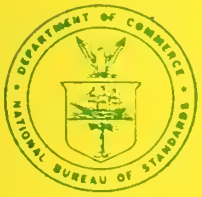
TECHNICAL ASSOCIATION OF THE
PULP AND PAPER INDUSTRY

COLLABORATIVE REFERENCE PROGRAM FOR PAPER

REPORT NO. 51S
STRENGTH TESTS



U.S. DEPARTMENT OF COMMERCE
National Bureau of Standards

NBS COLLABORATIVE REFERENCE PROGRAMS

TAPPI Paper and Board (6 times per year)

- Bursting strength
- Tearing strength
- Tensile breaking strength
- Elongation to break
- Tensile energy absorption
- Folding endurance
- Stiffness
- Air resistance
- Grammage
- Smoothness
- Surface pick strength
- K & N ink absorption
- pH
- Opacity
- Blue reflectance (brightness)
- Specular gloss, 75°
- Thickness
- Concora (flat crush)
- Ring crush

FKBG-API Containerboard (48 times per year)

- Mullen burst of linerboard
- Concora test of medium

MCCA Color and Appearance (4 times per year)

- Gloss at 60°
- Color and color difference
- Retroreflectivity

Rubber (4 times per year)

- Tensile strength, ultimate elongation and tensile stress
- Hardness
- Mooney viscosity
- Vulcanization properties

ASTM Textiles (3 times per year)

- Flammability (FF3-71 and FF5-74)

ASTM Cement (2 times per year)

- Chemical (11 chemical components)
- Physical (8 characteristics)

AASHTO Bituminous

- Asphalt cement (2 times per year)
- Cutbacks (once a year)

Collaborative Reference Programs
B360 Polymer Building
National Bureau of Standards
Washington, D.C. 20234

TECHNICAL ASSOCIATION OF THE
PULP AND PAPER INDUSTRY

COLLABORATIVE REFERENCE PROGRAM FOR PAPER

Report No. 51S
STRENGTH TESTS

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U. S. DEPARTMENT OF COMMERCE
National Bureau of Standards

NBSIR 78-1336

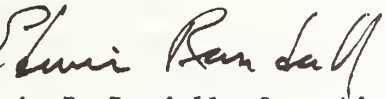
INTRODUCTION

Reports 51S and 51G comprise the third 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

March 28, 1978

TAPPI-NBS COLLABORATIVE REFERENCE PROGRAM

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.

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 T10-1 TABLE 1

BURSTING STRENGTH, PSI

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

LAB CODE	SAMPLE H62 MEAN	PRINTING 77 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE H39 MEAN	PRINTING 84 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.F. 15 VAR	F	LAB
L107	15.20	-1.73	-1.22	1.01	.91	32.80	-2.74	-1.24	3.12	1.46	10C	A	L107
L121	16.26	-.67	-.47	1.11	.99	35.32	-.22	-.10	1.96	.92	10C	A	L121
L131	15.20	-1.73	-1.22	1.42	1.27	31.13	-4.40	-2.00	2.39	1.12	10C	A	L131
L134	16.67	-.26	-.18	.82	.73	35.27	-.27	-.12	1.44	.67	10C	A	L134
L150	17.07	.14	.10	1.94	1.74	36.97	1.43	.65	2.38	1.11	10C	A	L150
L153	17.33	.41	.29	1.23	1.10	35.57	.03	.01	1.62	.76	10C	A	L153
L158	16.43	-.50	-.35	1.16	1.04	NO DATA REPORTED FOR SAMPLE H39					10C	M	L158
L162	13.67	-3.26	-2.29	1.68	1.50	29.80	-5.74	-2.61	3.91	1.83	10C	B	L162
L167	17.57	.65	.45	.62	.56	35.67	.13	.06	.76	.35	10C	A	L167
L183	16.07	-.86	-.61	1.41	1.26	31.70	-3.84	-1.74	2.35	1.10	10C	A	L183
L191	16.83	-.09	-.07	1.18	1.05	36.07	.53	.24	2.08	.97	10C	A	L191
L203A	15.23	-1.69	-1.19	1.19	1.06	35.83	.30	.14	2.58	1.21	10C	A	L203A
L203B	15.27	-1.66	-1.17	1.33	1.19	36.98	1.45	.66	3.36	1.58	10C	A	L203B
L207	19.43	2.51	1.76	.80	.71	37.87	2.33	1.06	1.68	.93	10C	A	L207
L212	17.63	.71	.50	1.29	1.15	35.40	-.14	-.06	2.98	1.40	10C	A	L212
L223A	19.68	2.75	1.94	1.20	1.07	43.17	7.63	3.47	1.68	.79	10C	A	L223A
L225	18.27	1.34	.94	1.15	1.03	37.20	1.66	.76	2.02	.95	10C	A	L225
L232	17.00	.07	.05	1.34	1.20	35.70	.16	.07	2.40	1.13	10C	A	L232
L237A	17.00	.07	.05	.76	.68	36.67	1.13	.51	.90	.42	10C	A	L237A
L237B	17.60	.67	.47	.74	.66	36.93	1.40	.64	1.10	.52	10C	A	L237B
L243	18.37	1.44	1.01	1.08	.96	35.40	-.14	-.06	2.18	1.02	10C	A	L243
L248	17.01	.09	.06	1.04	.93	36.37	.83	.38	1.95	.91	10F	C	L248
L249	15.03	-1.89	-1.33	.61	.55	32.91	-2.63	-1.20	1.20	.56	10C	A	L249
L261	16.37	-.56	-.39	.71	.64	33.27	-2.27	-1.03	1.83	.86	10C	A	L261
L264	16.93	.01	.00	.96	.86	35.40	-.14	-.06	1.40	.66	10C	A	L264
L279	16.15	-.77	-.54	.98	.87	35.63	.10	.04	1.38	.65	10C	A	L279
L299	18.33	1.41	.99	1.36	1.22	38.47	2.93	1.33	2.15	1.01	10C	A	L299
L305	16.67	-.26	-.18	1.11	1.00	38.37	2.83	1.29	1.62	.76	10C	A	L305
L311	17.63	.71	.50	1.51	1.35	37.43	1.90	.86	2.26	1.06	10C	A	L311
L312	18.33	1.41	.99	.72	.65	34.67	-.87	-.40	2.09	.95	10C	A	L312
L315	19.79	2.86	2.01	1.56	1.39	36.97	1.43	.65	4.03	1.89	10C	A	L315
L321	17.27	.34	.24	1.27	1.13	33.50	-2.04	-.93	3.67	1.72	10C	A	L321
L322	17.49	.56	.39	1.10	.98	38.33	2.80	1.27	2.54	1.24	10C	A	L322
L326	16.63	-.29	-.21	1.26	1.13	35.97	.43	.20	1.86	.87	10C	A	L326
L330	17.57	.65	.45	.90	.81	38.22	2.68	1.22	2.25	1.05	10C	A	L330
L331	17.27	.34	.24	1.16	1.04	37.00	1.46	.67	3.30	1.54	10C	A	L331
L333	14.80	-2.13	-1.50	1.08	.97	32.87	-2.67	-1.21	2.39	1.12	10C	A	L333
L339	15.30	-1.63	-1.14	1.14	1.02	35.03	-.51	-.23	2.16	1.01	10C	A	L339
L344	13.90	-3.03	-2.13	.97	.87	32.43	-3.10	-1.41	1.60	.75	10C	A	L344
L356	18.19	1.27	.89	1.67	1.49	34.92	-.62	-.28	1.63	.76	10C	A	L356
L358	15.80	-1.13	-.79	.92	.82	30.70	-4.84	-2.20	2.28	1.07	10C	A	L358
L360	17.50	.57	.40	.85	.76	34.95	-.58	-.27	2.73	1.28	10C	A	L360
L390	17.13	.21	.14	1.41	1.26	36.40	.86	.39	1.30	.61	10C	A	L390
L561	20.53	3.61	2.54	1.43	1.28	39.23	3.70	1.68	2.30	1.08	10C	A	L561
L563	10.86	-6.07	-4.27	1.06	.95	30.37	-5.17	-2.35	1.25	.58	10C	X	L563
L568	18.29	1.37	.96	1.11	.99	37.09	1.56	.71	3.07	1.44	10C	A	L568
L599	17.79	.87	.61	.83	.74	37.52	1.98	.90	1.46	.68	10C	A	L599
L601	16.37	-.56	-.39	1.15	1.03	37.23	1.69	.77	1.85	.87	10C	A	L601

