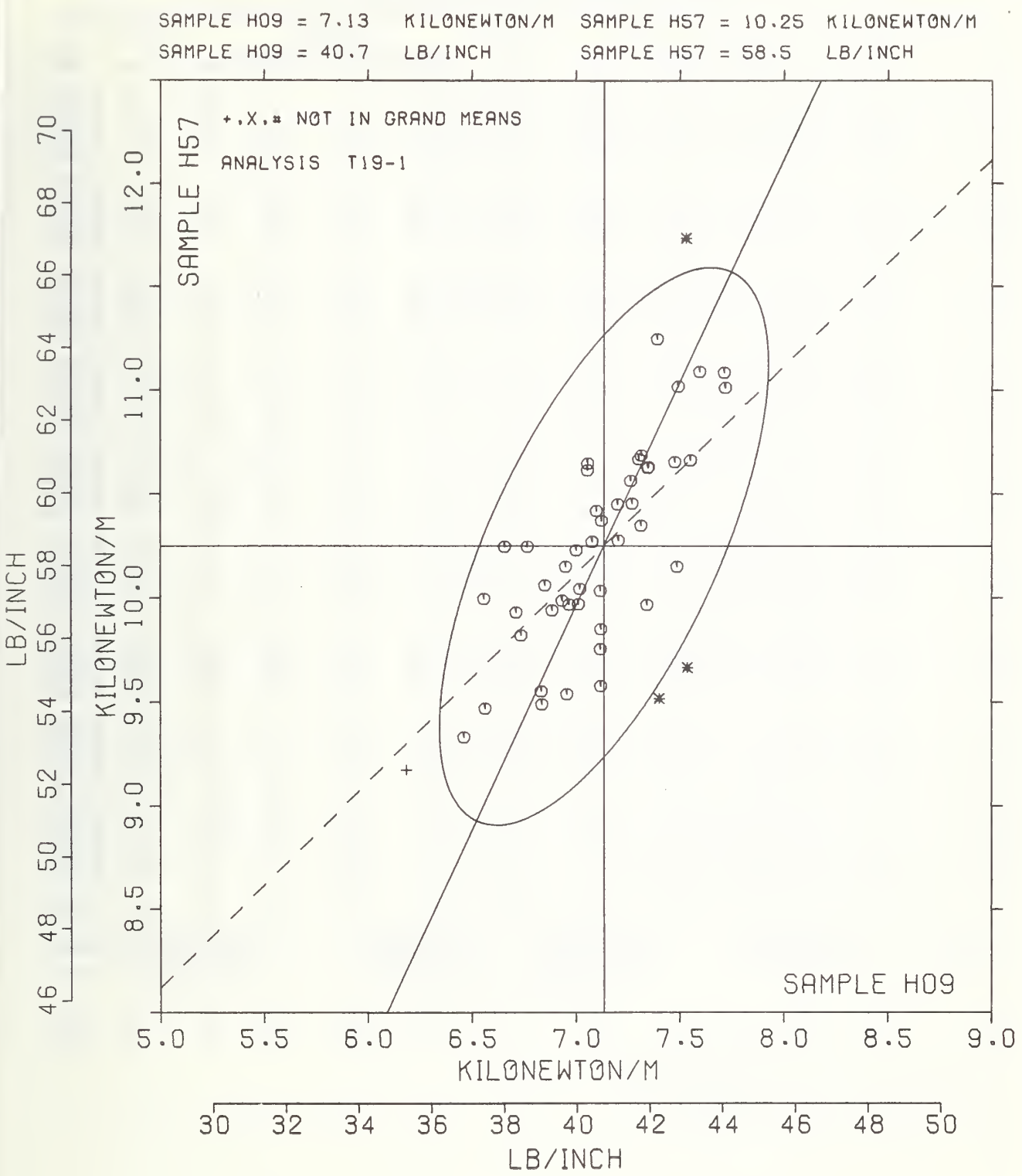
Best Values: H09 7.0 ± 0.5 kilonewton per meter
H57 10.1 ± 0.8 kilonewton per meter

ANALYSIS T19-1 TABLE 2

TENSILE BREAKING STRENGTH, KILONEWTONS PER METER - PACKAGING PAPER

TAPPI STANDARDS T404 OS-76 AND T494 OS-70, TENSILE BREAKING STRENGTH, PENDULUM AND CRE TYPES

LAB CODE	F	MEANS E09	E57	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L2501	*	6.18	9.17	-1.38	.41	.76	19L	TENSILE STRENGTH, PACKAGING PAPER, CRE, 20 C, 65% RH
L318	O	6.46	9.33	-1.12	.22	1.06	19G	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L267	O	6.56	10.00	-.47	.42	1.08	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L582	O	6.56	9.47	-.95	.19	1.10	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L264A	O	6.66	10.25	-.20	.43	1.41	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L122	O	6.71	9.93	-.47	.25	1.21	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L182I	O	6.74	9.82	-.56	.18	.91	19D	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L243	O	6.77	10.25	-.16	.33	.88	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L151	O	6.83	9.55	-.76	-.02	.69	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L1571	O	6.84	9.49	-.81	-.05	.95	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L336	O	6.85	10.06	-.29	.18	.99	19G	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L251	O	6.88	9.94	-.39	.10	1.22	19G	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L217P	O	6.93	9.99	-.32	.07	.71	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L182L	O	6.95	10.15	-.17	.12	.93	19T	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L280	O	6.96	9.54	-.72	-.14	.98	19G	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L575	O	6.97	9.97	-.32	.03	.92	19D	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L174	O	7.00	10.23	-.07	.11	.95	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L324	O	7.01	9.97	-.30	-.01	.86	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L217A	O	7.02	10.04	-.24	.02	.71	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L281	O	7.05	10.61	.30	.22	1.25	19G	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L157A	O	7.06	10.65	.33	.24	.83	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L224	O	7.08	10.27	-.00	.06	1.18	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L576	O	7.10	10.42	.14	.10	.98	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L265	O	7.12	10.03	-.20	-.08	1.12	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L274	O	7.12	9.75	-.46	-.19	.64	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L312	O	7.12	9.58	-.62	-.27	.95	19D	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L234L	O	7.12	9.85	-.37	-.16	.87	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L126	O	7.12	10.37	.11	.06	.93	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L305	O	7.20	10.45	.21	.02	.73	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L238A	O	7.20	10.27	.05	-.05	1.12	19T	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L257A	O	7.26	10.56	.34	.01	.72	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L225	O	7.27	10.45	.24	-.04	1.30	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L257C	O	7.30	10.67	.45	.02	.67	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L153	O	7.31	10.35	.17	-.12	1.06	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L580	O	7.31	10.68	.47	.02	.98	19G	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L392	O	7.34	9.97	-.17	-.31	1.25	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L257B	O	7.35	10.63	.43	-.04	.71	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L334	O	7.35	10.63	.43	-.04	1.20	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L237A	O	7.39	11.24	1.01	.18	1.26	19Q	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L565	*	7.40	9.52	-.55	-.55	.60	19T	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L568	O	7.48	10.65	.51	-.14	1.17	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L107	O	7.49	10.15	.06	-.36	1.15	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L264P	O	7.49	11.02	.85	-.00	.98	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L167	*	7.53	11.73	1.51	.26	1.36	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L562	*	7.54	9.66	-.36	-.61	1.09	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L356	O	7.55	10.66	.55	-.21	1.11	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L237B	O	7.59	11.09	.96	-.07	1.13	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L561	O	7.71	11.08	1.00	-.18	.93	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L581	O	7.72	11.01	.94	-.21	1.22	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
GMEANS:		7.13	10.25			1.00		
		95% ELLIPSE:		1.46	.55	WITH GAMMA = 65 DEGREES		


TENSILE STRENGTH, PACKAGING PAPERS
SAMPLE H09 = 7.13 KILONEWTON/M SAMPLE H57 = 10.25 KILONEWTON/M
SAMPLE H09 = 40.7 LB/INCH SAMPLE H57 = 58.5 LB/INCH
+,X,* NOT IN GRAND MEANS
ANALYSIS T19-1
SAMPLE H57
KILONEWTON/M
LB/INCH
SAMPLE H09
KILONEWTON/M
LB/INCH

ANALYSIS T20-1 TABLE 1

TENSILE BREAKING STRENGTH, KILONEWTONS PER METER

TAPPI STANDARD T494 OS-70, TENSILE BREAKING PROPERTIES OF PAPER & PAPERBOARD (CONSTANT RATE OF ELONGATION).

LAB CODE	SAMPLE H43 MEAN	PRINTING 91 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE J03 MEAN	PRINTING 72 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.= 20 VAR	F	LAB
L100	7.57	.26	.67	.20	.56	3.87	.17	.67	.09	.48	20E	O	L100
L115	6.94	-.38	-.98	.58	1.62	3.64	-.06	-.23	.11	.56	20D	O	L115
L122	7.29	-.02	-.05	.18	.50	3.68	-.02	-.07	.19	.99	20A	O	L122
L124C	6.61	-.71	-1.84	.52	1.44	2.78	-.91	-3.66	.15	.75	20A	X	L124C
L125	7.91	.60	1.56	.36	1.00	4.09	.39	1.56	.17	.89	20C	O	L125
L131	7.63	.31	.82	.26	.73	3.69	-.01	-.03	.35	1.80	20E	O	L131
L141T	6.75	-.56	-1.47	.22	.62	3.61	-.09	-.37	.08	.39	20A	O	L141T
L143	8.31	1.00	2.60	.57	1.59	4.39	.69	2.76	.17	.89	20E	*	L143
L148	7.46	.15	.39	.28	.79	3.94	.25	.99	.23	1.18	20A	O	L148
L159	6.67	-.64	-1.67	.45	1.26	3.46	-.24	-.96	.20	1.00	20A	O	L159
L163	7.74	.43	1.12	.23	.63	3.86	.16	.64	.16	.81	20D	O	L163
L176	7.02	-.30	-.78	.65	1.80	3.43	-.26	-1.06	.48	2.45	20E	O	L176
L185	7.44	.13	.34	.34	.95	3.78	.09	.35	.23	1.17	20C	O	L185
L190R	6.94	-.37	-.97	.26	.72	3.53	-.17	-.67	.13	.65	20A	O	L190R
L206	6.68	-.63	-1.64	.37	1.04	3.17	-.53	-2.13	.26	1.32	20A	O	L206
L223B	7.43	.11	.30	.32	.90	3.81	.11	.44	.17	.88	20A	O	L223B
L230	7.30	-.01	-.03	.25	.70	3.64	-.05	-.22	.14	.73	20O	O	L230
L243	7.42	.10	.27	.22	.62	3.73	.04	.14	.12	.52	20A	O	L243
L251	6.95	-.36	-.93	.72	2.01	3.40	-.30	-1.21	.41	2.11	20G	O	L251
L255	7.55	.24	.63	.32	.90	3.67	-.03	-.12	.22	1.11	20A	O	L255
L260	7.16	-.16	-.40	.37	1.02	3.82	.12	.48	.15	.75	20A	O	L260
L261	7.59	.27	.72	.31	.85	3.94	.24	.98	.21	1.09	20A	O	L261
L278	6.88	-.43	-1.13	.25	.70	3.30	-.40	-1.61	.20	1.03	20A	O	L278
L291	7.85	.54	1.41	.84	2.33	4.06	.37	1.47	.39	1.97	20A	O	L291
L309	6.44	-.88	-2.29	.20	.55	4.06	.36	1.45	.20	1.04	20E	X	L309
L315	7.38	.06	.16	.39	1.09	3.72	.02	.09	.15	.78	20A	O	L315
L318	6.88	-.43	-1.13	.21	.59	3.44	-.26	-1.04	.13	.65	20G	O	L318
L328	7.57	.26	.68	.22	.61	3.78	.08	.34	.14	.72	20A	O	L328
L331	5.79	-1.52	-3.96	.29	.82	3.64	-.05	-.21	.29	1.46	20A	X	L331
L333	7.46	.15	.39	.19	.54	3.72	.02	.08	.11	.57	20A	O	L333
L344	7.57	.26	.68	.38	1.04	3.64	-.06	-.24	.23	1.17	20A	O	L344
L360	NO DATA REPORTED FOR SAMPLE H43					3.58	-.12	-.48	.12	.61	20B	M	L360
L372	7.39	.08	.21	.24	.67	3.66	-.04	-.15	.12	.64	20A	O	L372
L378	7.44	.12	.32	.24	.67	3.76	.06	.26	.12	.62	20A	O	L378
L390	7.41	.09	.25	1.10	3.05	3.99	.29	1.17	.16	.81	20A	O	L390
L442	6.65	-.66	-1.73	.34	.95	3.03	-.67	-2.68	.19	.99	20G	*	L442
L531	7.35	.04	.10	.23	.63	3.83	.13	.51	.17	.85	20A	O	L531
L557	7.30	-.02	-.04	.29	.81	3.63	-.06	-.26	.16	.84	20A	O	L557
L558	10.58	3.26	8.51	1.72	4.78	5.79	2.09	8.38	.72	3.70	20C	#	L558
L559	13.07	5.76	15.01	.36	1.00	6.33	2.64	10.57	.23	1.18	20C	#	L559
L560	7.78	.47	1.22	.24	.66	3.76	.07	.27	.20	1.01	20C	O	L560
L561	7.02	-.29	-.76	.45	1.26	3.51	-.19	-.77	.31	1.56	20A	O	L561
L567	7.65	.34	.88	.19	.54	3.81	.11	.44	.17	.87	20A	O	L567
L575	7.08	-.23	-.60	.58	1.61	3.70	.01	.03	.18	.93	20D	O	L575
L587	NO DATA REPORTED FOR SAMPLE H43					3.92	.22	.90	.13	.67	20A	M	L587
L592	6.78	-.53	-1.39	.20	.56	3.73	.03	.11	.15	.78	20A	*	L592

GR. MEAN = 7.21 KILONEWTON/M GRAND MEAN = 3.70 KILONEWTON/M TEST DETERMINATIONS = 20
SD MEANS = .38 KILONEWTON/M SD OF MEANS = .25 KILONEWTON/M 39 LABS IN GRAND MEANS
AVERAGE SDR = .36 KILONEWTON/M AVERAGE SDR = .20 KILONEWTON/M
GR. MEAN =24.665 LB/15 MM GRAND MEAN =12.470 LB/15 MM

L139	7.01	-.30	-.79	.25	.70	3.74	.04	.17	.18	.90	20H	*	L139
L231	6.14	-1.17	-3.05	.52	1.44	3.08	-.62	-2.49	.24	1.25	20H	*	L231
L250I	6.80	-.52	-1.35	.20	.56	3.42	-.27	-1.10	.14	.74	20L	*	L250I

TOTAL NUMBER OF LABORATORIES REPORTING = 49

Best Values: H43 7.3 ± 0.6 kilonewton per meter
J03 3.7 ± 0.4 kilonewton per meter

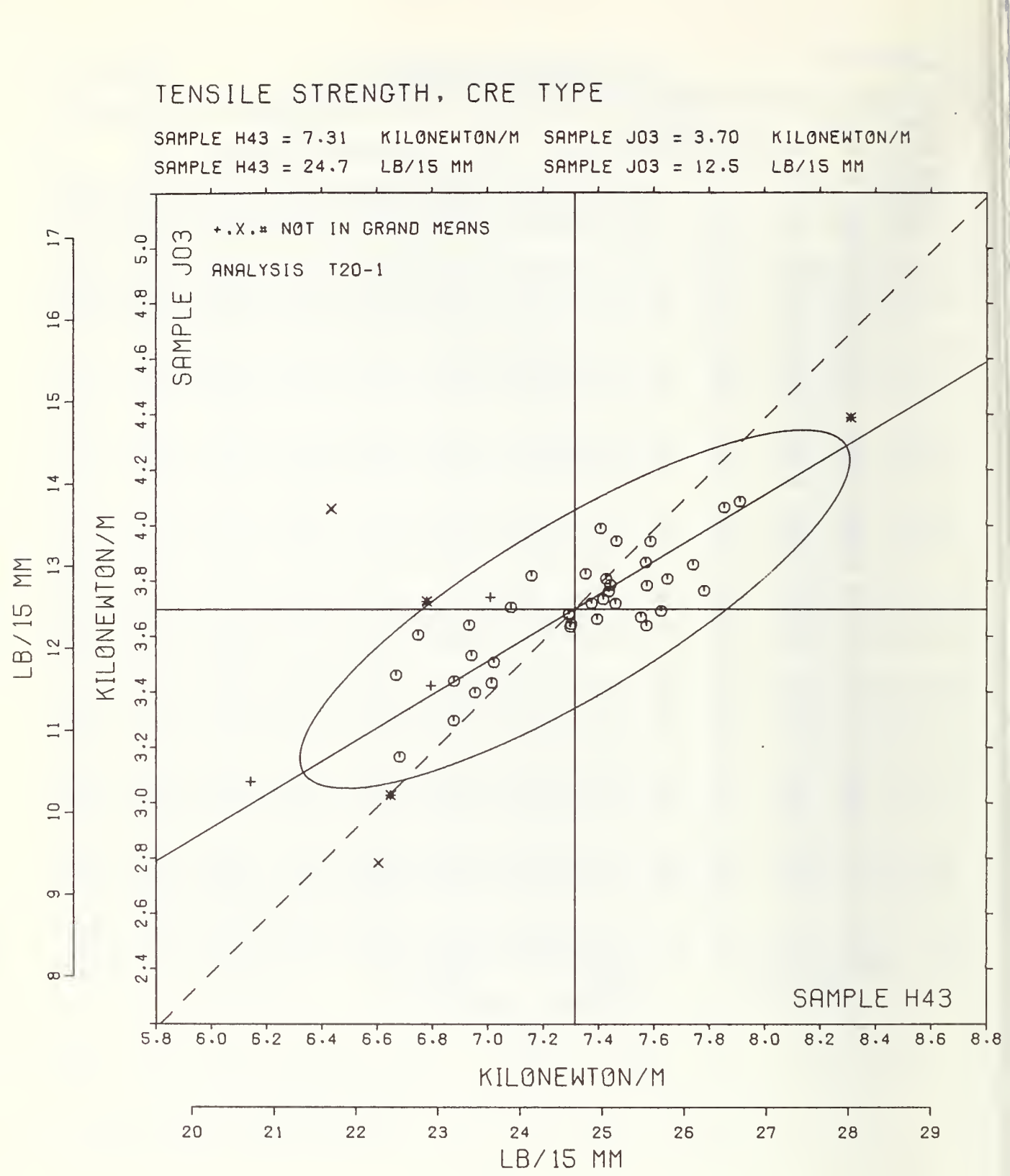
The following laboratories were omitted from the grand means because of extreme test results: 558, 559.

ANALYSIS T20-1 TABLE 2

TENSILE BREAKING STRENGTH, KILONEWTONS PER METER

TAPPI STANDARD T494 OS-70, TENSILE BREAKING PROPERTIES OF PAPER & PAPERBOARD (CONSTANT RATE OF ELONGATION)

LAB CODE	F	MEANS B43	MEANS J03	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L587	M		3.92			.67	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE
L360	M		3.58			.61	20H	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE
L331	X	5.79	3.64	-1.33	.74	1.14	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L231	*	6.14	3.08	-1.32	.07	1.34	20H	TENSILE STRENGTH, PRINTING PAPER, CRE, SHORT TEST SPAN
L309	X	6.44	4.06	-.57	.76	.79	20E	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L124C	X	6.61	2.78	-1.08	-.42	1.09	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L442	*	6.65	3.03	-.91	-.23	.97	20G	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L159	G	6.67	3.46	-.67	.13	1.13	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L206	G	6.68	3.17	-.81	-.13	1.18	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L141T	G	6.75	3.61	-.53	.21	.51	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L592	*	6.78	3.73	-.44	.30	.67	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L250I	*	6.80	3.42	-.58	.03	.65	20L	TENSILE STRENGTH, PRINTING PAPER, CRE, 20 C, 65% RH
L278	G	6.88	3.30	-.58	-.12	.86	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L318	G	6.88	3.44	-.50	.00	.62	20G	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L115	G	6.94	3.64	-.35	.15	1.09	20D	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L190R	G	6.94	3.53	-.40	.05	.69	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L251	G	6.95	3.40	-.46	-.07	2.06	20G	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L139	*	7.01	3.74	-.24	.19	.80	20H	TENSILE STRENGTH, PRINTING PAPER, CRE, SHORT TEST SPAN
L176	G	7.02	3.43	-.39	-.07	2.12	20E	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L561	G	7.02	3.51	-.35	-.01	1.41	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L575	G	7.08	3.70	-.19	.12	1.27	20D	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L260	G	7.16	3.82	-.07	.18	.89	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L122	G	7.29	3.68	-.03	-.00	.74	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L557	G	7.30	3.63	-.05	-.05	.82	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L230	G	7.30	3.64	-.04	-.04	.71	20G	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L531	G	7.35	3.83	.10	.09	.74	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L315	G	7.38	3.72	.06	-.01	.94	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L372	G	7.39	3.66	.05	-.07	.65	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L390	G	7.41	3.99	.23	.20	1.93	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L243	G	7.42	3.73	.11	-.02	.62	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L223B	G	7.43	3.81	.15	.04	.89	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L378	G	7.44	3.76	.14	-.01	.65	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L185	G	7.44	3.78	.16	.01	1.06	20C	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L333	G	7.46	3.72	.14	-.06	.55	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L148	G	7.46	3.94	.26	.13	.98	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L255	G	7.55	3.67	.19	-.15	1.01	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L100	G	7.57	3.87	.31	.01	.52	20E	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L344	G	7.57	3.64	.19	-.18	1.10	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L328	G	7.57	3.78	.27	-.06	.67	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L261	G	7.59	3.94	.36	.07	.97	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L131	G	7.63	3.69	.27	-.17	1.26	20E	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L567	G	7.65	3.81	.34	-.08	.70	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L163	G	7.74	3.86	.45	-.08	.72	20D	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L560	G	7.78	3.76	.44	-.18	.83	20C	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L291	G	7.85	4.06	.65	.04	2.15	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L125	G	7.91	4.09	.71	.03	.95	20C	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L143	*	8.31	4.39	1.21	.08	1.24	20E	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L558	#	10.58	5.79	3.88	.11	4.24	20C	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L559	#	13.07	6.33	6.30	-.70	1.09	20C	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
GMEANS:		7.31	3.70			1.00		
		95% ELLIPSE:		1.14	.31	WITH GAMMA = 30 DEGREES		


TENSILE STRENGTH, CRE TYPE
SAMPLE H43 = 7.31 KILONEWTON/M SAMPLE J03 = 3.70 KILONEWTON/M
SAMPLE H43 = 24.7 LB/15 MM SAMPLE J03 = 12.5 LB/15 MM
+.X.* NOT IN GRAND MEANS
ANALYSIS T20-1
SAMPLE J03
KILONEWTON/M
LB/15 MM
SAMPLE H43
KILONEWTON/M
LB/15 MM

ANALYSIS T20-2 TABLE 1

TENSILE BREAKING STRENGTH, KILONEWTONS PER METER

TAPPI STANDARD T404 OS-76, TENSILE BREAKING STRENGTH OF PAPER AND PAPERBOARD (PENDULUM-TYPE TESTER)

LAB CODE	SAMPLE H43 MEAN	PRINTING 91 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE J03 MEAN	PRINTING 72 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.* 20 VAR	F	LAB
L103	7.65	.54	.76	.28	.81	3.90	.17	.62	.18	.92	20R	O	L103
L108	5.89	-1.21	-1.72	.21	.60	3.57	-.16	-.58	.16	.81	20P	O	L108
L121	6.59	-.51	-.73	.22	.64	3.77	.04	.13	.11	.56	20P	O	L121
L124P	7.06	-.04	-.06	.32	.94	3.56	-.17	-.64	.25	1.28	20P	O	L124P
L128	7.46	.36	.50	.23	.68	3.75	.01	.05	.19	.94	20T	O	L128
L148	6.62	-.49	-.69	.54	1.58	3.71	-.02	-.09	.17	.87	20P	O	L148
L162	7.61	.50	.71	.26	.77	3.94	.20	.76	.17	.84	20T	O	L162
L182L	7.45	.35	.49	.23	.68	3.74	.01	.03	.19	.97	20T	O	L182L
L189	7.53	.42	.60	.28	.81	4.00	.27	1.00	.20	1.04	20R	O	L189
L191P	7.01	-.10	-.14	.31	.92	3.90	.16	.61	.16	.82	20P	O	L191P
L195	7.76	.65	.92	.41	1.20	3.96	.23	.85	.17	.86	20R	O	L195
L212	6.75	-.36	-.50	.44	1.31	3.42	-.31	-1.13	.13	.67	20R	O	L212
L213	7.40	.29	.41	.41	1.20	3.64	-.09	-.33	.27	1.39	20T	O	L213
L218	7.70	.60	.85	.20	.58	3.72	-.01	-.04	.23	1.16	20P	O	L218
L241	8.07	.97	1.37	.32	.94	4.25	.52	1.93	.21	1.07	20R	O	L241
L242	7.31	.20	.28	.20	.58	3.65	-.08	-.29	.11	.57	20Y	O	L242
L249	7.36	.25	.35	.25	.73	3.76	.03	.12	.18	.90	20P	O	L249
L254	7.26	.15	.21	.31	.91	3.67	-.06	-.23	.25	1.26	20P	O	L254
L259	8.22	1.11	1.57	.27	.79	4.12	.39	1.43	.26	1.32	20P	O	L259
L262	7.30	.19	.28	.27	.81	3.74	.01	.03	.17	.85	20R	O	L262
L274	7.07	-.03	-.05	.21	.60	3.52	-.22	-.80	.20	1.00	20P	O	L274
L275	6.42	-.69	-.97	.38	1.13	3.26	-.48	-1.76	.22	1.09	20R	O	L275
L279P	6.84	-.27	-.38	.62	1.84	3.84	.11	.41	.11	.57	20P	O	L279P
L285	5.15	-1.95	-2.76	.19	.56	2.94	-.79	-2.93	.45	2.29	20P	*	L285
L290	6.35	-.75	-1.07	.39	1.13	3.35	-.39	-1.42	.26	1.30	20P	O	L290
L311	6.13	-.97	-1.38	.24	.72	11.73	8.00	29.57	.40	2.04	20V	#	L311
L321	6.62	-.48	-.68	.56	1.64	3.60	-.13	-.49	.31	1.56	20V	O	L321
L322	3.97	-3.13	-4.44	.55	1.63	2.53	-1.20	-4.42	.33	1.70	20P	#	L322
L330	5.31	-1.80	-2.55	.39	1.15	3.40	-.33	-1.21	.42	2.16	20P	*	L330
L356	7.70	.59	.84	.27	.78	3.78	.05	.18	.21	1.06	20P	O	L356
L362	7.87	.76	1.08	.36	1.04	3.72	-.01	-.03	.19	.95	20R	O	L362
L370	7.57	.46	.65	.34	.99	4.17	.44	1.64	.15	.76	20P	O	L370
L376	7.67	.56	.79	.32	.94	3.97	.24	.89	.14	.72	20P	O	L376
L393	7.53	.43	.60	.31	.92	4.09	.36	1.34	.16	.82	20P	O	L393
L484	6.64	-.46	-.66	.26	.77	3.41	-.32	-1.20	.12	.63	20U	O	L484
L556	6.05	-1.06	-1.50	.68	1.99	3.65	-.08	-.30	.42	2.15	20P	O	L556
L571	7.38	.28	.39	.68	1.99	3.99	.26	.97	.33	1.67	20P	O	L571
L585	7.57	.47	.66	.16	.48	3.96	.23	.85	.13	.66	20V	O	L585
L599	7.19	.09	.12	.43	1.27	3.62	-.11	-.39	.19	.94	20V	O	L599

GR. MEAN = 7.11 KILONEWTON/M GRAND MEAN = 3.73 KILONEWTON/M TEST DETERMINATIONS = 20

SD MEANS = .71 KILONEWTON/M SD OF MEANS = .27 KILONEWTON/M 37 LABS IN GRAND MEANS

AVERAGE SDR = .34 KILONEWTON/M AVERAGE SDR = .20 KILONEWTON/M

GR. MEAN =23.969 LB/15 MM GRAND MEAN =12.585 LB/15 MM

TOTAL NUMBER OF LABORATORIES REPORTING = 39

Best Values: H43 7.2 $\pm$ 1.1 kilonewton per meter
J03 3.7 $\pm$ 0.4 kilonewton per meter

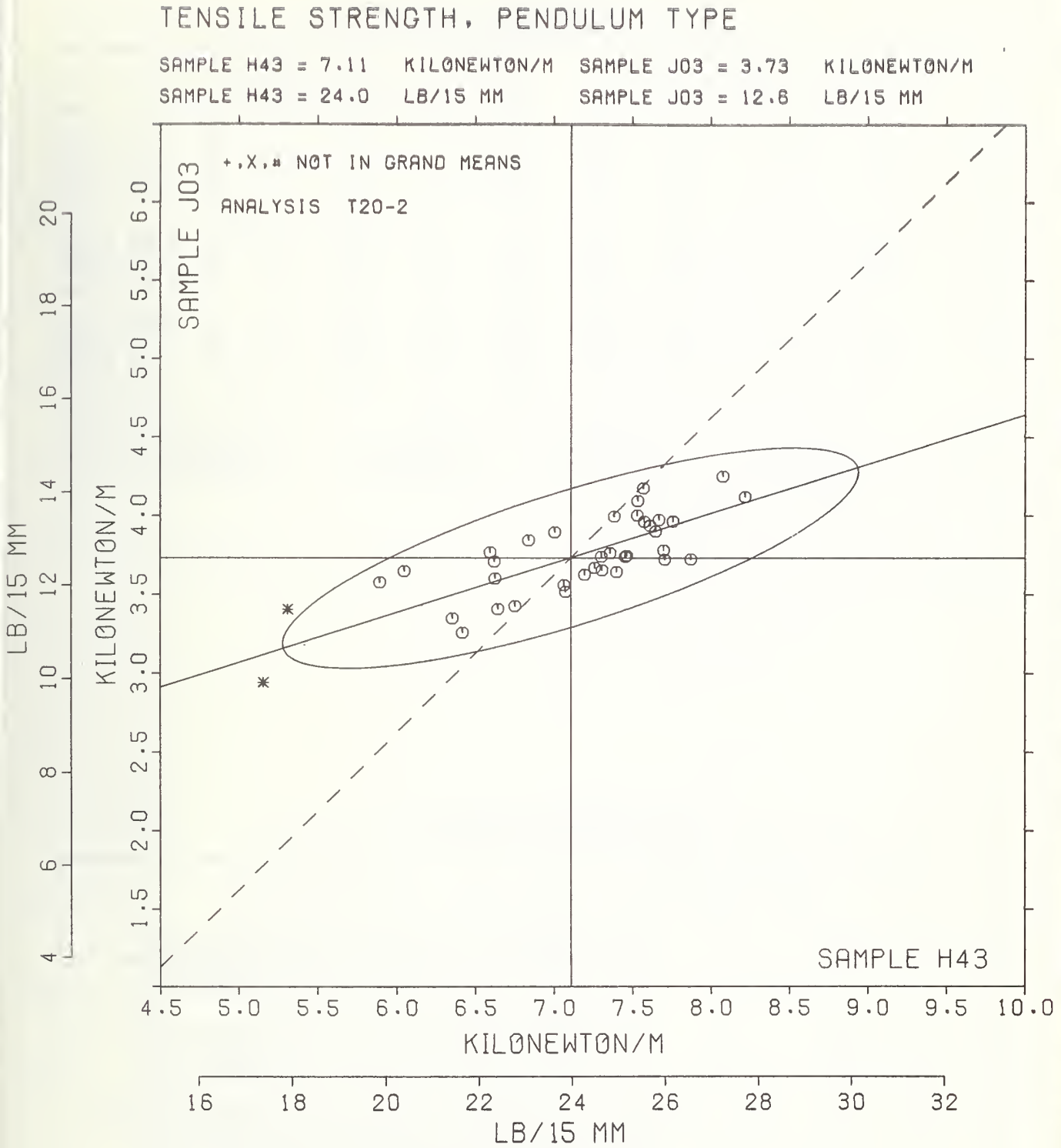
The following laboratories were omitted from the grand means because of extreme test results: 311, 322.

ANALYSIS T20-2 TABLE 2

TENSILE BREAKING STRENGTH, KILONEWTONS PER METER

TAPPI STANDARD T404 OS-76, TENSILE BREAKING STRENGTH OF PAPER AND PAPERBOARD (PENDULUM-TYPE TESTER)

LAB CODE	F	MEANS E43	MEANS J03	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L322	#	3.97	2.53	-3.35	-.20	1.66	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L285	*	5.15	2.94	-2.10	-.17	1.43	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L330	*	5.31	3.40	-1.81	.23	1.65	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L108	O	5.89	3.57	-1.20	.22	.71	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L556	O	6.05	3.65	-1.03	.24	2.07	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L311	#	6.13	11.73	1.48	7.92	1.38	20V	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L290	O	6.35	3.35	-.83	-.14	1.21	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L275	O	6.42	3.26	-.80	-.25	1.11	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L121	O	6.59	3.77	-.48	.19	.60	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L148	O	6.62	3.71	-.47	.12	1.23	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L321	O	6.62	3.60	-.50	.02	1.60	20V	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L484	O	6.64	3.41	-.54	-.17	.70	20U	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L212	O	6.75	3.42	-.43	-.19	.99	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L279P	O	6.84	3.84	-.22	.19	1.21	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L191P	O	7.01	3.90	-.05	.19	.87	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L124P	O	7.06	3.56	-.09	-.15	1.11	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L274	O	7.07	3.52	-.10	-.20	.80	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L599	O	7.19	3.62	.05	-.13	1.11	20V	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L254	O	7.26	3.67	.13	-.11	1.09	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L262	O	7.30	3.74	.19	-.05	.83	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L242	O	7.31	3.65	.17	-.13	.58	20Y	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L249	O	7.36	3.76	.25	-.05	.81	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L571	O	7.38	3.99	.34	.17	1.83	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L213	O	7.40	3.64	.25	-.17	1.29	20T	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L182L	O	7.45	3.74	.33	-.10	.82	20T	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L128	O	7.46	3.75	.34	-.09	.81	20T	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L189	O	7.53	4.00	.48	.13	.92	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L393	O	7.53	4.09	.52	.22	.87	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L370	O	7.57	4.17	.57	.28	.88	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L585	O	7.57	3.96	.51	.08	.57	20V	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L162	O	7.61	3.94	.54	.04	.80	20T	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L103	O	7.65	3.90	.57	-.00	.87	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L376	O	7.67	3.97	.61	.06	.83	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L356	O	7.70	3.78	.58	-.13	.92	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L218	O	7.70	3.72	.57	-.19	.87	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L195	O	7.76	3.96	.69	.03	1.03	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L362	O	7.87	3.72	.73	-.24	1.00	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L241	O	8.07	4.25	1.08	.21	1.01	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L259	O	8.22	4.12	1.17	.04	1.06	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
GMEANS:		7.11	3.73			1.00		
		95% ELLIPSE:		1.91	.42	WITH GAMMA = 17 DEGREES		


TENSILE STRENGTH, PENDULUM TYPE
SAMPLE H43 = 7.11 KILONEWTON/M SAMPLE J03 = 3.73 KILONEWTON/M
SAMPLE H43 = 24.0 LB/15 MM SAMPLE J03 = 12.6 LB/15 MM
+,X,* NOT IN GRAND MEANS
ANALYSIS T20-2
SAMPLE J03
KILONEWTON/M
LB/15 MM
SAMPLE H43
KILONEWTON/M
LB/15 MM

REPORT NO. 505 TAPPI COLLABORATIVE REFERENCE PROGRAM NOVEMBER 1977

ANALYSIS T25-1 TABLE 1

TENSILE ENERGY ABSORPTION, JOULES PER SQUARE METER - PACKAGING PAPER

TAPPI STANDARD T494 OS-70, TENSILE BREAKING PROPERTIES OF PAPER & PAPERBOARD (CONSTANT RATE OF ELONGATION)

LAB CODE	SAMPLE B09 KRAFT 147 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	SAMPLE B57 KRAFT 147 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	TEST D.* 20 VAR	F	LAB
L122	200.	8.	.78	39.	1.35	112.	6.	1.19	22.	1.56	25F	O	L122
L126	200.	9.	.81	40.	1.42	108.	2.	.36	13.	.92	25G	O	L126
L151	207.	15.	1.45	15.	.53	114.	8.	1.66	12.	.86	25F	O	L151
L174	203.	11.	1.02	27.	.95	108.	3.	.53	15.	1.03	25Y	O	L174
L182	201.	9.	.90	21.	.75	114.	8.	1.56	19.	1.33	25B	O	L182
L237B	179.	-13.	-1.21	25.	.86	106.	-0.	-.05	15.	1.06	25H	O	L237B
L243	189.	-3.	-.30	24.	.85	100.	-6.	-1.21	12.	.86	25Z	O	L243
L250	188.	-4.	-.35	23.	.82	105.	-1.	-.17	9.	.63	25A	O	L250
L264	180.	-12.	-1.13	40.	1.40	100.	-6.	-1.15	15.	1.04	25P	O	L264
L265	173.	-19.	-1.83	37.	1.31	121.	15.	2.93	16.	1.10	25E	#	L265
L267	177.	-15.	-1.45	34.	1.20	102.	-3.	-.65	12.	.85	25F	O	L267
L280	195.	3.	.31	29.	1.03	52.	-54.	-10.65	6.	.42	25B	#	L280
L312	238.	46.	4.38	25.	.88	143.	37.	7.31	27.	1.89	25J	#	L312
L318	194.	2.	.21	28.	1.00	100.	-5.	-1.07	11.	.80	25A	O	L318
L336	179.	-13.	-1.20	26.	.93	104.	-1.	-.27	17.	1.18	25A	O	L336
L580	197.	5.	.48	27.	.94	102.	-4.	-.74	12.	.86	25C	O	L580

GR. MEAN = 192. JOULES/SQ M — GRAND MEAN = 106. JOULES/SQ M — TEST DETERMINATIONS = 20

SD MEANS = 11. JOULES/SQ M — SD OF MEANS = 5. JOULES/SQ M — 13 LABS IN GRAND MEANS

AVERAGE SDR = 28. JOULES/SQ M — AVERAGE SDR = 14. JOULES/SQ M

GR. MEAN = 13.14 FT.LB/SQ FT — GRAND MEAN = 7.25 FT.LB/SQ FT

TOTAL NUMBER OF LABORATORIES REPORTING = 16

Best Values: H09 192 ± 14 joulea per square meter
H57 106 ± 7 joules per square meter

The following laboratories were omitted from the grand means because of extreme teat resulta: 265, 280, 312.

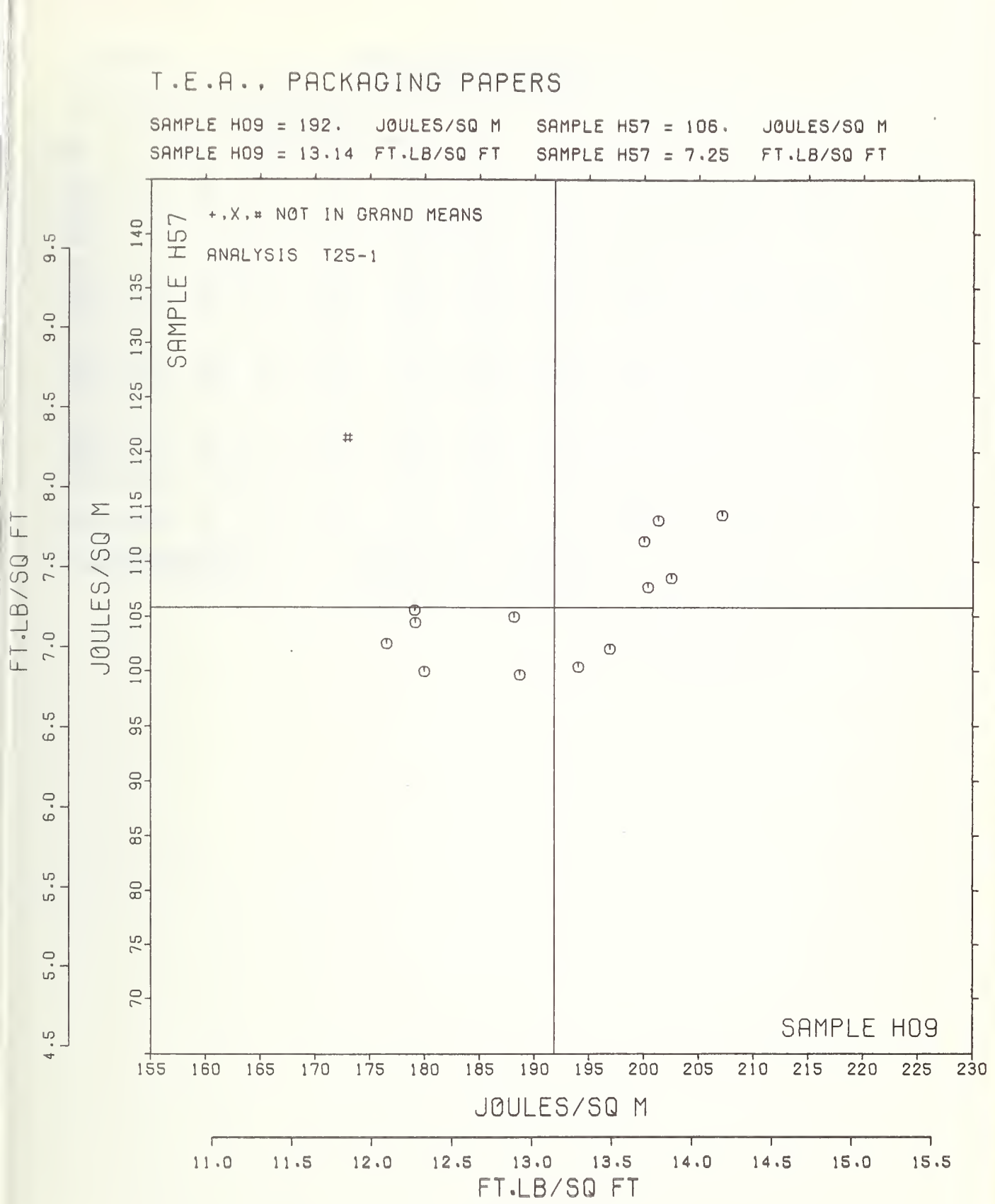
REPORT NO. 505 TAPPI COLLABORATIVE REFERENCE PROGRAM NOVEMBER 1977

ANALYSIS T25-1 TABLE 2

TENSILE ENERGY ABSORPTION, JOULES PER SQUARE METER - PACKAGING PAPER

TAPPI STANDARD T494 OS-70, TENSILE BREAKING PROPERTIES OF PAPER & PAPERBOARD (CONSTANT RATE OF ELONGATION)