GR. MEAN = 16.93 PSI GRAND MEAN = 35.54 PSI TEST DETERMINATIONS = 15

SD MEANS = 1.42 PSI SD OF MEANS = 2.20 PSI 45 LABS IN GRAND MEANS

AVERAGE SDR = 1.12 PSI AVERAGE SDR = 2.13 PSI

GR. MEAN = 116.7 KILOPASCAL GRAND MEAN = 245.0 KILOPASCAL

L128	17.73	.81	.57	.80	.71	36.27	.73	.33	2.28	1.07	10B	*	L128
L242	18.61	1.68	1.18	.81	.72	37.36	1.83	.83	1.64	.77	10T	*	L242
L251	19.48	2.55	1.79	.90	.81	36.83	1.29	.59	1.86	.87	10V	*	L251
L269	20.47	3.54	2.49	1.52	1.36	37.67	2.13	.97	1.33	.62	10A	*	L269
L484	16.80	-.13	-.09	1.13	1.01	34.93	-.60	-.27	2.23	1.04	10M	*	L484

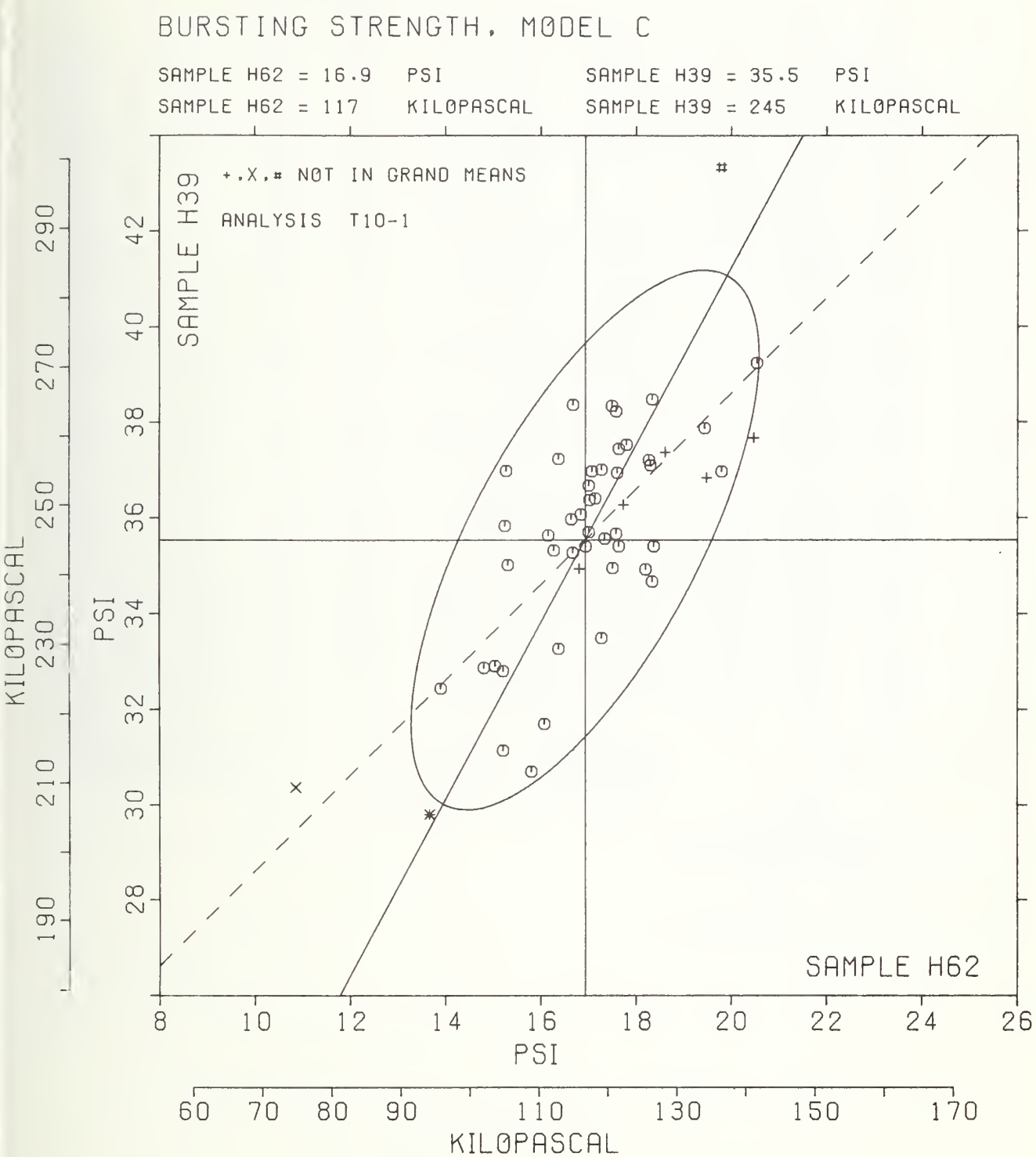
TOTAL NUMBER OF LABORATORIES REPORTING = 53

Best Values: H62 17.0 ± 2.3 psi
H39 35.7 ± 2.8 psi

The following laboratories were omitted from the grand means because of extreme test results: 223A.