LAB CODE	F	MEANS B09	B57	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L265	#	173.	121.	-13.	21.	1.20	25E	TENSILE ENERGY ABS.,PACKAGING PAPER,FLAT/FLAT JAWS
L267	O	177.	102.	-15.	2.	1.02	25F	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/FLAT JAWS
L237B	O	179.	106.	-12.	4.	.96	25H	TENSILE ENERGY ABS.,PACKAGING PAPER,2-PIN STRAIN GAGE
L336	O	179.	104.	-12.	3.	1.05	25A	TENSILE ENERGY ABS.,PACKAGING PAPER,FLAT/FLAT JAWS
L264	O	180.	100.	-13.	-1.	1.22	25F	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/FLAT JAWS
L250	O	188.	105.	-4.	0.	.72	25A	TENSILE ENERGY ABS.,PACKAGING PAPER,FLAT/FLAT JAWS
L243	O	189.	100.	-5.	-5.	.85	25Z	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/LINE JAWS
L318	O	194.	100.	0.	-6.	.90	25A	TENSILE ENERGY ABS.,PACKAGING PAPER,FLAT/FLAT JAWS
L280	#	195.	52.	-16.	-52.	.72	25B	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/FLAT JAWS
L580	O	197.	102.	3.	-5.	.90	25C	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/LINE JAWS
L122	O	200.	112.	10.	3.	1.46	25P	TENSILE ENERGY ABS.,PACKAGING PAPER,PATTERNED FLAT JAWS
L126	O	200.	108.	9.	-1.	1.17	25G	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/LINE JAWS
L182	O	201.	114.	12.	4.	1.04	25B	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/FLAT JAWS
L174	O	203.	108.	11.	-1.	.99	25Y	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/FLAT JAWS
L151	O	207.	114.	17.	3.	.70	25F	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/FLAT JAWS
L312	#	238.	143.	56.	19.	1.38	25J	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/FLAT JAWS
GMEANS:		192.	106.			1.00		
		95% ELLIPSE:		33.	11.	WITH GAMMA = 20 DEGREES		


T.E.A., PACKAGING PAPERS
SAMPLE H09 = 192. JOULES/SQ M
SAMPLE H09 = 13.14 FT.LB/SQ FT
SAMPLE H57 = 106. JOULES/SQ M
SAMPLE H57 = 7.25 FT.LB/SQ FT
+,X,# NOT IN GRAND MEANS
ANALYSIS T25-1
SAMPLE H57
SAMPLE H09
JOULES/SQ M
FT.LB/SQ FT

ANALYSIS T26-1 TABLE 1

TENSILE ENERGY ABSORPTION, JOULES PER SQUARE METER - PRINTING PAPER

TAPPI STANDARD T494 OS-70, TENSILE BREAKING PROPERTIES OF PAPER & PAPERBOARD (CONSTANT RATE OF ELONGATION)

LAB CODE	SAMPLE B43 91 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	SAMPLE J03 72 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	TEST D.= 20 VAR	F	LAB
L100	87.4	5.4	.35	4.4	.47	39.2	5.0	.81	1.5	.32	26A	O	L100
L115	81.0	-1.0	-.07	7.2	.76	36.8	2.7	.43	3.0	.66	26C	O	L115
L121	3.5	-78.5	-5.09	.4	.04	1.7	-32.5	-5.30	.2	.04	26D	#	L121
L122	98.5	16.5	1.07	7.0	.75	37.9	3.7	.60	5.5	1.21	26L	O	L122
L139	68.5	-13.5	-.88	9.9	1.05	33.5	-.7	-.11	4.3	.95	26B	O	L139
L159	69.3	-12.7	-.82	13.3	1.40	31.7	-2.5	-.40	5.0	1.09	26F	O	L159
L163	91.7	9.7	.63	9.2	.97	36.7	2.6	.42	4.0	.89	26J	O	L163
L185	83.4	1.4	.09	12.2	1.29	33.7	-.5	-.08	6.0	1.31	26C	O	L185
L206	69.0	-13.0	-.84	10.4	1.10	23.0	-11.2	-1.83	5.9	1.30	26Y	O	L206
L231	56.5	-25.6	-1.66	12.6	1.33	28.0	-6.2	-1.01	6.1	1.33	26E	O	L231
L250	95.7	13.7	.89	7.1	.75	39.1	5.0	.81	5.2	1.14	26A	O	L250
L255	103.7	21.7	1.41	11.5	1.22	38.6	4.4	.72	5.8	1.28	26P	O	L255
L309	78.0	-4.1	-.26	6.3	.67	43.5	9.3	1.52	5.0	1.09	26I	O	L309
L318	96.2	14.2	.92	8.0	.85	37.3	3.1	.51	4.3	.94	26A	O	L318
L372	74.4	-7.6	-.49	5.3	.56	27.4	-6.8	-1.11	3.0	.66	26Y	O	L372
L378	107.0	25.0	1.62	18.0	1.90	40.9	6.8	1.10	4.5	.99	26A	O	L378
L393	81.3	-.8	-.05	8.5	.90	33.9	-.3	-.05	4.4	.97	26V	O	L393
L442	68.5	-13.5	-.88	8.3	.88	19.7	-14.5	-2.36	3.5	.77	26B	O	L442
L567	98.2	16.2	1.05	8.1	.86	39.0	4.8	.79	4.7	1.04	26A	O	L567
L575	80.8	-1.2	-.08	16.5	1.74	34.8	.6	.10	5.6	1.23	26B	O	L575
L587	NO DATA REPORTED FOR SAMPLE B43					37.9	3.7	.60	4.5	.99	26C	M	L587
L592	51.2	-30.8	-2.00	5.3	.56	29.0	-5.2	-.84	3.7	.82	26G	O	L592

GR. MEAN = 82.0 JOULES/SQ M — GRAND MEAN = 34.2 JOULES/SQ M — TEST DETERMINATIONS = 20

SD MEANS = 15.4 JOULES/SQ M — SD OF MEANS = 6.1 JOULES/SQ M — 20 LABS IN GRAND MEANS

AVERAGE SDR = 9.4 JOULES/SQ M — AVERAGE SDR = 4.5 JOULES/SQ M

GR. MEAN = 5.619 FT.LB/SQ FT — GRAND MEAN = 2.342 FT.LB/SQ FT

TOTAL NUMBER OF LABORATORIES REPORTING = 22

Best Values: H43 83 $\pm$ 24 joules per square meter
J03 35 $\pm$ 8 joules per square meter

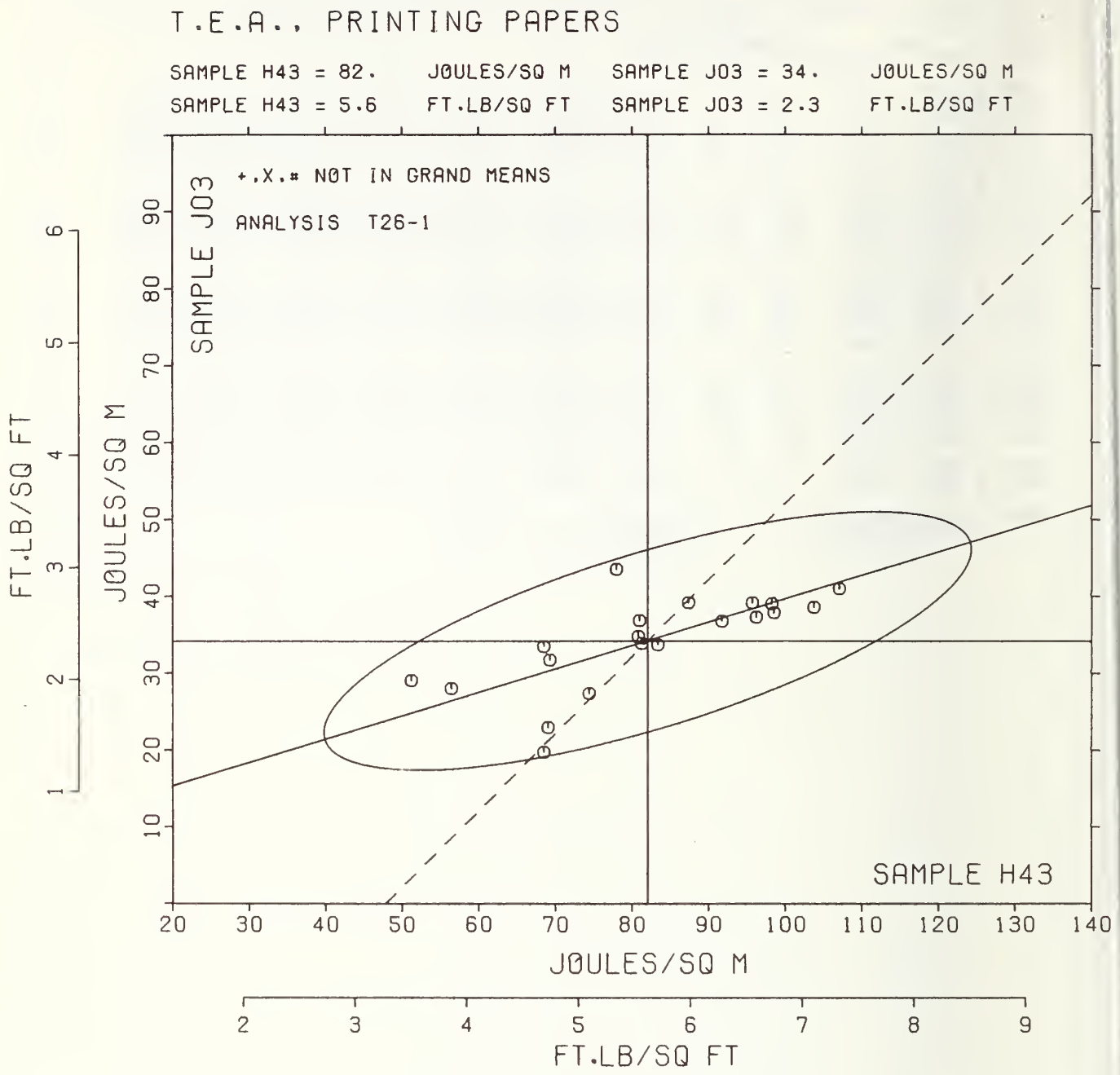
Data from the following laboratories appear to be off by a multiplicative factor: 121.

ANALYSIS T26-1 TABLE 2

TENSILE ENERGY ABSORPTION, JOULES PER SQUARE METER - PRINTING PAPER

TAPPI STANDARD T494 OS-70, TENSILE BREAKING PROPERTIES OF PAPER & PAPERBOARD (CONSTANT RATE OF ELONGATION).

LAB CODE	P	MEANS 843	MEANS J03	COORDINATES MAJOR	COORDINATES MINOR	AVG E.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L587	M		37.9			.99	26C	TENSILE ENERGY ABS.,PRINTING PAPERS,LINE/LINE JAWS
L121	#	3.5	1.7	-84.6	-8.2	.04	26D	TENSILE ENERGY ABS.,PRINTING PAPERS,2-PIN STRAIN GAGE
L592	O	51.2	29.0	-31.0	4.0	.69	26G	TENSILE ENERGY ABS.,PRINTING PAPERS,LINE/LINE JAWS
L231	O	56.5	28.0	-26.3	1.5	1.33	26E	TENSILE ENERGY ABS.,PRINTING PAPERS,PLAT/PLAT JAWS
L442	O	68.5	19.7	-17.1	-9.9	.82	26B	TENSILE ENERGY ABS.,PRINTING PAPERS,LINE/FLAT JAWS
L139	O	68.5	33.5	-13.1	3.3	1.00	26H	TENSILE ENERGY ABS.,PRINTING PAPERS,2-PIN STRAIN GAGE
L206	O	69.0	23.0	-15.7	-7.0	1.20	26Y	TENSILE ENERGY ABS.,PRINTING PAPERS,LINE/PLAT JAWS
L159	O	69.3	31.7	-12.9	1.4	1.25	26P	TENSILE ENERGY ABS.,PRINTING PAPERS,LINE/FLAT JAWS
L372	O	74.4	27.4	-9.3	-4.3	.61	26Y	TENSILE ENERGY ABS.,PRINTING PAPERS,LINE/PLAT JAWS
L309	O	78.0	43.5	-1.2	10.1	.88	26I	TENSILE ENERGY ABS.,PRINTING PAPERS,FLAT/FLAT JAWS
L575	O	80.8	34.8	-1.0	.9	1.49	26B	TENSILE ENERGY ABS.,PRINTING PAPERS,LINE/PLAT JAWS
L115	O	81.0	36.8	-.2	2.8	.71	26C	TENSILE ENERGY ABS.,PRINTING PAPERS,LINE/LINE JAWS
L393	O	81.3	33.9	-.8	-.1	.93	26V	TENSILE ENERGY ABS.,PRINTING PAPERS,LINE/FLAT JAWS
L185	O	83.4	33.7	1.2	-.9	1.30	26C	TENSILE ENERGY ABS.,PRINTING PAPERS,LINE/LINE JAWS
L100	O	87.4	39.2	6.6	3.2	.40	26A	TENSILE ENERGY ABS.,PRINTING PAPERS,PLAT/PLAT JAWS
L163	O	91.7	36.7	10.0	-.4	.93	26J	TENSILE ENERGY ABS.,PRINTING PAPERS,LINE/FLAT JAWS
L250	O	95.7	39.1	14.5	.8	.94	26A	TENSILE ENERGY ABS.,PRINTING PAPERS,PLAT/FLAT JAWS
L318	O	96.2	37.3	14.5	-1.2	.90	26A	TENSILE ENERGY ABS.,PRINTING PAPERS,PLAT/FLAT JAWS
L567	O	98.2	39.0	16.9	-.1	.95	26A	TENSILE ENERGY ABS.,PRINTING PAPERS,PLAT/PLAT JAWS
L122	O	98.5	37.9	16.8	-1.3	.98	26L	TENSILE ENERGY ABS.,PRINTING PAPERS,PATTERNED FLAT JAWS
L255	O	103.7	38.6	22.0	-2.1	1.25	26P	TENSILE ENERGY ABS.,PRINTING PAPERS,PATTERNED FLAT JAWS
L378	O	107.0	40.9	25.9	-.8	1.45	26A	TENSILE ENERGY ABS.,PRINTING PAPERS,FLAT/PLAT JAWS
GMEANS:		82.0	34.2			1.00		
		95% ELLIPSE:		44.0	11.4	WITH GAMMA = 16 DEGREES		


T.E.A., PRINTING PAPERS
SAMPLE H43 = 82. JOULES/SQ M
SAMPLE H43 = 5.6 FT.LB/SQ FT
SAMPLE J03 = 34. JOULES/SQ M
SAMPLE J03 = 2.3 FT.LB/SQ FT
+.X.* NOT IN GRAND MEANS
ANALYSIS T26-1
SAMPLE J03
SAMPLE H43
JOULES/SQ M
FT.LB/SQ FT

REPORT NO. 508 TAPPI COLLABORATIVE REFERENCE PROGRAM NOVEMBER 1977

ANALYSIS T28-1 TABLE 1

ELONGATION TO BREAK, PERCENT - PACKAGING PAPER

TAPPI STANDARD T494 OS-70, TENSILE BREAKING PROPERTIES OF PAPER & PAPERBOARD (CONSTANT RATE OF ELONGATION).

LAB CODE	SAMPLE H09 MEAN	KRAFT 147 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE B57 MEAN	KRAFT 147 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.* 20 VAR	F	LAB
L122	4.21	.03	.13	.54	1.19	1.76	.04	.34	.19	1.23	28P	@	L122
L126	4.03	-.15	-.60	.58	1.29	1.64	-.09	-.75	.14	.94	28C	@	L126
L151	4.54	.36	1.48	.30	.66	1.94	.22	1.90	.20	1.28	28B	@	L151
L182	4.11	-.07	-.28	.25	.56	1.62	-.10	-.85	.15	.95	28B	@	L182
L243	4.04	-.14	-.59	.33	.73	1.49	-.23	-2.05	.10	.64	28C	@	L243
L264	3.94	-.24	-.97	.74	1.64	1.76	.04	.38	.17	1.13	28B	@	L264
L265	3.87	-.31	-1.27	.58	1.28	1.66	-.06	-.51	.12	.87	28A	@	L265
L267	4.02	-.16	-.64	.52	1.15	1.78	.05	.47	.12	.75	28B	@	L267
L280	4.22	.04	.16	.47	1.03	.89	-.83	-7.24	.06	.39	28B	#	L280
L312	4.58	.40	1.64	.51	1.14	2.44	.72	6.26	.31	2.03	28B	#	L312
L318	4.71	.53	2.17	.27	.60	1.80	.07	.64	.13	.85	28A	@	L318
L324	4.06	-.12	-.49	.35	.78	1.65	-.07	-.63	.16	1.05	28P	@	L324
L336	4.37	.19	.79	.41	.91	1.74	.02	.16	.15	.97	28A	@	L336
L580	4.10	-.08	-.33	.43	.96	1.69	-.03	-.23	.16	1.03	28C	@	L580
L581	3.80	-.38	-1.56	.51	1.12	3.08	1.36	11.85	.90	5.90	28A	#	L581
L582	4.33	.15	.61	.57	1.27	1.85	.13	1.13	.20	1.30	28A	@	L582
GR. MEAN *	4.18 PERCENT					GRAND MEAN *	1.72 PERCENT				TEST DETERMINATIONS *		20
SD MEANS *	.24 PERCENT					SD OF MEANS *	.11 PERCENT				13 LABS IN GRAND MEANS		
	AVERAGE SDR *	.45 PERCENT					AVERAGE SDR *	.15 PERCENT					
L153	4.54	.36	1.50	.45	1.00	2.29	.57	5.00	.17	1.13	28Q	*	L153

TOTAL NUMBER OF LABORATORIES REPORTING * 17

Best Values: H09 4.2 ± 0.5 percent
H57 1.7 ± 0.2 percent

The following laboratories were omitted from the grand means because of extreme test results: 280, 312, 581.

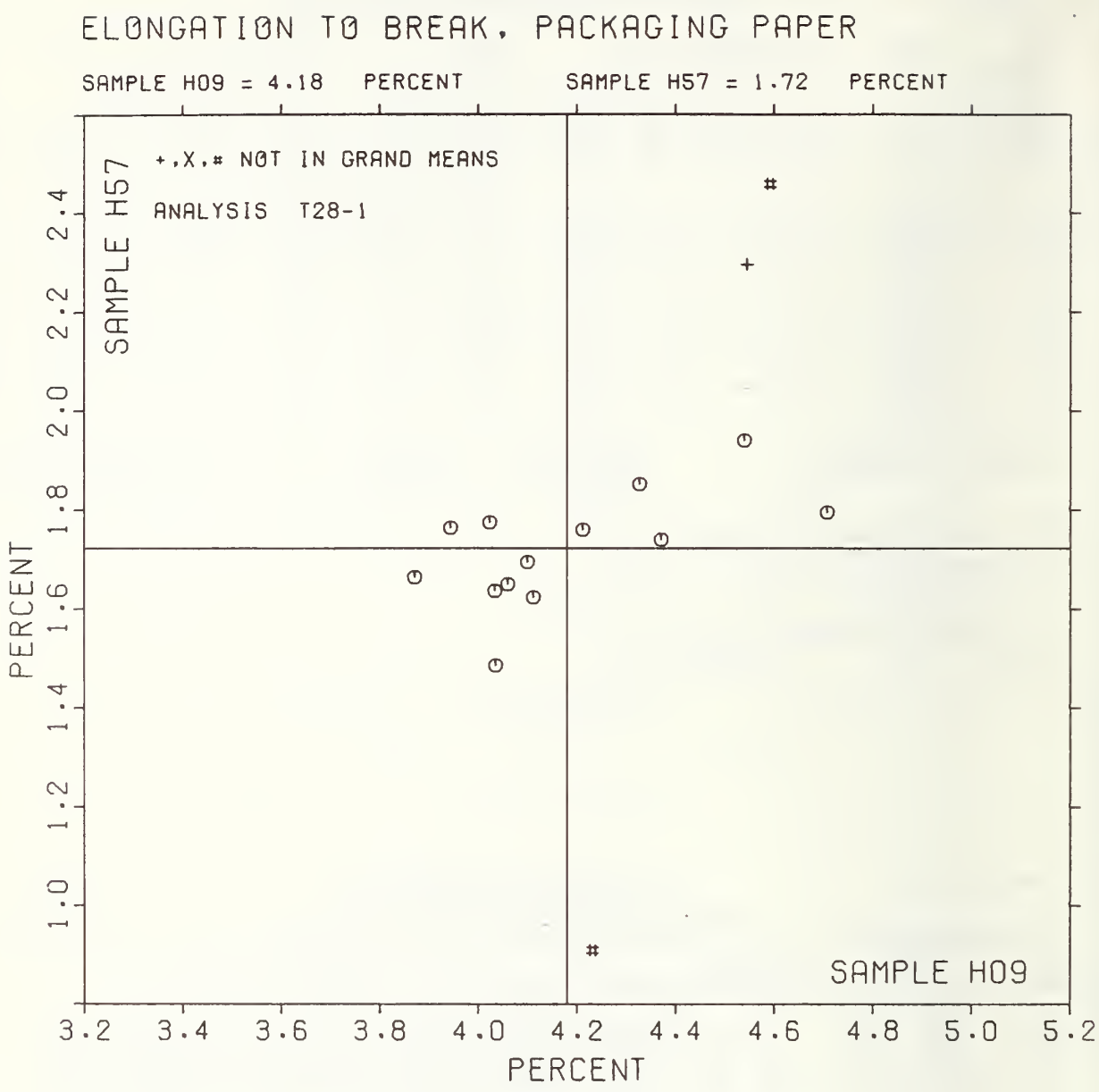
REPORT NO. 508 TAPPI COLLABORATIVE REFERENCE PROGRAM NOVEMBER 1977

ANALYSIS T28-1 TABLE 2

ELONGATION TO BREAK, PERCENT - PACKAGING PAPER

TAPPI STANDARD T494 OS-70, TENSILE BREAKING PROPERTIES OF PAPER & PAPERBOARD (CONSTANT RATE OF ELONGATION)

LAB CODE	F	MEANS B09	B57	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L581	#	3.80	3.08	.06	1.41	3.51	28A	ELONGATION,PACKAGING PAPER,LOAD CELL,FLAT/FLAT JAWS
L265	@	3.87	1.66	-.31	.04	1.08	28A	ELONGATION,PACKAGING PAPER,LOAD CELL,FLAT/FLAT JAWS
L264	@	3.94	1.76	-.21	.11	1.38	28B	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
L267	@	4.02	1.78	-.13	.10	.95	28B	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
L126	@	4.03	1.64	-.17	-.04	1.11	28C	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/LINE JAWS
L243	@	4.04	1.49	-.21	-.18	.68	28C	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/LINE JAWS
L324	@	4.06	1.65	-.14	-.03	.91	28P	ELONGATION,PACKAGING PAPER,LOAD CELL,PATTERNED FLAT JAWS
L580	@	4.10	1.69	-.08	-.00	.99	28C	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/LINE JAWS
L182	@	4.11	1.62	-.10	-.07	.75	28B	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
L122	@	4.21	1.76	.04	.03	1.21	28P	ELONGATION,PACKAGING PAPER,LOAD CELL,PATTERNED FLAT JAWS
L280	#	4.22	.89	-.22	-.80	.71	28B	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
L582	@	4.33	1.85	.18	.08	1.28	28A	ELONGATION,PACKAGING PAPER,LOAD CELL,FLAT/FLAT JAWS
L336	@	4.37	1.74	.19	-.04	.94	28A	ELONGATION,PACKAGING PAPER,LOAD CELL,FLAT/FLAT JAWS
L151	@	4.54	1.94	.41	.09	.97	28B	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
L153	*	4.54	2.29	.53	.43	1.07	28Q	ELONGATION,PACKAGING PAPER,PENDULUM, PATTERNED FLAT JAWS
L312	#	4.58	2.44	.60	.56	1.58	28B	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
L318	@	4.71	1.80	.52	-.10	.72	28A	ELONGATION,PACKAGING PAPER,LOAD CELL,FLAT/FLAT JAWS
GMEANS:		4.18	1.72			1.00		
		95% ELLIPSE:		.75	.26	WITH GAMMA * 18 DEGREES		


ELONGATION TO BREAK, PACKAGING PAPER
SAMPLE H09 = 4.18 PERCENT
SAMPLE H57 = 1.72 PERCENT
+,X,# NOT IN GRAND MEANS
ANALYSIS T28-1
SAMPLE H57
SAMPLE H09
PERCENT
PERCENT
1.0
1.2
1.4
1.6
1.8
2.0
2.2
2.4
3.2
3.4
3.6
3.8
4.0
4.2
4.4
4.6
4.8
5.0
5.2

ANALYSIS T29-1 TABLE 1

ELONGATION TO BREAK, PERCENT - PRINTING PAPER

TAPPI STANDARD T494 OS-70, TENSILE BREAKING PROPERTIES OF PAPER & PAPERBOARD (CONSTANT RATE OF ELONGATION)

LAB	SAMPLE H43 PRINTING 91 GRAMS PER SQUARE METER					SAMPLE J03 PRINTING 72 GRAMS PER SQUARE METER					TEST D.F. 20		
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
1100	1.760	.012	.03	.068	.48	1.570	.132	.48	.057	.43	29A	0	L100
L121	1.149	-.598	-1.65	.096	.68	1.045	-.392	-1.43	.070	.52	29D	0	L121
L122	2.090	.342	.94	.089	.63	1.590	.152	.56	.145	1.08	29P	0	L122
L141T	1.566	-.181	-.50	.152	1.08	1.401	-.037	-.13	.118	.87	29D	0	L141T
L176	2.235	.487	1.34	.362	2.57	1.555	.117	.43	.368	2.74	29B	E	L176
L185	1.805	.057	.16	.164	1.16	1.475	.037	.14	.148	1.10	29C	0	L185
L190R	1.988	.240	.66	.135	.96	1.601	.164	.60	.112	.84	29A	0	L190R
L231	1.850	.102	.28	.204	1.45	1.710	.272	.99	.186	1.38	29A	0	L231
L255	2.230	.483	1.33	.146	1.03	1.687	.249	.91	.156	1.16	29P	0	L255
L309	1.960	.212	.58	.118	.83	1.788	.350	1.28	.105	.78	29A	0	L309
L318	2.139	.391	1.08	.095	.67	1.711	.274	1.00	.128	.95	29A	0	L318
L344	1.750	.002	.01	.167	1.19	1.406	-.032	-.12	.167	1.24	29A	0	L344
L372	1.660	-.088	-.24	.088	.63	1.357	-.080	-.29	.088	.66	29B	0	L372
L378	2.020	.272	.75	.140	.99	1.645	.207	.76	.123	.92	29A	0	L378
L442	1.610	-.138	-.38	.117	.83	1.055	-.383	-1.40	.115	.85	29R	E	L442
L561	1.235	-.513	-1.41	.157	1.11	1.105	-.333	-1.22	.115	.85	29R	0	L561
L567	.937	-.810	-2.23	.064	.46	.756	-.682	-2.49	.076	.56	29A	0	L567
L575	1.800	.052	.14	.229	1.63	1.480	.042	.15	.158	1.17	29B	0	L575
L587	NO DATA REPORTED FOR SAMPLE H43					1.518	.081	.29	.117	.87	29C	M	L587
L592	1.423	-.324	-.89	.087	.62	1.380	-.058	-.21	.120	.89	29C	0	L592
GR. MEAN = 1.748 PERCENT						GRAND MEAN = 1.438 PERCENT					TEST DETERMINATIONS = 20		
SD MEANS = .363 PERCENT						SD OF MEANS = .274 PERCENT					19 LABS IN GRAND MEANS		
AVERAGE SDR = .141 PERCENT						AVERAGE SDR = .134 PERCENT							
L242	2.320	.572	1.57	.144	1.02	2.165	.727	2.66	.153	1.14	29R	*	L242
L484	1.914	.166	.46	.198	1.40	1.452	.015	.05	.204	1.52	29R	*	L484

TOTAL NUMBER OF LABORATORIES REPORTING = 22

Best Values: H43 1.8 ± 0.6 percent
J03 1.5 ± 0.4 percent

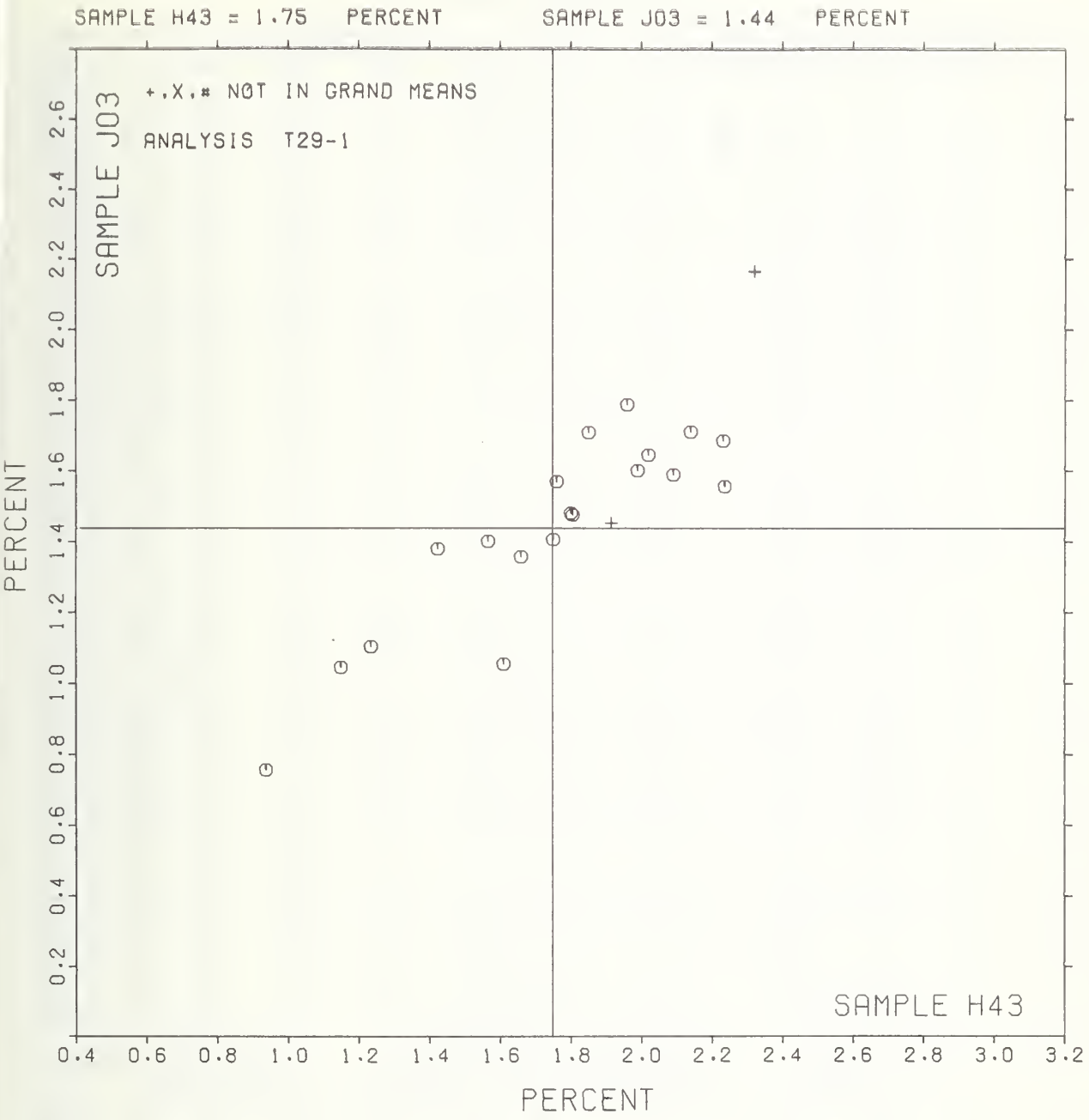
ANALYSIS T29-1 TABLE 2

ELONGATION TO BREAK, PERCENT - PRINTING PAPER

TAPPI STANDARD T494 OS-70, TENSILE BREAKING PROPERTIES OF PAPER & PAPERBOARD (CONSTANT RATE OF ELONGATION)

LAB CODE	F	MEANS H43	MEANS J03	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L587	M		1.518			.87	29C	ELONGATION,PRINTING PAPERS,LOAD CELL,LINE/LINE JAWS
L567	O	.937	.756	-1.056	-.075	.51	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L121	O	1.149	1.045	-.715	.034	.60	29D	ELONGATION,PRINTING PAPERS,LOAD CELL,2-PIN STRAIN GAGE
L561	O	1.235	1.105	-.611	.032	.98	29B	ELONGATION,PRINTING PAPERS,LOAD CELL,LINE/FLAT JAWS
L592	O	1.423	1.380	-.296	.144	.76	29C	ELONGATION,PRINTING PAPERS,LOAD CELL,LINE/LINE JAWS
L141T	O	1.566	1.401	-.168	.077	.98	29D	ELONGATION,PRINTING PAPERS,LOAD CELL,2-PIN STRAIN GAGE
L442	O	1.610	1.055	-.337	-.229	.84	29B	ELONGATION,PRINTING PAPERS,LOAD CELL,LINE/FLAT JAWS
L372	O	1.660	1.357	-.118	-.013	.64	29B	ELONGATION,PRINTING PAPERS,LOAD CELL,LINE/FLAT JAWS
L344	O	1.750	1.406	-.017	-.027	1.21	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L100	O	1.760	1.570	.088	.100	.45	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L575	O	1.800	1.480	.067	.003	1.40	29B	ELONGATION,PRINTING PAPERS,LOAD CELL,LINE/FLAT JAWS
L185	O	1.805	1.475	.068	-.004	1.13	29C	ELONGATION,PRINTING PAPERS,LOAD CELL,LINE/LINE JAWS
L231	O	1.850	1.710	.243	.160	1.42	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L484	*	1.914	1.452	.143	-.086	1.46	29R	ELONGATION,PRINTING PAPERS,PENDULUM, FLAT/FLAT JAWS
L309	O	1.960	1.788	.377	.158	.81	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L190R	O	1.988	1.601	.290	-.009	.90	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L378	O	2.020	1.645	.342	.008	.96	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L122	O	2.090	1.590	.366	-.078	.86	29P	ELONGATION,PRINTING PAPERS,LOAD CELL,PATTERNED FLAT JAWS
L318	O	2.138	1.711	.477	-.008	.81	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L255	O	2.230	1.687	.537	-.082	1.10	29P	ELONGATION,PRINTING PAPERS,LOAD CELL,PATTERNED FLAT JAWS
L176	O	2.235	1.555	.463	-.192	2.65	29B	ELONGATION,PRINTING PAPERS,LOAD CELL,LINE/FLAT JAWS
L242	*	2.320	2.165	.890	.252	1.08	29R	ELONGATION,PRINTING PAPERS,PENDULUM, FLAT/FLAT JAWS
GMEANS:		1.748	1.438			1.00		
		95% ELLIPSE:		1.221	.289	WITH GAMMA = 36 DEGREES		

ELONGATION TO BREAK, PRINTING PAPER



ANALYSIS T30-1 TABLE 1
FOLDING ENDURANCE (MIT), DOUBLE FOLDS
TAPPI STANDARD T511 SU-69

LAB CODE	SAMPLE H11 MEAN	PRINTING 89 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE H23 MEAN	PRINTING 91 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.- 15 VAR	F	LAB
L100M	128.	8.	.18	25.	.65	482.	81.	.55	91.	.86	30N	@	L100M
L100N	172.	52.	1.18	51.	1.31	639.	239.	1.63	166.	1.58	30N	@	L100N
L105	144.	24.	.54	28.	.72	373.	-28.	-.19	62.	.59	30N	@	L105
L121	133.	14.	.30	33.	.85	409.	8.	.05	59.	.56	30M	@	L121
L122	145.	25.	.57	74.	1.89	559.	158.	1.08	230.	2.18	30N	@	L122
L124	122.	2.	.05	48.	1.22	427.	26.	.18	90.	.86	30N	@	L124
L150	116.	-4.	-.08	27.	.70	350.	-51.	-.35	90.	.86	30N	@	L150
L158	49.	-71.	-1.60	21.	.52	112.	-289.	-1.97	40.	.38	30N	@	L158
L159	105.	-15.	-.33	26.	.65	464.	63.	.43	104.	.99	30N	@	L159
L162	133.	13.	.30	43.	1.09	424.	23.	.16	122.	1.15	30N	@	L162
L163	102.	-18.	-.40	52.	1.32	326.	-75.	-.51	115.	1.09	30N	@	L163
L176	170.	50.	1.13	67.	1.70	513.	112.	.76	109.	1.04	30N	@	L176
L182M	209.	90.	2.01	50.	1.29	627.	226.	1.54	127.	1.20	30M	@	L182M
L185	147.	27.	.60	69.	1.76	551.	150.	1.02	176.	1.67	30N	@	L185
L190C	253.	133.	3.00	99.	2.52	714.	313.	2.13	171.	1.62	30N	*	L190C
L212	120.	-0.	-.00	27.	.68	482.	81.	.56	78.	.74	30N	@	L212
L223F	123.	3.	.08	32.	.82	352.	-49.	-.33	65.	.61	30M	@	L223F
L230	75.	-44.	-.99	40.	1.02	221.	-180.	-1.23	120.	1.13	30N	@	L230
L232	170.	50.	1.13	47.	1.21	484.	84.	.57	167.	1.58	30N	@	L232
L236	102.	-18.	-.39	34.	.86	253.	-148.	-1.01	68.	.65	30N	@	L236
L238A	78.	-42.	-.95	40.	1.03	270.	-131.	-.89	126.	1.19	30N	@	L238A
L238B	69.	-51.	-1.14	28.	.72	314.	-87.	-.59	102.	.97	30D	@	L238B
L243	114.	-5.	-.12	43.	1.10	502.	101.	.69	117.	1.11	30D	@	L243
L254	86.	-34.	-.75	53.	1.36	298.	-103.	-.70	167.	1.58	30M	@	L254
L262	135.	15.	.33	36.	.91	413.	12.	.09	77.	.73	30N	@	L262
L274	102.	-17.	-.39	28.	.71	417.	16.	.11	102.	.96	30N	@	L274
L275	219.	99.	2.23	65.	1.67	637.	237.	1.61	80.	.76	30N	@	L275
L278	97.	-22.	-.50	27.	.70	148.	-253.	-1.73	39.	.37	30C	*	L278
L279	122.	2.	.05	30.	.76	594.	193.	1.32	76.	.72	30N	*	L279
L285A	117.	-3.	-.06	89.	2.27	450.	49.	.34	126.	1.19	30N	@	L285A
L285B	113.	-6.	-.14	52.	1.34	463.	62.	.42	189.	1.79	30N	@	L285B
L299	121.	1.	.03	58.	1.48	368.	-33.	-.23	119.	1.12	30N	@	L299
L321	244.	125.	2.80	100.	2.55	480.	79.	.54	144.	1.37	30M	X	L321
L326N	77.	-43.	-.97	32.	.82	201.	-200.	-1.36	56.	.53	30N	@	L326N
L339	25.	-95.	-2.13	11.	.28	114.	-287.	-1.96	40.	.38	30N	@	L339
L341	101.	-19.	-.42	26.	.66	363.	-38.	-.26	83.	.79	30C	@	L341
L366A	72.	-47.	-1.06	27.	.70	258.	-143.	-.97	45.	.43	30N	@	L366A
L376	66.	-54.	-1.21	28.	.72	283.	-118.	-.81	110.	1.05	30N	@	L376
L378	136.	16.	.37	27.	.70	481.	80.	.55	180.	1.70	30N	@	L378
L388	138.	18.	.40	36.	.93	470.	69.	.47	135.	1.28	30N	@	L388
L390	88.	-31.	-.70	31.	.80	284.	-117.	-.80	49.	.47	30N	@	L390
L396M	109.	-11.	-.24	28.	.71	351.	-50.	-.34	62.	.59	30N	@	L396M
L531	91.	-28.	-.64	26.	.66	266.	-135.	-.92	41.	.39	30N	@	L531
L565	144.	24.	.55	26.	.68	483.	82.	.56	143.	1.36	30N	@	L565
L567	191.	71.	1.60	45.	1.14	664.	263.	1.80	124.	1.18	30N	@	L567
L589	53.	-66.	-1.49	17.	.42	214.	-187.	-1.28	85.	.80	30N	@	L589
L599	123.	3.	.07	37.	.95	372.	-29.	-.20	99.	.94	30C	@	L599
GR. MEAN =	120. DOUBLE FOLDS			GRAND MEAN =		401. DOUBLE FOLDS			TEST DETERMINATIONS =		15		
SD MEANS =	45. DOUBLE FOLDS			SD OF MEANS =		147. DOUBLE FOLDS			46 LABS IN GRAND MEANS				
	AVERAGE SDR =		39. DOUBLE FOLDS			AVERAGE SDR =		105. DOUBLE FOLDS					
L143	89.	-30.	-.68	37.	.95	230.	-171.	-1.17	53.	.51	30T	*	L143
L182S	147.	28.	.62	53.	1.35	526.	125.	.85	121.	1.15	30S	*	L182S
L280	63.	-57.	-1.27	25.	.63	211.	-190.	-1.29	99.	.94	30K	*	L280
L326S	66.	-54.	-1.22	15.	.38	176.	-224.	-1.53	49.	.47	30S	*	L326S
L3668	158.	38.	.86	35.	.88	383.	-17.	-.12	59.	.56	30T	*	L3668
L396S	131.	12.	.26	63.	1.61	411.	10.	.07	158.	1.50	30T	*	L396S
L581	141.	21.	.47	32.	.81	389.	-12.	-.08	60.	.57	30T	*	L581

TOTAL NUMBER OF LABORATORIES REPORTING = 54

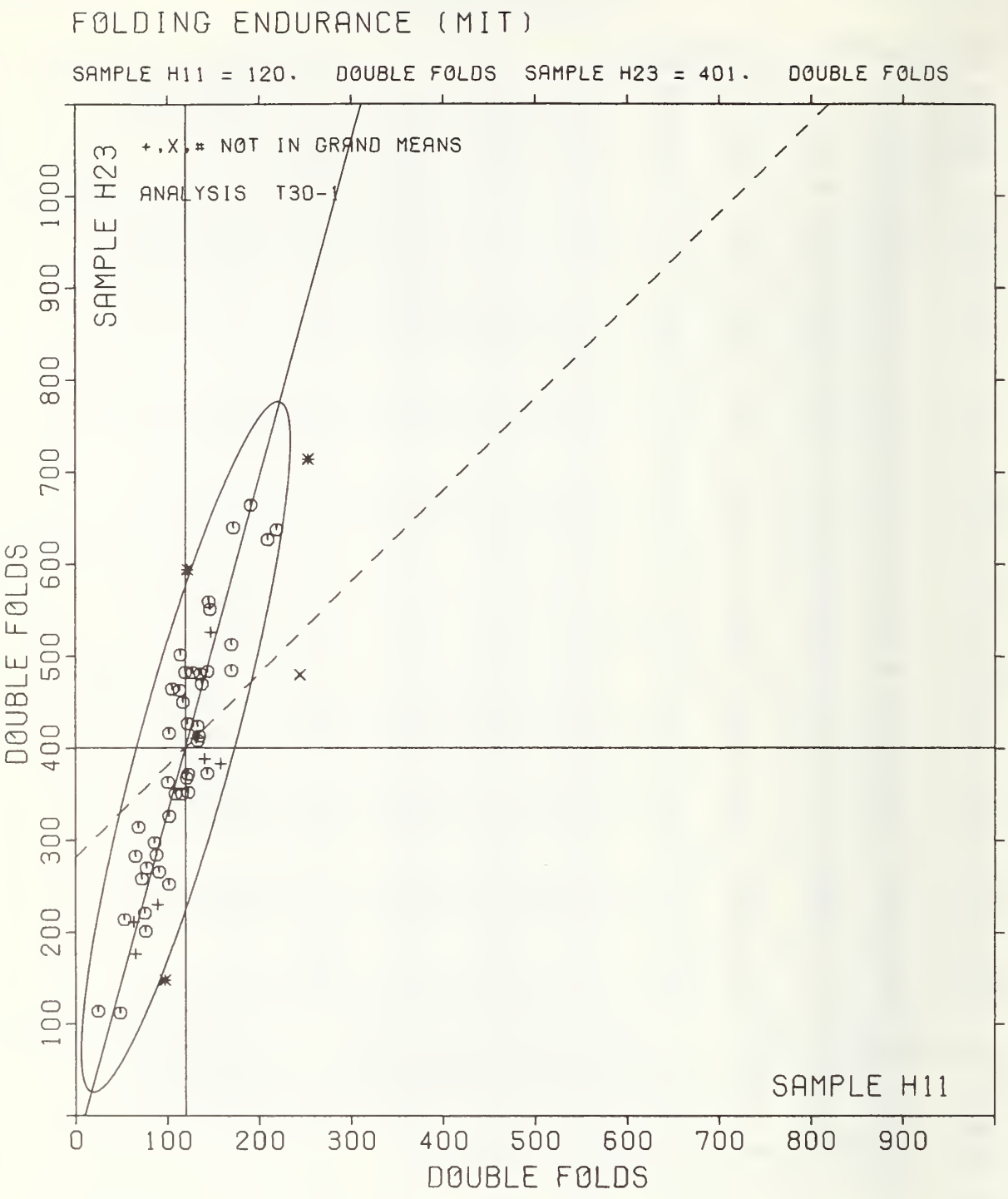
Best Values: H11 155 double folds
H23 560 double folds

The ISO (International Standards Organization) is proposing that MIT folding endurance be reported as the logarithm (to the base 10) of the double fold instead of the double fold as in the past.