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

LAB CODE	F	MEANS H62	MEANS H39	COORDINATES MAJOR	COORDINATES MINOR	AVG R,SDR VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L563	X	10.86	30.37	-7.43	2.89	.77 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
LI62	*	13.67	29.80	-6.60	.15	1.67 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L344	O	13.90	32.43	-4.17	1.19	.81 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L333	O	14.80	32.87	-3.36	.61	1.04 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L249	O	15.03	32.91	-3.21	.42	.56 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L107	O	15.20	32.80	-3.23	.22	1.18 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L131	O	15.20	31.13	-4.70	-.57	1.20 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L203A	O	15.23	35.83	-.54	1.63	1.13 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L203B	O	15.27	36.98	.48	2.15	1.38 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L339	O	15.30	35.03	-1.22	1.19	1.02 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L358	O	15.80	30.70	-4.79	-1.30	.95 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L183	O	16.07	31.70	-3.79	-1.06	1.18 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L279	O	16.15	35.63	-.28	.73	.76 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L121	O	16.26	35.32	-.51	.49	.95 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L601	O	16.37	37.23	1.22	1.30	.95 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L261	O	16.37	33.27	-2.26	-.58	.75 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L158	M	16.43				1.04 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L326	O	16.63	35.97	.24	.46	1.00 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L134	O	16.67	35.27	-.36	.10	.70 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L305	O	16.67	38.37	2.37	1.57	.88 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L484	*	16.80	34.93	-.59	-.17	1.03 10M	BURSTING STRENGTH UP TO 45 PSI,REGMED MT/MGT,MANUAL CLAMP
L191	O	16.83	36.07	.42	.34	1.01 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L264	O	16.93	35.40	-.12	-.07	.76 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L232	O	17.00	35.70	.18	.01	1.16 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L237A	O	17.00	36.67	1.03	.47	.55 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L248	O	17.01	36.37	.77	.32	.92 10E	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L150	O	17.07	36.97	1.32	.56	1.43 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L390	O	17.13	36.40	.86	.23	.93 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L321	O	17.27	35.50	-1.63	-1.27	1.43 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L331	O	17.27	37.00	1.45	.40	1.29 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
I153	O	17.33	35.57	.22	-.34	.93 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L322	O	17.49	38.33	2.73	.84	1.11 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L360	O	17.50	34.95	-.24	-.78	1.02 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L330	O	17.57	38.22	2.67	.71	.93 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L167	O	17.57	35.67	.42	-.51	.46 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L237B	O	17.60	36.93	1.55	.07	.59 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
I212	O	17.63	35.40	.21	-.69	1.27 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L311	O	17.63	37.43	2.00	.28	1.20 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
I128	*	17.73	36.27	1.03	-.36	.89 10B	BURSTING STRENGTH UP TO 45 PSI, PERKINS B, MANUAL CLAMP
L599	O	17.79	37.52	2.16	.18	.71 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L355	O	18.19	34.92	.06	-1.41	1.13 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L225	O	18.27	37.20	2.10	-.39	.99 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L568	O	18.29	37.09	2.02	-.46	1.22 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L299	O	18.33	38.47	3.25	.15	1.11 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L312	O	18.33	34.67	-.10	-1.65	.80 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L243	O	18.37	35.40	.56	-1.33	.99 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L242	*	18.61	37.36	2.40	-.51	.75 10T	BURSTING STRENGTH UP TO 45 PSI, L*W,MANUAL CLAMP
L207	O	19.43	37.87	3.24	-1.10	.82 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L251	*	19.48	36.83	2.35	-1.63	.84 10V	BURSTING STRENGTH UP TO 45 PSI, L*W,MANUAL CLAMP, 20C,65% RH
L223A	#	19.69	43.17	8.02	1.20	.93 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L315	O	19.79	36.97	2.62	-1.84	1.64 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L269	*	20.47	37.67	3.56	-2.10	.99 10A	BURSTING STRENGTH UP TO 45 PSI, PERKINS A, MANUAL CLAMP
L561	O	20.53	39.23	4.97	-1.42	1.18 10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
GMEANS:		16.93	35.54			1.00	
		95% ELLIPSE:		6.28	2.39	WITH GAMMA = 61 DEGREES	