Please see page 43 of this report for a demonstration of this proposal.

ANALYSIS T30-1 TABLE 2
FOLDING ENDURANCE (MIT), DOUBLE FOLDS
TAPPI STANDARD T511 SU-69

LAB CODE	F	MEANS H11	MEANS H23	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L339	O	25.	114.	-302.	16.	.33	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L158	O	49.	112.	-297.	-8.	.45	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L589	O	53.	214.	-198.	15.	.61	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L280	*	63.	211.	-198.	4.	.78	30E	FOLDING ENDURANCE, KOHLER-MOLIN
L326S	*	66.	176.	-231.	-7.	.42	30S	FOLDING ENDURANCE, SCHOPPER, LEIPZIG
L376	O	66.	283.	-128.	21.	.89	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L238B	O	69.	314.	-97.	26.	.84	30D	FOLDING ENDURANCE, MIT, MODIFIED DRIVE TO REDUCE HEATING
L366A	O	72.	258.	-150.	8.	.56	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L230	O	75.	221.	-185.	-5.	1.08	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L326N	O	77.	201.	-204.	-11.	.67	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L238A	O	78.	270.	-137.	6.	1.11	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L254	O	86.	298.	-108.	5.	1.47	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L390	O	88.	284.	-121.	-1.	.64	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L143	*	89.	230.	-173.	-16.	.73	30T	FOLDING ENDURANCE, SCHOPPER, TMI
L531	O	91.	266.	-138.	-8.	.52	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L278	*	97.	148.	-250.	-45.	.53	30C	FOLDING ENDURANCE, MIT, CIRCULATING FAN IN CEILING
L341	O	101.	363.	-42.	8.	.72	30C	FOLDING ENDURANCE, MIT, CIRCULATING FAN IN CEILING
L163	O	102.	326.	-77.	-3.	1.20	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L236	O	102.	253.	-148.	-22.	.75	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L274	O	102.	417.	11.	21.	.83	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L159	O	105.	464.	57.	31.	.82	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L396M	O	109.	351.	-51.	-3.	.65	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L285B	O	113.	463.	58.	22.	1.56	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L243	O	114.	502.	96.	32.	1.11	30D	FOLDING ENDURANCE, MIT, MODIFIED DRIVE TO REDUCE HEATING
L150	O	116.	350.	-50.	-10.	.78	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L285A	O	117.	450.	47.	15.	1.73	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L212	O	120.	482.	79.	22.	.71	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L299	O	121.	368.	-31.	-10.	1.30	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L124	O	122.	427.	26.	5.	1.04	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L279	*	122.	594.	187.	49.	.74	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L599	O	123.	372.	-27.	-11.	.95	30C	FOLDING ENDURANCE, MIT, CIRCULATING FAN IN CEILING
L223F	O	123.	352.	-46.	-16.	.72	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L100M	O	128.	482.	81.	14.	.76	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L396S	*	131.	411.	13.	-9.	1.56	30T	FOLDING ENDURANCE, SCHOPPER, TMI
L162	O	133.	424.	26.	-7.	1.12	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L121	O	133.	409.	11.	-11.	.71	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L262	O	135.	413.	16.	-11.	.82	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L378	O	136.	481.	82.	5.	1.20	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L388	O	138.	470.	71.	1.	1.10	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L581	*	141.	389.	-6.	-24.	.69	30T	FOLDING ENDURANCE, SCHOPPER, TMI
L105	O	144.	373.	-21.	-31.	.65	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L565	O	144.	483.	86.	-2.	1.02	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L122	O	145.	559.	159.	17.	2.03	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L185	O	147.	551.	152.	14.	1.72	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L182S	*	147.	526.	128.	6.	1.25	30S	FOLDING ENDURANCE, SCHOPPER, LEIPZIG
L366B	*	158.	383.	-7.	-42.	.72	30T	FOLDING ENDURANCE, SCHOPPER, TMI
L176	O	170.	513.	121.	-19.	1.37	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L232	O	170.	484.	94.	-26.	1.40	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L100N	O	172.	639.	244.	12.	1.44	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L567	O	191.	664.	273.	1.	1.16	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L182M	O	209.	627.	241.	-27.	1.24	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L275	O	219.	637.	254.	-33.	1.21	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L321	X	244.	480.	109.	-99.	1.96	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L190C	*	253.	714.	337.	-46.	2.07	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
GMEANS:		120.	401.			1.00		
		95% ELLIPSE:		389.	52.	WITH GAMMA = 74 DEGREES		


FOLDING ENDURANCE (MIT)
SAMPLE H11 = 120. DOUBLE FOLDS SAMPLE H23 = 401. DOUBLE FOLDS
+,X,* NOT IN GRAND MEANS
ANALYSIS T30-1
SAMPLE H23
DOUBLE FOLDS
100
200
300
400
500
600
700
800
900
1000
SAMPLE H11
0
100
200
300
400
500
600
700
800
900
DOUBLE FOLDS

ANALYSIS T30-2 TABLE 1
FOLDING ENDURANCE (MIT)
DATA IS LOG(BASE 10) OF THE DOUBLE FOLD MEASUREMENT

LAB CODE	SAMPLE B11 MEAN	PRINTING 89 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE B23 MEAN	PRINTING 91 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.F= 15 VAR	F	LAB
L100M	2.10	.05	.31	.09	.58	2.68	.09	.63	.08	.63	30M	6	L100M
L100N	2.22	.17	1.07	.13	.87	2.79	.21	1.43	.11	.90	30N	6	L100N
L105	2.15	.10	.64	.09	.56	2.57	-.02	-.13	.08	.60	30M	6	L105
L121	2.11	.06	.40	.11	.72	2.61	.02	.15	.06	.50	30M	6	L121
L122	2.09	.04	.25	.29	1.89	2.71	.13	.89	.18	1.40	30M	6	L122
L124	2.04	-.01	-.04	.22	1.43	2.62	.04	.25	.10	.76	30N	6	L124
L150	2.05	.00	.02	.10	.66	2.53	-.05	-.37	.11	.90	30M	6	L150
L158	1.65	-.40	-2.58	.20	1.28	2.02	-.56	-3.87	.16	1.28	30N	X	L158
L159	2.01	-.04	-.25	.10	.63	2.66	.07	.50	.10	.76	30N	6	L159
L162	2.10	.05	.32	.16	1.01	2.61	.02	.16	.14	1.12	30M	6	L162
L163	1.96	-.09	-.54	.20	1.27	2.49	-.10	-.66	.15	1.21	30N	6	L163
L176	2.20	.15	.96	.17	1.11	2.70	.12	.79	.10	.77	30N	6	L176
L182M	2.31	.26	1.65	.11	.73	2.79	.20	1.40	.09	.72	30M	6	L182M
L185	2.12	.07	.43	.22	1.42	2.72	.14	.94	.14	1.08	30N	6	L185
L190C	2.37	.32	2.07	.17	1.10	2.84	.26	1.76	.11	.86	30N	6	L190C
L212	2.07	.02	.12	.09	.61	2.68	.09	.64	.07	.57	30M	6	L212
L223F	2.08	.03	.17	.11	.73	2.54	-.05	-.32	.09	.73	30M	6	L223F
L230	1.82	-.23	-1.48	.24	1.55	2.29	-.29	-2.00	.21	1.68	30N	6	L230
L232	2.21	.16	1.05	.12	.80	2.66	.07	.51	.16	1.24	30N	6	L232
L236	1.99	-.06	-.39	.14	.89	2.39	-.20	-1.37	.13	1.05	30N	6	L236
L238A	1.84	-.21	-1.37	.23	1.46	2.39	-.20	-1.36	.20	1.61	30N	6	L238A
L238B	1.81	-.24	-1.56	.17	1.13	2.47	-.11	-.76	.15	1.19	30D	6	L238B
L243	2.03	-.02	-.10	.15	.94	2.69	.10	.72	.10	.83	30D	6	L243
L254	1.87	-.18	-1.18	.25	1.61	2.39	-.19	-1.32	.30	2.33	30M	6	L254
L262	2.11	.06	.40	.13	.84	2.61	.02	.17	.08	.67	30N	6	L262
L274	2.00	-.05	-.35	.12	.76	2.61	.02	.17	.09	.74	30N	6	L274
L275	2.32	.27	1.73	.15	.94	2.80	.22	1.49	.06	.44	30N	6	L275
L278	1.97	-.08	-.50	.13	.81	2.15	-.43	-2.97	.13	1.02	30C	X	L278
L279	2.07	.02	.16	.11	.68	2.77	.19	1.28	.06	.45	30N	6	L279
L285A	1.99	-.06	-.41	.26	1.70	2.63	.05	.34	.14	1.09	30N	6	L285A
L285B	2.01	-.04	-.26	.21	1.36	2.61	.03	.19	.26	2.07	30N	6	L285B
L299	2.02	-.03	-.18	.26	1.70	2.54	-.05	-.34	.18	1.46	30N	6	L299
L321	2.35	.30	1.94	.18	1.17	2.66	.08	.52	.14	1.12	30M	*	L321
L326N	1.84	-.21	-1.32	.20	1.27	2.29	-.30	-2.05	.13	1.03	30N	6	L326N
L339	1.35	-.70	-4.47	.22	1.39	2.03	-.56	-3.83	.17	1.32	30N	X	L339
L341	1.99	-.06	-.37	.11	.69	2.55	-.04	-.25	.11	.86	30C	6	L341
L366A	1.83	-.22	-1.40	.17	1.11	2.41	-.18	-1.23	.08	.59	30N	6	L366A
L376	1.77	-.28	-1.77	.21	1.35	2.42	-.17	-1.16	.19	1.53	30N	6	L376
L378	2.12	.08	.48	.10	.62	2.64	.05	.36	.23	1.85	30N	6	L378
L388	2.12	.07	.48	.12	.77	2.65	.07	.47	.14	1.10	30N	6	L388
L390	1.92	-.13	-.84	.16	1.04	2.45	-.14	-.94	.07	.56	30N	6	L390
L396M	2.02	-.03	-.16	.11	.71	2.54	-.05	-.32	.08	.65	30N	6	L396M
L531	1.94	-.11	-.68	.12	.80	2.42	-.16	-1.13	.07	.52	30N	6	L531
L565	2.15	.10	.65	.08	.54	2.67	.08	.56	.13	1.04	30N	6	L565
L567	2.27	.22	1.41	.10	.64	2.82	.23	1.58	.08	.65	30N	6	L567
L589	1.70	-.35	-2.22	.15	.99	2.30	-.28	-1.95	.16	1.30	30N	6	L589
L599	2.07	.02	.15	.12	.79	2.56	-.03	-.20	.12	.94	30C	6	L599
GR. MEAN =	2.05 LOG(10) FOLD				GRAND MEAN =	2.58 LOG(10) FOLD				TEST DETERMINATIONS = 15			
SD MEANS =	.16 LOG(10) FOLD				SD OF MEANS =	.15 LOG(10) FOLD				44 LABS IN GRAND MEANS			
	AVERAGE SDR =	.16 LOG(10) FOLD				AVERAGE SDR =	.13 LOG(10) FOLD						
L143	1.92	-.13	-.85	.18	1.14	2.35	-.24	-1.64	.13	1.00	30T	*	L143
L182S	2.14	.09	.61	.15	.96	2.71	.13	.86	.10	.79	30S	*	L182S
L280	1.76	-.29	-1.83	.20	1.27	2.27	-.32	-2.19	.25	1.99	30E	*	L280
L326S	1.81	-.24	-1.56	.10	.66	2.21	-.37	-2.55	.21	1.69	30S	*	L326S
L366B	2.19	.14	.89	.10	.67	2.58	-.01	-.04	.07	.56	30T	*	L366B
L396S	2.07	.02	.10	.23	1.49	2.58	-.01	-.04	.19	1.49	30T	*	L396S
L681	2.14	.09	.56	.11	.68	2.58	-.00	-.00	.07	.52	30T	*	L681

TOTAL NUMBER OF LABORATORIES REPORTING = 54

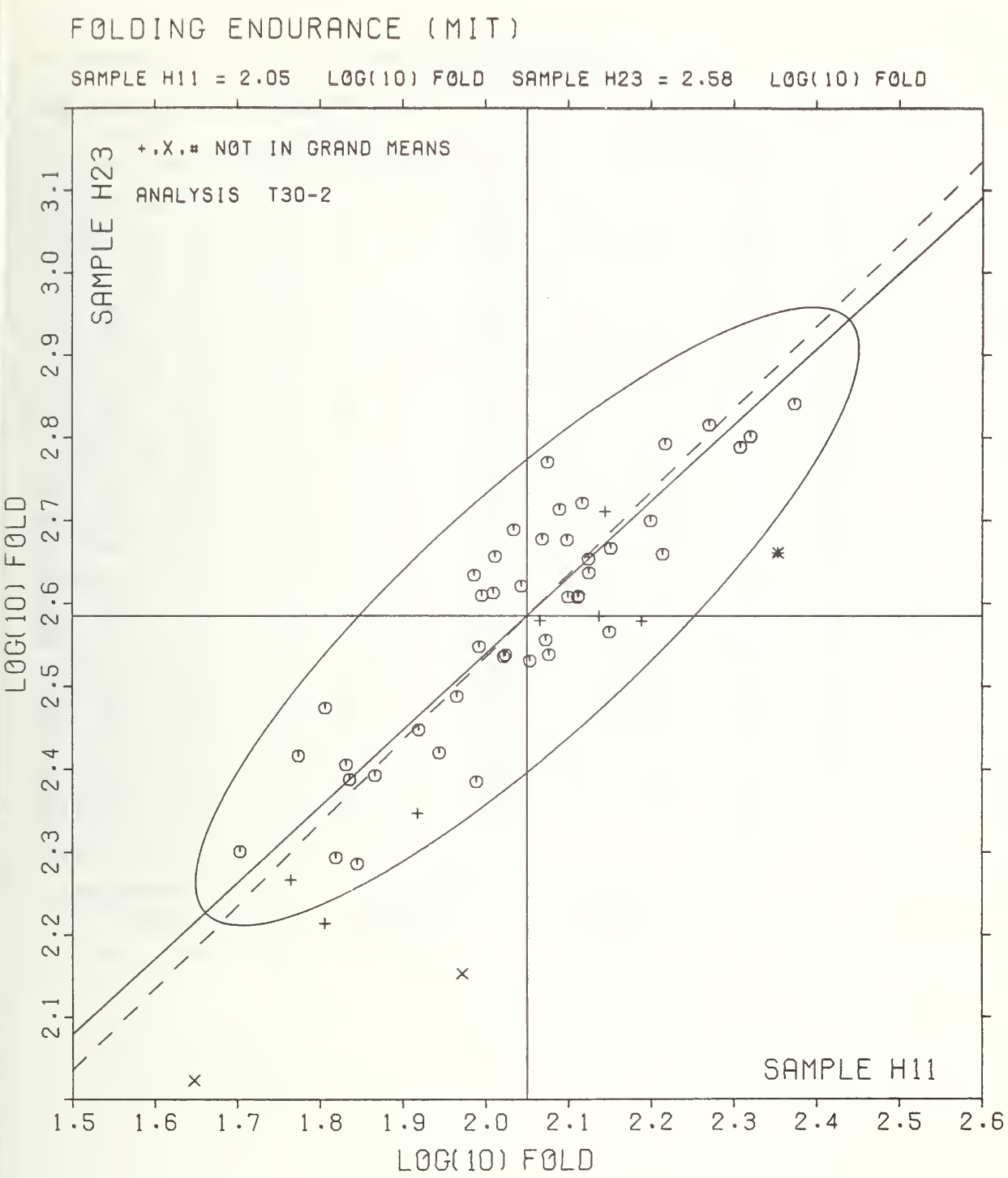
The ISO (International Standards Organization) is proposing that MIT folding endurance be reported as the logarithm (to the base 10) of the double fold instead of the double fold as in the past.

Analysis T30-1 in this report is the same as in the past with no changes. This analysis, T30-2, shows the data as the ISO proposes. This analysis uses the raw data reported for T30-1. The raw data are converted to the logarithm (base 10) as shown in the example to the right, and then the mean of the converted data is calculated and reported as ISO folding endurance.

Raw data (Folding number in double folds)	log (base 10) of raw data
207	2.32
166	2.22
151	2.18
332	2.52
260	2.41
137	2.14
199	2.30
230	2.36
210	2.32
mean of raw data	mean of logs "Folding endurance"

ANALYSIS T30-2 TABLE 2
FOLDING ENDURANCE (MIT)
DATA IS LOG(BASE 10) OF THE DOUBLE FOLD MEASUREMENT

LAB CODE	F	MEANS H11	MEANS H23	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L339	X	1.35	2.03	-.89	.06	1.35	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L158	X	1.65	2.02	-.68	-.14	1.28	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L589	O	1.70	2.30	-.45	.03	1.15	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L280	*	1.76	2.27	-.43	-.04	1.63	30K	FOLDING ENDURANCE, KOHLER-MOLIN
L376	O	1.77	2.42	-.32	.06	1.44	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L326S	*	1.81	2.21	-.43	-.11	1.18	30S	FOLDING ENDURANCE, SCHOPPER, LEIPZIG
L238B	O	1.81	2.47	-.25	.08	1.16	30D	FOLDING ENDURANCE, MIT, MODIFIED DRIVE TO REDUCE HEATING
L230	O	1.82	2.29	-.37	-.06	1.61	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L366A	O	1.83	2.41	-.28	.02	.85	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L238A	O	1.84	2.39	-.29	-.00	1.54	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L326N	O	1.84	2.29	-.35	-.08	1.15	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L254	O	1.87	2.35	-.27	-.02	1.57	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L143	*	1.92	2.35	-.26	-.09	1.07	30T	FOLDING ENDURANCE, SCHOPPER, TMI
L390	O	1.92	2.45	-.19	-.01	.80	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L531	O	1.94	2.42	-.19	-.05	.66	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L163	O	1.96	2.49	-.13	-.01	1.24	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L278	X	1.97	2.15	-.35	-.26	.91	30C	FOLDING ENDURANCE, MIT, CIRCULATING FAN IN CEILING
L285A	O	1.99	2.63	-.01	.08	1.40	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L236	O	1.99	2.39	-.18	-.11	.97	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L341	O	1.99	2.55	-.07	.01	.78	30C	FOLDING ENDURANCE, MIT, CIRCULATING FAN IN CEILING
L274	O	2.00	2.61	-.02	.05	.75	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L285B	O	2.01	2.61	-.01	.05	1.72	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L159	O	2.01	2.66	.02	.08	.70	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L299	O	2.02	2.54	-.05	-.02	1.58	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L396M	O	2.02	2.54	-.05	-.02	.68	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L243	O	2.03	2.69	.06	.09	.88	30D	FOLDING ENDURANCE, MIT, MODIFIED DRIVE TO REDUCE HEATING
L124	O	2.04	2.62	.02	.03	1.09	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L150	O	2.05	2.53	-.03	-.04	.78	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L356S	*	2.07	2.58	.01	-.01	1.49	30T	FOLDING ENDURANCE, SCHOPPER, TMI
L212	O	2.07	2.68	.08	.06	.59	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L599	O	2.07	2.56	-.00	-.04	.86	30C	FOLDING ENDURANCE, MIT, CIRCULATING FAN IN CEILING
L279	O	2.07	2.77	.14	.12	.57	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L223F	O	2.08	2.54	-.01	-.05	.73	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L122	O	2.09	2.71	.12	.07	1.65	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L100M	O	2.10	2.68	.10	.03	.60	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L162	O	2.10	2.61	.05	-.02	1.07	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L121	O	2.11	2.61	.06	-.03	.61	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L262	O	2.11	2.61	.06	-.02	.76	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L185	O	2.12	2.72	.14	.05	1.25	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L388	O	2.12	2.65	.10	-.00	.93	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L378	O	2.12	2.64	.09	-.01	1.23	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L581	*	2.14	2.58	.06	-.06	.60	30T	FOLDING ENDURANCE, SCHOPPER, TMI
L182S	*	2.14	2.71	.15	.03	.88	30S	FOLDING ENDURANCE, SCHOPPER, LEIPZIG
L105	O	2.15	2.57	.06	-.08	.58	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L565	O	2.15	2.67	.13	-.01	.79	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L366B	*	2.19	2.58	.10	-.10	.61	30T	FOLDING ENDURANCE, SCHOPPER, TMI
L176	O	2.20	2.70	.19	-.02	.94	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L232	O	2.21	2.66	.17	-.06	1.02	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L100N	O	2.22	2.79	.26	.04	.89	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L567	O	2.27	2.82	.32	.02	.65	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L182M	O	2.31	2.79	.33	-.02	.73	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L275	O	2.32	2.80	.35	-.02	.69	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L321	*	2.35	2.66	.27	-.15	1.15	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L190C	O	2.37	2.84	.41	-.03	.98	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
GMEANS:		2.05	2.58			1.00		
		95% ELLIPSE:		.53	.14	WITH GAMMA = 42 DEGREES		