BURSTING STRENGTH, MODEL C
SAMPLE H62 = 16.9 PSI
SAMPLE H62 = 117 KILOPASCAL
SAMPLE H39 = 35.5 PSI
SAMPLE H39 = 245 KILOPASCAL
+,X,# NOT IN GRAND MEANS
ANALYSIS T10-1
SAMPLE H39
PSI
KILOPASCAL
SAMPLE H62
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 H62 MEAN	PRINTING 77 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE H39 MEAN	PRINTING 84 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.* 15 VAR	F	LAB
L100	18.13	.41	.51	1.16	1.00	36.63	.50	.34	1.47	.73	10D	A	L100
L115	17.39	-.33	-.40	1.08	.93	37.73	1.60	1.10	1.60	.80	10D	A	L115
L118	18.73	1.01	1.26	.99	.85	35.43	-.70	-.48	1.50	.75	10D	A	L118
L122	18.93	1.22	1.51	1.16	1.01	37.00	.87	.59	1.96	.98	10F	A	L122
L125	13.67	-4.05	-5.01	2.74	2.38	35.87	-.27	-.18	5.78	2.88	10D	#	L125
L141	17.75	.03	.04	1.62	1.40	36.47	.33	.23	1.42	.71	10D	A	L141
L148	18.60	.89	1.10	1.18	1.03	37.87	1.73	1.19	1.68	.84	10D	A	L148
L157	18.83	1.12	1.39	1.53	1.33	37.60	1.47	1.00	2.77	1.38	10D	A	L157
L159	14.49	-3.23	-3.99	.78	.68	30.50	-5.63	-3.86	1.75	.87	10D	X	L159
L163	17.20	-.51	-.63	1.40	1.21	35.10	-1.03	-.71	2.81	1.40	10D	A	L163
L166	16.73	-.98	-1.21	1.22	1.06	33.97	-2.17	-1.48	2.27	1.13	10D	A	L166
L176	18.80	1.09	1.35	1.01	.88	37.07	.93	.64	1.98	.99	10D	A	L176
L185	18.57	.85	1.06	.98	.85	36.70	.57	.39	2.09	1.04	10D	A	L185
L190C	16.67	-1.05	-1.29	1.37	1.19	35.23	-.90	-.62	2.22	1.10	10D	A	L190C
L190R	18.20	.49	.60	1.05	.91	37.17	1.03	.71	1.71	.85	10D	A	L190R
L194	18.43	.72	.89	1.04	.90	36.31	.17	.12	1.26	.63	10D	A	L194
L217	17.37	-.35	-.43	.69	.60	34.20	-1.93	-1.32	2.11	1.05	10D	A	L217
L224	17.87	.15	.19	1.41	1.22	38.87	2.73	1.87	2.39	1.19	10D	A	L224
L226B	17.70	-.01	-.01	1.03	.89	36.31	.18	.12	1.54	.77	10D	A	L226B
L226C	18.00	.29	.36	1.77	1.54	38.07	1.93	1.32	3.34	1.66	10D	A	L226C
L233	17.37	-.35	-.43	1.03	.89	33.65	-2.48	-1.70	1.16	.56	10D	A	L233
L241	18.94	1.23	1.52	1.24	1.08	34.87	-1.27	-.87	1.96	.97	10D	A	L241
L255	17.14	-.57	-.71	.78	.67	33.33	-2.80	-1.92	1.65	.82	10D	A	L255
L257A	17.67	-.05	-.06	1.40	1.21	36.20	.07	.05	2.46	1.22	10D	A	L257A
L257B	17.87	.15	.19	1.68	1.46	36.13	-.00	-.00	1.55	.77	10D	A	L257B
L257C	18.13	.42	.52	1.19	1.03	36.47	.33	.23	1.73	.86	10D	A	L257C
L262	17.67	-.05	-.06	.82	.71	36.47	.33	.23	1.97	.98	10D	A	L262
L275	16.51	-1.21	-1.49	1.52	1.32	37.80	1.67	1.14	3.47	1.73	10D	A	L275
L280	18.73	1.02	1.26	1.04	.90	36.65	.52	.36	2.00	.99	10D	A	L280
L285	16.83	-.88	-1.09	1.29	1.12	38.17	2.04	1.40	2.83	1.41	10D	A	L285
L309	16.45	-1.27	-1.57	1.15	1.00	34.52	-1.61	-1.11	2.58	1.28	10D	A	L309
L341	17.70	-.01	-.01	.84	.73	34.30	-1.83	-1.26	1.32	.66	10D	A	L341
L352	16.27	-1.45	-1.79	.58	.50	33.38	-2.75	-1.89	2.39	1.19	10D	A	L352
L378	17.13	-.58	-.72	1.06	.92	34.83	-1.30	-.89	1.71	.85	10D	A	L378
L567	16.07	-1.65	-2.04	1.36	1.18	36.80	.67	.46	1.74	.87	10D	A	L567
L575	18.37	.66	.82	.64	.55	36.59	.46	.31	2.25	1.12	10D	A	L575
L581	17.30	-.41	-.51	1.22	1.06	35.40	-.73	-.50	2.26	1.13	10D	A	L581
L587	17.60	-.11	-.14	1.00	.87	37.53	1.40	.96	1.22	.61	10D	A	L587

GR. MEAN * 17.71 PSI GRAND MEAN * 36.13 PSI TEST DETERMINATIONS * 15

SD MEANS * .81 PSI SD OF MEANS * 1.46 PSI 35 LABS IN GRAND MEANS

AVERAGE SDR * 1.15 PSI AVERAGE SDR * 2.01 PSI

GR. MEAN * 122.1 KILOPASCAL GRAND MEAN * 249.1 KILOPASCAL

L337	15.20	-2.51	-3.11	.77	.67	33.33	-2.80	-1.92	1.41	.70	10B	*	L337

TOTAL NUMBER OF LABORATORIES REPORTING * 39

Best Values: H62 18.0 $\pm$ 1.4 psi
H39 36.1 $\pm$ 2.1 psi

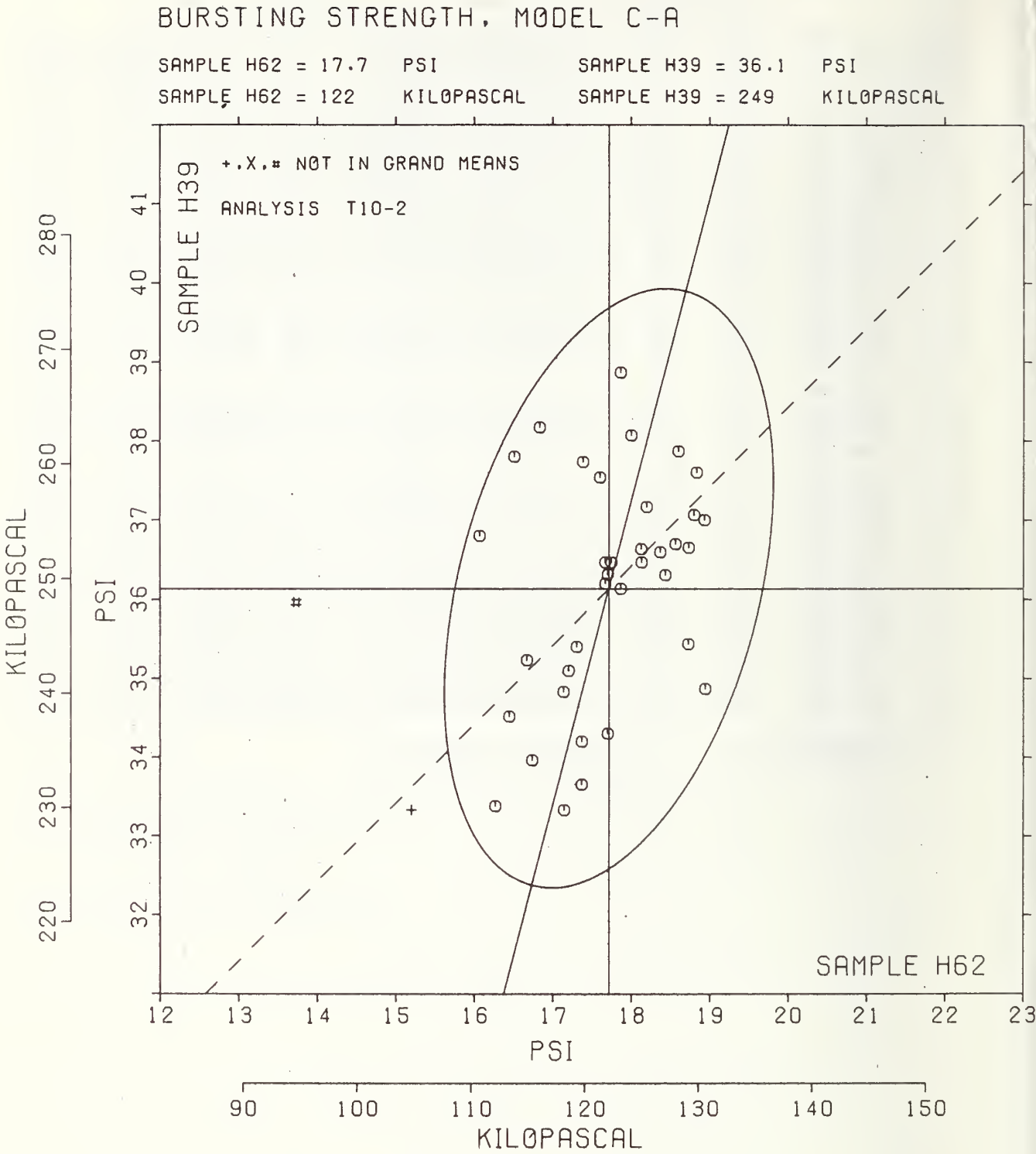
The following laboratories were omitted from the grand means because of extreme test results: 125.

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	F	MEANS H62	MEANS H39	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L125	#	13.67	35.87	-1.28	3.85	2.63	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L159	X	14.49	30.50	-6.27	1.70	.78	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L337	*	15.20	33.33	-3.34	1.72	.69	10H	BURSTING STRENGTH UP TO 45 PSI, PERKINS AH, HYDRAULIC CLAMP
L567	A	16.07	36.80	.23	1.76	1.02	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L352	A	16.27	33.38	-3.03	.70	.84	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L309	B	16.45	34.52	-1.88	.82	1.14	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L275	A	16.51	37.80	1.31	1.59	1.52	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L190C	B	16.67	35.23	-1.14	.78	1.15	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L166	A	16.73	33.97	-2.34	.40	1.09	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L285	A	16.83	38.17	1.75	1.37	1.26	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L378	B	17.13	34.83	-1.40	.23	.88	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L255	B	17.14	33.33	-2.85	-.15	.75	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L163	B	17.20	35.10	-1.13	.23	1.31	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L581	A	17.30	35.40	-.81	.21	1.09	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L233	B	17.37	33.65	-2.49	-.29	.74	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L217	A	17.37	34.20	-1.96	-.15	.83	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L115	A	17.39	37.73	1.47	.72	.87	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L567	A	17.60	37.53	1.33	.46	.74	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L262	A	17.67	36.47	.31	.13	.84	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L257A	B	17.67	36.20	.05	.06	1.22	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L341	B	17.70	34.30	-1.78	-.45	.69	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L226B	B	17.70	36.31	.17	.06	.83	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L141	B	17.75	36.47	.33	.05	1.06	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L224	B	17.87	38.87	2.68	.54	1.20	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L257B	A	17.87	36.13	.04	-.15	1.12	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L226C	A	18.00	38.07	1.94	.21	1.60	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L100	B	18.13	36.63	.59	-.28	.87	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L257C	B	18.13	36.47	.43	-.32	.94	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L190R	B	18.20	37.17	1.12	-.21	.88	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L575	A	18.37	36.59	.61	-.52	.83	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L194	B	18.43	36.31	.35	-.65	.77	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L185	A	18.57	36.70	.76	-.68	.95	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L148	A	18.60	37.87	1.90	-.42	.93	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L118	A	18.73	35.43	-.42	-1.16	.80	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L280	A	18.73	36.65	.76	-.86	.95	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L176	A	18.80	37.07	1.18	-.82	.93	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L157	A	18.83	37.60	1.70	-.71	1.35	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L122	A	18.93	37.00	1.15	-.96	.99	10F	BURSTING STRENGTH UP TO 45 PSI,PERKINS C, H.CLAMP,TRANSDUCER
L241	A	18.94	34.87	-.92	-1.51	1.03	10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
GMEANS:		17.71	36.13			1.00		
		95% ELLIPSE:		3.89	1.92	WITH GAMMA = 75 DEGREES		


BURSTING STRENGTH, MODEL C-A
SAMPLE H62 = 17.7 PSI
SAMPLE H62 = 122 KILOPASCAL
SAMPLE H39 = 36.1 PSI
SAMPLE H39 = 249 KILOPASCAL
+,X,# NOT IN GRAND MEANS
ANALYSIS T10-2
SAMPLE H39
PSI
KILOPASCAL
SAMPLE H62
PSI
KILOPASCAL