FOLDING ENDURANCE (MIT)
SAMPLE H11 = 2.05 LOG(10) FOLD SAMPLE H23 = 2.58 LOG(10) FOLD
+,X,* NOT IN GRAND MEANS
ANALYSIS T30-2
SAMPLE H23
LOG(10) FOLD
SAMPLE H11
LOG(10) FOLD
1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3 2.4 2.5 2.6
2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 3.0 3.1

ANALYSIS T35-1 TABLE 1

GURLEY STIFFNESS

RESULTS EXPRESSED IN STANDARD GURLEY UNITS: MILLIGRAMS FOR A 1X3 INCH SPECIMEN (ACTUAL LENGTH 3.5 INCHES)

LAB CODE	SAMPLE H66 MEAN	PRINTING 84 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE H70 MEAN	PRINTING 102 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.= 10 VAR	F	LAB
L100	504.	39.	1.67	18.	.62	238.	-11.	-.76	4.	.36	35G	ó	L100
L121	476.	11.	.49	37.	1.29	274.	25.	1.63	27.	2.21	35G	ó	L121
L122	467.	3.	.12	34.	1.17	249.	-0.	-.02	12.	1.01	35G	ó	L122
L132	464.	-1.	-.02	29.	1.00	237.	-12.	-.81	9.	.78	35G	ó	L132
L139	455.	-10.	-.40	12.	.40	258.	9.	.61	11.	.90	35G	ó	L139
L148	448.	-17.	-.70	29.	1.00	253.	4.	.28	11.	.95	35G	ó	L148
L153	475.	11.	.45	40.	1.36	248.	-2.	-.11	13.	1.07	35G	ó	L153
L159	441.	-24.	-1.00	29.	1.01	235.	-14.	-.95	6.	.53	35G	ó	L159
L162	438.	-26.	-1.10	21.	.72	225.	-24.	-1.58	14.	1.14	35G	ó	L162
L163	430.	-35.	-1.46	24.	.84	241.	-8.	-.51	16.	1.32	35G	ó	L163
L183	478.	13.	.57	28.	.96	270.	20.	1.35	19.	1.55	35G	ó	L183
L190C	467.	2.	.09	9.	.30	269.	19.	1.27	17.	1.41	35G	ó	L190C
L195	485.	20.	.85	41.	1.40	268.	19.	1.24	7.	.55	35G	ó	L195
L212	482.	18.	.74	25.	.86	277.	28.	1.81	19.	1.53	35G	ó	L212
L223	440.	-25.	-1.05	25.	.85	242.	-7.	-.46	13.	1.10	35G	ó	L223
L224	501.	37.	1.56	29.	1.00	265.	16.	1.04	15.	1.28	35G	ó	L224
L232	446.	-18.	-.78	42.	1.45	302.	53.	3.48	31.	2.55	35G	X	L232
L236	464.	-0.	-.02	41.	1.42	244.	-5.	-.33	8.	.65	35G	ó	L236
L241	459.	-5.	-.21	44.	1.52	246.	-4.	-.24	16.	1.28	35G	ó	L241
L249	444.	-21.	-.87	29.	1.01	243.	-6.	-.41	9.	.73	35G	ó	L249
L254	426.	-38.	-1.62	20.	.70	213.	-36.	-2.38	12.	1.03	35G	ó	L254
L260	466.	1.	.06	12.	.40	259.	10.	.65	6.	.46	35G	ó	L260
L285	290.	-175.	-7.40	16.	.55	185.	-64.	-4.23	12.	.96	35G	#	L285
L291	463.	-1.	-.06	32.	1.11	262.	13.	.87	6.	.53	35G	ó	L291
L297	427.	-37.	-1.57	33.	1.15	214.	-35.	-2.33	10.	.83	35G	ó	L297
L308	436.	-29.	-1.22	26.	.88	237.	-12.	-.78	12.	1.01	35G	ó	L308
L321	466.	2.	.08	31.	1.07	247.	-2.	-.13	18.	1.46	35G	ó	L321
L356	508.	44.	1.86	65.	2.25	245.	-4.	-.26	20.	1.63	35G	ó	L356
L376	486.	22.	.92	36.	1.24	243.	-6.	-.42	8.	.69	35G	ó	L376
L378	453.	-12.	-.50	11.	.39	254.	5.	.32	8.	.63	35G	ó	L378
L382	462.	-2.	-.10	23.	.79	247.	-2.	-.16	5.	.43	35G	ó	L382
L390	514.	50.	2.10	48.	1.64	258.	8.	.54	18.	1.47	35G	ó	L390
L396	473.	8.	.34	26.	.90	252.	2.	.16	9.	.77	35G	ó	L396
L567	455.	-9.	-.40	20.	.70	265.	16.	1.04	10.	.84	35G	ó	L567
L571	441.	-24.	-1.00	20.	.68	241.	-8.	-.55	11.	.91	35G	ó	L571
L575	497.	33.	1.39	40.	1.37	255.	6.	.37	12.	.95	35G	ó	L575
GR. MEAN =	465. GURLEY UNITS					GRAND MEAN =	249. GURLEY UNITS				TEST DETERMINATIONS = 10		
SD MEANS =	24. GURLEY UNITS					SD OF MEANS =	15. GURLEY UNITS				34 LABS IN GRAND MEANS		
	AVERAGE SDR =	29. GURLEY UNITS					AVERAGE SDR =	12. GURLEY UNITS					
L213	450.	-15.	-.62	43.	1.48	247.	-3.	-.17	19.	1.58	35R	=	L213

TOTAL NUMBER OF LABORATORIES REPORTING = 37

Best Values: H66 460 ± 40 Gurley units
H70 245 ± 25 Gurley units

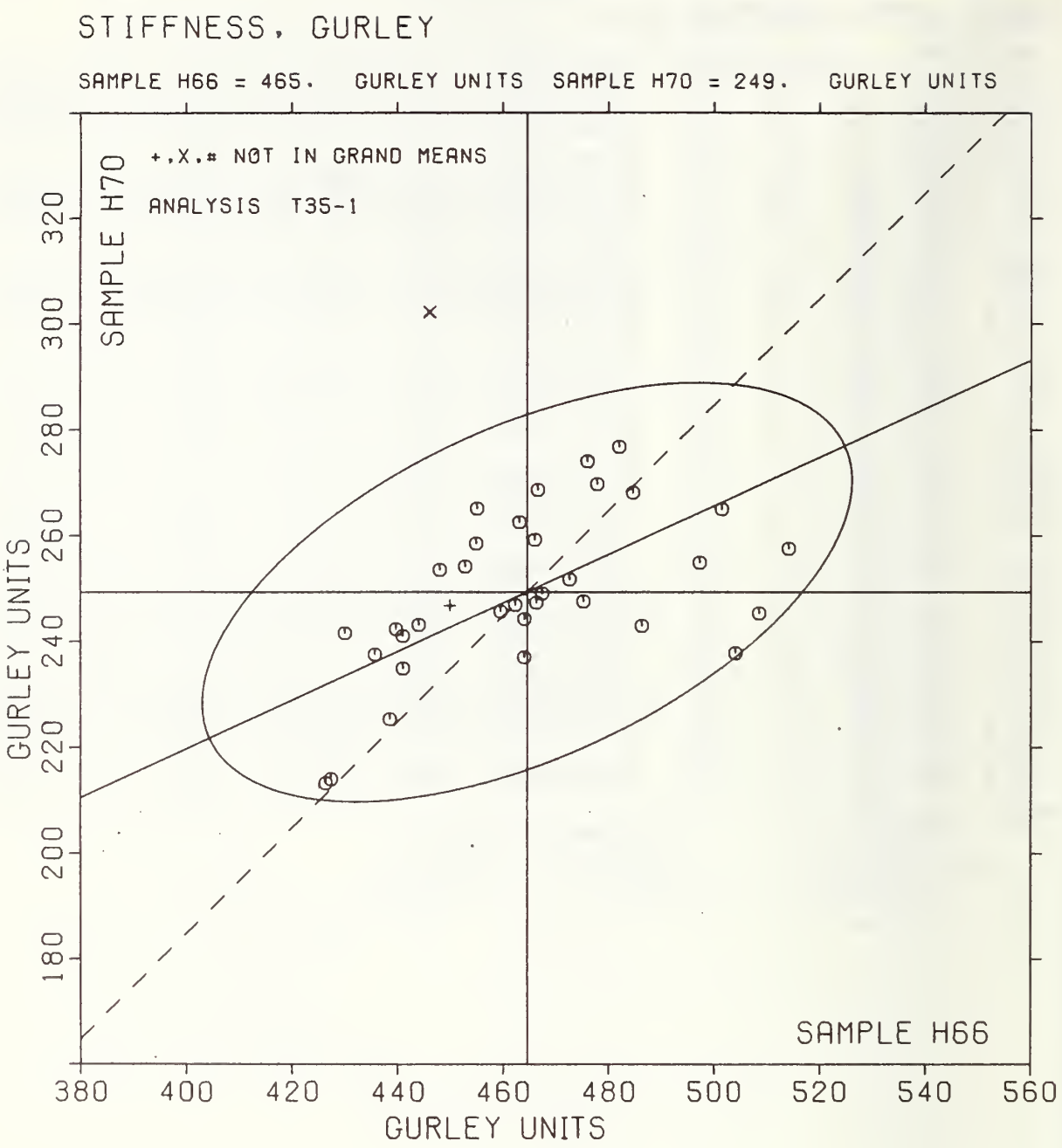
The following laboratories were omitted from the grand means because of extreme test results: 285.

ANALYSIS T35-1 TABLE 2

GURLEY STIFFNESS

RESULTS EXPRESSED IN STANDARD GURLEY UNITS; MILLIGRAMS FOR A 1X3 INCH SPECIMEN (ACTUAL LENGTH 3.5 INCHES).

LAB CODE	P	MEANS M66	M70	COORDINATES MAJOR	MINOR	AVG S.DR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L285	#	290.	186.	-186.	15.	.75	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L254	@	426.	213.	-80.	-17.	.86	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L297	@	427.	214.	-48.	-17.	.99	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L163	@	430.	241.	-35.	7.	1.05	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L308	@	436.	237.	-31.	1.	.94	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L162	@	438.	225.	-34.	-11.	.93	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L223	@	440.	242.	-25.	4.	.98	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L159	@	441.	235.	-27.	-3.	.77	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L571	@	441.	241.	-25.	2.	.79	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L249	@	444.	243.	-21.	3.	.87	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L232	X	446.	302.	5.	56.	2.00	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L148	@	448.	253.	-13.	11.	.97	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L213	*	450.	247.	-14.	4.	1.53	35H	STIFFNESS, GURLEY (UNITS: MG/1X3 TEST PIECE), 20 C, 65% RH
L378	@	453.	254.	-9.	9.	.51	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L139	@	455.	258.	-5.	12.	.65	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L567	@	455.	265.	-2.	18.	.77	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L241	@	459.	246.	-6.	-1.	1.40	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L382	@	462.	247.	-3.	-1.	.61	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L291	@	463.	262.	4.	13.	.82	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L132	@	464.	237.	-6.	-11.	.89	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L236	@	464.	244.	-3.	-4.	1.04	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L260	@	466.	259.	5.	8.	.43	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L321	@	466.	247.	1.	-3.	1.27	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L190C	@	467.	269.	10.	17.	.85	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L122	@	467.	249.	2.	-1.	1.09	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L396	@	473.	252.	8.	-1.	.83	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L153	@	475.	248.	9.	-6.	1.22	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L121	@	476.	274.	21.	18.	1.75	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L183	@	478.	270.	21.	13.	1.25	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L212	@	482.	277.	27.	18.	1.19	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L195	@	485.	268.	26.	9.	.97	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L376	@	486.	243.	17.	-15.	.97	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L575	@	497.	255.	32.	-9.	1.16	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L224	@	501.	265.	40.	-1.	1.14	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L100	@	504.	238.	31.	-27.	.49	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L356	@	508.	245.	38.	-22.	1.94	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L390	@	514.	258.	49.	-13.	1.56	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
GMEANS:		465.	249.			1.00		
		95% ELLIPSE:		66.	31.	WITH GAMMA = 24 DEGREES		


STIFFNESS, GURLEY
SAMPLE H66 = 465. GURLEY UNITS SAMPLE H70 = 249. GURLEY UNITS
+,X,* NOT IN GRAND MEANS
ANALYSIS T35-1
SAMPLE H70
GURLEY UNITS
180
200
220
240
260
280
300
320
SAMPLE H66
380
400
420
440
460
480
500
520
540
560
GURLEY UNITS

ANALYSIS T36-1 TABLE 1
TABER STIFFNESS
TAPPI STANDARD T489 OS-76, RESULTS EXPRESSED IN GRAM CENTIMETERS

LAB CODE	SAMPLE E28 KRAFT ENVELOPE 121 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	SAMPLE J09 PRINTING 149 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	TEST D.= 10 VAR	F	LAB
L107A	7.37	.11	.13	.29	.81	16.62	-.94	-.81	.68	.72	36T	ó	L107A
L122	7.64	.38	.45	.42	1.17	16.09	-1.48	-1.27	.55	.58	36T	ó	L122
L123	7.20	-.06	-.08	.42	1.16	1.62	-15.95	-13.71	.04	.04	36T	#	L123
L126	5.26	-2.00	-2.40	.52	1.43	16.00	-1.57	-1.35	1.39	1.48	36T	*	L126
L149	8.30	1.04	1.24	.48	1.33	18.30	.73	.63	1.34	1.42	36T	ó	L149
L150	7.03	-.23	-.28	.54	1.48	18.50	.93	.80	.97	1.03	36T	ó	L150
L158	6.32	-.94	-1.13	.24	.66	19.50	1.93	1.66	1.97	2.09	36T	ó	L158
L163	7.86	.60	.71	.43	1.20	15.85	-1.72	-1.48	.45	.48	36T	ó	L163
L173B	8.27	1.01	1.20	.38	1.04	17.18	-.39	-.33	.55	.58	36T	ó	L173B
L176	6.30	-.96	-1.15	.45	1.25	17.50	-.07	-.06	.53	.56	36T	ó	L176
L182	7.75	.49	.58	.30	.84	17.00	-.57	-.49	.63	.67	36T	ó	L182
L212	6.47	-.79	-.94	.41	1.12	18.80	1.23	1.06	2.06	2.18	36T	ó	L212
L228	1.70	-5.56	-6.66	.08	.23	3.76	-13.81	-11.87	.13	.14	36T	#	L228
L242	8.67	1.41	1.69	.26	.73	18.02	.46	.39	1.02	1.08	36T	ó	L242
L243	7.60	.34	.40	.39	1.09	16.65	-.92	-.79	.53	.56	36T	ó	L243
L260	7.04	-.22	-.27	.22	.61	19.37	1.81	1.55	.59	.63	36T	ó	L260
L262	7.14	-.12	-.15	.22	.61	18.90	1.33	1.15	.46	.49	36T	ó	L262
L274	7.20	-.06	-.08	.54	1.49	16.95	-.62	-.53	.72	.77	36T	ó	L274
L281	6.67	-.59	-.70	.39	1.07	18.57	1.01	.87	.79	.84	36T	ó	L281
L290	6.39	-.87	-1.05	.34	.93	18.00	.43	.37	1.15	1.23	36T	ó	L290
L318	7.95	.69	.82	.33	.91	16.17	-1.39	-1.20	.94	1.00	36T	ó	L318
L321	7.50	.24	.28	.00	.00	15.74	-1.83	-1.57	1.05	1.11	36T	ó	L321
L324	6.51	-.75	-.90	.41	1.12	17.65	.08	.07	.53	.56	36T	ó	L324
L339	19.17	11.91	14.24	1.67	4.61	38.96	21.39	18.39	4.34	4.61	36T	#	L339
L442	8.55	1.29	1.54	.76	2.11	18.51	.94	.81	2.86	3.04	36T	ó	L442
L570	13.80	6.54	7.82	2.57	7.11	25.60	8.03	6.90	3.03	3.21	36T	#	L570
L580	7.26	-.00	-.00	.15	.42	18.13	.56	.48	.35	.37	36T	ó	L580
GR. MEAN =	7.26 TABER UNITS					GRAND MEAN =	17.57 TABER UNITS				TEST DETERMINATIONS =		10
SD MEANS =	.84 TABER UNITS					SD OF MEANS =	1.16 TABER UNITS				23 LABS IN GRAND MEANS		
	AVERAGE SDR =		.36 TABER UNITS				AVERAGE SDR =		.94 TABER UNITS				
L250	7.45	.19	.22	.33	.91	15.05	-2.52	-2.16	.64	.68	36U	*	L250

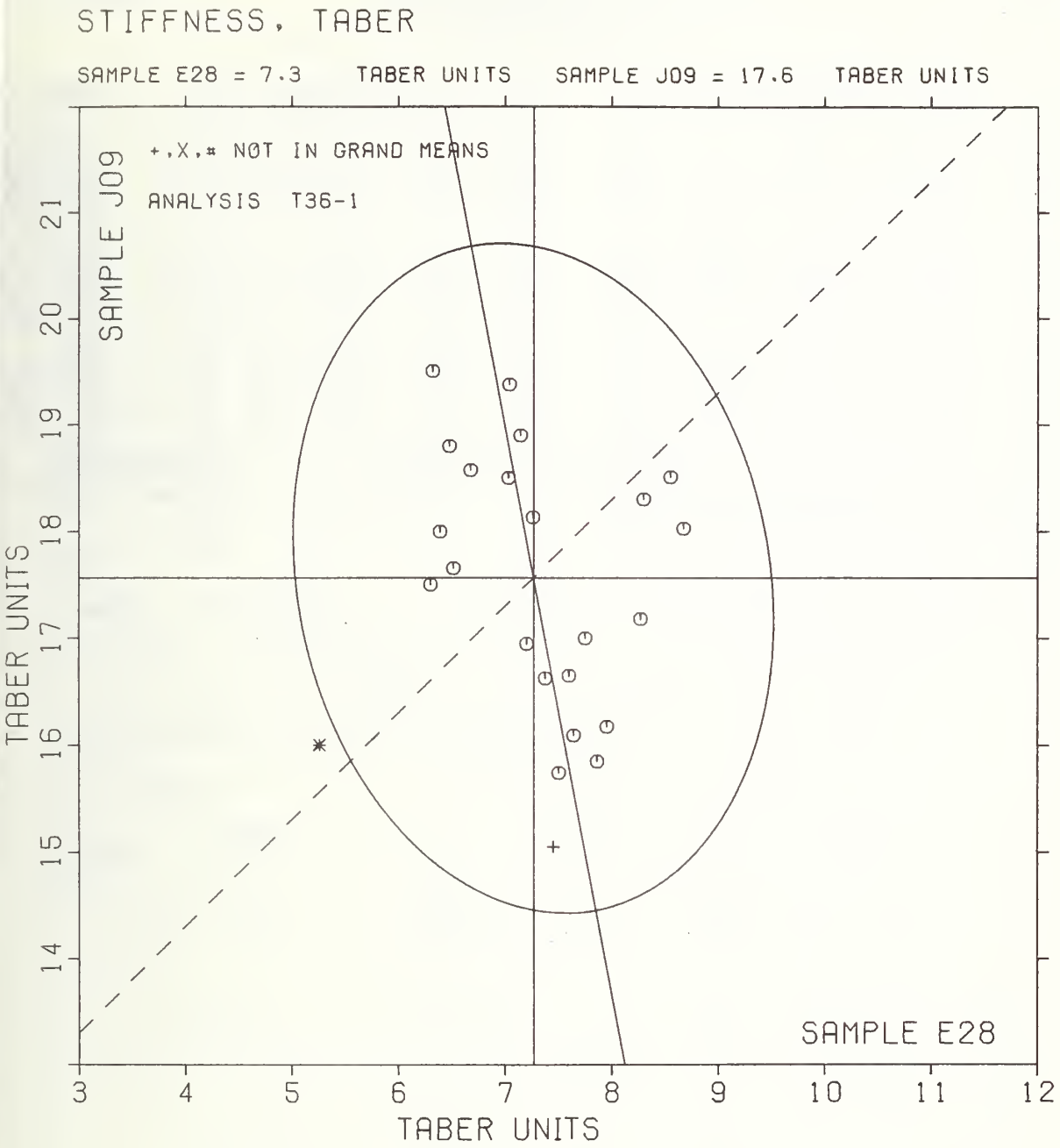
TOTAL NUMBER OF LABORATORIES REPORTING = 28

Best Values: E28 7.4 ± 1.1 Taber units
J09 17.2 ± 1.9 Taber units

Data from the following laboratories appear to be off by a multiplicative factor: 123, 228, 339, 570.