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 H40 PRINTING 151 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	SAMPLE H07 KRAFT 147 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	TEST D.F 15 VAR	F	LAB
L100	53.8	-.5	-.26	1.9	.71	70.3	-3.3	-.74	6.0	.88	11D	O	L100
L103	55.3	1.0	.52	2.1	.80	75.1	1.4	.32	4.0	.59	11C	O	L103
L107	56.7	2.4	1.24	4.2	1.59	76.7	3.0	.68	9.8	1.44	11C	O	L107
L118	53.6	-.8	-.40	3.2	1.22	77.2	3.5	.80	6.6	.97	11D	O	L118
L122	55.1	.7	.38	2.7	1.02	71.5	-2.1	-.48	4.5	.66	11F	O	L122
L128	56.5	2.1	1.11	3.2	1.24	72.9	-.8	-.18	6.7	.98	11D	O	L128
L141	55.4	1.1	.57	2.7	1.04	74.8	1.1	.25	8.3	1.22	11D	O	L141
L148	56.1	1.7	.90	3.2	1.22	77.6	3.9	.89	6.7	.98	11D	O	L148
L159	50.1	-4.3	-2.21	2.3	.88	65.3	-8.4	-1.88	6.4	.95	11D	O	L159
L170	54.8	.5	.24	.9	.35	69.0	-4.6	-1.04	2.4	.35	11C	O	L170
L174	62.2	7.9	4.08	1.6	.60	74.9	1.3	.29	4.9	.72	11D	X	L174
L176	55.1	.8	.41	3.7	1.40	67.5	-6.1	-1.37	5.0	.74	11D	O	L176
L182	55.9	1.6	.83	2.5	.95	77.5	3.9	.87	6.0	.88	11D	O	L182
L218	56.6	2.3	1.19	3.8	1.46	75.1	1.5	.33	6.4	.94	11D	O	L218
L232	54.1	-.2	-.12	3.3	1.27	69.0	-4.6	-1.04	9.9	1.45	11C	O	L232
L237A	54.5	.1	.07	1.4	.52	78.9	5.3	1.19	4.1	.61	11C	O	L237A
L237B	56.1	1.7	.90	1.2	.47	78.2	4.5	1.02	3.1	.45	11C	O	L237B
L238A	51.2	-3.1	-1.61	3.3	1.25	74.1	.4	.10	8.2	1.21	11Y	O	L238A
L243	53.0	-1.4	-.71	2.8	1.08	74.0	.4	.09	6.5	.96	11C	O	L243
L248	55.1	.7	.37	2.4	.93	71.7	-1.9	-.43	7.2	1.06	11F	O	L248
L273	51.3	-3.1	-1.59	1.4	.55	75.4	1.7	.39	3.8	.56	11C	O	L273
L279	55.8	1.5	.76	1.9	.74	79.2	5.5	1.25	4.3	.64	11C	O	L279
L280	54.3	.0	.01	2.8	1.08	76.2	2.6	.58	6.2	.91	11D	O	L280
L294	56.2	1.9	.97	2.2	.85	NO DATA REPORTED FOR SAMPLE H07					11C	M	L294
L303	51.4	-3.0	-1.54	1.9	.73	65.0	-8.7	-1.95	6.5	.96	11C	O	L303
L330	56.2	1.9	.99	2.6	.97	76.4	2.8	.62	6.3	.94	11C	O	L330
L331	56.1	1.8	.93	3.5	1.33	77.7	4.0	.90	8.3	1.23	11C	O	L331
L333	52.6	-1.7	-.90	3.6	1.37	68.7	-5.0	-1.12	6.8	1.01	11C	O	L333
L334	56.6	2.2	1.16	1.7	.66	72.9	-.7	-.16	10.1	1.49	11D	O	L334
L344	54.7	.4	.19	1.8	.68	76.8	3.1	.71	8.7	1.28	11C	O	L344
L356	54.2	-.1	-.07	2.9	1.12	75.8	2.1	.47	9.0	1.33	11C	O	L356
L362	50.7	-3.7	-1.90	2.5	.95	60.4	-13.2	-2.97	6.2	.91	11D	*	L362
L378	54.2	-.1	-.07	3.2	1.21	74.6	1.0	.22	11.5	1.70	11D	O	L378
L392	51.0	-3.3	-1.73	2.6	.99	72.8	-.9	-.19	5.9	.87	11C	O	L392
L565	52.8	-1.5	-.78	1.5	.59	70.7	-2.9	-.65	3.5	.52	11D	O	L565
L567	53.9	-.4	-.21	2.6	1.00	78.5	4.8	1.08	8.7	1.28	11D	O	L567
L575	57.3	3.0	1.54	4.0	1.51	79.1	5.4	1.22	10.3	1.53	11D	O	L575
L604	53.9	-.4	-.22	2.9	1.10	74.6	1.0	.21	9.7	1.43	11C	O	L604

GR. MEAN = 54.3 PSI GRAND MEAN = 73.7 PSI TEST DETERMINATIONS = 15

SD MEANS = 1.9 PSI SD OF MEANS = 4.5 PSI 36 LABS IN GRAND MEANS

AVERAGE SDR = 2.6 PSI AVERAGE SDR = 6.9 PSI

GR. MEAN = 374.6 KILOPASCAL GRAND MEAN = 507.8 KILOPASCAL

L242	57.8	3.5	1.80	2.1	.82	77.3	3.6	.82	5.1	.75	11T	*	L242
L251	50.4	-3.9	-2.03	2.6	.97	69.2	-4.4	-1.00	6.8	1.01	11V	*	L251
L393	56.9	2.5	1.31	2.9	1.11	78.4	4.7	1.07	5.3	.78	11H	*	L393
L394	64.4	10.1	5.22	2.2	.84	88.0	14.3	3.22	3.0	.44	11H	*	L394
L570	54.7	.3	.17	2.4	.93	72.5	-1.1	-.25	7.2	1.07	11H	*	L570
L576	57.3	2.9	1.52	2.5	.95	79.6	6.0	1.34	5.0	.74	11P	*	L576
L593	57.7	3.4	1.76	3.3	1.24	77.5	3.9	.87	8.6	1.27	11J	*	L593