ANALYSIS T36-1 TABLE 2
TABER STIFFNESS
TAPPI STANDARD T489 OS-76, RESULTS EXPRESSED IN GRAM CENTIMETERS

LAB CODE	F	MEANS E28	MEANS J09	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L228	#	1.70	3.76	12.54	-8.02	.18	36T	STIFFNESS, TABER
L126	*	5.26	16.00	1.17	-2.26	1.45	36T	STIFFNESS, TABER
L176	O	6.30	17.50	-.11	-.96	.91	36T	STIFFNESS, TABER
L158	O	6.32	19.50	-2.07	-.57	1.38	36T	STIFFNESS, TABER
L290	O	6.39	18.00	-.59	-.78	1.08	36T	STIFFNESS, TABER
L212	O	6.47	18.80	-1.36	-.55	1.65	36T	STIFFNESS, TABER
L324	O	6.51	17.65	-.22	-.73	.84	36T	STIFFNESS, TABER
L281	O	6.67	18.57	-1.10	-.39	.96	36T	STIFFNESS, TABER
L150	O	7.03	18.50	-.96	-.06	1.26	36T	STIFFNESS, TABER
L260	O	7.04	19.37	-1.82	.11	.62	36T	STIFFNESS, TABER
L262	O	7.14	18.90	-1.33	.12	.55	36T	STIFFNESS, TABER
L274	O	7.20	16.95	.59	-.18	1.13	36T	STIFFNESS, TABER
L123	#	7.20	1.62	15.66	-3.00	.60	36T	STIFFNESS, TABER
L580	O	7.26	18.13	-.55	.10	.40	36T	STIFFNESS, TABER
L107A	O	7.37	16.62	.95	-.06	.77	36T	STIFFNESS, TABER
L250	*	7.45	15.05	2.51	-.28	.80	36U	STIFFNESS, TABER, 20 C, 65% RH
L321	O	7.50	15.74	1.84	-.10	.56	36T	STIFFNESS, TABER
L243	O	7.60	16.65	.96	.16	.83	36T	STIFFNESS, TABER
L122	O	7.64	16.09	1.52	.10	.88	36T	STIFFNESS, TABER
L182	O	7.75	17.00	.65	.37	.75	36T	STIFFNESS, TABER
L163	O	7.86	15.85	1.80	.27	.84	36T	STIFFNESS, TABER
L318	O	7.95	16.17	1.49	.42	.96	36T	STIFFNESS, TABER
L173B	O	8.27	17.18	.57	.92	.81	36T	STIFFNESS, TABER
L149	O	8.30	18.30	-.53	1.15	1.38	36T	STIFFNESS, TABER
L442	O	8.55	18.51	-.69	1.44	2.57	36T	STIFFNESS, TABER
L242	O	8.67	18.02	-.19	1.47	.91	36T	STIFFNESS, TABER
L570	#	13.80	25.60	-6.69	7.91	5.16	36T	STIFFNESS, TABER
L339	#	19.17	38.96	-18.83	15.65	4.61	36T	STIFFNESS, TABER
GMEANS:		7.26	17.57			1.00		
		95% ELLIPSE:		3.16	2.21	WITH GAMMA =-79 DEGREES		


STIFFNESS, TABER
SAMPLE E28 = 7.3 TABER UNITS
SAMPLE J09 = 17.6 TABER UNITS
+,X,* NOT IN GRAND MEANS
ANALYSIS T36-1
SAMPLE J09
TABER UNITS
14
15
16
17
18
19
20
21
SAMPLE E28
3
4
5
6
7
8
9
10
11
12
TABER UNITS

ANALYSIS T49-1 TABLE 1
SURFACE PICK STRENGTH, IGT

LAB CODE	SAMPLE H78 PRINTING 151 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	SAMPLE H17 PRINTING 89 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	TEST D.= 4 VAR	F	LAB
L107	77.0	19.7	1.43	.0	.00	NO DATA REPORTED FOR SAMPLE H17					49T	M	L107
L121	660.0	602.7	43.82	.0	.00	226.0	203.3	26.80	15.3	8.04	49F	#	L121
L122	61.8	4.5	.33	2.3	1.20	23.7	1.0	.14	1.3	.66	49Q	O	L122
L149	79.4	22.2	1.61	4.6	2.40	25.4	2.7	.36	2.7	1.42	49L	O	L149
L1821	41.9	-15.4	-1.12	1.5	.77	14.8	-7.9	-1.05	.4	.18	49Q	O	L1821
L183	NO DATA REPORTED FOR SAMPLE H78					26.7	4.0	.52	1.9	.98	49Q	M	L183
L190C	53.5	-3.7	-.27	1.6	.82	19.9	-2.8	-.37	1.8	.93	49T	O	L190C
L242	42.9	-14.4	-1.05	3.2	1.66	12.2	-10.5	-1.39	.8	.44	49P	O	L242
L274	52.3	-5.0	-.36	.0	.00	30.8	8.1	1.07	4.3	2.24	49I	O	L274
L277	251.0	193.8	14.09	10.0	5.23	111.9	89.2	11.75	27.3	14.35	49I	#	L277
L280	3.7	-53.6	-3.90	.0	.00	1.1	-21.6	-2.85	.2	.10	49U	#	L280
L291	NO DATA REPORTED FOR SAMPLE H78					26.0	3.3	.44	2.2	1.14	49I	M	L291
L382	69.2	11.9	.86	.3	.15	32.1	9.4	1.24	2.1	1.13	49I	O	L382
L388	116.1	58.8	4.28	5.4	2.82	55.8	33.1	4.36	3.6	1.89	49Q	#	L388
L484	925.0	867.7	63.09	25.2	13.13	497.5	474.8	62.59	28.7	15.08	49P	#	L484

GR. MEAN = 57.3 KP CM/SEC GRAND MEAN = 22.7 KP CM/SEC TEST DETERMINATIONS = 4
SD MEANS = 13.8 KP CM/SEC SD OF MEANS = 7.6 KP CM/SEC 7 LABS IN GRAND MEANS
AVERAGE SDR = 1.9 KP CM/SEC AVERAGE SDR = 1.9 KP CM/SEC
TOTAL NUMBER OF LABORATORIES REPORTING = 15

Data from the following laboratories were not understood: 121, 277, 280, 388, 484.

TAPPI COLLABORATIVE REFERENCE PROGRAM

ANALYSIS T49-1
SURFACE PICK STRENGTH, IGT

LAB CODE	REPORTED BY LAB MEANS H78	H17	UNITS	VISCOSITY in Poise	FLUID	CALCULATED MEANS IN kP cm/sec H78	H17	assumed viscosity
L107	77.0	---	kP cm/sec	672	IPC Fluid	77.0	---	
L121	660 +	226	ft/min	---	IPI #2 Ink	---	---	
L122	61.8	23.7	kP cm/sec	328	IGT Oil	61.8	23.7	
L149	1848	591	mm/sec	430	Polybutene	79.4	25.4	
L158	NO DATA							
L182	41.9	14.8	kP cm/sec	146	IGT Low Visc Oil	41.9	14.8	
L183	no pick	26.7	kP cm/sec	---	IGT Oil	---	26.7	
L190	53.5	19.9	kP cm/sec	284/632	IPC Fluid	53.5	19.9	
L207	NO DATA							
L242	1100	725	mm/sec	390/168	IGT Oil	42.9	12.2	
L243	NO DATA							
L274	52.3	30.8	kP cm/sec	316	PIB Fluid	52.3	30.8	
L276	NO DATA							
L277	251	112	kP cm/sec	1017	Polybutene	251	112	
L280	3.71+	1.07	m/sec	---	---	---	---	
L291	no pick	26.0	kP cm/sec	625	Polybutene	---	26.0	
L337	NO DATA							
L382	69.2	32.1	kP cm/sec	625	Polybutane	69.2	32.1	
L388	116	55.8	kP cm/sec	720	IGT Oil	116	55.8	
L484	925	498	mm/sec	---	IGT Oil	---	---	

ANALYSIS T50-1 TABLE 1

SURFACE PICK STRENGTH, WAX NUMBER

TAPPI STANDARD T459 68-75, SURFACE STRENGTH OF PAPER (WAX PICK TEST)

LAB CODE	SAMPLE H78 MEAN	PRINTING 151 GRAMS PER SQUARE METER DEV	N.DEV	SDR	E.SDR	SAMPLE H17 MEAN	PRINTING 89 GRAMS PER SQUARE METER DEV	N.DEV	SDR	E.SDR	TEST D.* VAR	F	LAB
L105	10.00	.16	.21	.71	1.62	6.80	.92	1.26	.45	1.35	50W	6	L105
L122	8.60	-1.24	-1.62	.55	1.26	4.60	-1.25	-1.75	.55	1.65	50W	6	L122
L158	10.40	.56	.74	.55	1.26	6.00	.12	.17	.00	.00	50W	6	L158
L162	9.60	-.24	-.31	.55	1.26	6.20	.32	.44	.45	1.35	50W	6	L162
L173A	9.60	-.24	-.31	.55	1.26	4.80	-1.08	-1.47	.45	1.35	50W	6	L173A
L182W	9.20	-.64	-.84	.84	1.92	6.20	.32	.44	.45	1.35	50W	6	L182W
L183	10.00	.16	.21	.00	.00	6.40	.52	.72	.55	1.65	50W	6	L183
L195	9.00	-.84	-1.10	.00	.00	5.20	-.68	-.93	.45	1.35	50W	6	L195
L213	10.60	.76	1.00	.55	1.26	6.60	.72	.99	.55	1.65	50W	6	L213
L225	11.20	1.36	1.78	.84	1.92	8.40	2.52	3.45	.55	1.65	50W	#	L225
L228	9.20	-.64	-.84	.45	1.03	6.00	.12	.17	.00	.00	50W	6	L228
L230	9.40	-.44	-.57	.55	1.26	6.00	.12	.17	.00	.00	50W	6	L230
L236	9.40	-.44	-.57	.89	2.05	5.20	-.68	-.93	.45	1.35	50W	6	L236
L243	8.60	-1.24	-1.62	.55	1.26	5.60	-.28	-.38	.55	1.65	50W	6	L243
L274	9.60	-.24	-.31	.55	1.26	5.60	-.28	-.38	.55	1.65	50W	6	L274
L285	11.00	1.16	1.52	.00	.00	7.00	1.12	1.54	.00	.00	50W	6	L285
L339	11.00	1.16	1.52	.00	.00	6.00	.12	.17	.00	.00	50W	6	L339
L366	10.80	.96	1.26	.45	1.03	6.40	.52	.72	.55	1.65	50W	6	L366
L378	9.60	-.24	-.31	.55	1.26	5.20	-.68	-.93	.45	1.35	50W	6	L378
L390	11.20	1.36	1.78	.45	1.03	7.00	1.12	1.54	.00	.00	50W	6	L390
L561	10.00	.16	.21	.00	.00	6.00	.12	.17	.00	.00	50W	6	L561
L567	9.80	-.04	-.05	.45	1.03	4.60	-1.28	-1.75	.55	1.65	50W	6	L567

GR. MEAN = 9.84 WAX NUMBER GRAND MEAN = 5.88 WAX NUMBER TEST DETERMINATIONS = 5

SD MEANS = .76 WAX NUMBER SD OF MEANS = .73 WAX NUMBER 21 LABS IN GRAND MEANS

AVERAGE SDR = .44 WAX NUMBER AVERAGE SDR = .33 WAX NUMBER

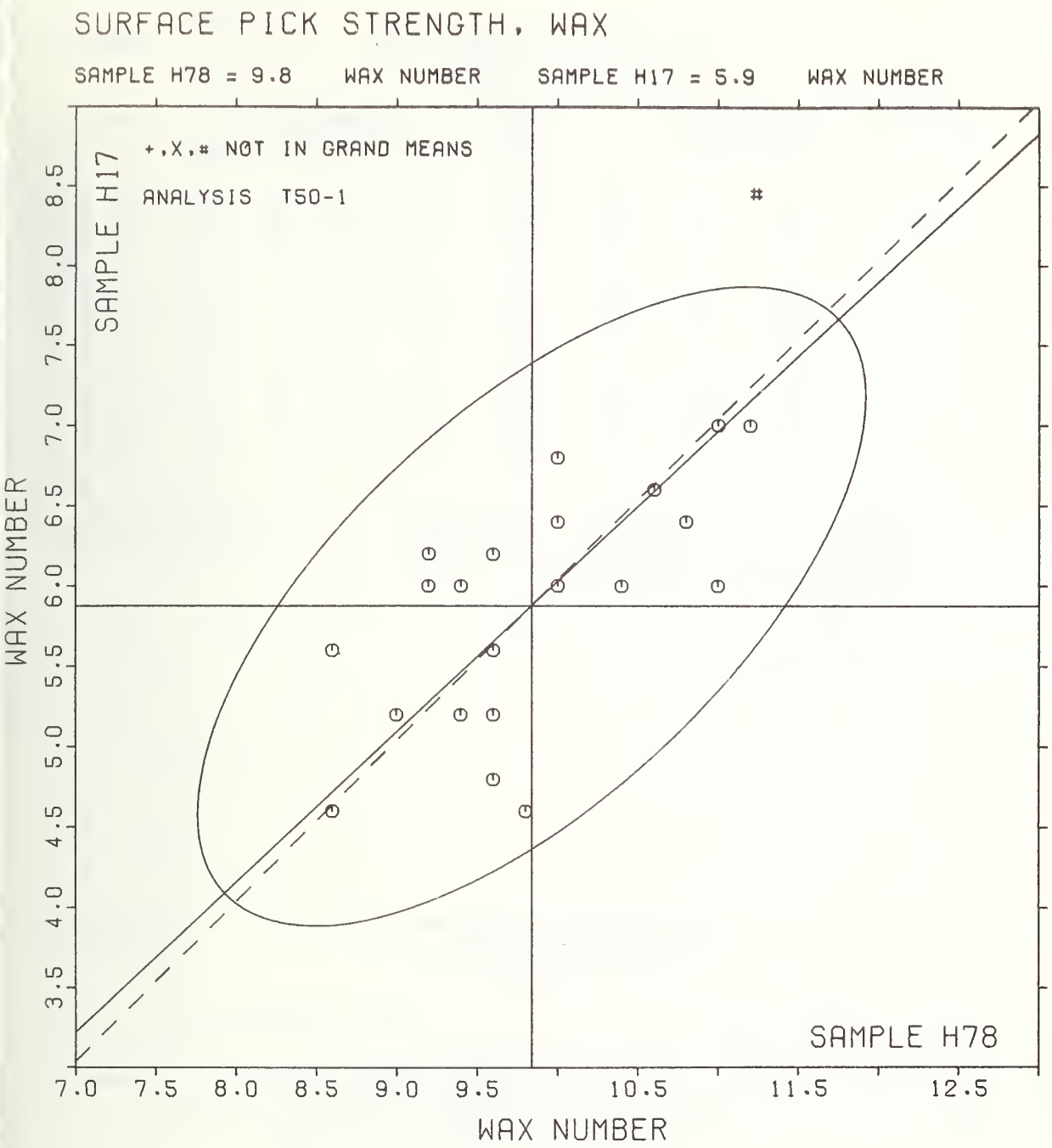
TOTAL NUMBER OF LABORATORIES REPORTING = 22

Best Values: H78 9.7 ± 1.1 Wax number
H17 6.0 ± 1.3 Wax number

The following laboratories were omitted from the grand means because of extreme test results: 225.

ANALYSIS T50-1 TABLE 2
SURFACE PICK STRENGTH, WAX NUMBER
TAPPI STANDARD T459 OS-75, SURFACE STRENGTH OF PAPER (WAX PICK TEST)

LAB CODE	F	MEANS H78	MEANS H17	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L243	O	8.60	5.60	-1.09	.64	1.45	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L122	O	8.60	4.60	-1.78	-.09	1.45	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L195	O	9.00	5.20	-1.07	.08	.67	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L228	O	9.20	6.00	-.38	.53	.51	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L182W	O	9.20	6.20	-.24	.67	1.63	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L236	O	9.40	5.20	-.78	-.19	1.70	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L230	O	9.40	6.00	-.24	.39	.63	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L378	O	9.60	5.20	-.64	-.33	1.30	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L274	O	9.60	5.60	-.36	-.04	1.45	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L173A	O	9.60	4.80	-.91	-.62	1.30	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L162	O	9.60	6.20	.05	.40	1.30	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L567	O	9.80	4.60	-.90	-.91	1.34	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L183	O	10.00	6.40	.48	.27	.83	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L561	O	10.00	6.00	.20	-.02	.00	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L105	O	10.00	6.80	.75	.56	1.49	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L158	O	10.40	6.00	.49	-.29	.63	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L213	O	10.60	6.60	1.05	.01	1.45	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L366	O	10.80	6.40	1.06	-.27	1.34	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L339	O	11.00	6.00	.93	-.70	.00	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L285	O	11.00	7.00	1.62	.03	.00	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L225	#	11.20	8.40	2.72	.91	1.79	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L390	O	11.20	7.00	1.76	-.11	.51	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
GMEANS:		9.84	5.88			1.00		
		95% ELLIPSE:		2.61	1.20	WITH GAMMA = 43 DEGREES		


SURFACE PICK STRENGTH, WAX
SAMPLE H78 = 9.8 WAX NUMBER
SAMPLE H17 = 5.9 WAX NUMBER
+,X,# NOT IN GRAND MEANS
ANALYSIS T50-1
SAMPLE H17
WAX NUMBER
3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5
SAMPLE H78
7.0 7.5 8.0 8.5 9.0 9.5 10.5 11.5 12.5
WAX NUMBER

REPORT NO. 505 TAPPI COLLABORATIVE REFERENCE PROGRAM NOVEMBER 1977
ANALYSIS T91-1 TABLE 1
CONCORA (CORRUGATING MEDIUM TEST-CMT)
TAPPI STANDARD T809 OS-71

LAB CODE	SAMPLE E61 MEAN	LINERBOARD 195 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE E62 MEAN	LINERBOARD 127 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	VAR	F	LAB	TEST D.F 10
L100	215.	2.	.16	23.	1.85	231.	5.	.36	15.	1.21	91B	O	L100	
L176	201.	-13.	-1.27	15.	1.26	232.	5.	.38	13.	1.07	91I	O	L176	
L182	216.	3.	.33	7.	.61	226.	0.	.02	14.	1.14	91T	O	L182	
L185	198.	-15.	-1.56	15.	1.20	243.	17.	1.17	11.	.89	91A	O	L185	
L218	212.	-1.	-.15	8.	.69	209.	-17.	-1.19	8.	.61	91A	O	L218	
L242	162.	-51.	-5.12	8.	.64	201.	-25.	-1.74	9.	.74	91G	#	L242	
L248	226.	13.	1.27	13.	1.04	234.	8.	.53	10.	.82	91B	O	L248	
L255	159.	-54.	-5.50	6.	.45	176.	-50.	-3.46	21.	1.69	91I	#	L255	
L269	212.	-1.	-.15	7.	.60	211.	-15.	-1.06	14.	1.10	91I	O	L269	
L274	207.	-6.	-.60	8.	.69	226.	0.	.01	17.	1.36	91R	O	L274	
L329	226.	13.	1.29	12.	.98	222.	-4.	-.27	8.	.66	91I	O	L329	
L336	212.	-1.	-.13	18.	1.49	247.	21.	1.45	16.	1.25	91I	O	L336	
L394	214.	1.	.12	13.	1.09	212.	-15.	-1.00	6.	.44	91R	O	L394	
L484	198.	-15.	-1.56	15.	1.23	224.	-2.	-.17	12.	.98	91B	O	L484	
L575	221.	8.	.81	6.	.47	248.	22.	1.52	15.	1.15	91B	O	L575	
L666	227.	14.	1.43	10.	.81	201.	-25.	-1.74	17.	1.31	91S	O	L666	

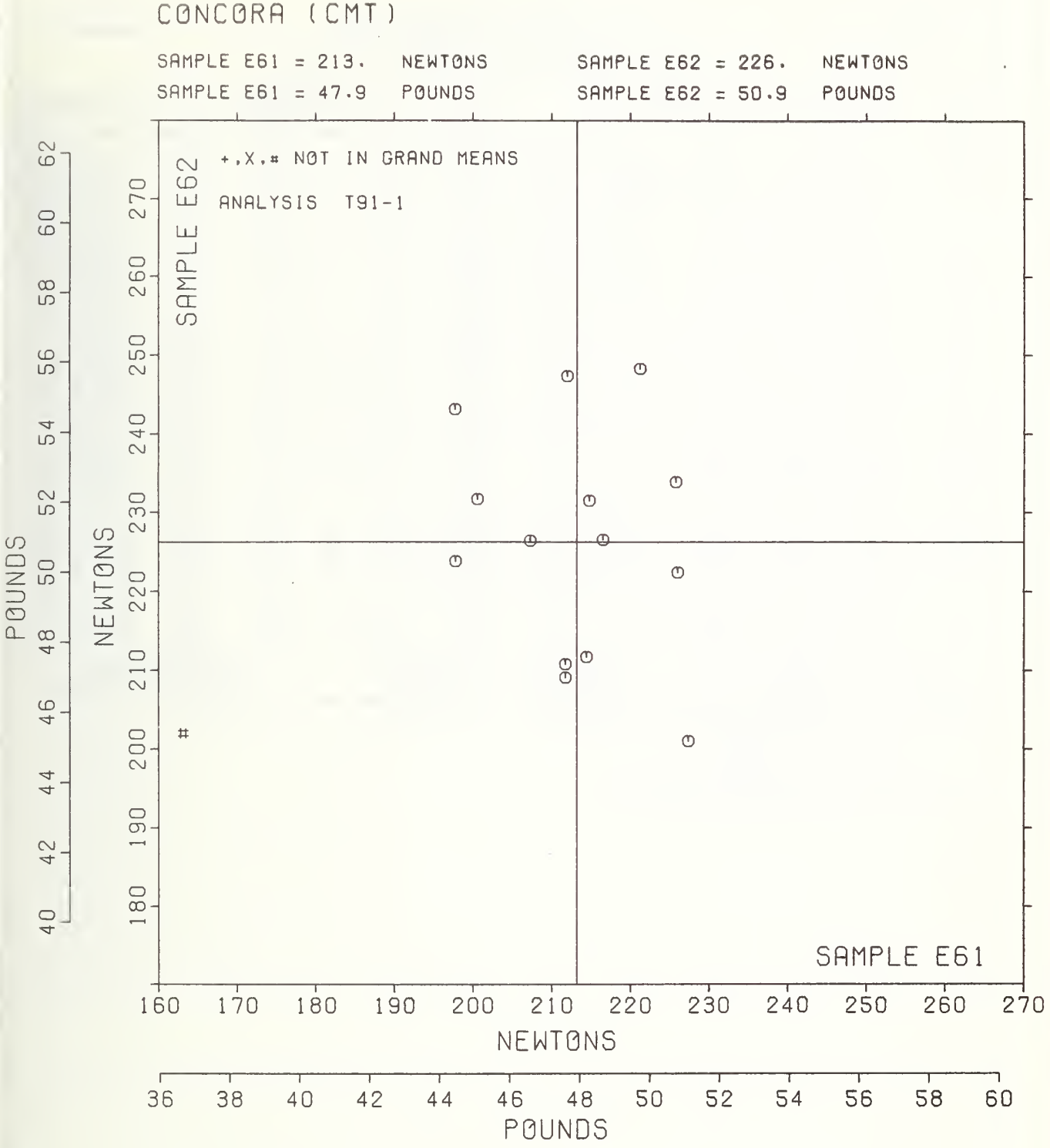
GR. MEAN = 213. NEWTONS GRAND MEAN = 226. NEWTONS TEST DETERMINATIONS = 10
SD MEANS = 10. NEWTONS SD OF MEANS = 14. NEWTONS 14 LABS IN GRAND MEANS
AVERAGE SDR = 12. NEWTONS AVERAGE SDR = 13. NEWTONS
GR. MEAN = 47.93 POUNDS GRAND MEAN = 50.86 POUNDS
TOTAL NUMBER OF LABORATORIES REPORTING = 16

Best Values: E61 220 ± 20 newtons
E62 230 ± 20 newtons

The following laboratories were omitted from the grand means because of extreme test results: 242, 255.

REPORT NO. 505 TAPPI COLLABORATIVE REFERENCE PROGRAM NOVEMBER 1977
ANALYSIS T91-1 TABLE 2
CONCORA (CORRUGATING MEDIUM TEST-CMT)
TAPPI STANDARD T809 OS-71

LAB CODE	F	MEANS E61	E62	COORDINATES MAJOR	MINOR	AVG E.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L255	#	159.	176.	35.	-65.	1.07	91I	FLAT CRUSH STRENGTH, CONCORA, B*D
L242	#	162.	201.	11.	-55.	.69	91G	FLAT CRUSH STRENGTH, CONCORA, GAYDON FLAT CRUSH TESTER
L185	O	198.	243.	-20.	-11.	1.05	91A	FLAT CRUSH STRENGTH, CONCORA, INSTRON
L484	O	198.	224.	-2.	-16.	1.10	91B	FLAT CRUSH STRENGTH, CONCORA, B*D
L176	O	201.	232.	-9.	-11.	1.16	91I	FLAT CRUSH STRENGTH, CONCORA, B*D
L274	O	207.	226.	-2.	-6.	1.02	91R	FLAT CRUSH STRENGTH, CONCORA, TMI
L218	O	212.	209.	16.	-6.	.65	91A	FLAT CRUSH STRENGTH, CONCORA, INSTRON
L269	O	212.	211.	15.	-5.	.85	91I	FLAT CRUSH STRENGTH, CONCORA, B*D
L336	O	212.	247.	-21.	4.	1.37	91I	FLAT CRUSH STRENGTH, CONCORA, B*D
L394	O	214.	212.	14.	-3.	.77	91R	FLAT CRUSH STRENGTH, CONCORA, TMI
L100	O	215.	231.	-5.	3.	1.53	91B	FLAT CRUSH STRENGTH, CONCORA, B*D
L182	O	216.	226.	1.	3.	.87	91T	FLAT CRUSH STRENGTH, CONCORA, TMI
L575	O	221.	248.	-19.	13.	.81	91B	FLAT CRUSH STRENGTH, CONCORA, B*D
L248	O	226.	234.	-4.	14.	.93	91B	FLAT CRUSH STRENGTH, CONCORA, INSTRON
L329	O	226.	222.	7.	11.	.82	91I	FLAT CRUSH STRENGTH, CONCORA, B*D
L666	O	227.	201.	28.	7.	1.06	91S	FLAT CRUSH STRENGTH, CONCORA, TOYO SEIKI (METHOD JIS-P-8126)
GMEANS:		213.	226.			1.00		
		95% ELLIPSE:		43.	27.	WITH GAMMA *-75 DEGREES		


CONCORA (CMT)
SAMPLE E61 = 213. NEWTONS
SAMPLE E61 = 47.9 POUNDS
SAMPLE E62 = 226. NEWTONS
SAMPLE E62 = 50.9 POUNDS
+,X,# NOT IN GRAND MEANS
ANALYSIS T91-1
SAMPLE E62
SAMPLE E61
NEWTONS
POUNDS
160 170 180 190 200 210 220 230 240 250 260 270
36 38 40 42 44 46 48 50 52 54 56 58 60
180 190 200 210 220 230 240 250 260 270
40 42 44 46 48 50 52 54 56 58 60 62

ANALYSIS T96-1 TABLE 1
RING CRUSH (COMPRESSION RESISTANCE OF PAPERBOARD)
TAPPI STANDARD T472 SU-68

LAB CODE	SAMPLE E61 MEAN	LINERBOARD 195 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE E62 MEAN	LINERBOARD 127 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.* 10 VAR	F	LAB
L100	341.	0.	.01	31.	1.32	207.	-1.	-.02	17.	1.05	96H	@	L100
L107	363.	23.	.65	20.	.88	213.	6.	.23	20.	1.23	96P	@	L107
L114	354.	13.	.37	24.	1.03	205.	-2.	-.07	18.	1.09	96P	@	L114
L122	343.	2.	.06	42.	1.81	203.	-4.	-.17	24.	1.47	96P	@	L122
L124	306.	-35.	-1.00	25.	1.10	182.	-25.	-.99	26.	1.60	96P	@	L124
L126	350.	9.	.27	20.	.85	244.	37.	1.44	16.	.98	96P	@	L126
L127	336.	-5.	-.14	24.	1.02	211.	4.	.16	12.	.72	96P	@	L127
L141	341.	0.	.00	21.	.91	214.	7.	.27	24.	1.47	96P	@	L141
L157	342.	2.	.05	24.	1.05	204.	-3.	-.12	15.	.95	96P	@	L157
L171	363.	23.	.65	19.	.83	231.	24.	.92	8.	.51	96H	@	L171
L176	306.	-35.	-1.00	33.	1.42	208.	0.	.02	17.	1.06	96P	@	L176
L182	369.	29.	.82	8.	.34	239.	32.	1.24	8.	.50	96H	@	L182
L191	279.	-62.	-1.77	51.	2.22	184.	-23.	-.90	23.	1.39	96P	@	L191
L242	403.	62.	1.78	7.	.31	261.	53.	2.09	6.	.39	96G	@	L242
L274	294.	-46.	-1.33	12.	.52	170.	-37.	-1.44	12.	.74	96X	@	L274
L303	403.	63.	1.80	13.	.57	249.	42.	1.65	14.	.85	96H	@	L303
L305	355.	15.	.42	14.	.62	220.	13.	.50	12.	.71	96P	@	L305
L307	319.	-22.	-.63	15.	.64	175.	-32.	-1.25	11.	.64	96P	@	L307
L329	283.	-57.	-1.65	14.	.59	160.	-48.	-1.86	6.	.35	96P	@	L329
L336	349.	8.	.22	26.	1.13	194.	-14.	-.53	22.	1.34	96P	@	L336
L350	366.	25.	.71	23.	1.00	227.	20.	.78	16.	1.00	96P	@	L350
L393	344.	3.	.09	16.	.68	185.	-22.	-.87	14.	.88	96P	@	L393
L484	211.	-130.	-3.72	22.	.95	143.	-64.	-2.51	14.	.84	96R	#	L484
L562	333.	-8.	-.23	47.	2.03	204.	-3.	-.13	27.	1.64	96P	@	L562
L570	286.	-55.	-1.57	32.	1.39	172.	-35.	-1.37	16.	1.00	96T	@	L570
L575	396.	56.	1.59	14.	.59	231.	24.	.93	14.	.83	96H	@	L575
L603	373.	32.	.92	21.	.92	215.	8.	.31	21.	1.29	96P	@	L603
L663	302.	-38.	-1.10	28.	1.21	186.	-21.	-.81	22.	1.33	96P	@	L663

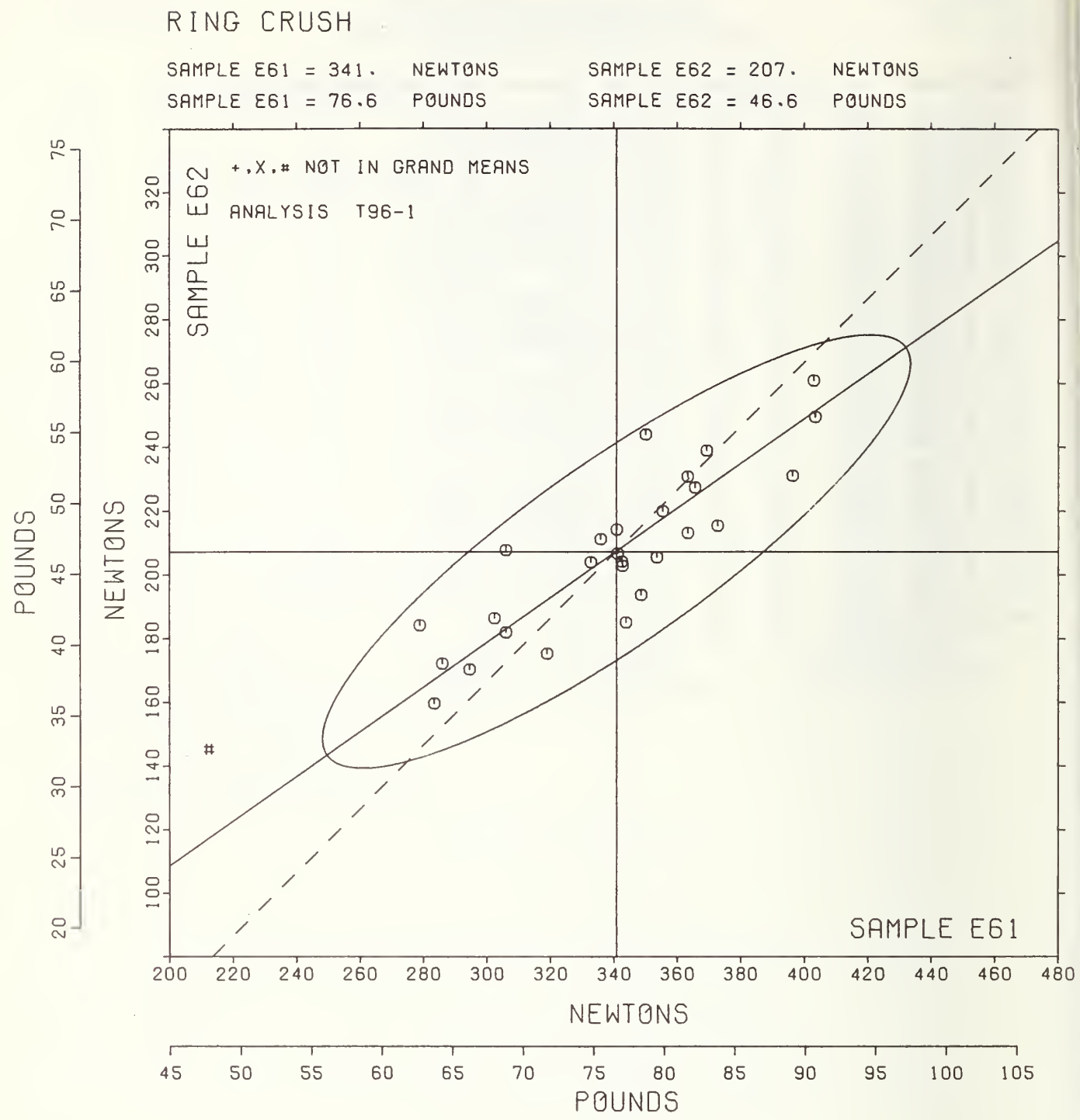
GR. MEAN * 341. NEWTONS — GRAND MEAN * 207. NEWTONS — TEST DETERMINATIONS * 10
SD MEANS * 35. NEWTONS — SD OF MEANS * 26. NEWTONS — 27 LABS IN GRAND MEANS
AVERAGE SDR * 23. NEWTONS — AVERAGE SDR * 16. NEWTONS
GR. MEAN * 76.61 POUNDS — GRAND MEAN * 46.59 POUNDS
TOTAL NUMBER OF LABORATORIES REPORTING * 28

Best Values: E61 340 ± 60 newtons
E62 210 ± 40 newtons

The following laboratories were omitted from the grand means because of extreme test results: 484.

ANALYSIS T56-1 TABLE 2
RING CRUSH (COMPRESSION RESISTANCE OF PAPERBOARD)
TAPPI STANDARD T472 SU-68

LAB CODE	F	MEANS E61	MEANS E62	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDE	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L484	#	211.	143.	-143.	22.	.89	96R	RING CRUSH, REGMED
L191	6	279.	184.	-64.	17.	1.81	96P	RING CRUSH, H AND D
L329	6	283.	160.	-74.	-6.	.47	96P	RING CRUSH, H AND D
L570	6	286.	172.	-65.	3.	1.20	96T	RING CRUSH, TMI
L274	6	294.	170.	-59.	-4.	.63	96X	RING CRUSH: GIVE INSTRUMENT MAKE + MODEL
L663	6	302.	186.	-43.	5.	1.27	96P	RING CRUSH, H AND D
L124	6	306.	182.	-43.	-1.	1.35	96P	RING CRUSH, H AND D
L176	6	306.	208.	-28.	20.	1.24	96P	RING CRUSH, H AND D
L307	6	319.	175.	-36.	-14.	.64	96P	RING CRUSH, H AND D
L562	6	333.	204.	-8.	2.	1.83	96P	RING CRUSH, H AND D
L127	6	336.	211.	-2.	6.	.87	96P	RING CRUSH, H AND D
L141	6	341.	214.	4.	6.	1.19	96P	RING CRUSH, H AND D
L100	6	341.	207.	0.	-1.	1.19	96H	RING CRUSH, H AND D
L157	6	342.	204.	-0.	-4.	1.00	96P	RING CRUSH, H AND D
L122	6	343.	203.	-1.	-5.	1.64	96P	RING CRUSH, H AND D
L393	6	344.	185.	-10.	-20.	.78	96P	RING CRUSH, H AND D
L336	6	349.	194.	-1.	-16.	1.24	96P	RING CRUSH, H AND D
L126	6	350.	244.	29.	25.	.91	96P	RING CRUSH, H AND D
L114	6	354.	205.	10.	-9.	1.06	96P	RING CRUSH, H AND D
L305	6	355.	220.	19.	2.	.67	96P	RING CRUSH, H AND D
L171	6	363.	231.	32.	6.	.67	96H	RING CRUSH, H AND D
L107	6	363.	213.	22.	-8.	1.05	96P	RING CRUSH, H AND D
L350	6	366.	227.	32.	2.	1.00	96P	RING CRUSH, H AND D
L182	6	369.	239.	42.	10.	.42	96H	RING CRUSH, H AND D
L603	6	373.	215.	31.	-12.	1.11	96P	RING CRUSH, H AND D
L575	6	396.	231.	59.	-12.	.71	96H	RING CRUSH, H AND D
L242	6	403.	261.	82.	8.	.35	96G	RING CRUSH, GAYDON FLAT CRUSH TESTER
L303	6	403.	249.	76.	-1.	.71	96H	RING CRUSH, H AND D
GMEANS:		341.	207.			1.00		
		95% ELLIPSE:		111.	28.	WITH GAMMA = 35 DEGREES		


RING CRUSH
SAMPLE E61 = 341. NEWTONS
SAMPLE E61 = 76.6 POUNDS
SAMPLE E62 = 207. NEWTONS
SAMPLE E62 = 46.6 POUNDS
+,X,# NOT IN GRAND MEANS
ANALYSIS T96-1
SAMPLE E62
NEWTONS
POUNDS
SAMPLE E61
NEWTONS
POUNDS

SUMMARY TABLE

TEST METHOD	SAMPLE CODE	GRAND MEAN	SD OF MEAN	AVER SDR	REPL CRP	LABS INCL	LABS PARTIC	REPL TAPPI	REPEAT	REPROD
BURSTING STRENGTH, MODEL C	B05	32.49	2.23	1.52	15	45	52	10	1.33	6.22
T10-1 PSI	B62	17.07	1.81	1.12					.98	5.05
BURSTING STRENGTH, MODEL C-A	B05	32.50	1.57	1.51	15	33	35	10	1.32	4.41
T10-2 PSI	B62	17.73	1.22	1.06					.93	3.43
BURSTING STRENGTH, HIGH RANGE	B08	79.2	4.4	6.7	15	34	44	10	5.8	12.7
T11-1 PSI	B40	54.4	2.6	2.5					2.2	7.2
TEARING STRENGTH, DEEP CUTOUT	B04	62.5	3.2	2.1	15	109	118	10	1.8	8.8
T15-1 GRAMS	B21	65.7	3.8	2.1					1.9	10.6
TEARING STRENGTH,NO CUTOUT	E17	63.6	3.8	2.2	15	14	16	10	1.9	10.5
T17-1 GRAMS	E32	85.4	4.1	2.8					2.5	11.3
TENSILE STRENGTH, PACKAGING PAPERS	B09	7.13	.31	.51	20	48	49	12	.40	.89
T19-1 KILONEWTON/M	B57	10.25	.52	.60					.48	1.48
TENSILE STRENGTH, CRE TYPE	B43	7.31	.38	.36	20	39	49	12	.29	1.08
T20-1 KILONEWTON/M	J03	3.70	.25	.20					.16	.70
TENSILE STRENGTH, PENDULUM TYPE	B43	7.11	.71	.34	20	37	39	12	.27	1.96
T20-2 KILONEWTON/M	J03	3.73	.27	.20					.16	.76
T.E.A., PACKAGING PAPERS	B09	192.	11.	28.	20	13	16	12	23.	32.
T25-1 JOULES/SQ M	B57	106.	5.	14.					11.	16.
T.E.A., PRINTING PAPERS	B43	82.0	15.4	9.4	20	20	22	12	7.6	43.0
T26-1 JOULES/SQ M	J03	34.2	6.1	4.5					3.6	17.1
ELONGATION TO BREAK, PACKAGING PAPER	B09	4.18	.24	.45	20	13	17	12	.36	.71
T28-1 PERCENT	B57	1.72	.11	.15					.12	.33
ELONGATION TO BREAK, PRINTING PAPER	B43	1.748	.363	.141	20	19	22	12	.113	1.009
T29-1 PERCENT	J03	1.438	.274	.134					.107	.761
FOLDING ENDURANCE (MIT)	B11	120.	45.	39.	15	46	54	10	34.	125.
T30-1 DOUBLE FOLDS	B23	401.	147.	105.					92.	409.
FOLDING ENDURANCE (MIT)	B11	2.05	.16	.16	15	44	54	10	.14	.44
T30-2 LOG(10) FOLD	B23	2.58	.15	.13					.11	.41
STIFFNESS, GURLEY	B66	465.	24.	29.	10	34	37	10	25.	65.
T35-1 GURLEY UNITS	B70	249.	15.	12.					11.	42.
STIFFNESS, TABER	E28	7.26	.84	.36	10	23	28	5	.45	2.34
T36-1 TABER UNITS	J09	17.57	1.16	.94					1.17	3.33
SURFACE PICK STRENGTH, IGT	B78	57.3	13.8	1.9	4	7	15	4	2.7	38.1
T49-1 KP CM/SEC	B17	22.7	7.6	1.9					2.6	21.0
SURFACE PICK STRENGTH, WAX	B78	9.84	.76	.44	5	21	22	5	.54	2.11
T50-1 WAX NUMBER	B17	5.88	.73	.33					.41	2.02
CONCORA (CMT)	E61	213.	10.	12.	10	14	16	10	11.	27.
T91-1 NEWTONS	E62	226.	14.	13.					11.	40.
RING CRUSH	E61	341.	35.	23.	10	27	28	10	20.	97.
T96-1 NEWTONS	E62	207.	26.	16.					14.	71.

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Collaborative Reference Programs provide participating laboratories with the means for checking periodically the level and uniformity of their testing in comparison with that of other participating laboratories. An important by-product of the programs is the provision of realistic pictures of the state of the testing art. This is one of the periodic reports showing averages for each participant, within and between laboratory variability, and other information for participants and standards committees.

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This diagram is composed of two full-size overlaid tracings. One tracing was made from the Thwing-Elmendorf tear tester with NO CUTOUT (old style). The other tracing was made from the Thwing-Elmendorf tear tester with DEEP CUTOUT. The cross hatched area represents the metal removed from the swinging sector when the deep cutout (new) style was created.