TOTAL NUMBER OF LABORATORIES REPORTING = 45

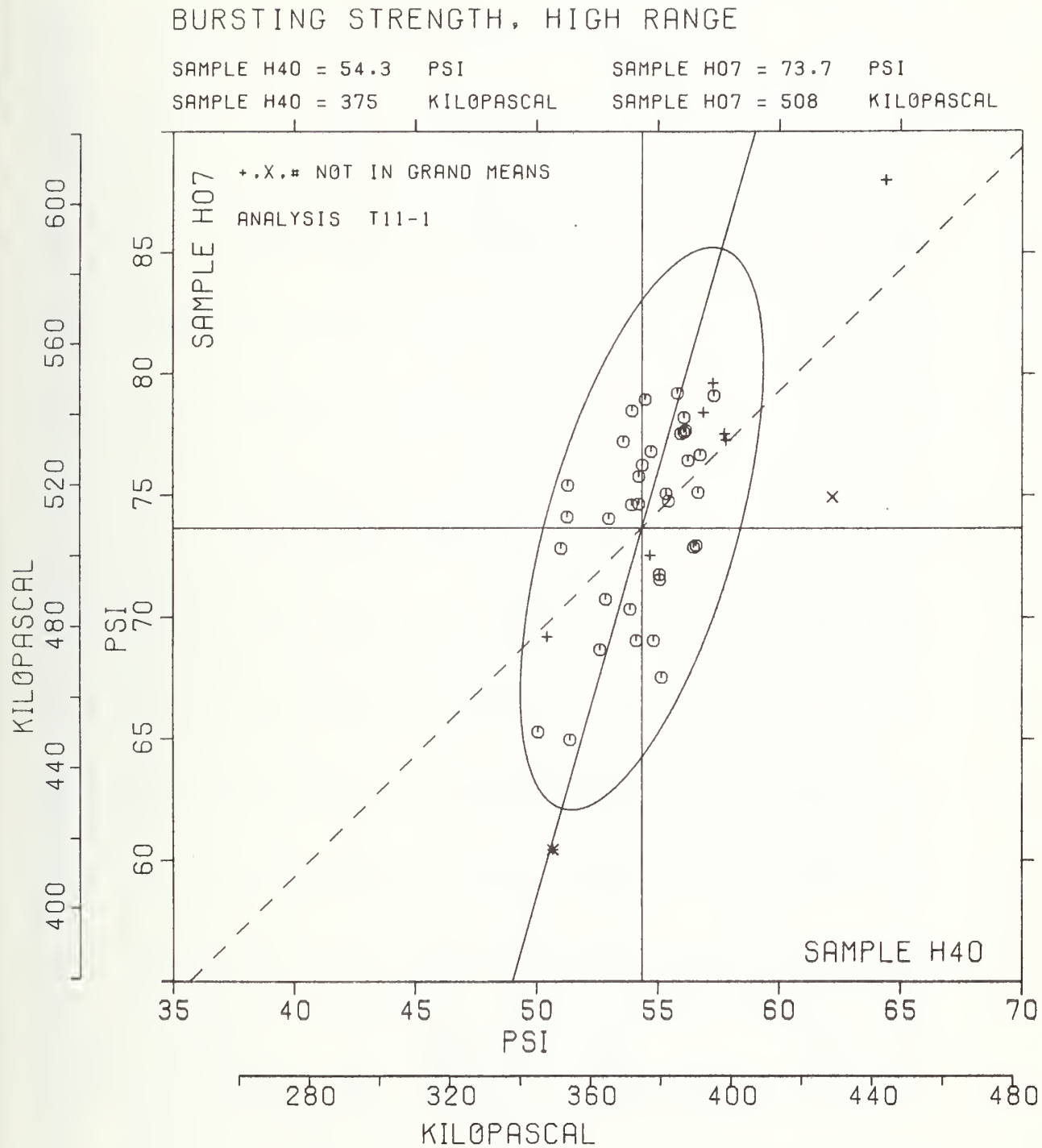
Best Values: H40 55 ± 3 psi
H07 74 ± 6 psi

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 H40	MEANS H07	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L159	O	50.1	65.3	-5.2	1.8	.91	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L251	*	50.4	69.2	-5.3	2.6	.99	11V	BURSTING STRENGTH 40 - 100 PSI, L+W,MANUAL CLAMP, 20C,65% RH
L362	*	50.7	60.4	-13.7	-.1	.93	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L392	O	51.0	72.8	-1.7	3.0	.93	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L238A	O	51.2	74.1	-.4	3.1	1.23	11Y	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L273	O	51.3	75.4	.8	3.4	.55	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L303	O	51.4	65.0	-9.2	.5	.85	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L333	O	52.6	68.7	-5.3	.3	1.19	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L565	O	52.8	70.7	-3.2	.6	.55	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L243	O	53.0	74.0	-.0	1.4	1.02	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L118	O	53.6	77.2	3.2	1.7	1.10	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L100	O	53.8	70.3	-3.3	-.4	.79	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L604	O	53.9	74.6	.8	.7	1.27	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L567	O	53.9	78.5	4.5	1.7	1.14	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L232	O	54.1	69.0	-4.5	-1.0	1.36	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L378	O	54.2	74.6	.9	.4	1.45	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L356	O	54.2	75.8	2.0	.7	1.22	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L280	O	54.3	76.2	2.5	.7	1.00	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L237A	O	54.5	78.9	5.1	1.3	.56	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L570	*	54.7	72.5	-1.0	-.6	1.00	11H	BURSTING STRENGTH 40 - 100 PSI, PERKINS AH, HYDRAULIC CLAMP
L344	O	54.7	76.8	3.1	.5	.98	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L170	O	54.8	69.0	-4.3	-1.7	.35	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L248	O	55.1	71.7	-1.6	-1.2	.99	11E	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L122	O	55.1	71.5	-1.8	-1.3	.84	11P	BURSTING STRENGTH 40 - 100 PSI,PERKINS C, H.CLAMP,TRANSDUCER
L176	O	55.1	67.5	-5.7	-2.4	1.07	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L103	O	55.3	75.1	1.6	-.6	.70	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L141	O	55.4	74.8	1.4	-.8	1.13	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L279	O	55.8	79.2	5.7	.1	.69	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L182	O	55.9	77.5	4.2	-.5	.91	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L148	O	56.1	77.6	4.3	-.6	1.10	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L237B	O	56.1	78.2	4.9	-.4	.46	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L331	O	56.1	77.7	4.4	-.6	1.28	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L294	M	56.2				.85	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L330	O	56.2	76.4	3.2	-1.1	.95	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L128	O	56.5	72.9	-.2	-2.3	1.11	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L334	O	56.6	72.9	-.1	-2.3	1.07	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L218	O	56.6	75.1	2.1	-1.8	1.20	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L107	O	56.7	76.7	3.6	-1.5	1.51	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L393	*	56.9	78.4	5.3	-1.1	.95	11H	BURSTING STRENGTH 40 - 100 PSI, PERKINS AH, HYDRAULIC CLAMP
L576	*	57.3	79.6	6.6	-1.2	.84	11P	BURSTING STRENGTH 40 - 100 PSI, PERKINS LC, MANUAL CLAMP
L575	O	57.3	79.1	6.1	-1.4	1.52	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L593	*	57.7	77.5	4.7	-2.2	1.25	11J	BURSTING STRENGTH 40 - 100 PSI, PERKINS JUMBO,HAND DRIVEN
L242	*	57.8	77.3	4.4	-2.3	.78	11T	BURSTING STRENGTH 40 - 100 PSI, L+W,MANUAL CLAMP
L174	X	62.2	74.9	3.4	-7.2	.66	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L394	*	64.4	88.0	16.6	-5.7	.64	11H	BURSTING STRENGTH 40 - 100 PSI, PERKINS AH, HYDRAULIC CLAMP
GMEANS:		54.3	73.7			1.00		
		95% ELLIPSE:		12.0	3.9	WITH GAMMA = 74 DEGREES		


BURSTING STRENGTH, HIGH RANGE
SAMPLE H40 = 54.3 PSI
SAMPLE H40 = 375 KILOPASCAL
SAMPLE H07 = 73.7 PSI
SAMPLE H07 = 508 KILOPASCAL
+.X.* NOT IN GRAND MEANS
ANALYSIS T11-1
SAMPLE H07
SAMPLE H40
PSI
KILOPASCAL
35 40 45 50 55 60 65 70
60 65 70 75 80 85
400 440 480 520 560 600
280 320 360 400 440 480

ANALYSIS T15-1 TABLE 1

TEARING STRENGTH, GRAMS

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

	SAMPLE	PRINTING				SAMPLE	WRITING				TEST D.= 15		
LAB	H21	106 GRAMS PER SQUARE METER				E10	70 GRAMS PER SQUARE METER						
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L100	63.0	-1.4	-.35	1.8	.84	52.7	-4.5	-1.35	1.0	.67	1SM	@	L100
L103	62.3	-2.1	-.53	1.3	.63	57.9	.7	.22	1.2	.84	1ST	@	L103
L107	67.7	3.3	.86	4.9	2.29	58.1	.9	.28	4.5	3.08	1ST	@	L107
L115	59.8	-4.6	-1.19	1.6	.77	55.6	-1.6	-.47	1.4	.97	1SC	@	L115
L118	63.1	-1.3	-.32	1.6	.77	54.7	-2.5	-.75	1.0	.67	1ST	@	L118
L121	65.1	.7	.17	2.5	1.17	59.6	2.4	.71	1.4	.93	1ST	@	L121
L122	63.5	-.9	-.24	1.8	.86	57.0	-.2	-.06	1.0	.69	1SC	@	L122
L124	63.7	-.7	-.17	1.7	.78	56.3	-.9	-.28	1.0	.71	1ST	@	L124
L126	66.9	2.5	.64	1.5	.68	58.5	1.3	.38	1.0	.68	1ST	@	L126
L128	64.1	-.3	-.07	1.4	.64	58.6	1.4	.41	.8	.57	1ST	@	L128
L134	72.3	7.9	2.03	1.6	.74	63.3	6.1	1.80	1.9	1.30	1ST	@	L134
L139	66.8	2.4	.62	1.9	.89	58.5	1.3	.38	1.2	.81	1ST	@	L139
L141	63.3	-1.1	-.29	2.4	1.13	56.7	-.5	-.16	1.2	.84	1ST	@	L141
L145	55.2	-9.2	-2.36	3.8	1.80	53.2	-4.0	-1.19	2.6	1.78	1ST	@	L145
L148	61.9	-2.5	-.65	1.9	.90	56.8	-.4	-.12	2.7	1.85	1ST	@	L148
L150	54.6	-9.8	-2.52	1.3	.61	52.2	-5.0	-1.48	1.5	1.04	1ST	@	L150
L151	78.1	13.7	3.53	2.5	1.17	68.5	11.3	3.36	1.4	.93	1SC	@	L151
L153	65.1	.7	.19	1.7	.79	57.9	.7	.22	1.4	.98	1SC	@	L153
L157	62.9	-1.5	-.39	1.8	.85	55.4	-1.8	-.53	1.2	.81	1ST	@	L157
L158	64.4	.0	.00	2.2	1.01	58.7	1.5	.43	2.8	1.91	1SR	@	L158
L159	69.2	4.8	1.25	1.7	.80	58.6	1.4	.40	2.2	1.53	1SL	@	L159
L162	62.7	-1.7	-.44	1.4	.68	55.9	-1.3	-.39	1.2	.80	1ST	@	L162
L163	61.5	-2.9	-.74	2.5	1.19	55.3	-1.9	-.57	1.6	1.08	1ST	@	L163
L166	63.5	-.9	-.22	1.7	.79	56.6	-.6	-.18	1.4	.93	1ST	@	L166
L167	67.3	2.9	.76	1.6	.77	60.9	3.7	1.09	2.0	1.34	1SC	@	L167
L170	67.0	2.6	.67	.4	.18	59.1	1.9	.55	.3	.18	1ST	@	L170
L173B	64.2	-.2	-.05	1.2	.57	60.9	3.7	1.11	1.2	.80	1ST	@	L173B
L174S	54.9	-9.5	-2.43	2.8	1.32	50.7	-6.5	-1.94	2.9	1.98	1ST	@	L174S
L176	66.4	2.0	.52	3.3	1.55	57.7	.5	.16	1.0	.71	1ST	@	L176
L182A	61.7	-2.7	-.70	2.2	1.01	51.7	-5.5	-1.62	1.4	.98	1SA	@	L182A
L182T	65.6	1.2	.31	2.4	1.12	57.4	.2	.06	1.7	1.15	1ST	@	L182T
L183	64.2	-.2	-.05	2.3	1.07	57.5	.3	.08	1.4	.96	1ST	@	L183
L185	66.7	2.3	.59	3.0	1.40	56.1	-1.1	-.32	1.3	.89	1ST	@	L185
L189	66.3	1.9	.50	1.8	.84	55.1	-2.1	-.63	1.2	.84	1ST	@	L189
L190C	62.3	-2.1	-.55	2.1	.99	54.3	-2.9	-.87	.6	.41	1ST	@	L190C
L190R	62.4	-2.0	-.51	1.2	.55	55.9	-1.3	-.38	1.3	.91	1SC	@	L190R
L191	74.9	10.5	2.71	2.0	.93	52.6	-4.6	-1.36	2.2	1.50	1ST	@	L191
L194	64.8	.4	.10	1.8	.83	57.9	.7	.22	.6	.41	1ST	@	L194
L195	67.7	3.3	.86	1.7	.78	55.3	-1.9	-.55	1.2	.84	1SC	@	L195
L206	67.3	2.9	.75	1.7	.81	61.5	4.3	1.27	1.6	1.11	1SR	@	L206
L207	70.3	5.9	1.51	2.0	.96	44.8	-12.4	-3.68	2.3	1.56	1SR	@	L207
L211	63.7	-.7	-.17	2.8	1.30	57.7	.5	.16	1.5	1.05	1SP	@	L211
L212	59.9	-4.5	-1.15	2.4	1.13	54.7	-2.5	-.75	1.2	.84	1ST	@	L212
L213	66.5	2.1	.55	1.2	.56	58.9	1.7	.51	1.0	.71	1ST	@	L213
L217	62.8	-1.6	-.41	1.7	.78	55.0	-2.2	-.66	1.0	.71	1ST	@	L217
L223	65.7	1.3	.33	2.5	1.16	56.2	-1.0	-.31	1.0	.70	1SR	@	L223
L224	60.5	-3.9	-.99	1.8	.85	52.5	-4.7	-1.38	1.0	.68	1ST	@	L224
L225	75.6	11.2	2.88	1.4	.66	63.1	5.9	1.76	.8	.57	1ST	@	L225
L226B	64.8	.4	.10	2.0	.92	56.0	-1.2	-.36	1.5	1.03	1ST	@	L226B
L226C	63.1	-1.3	-.34	2.9	1.37	56.0	-1.2	-.36	2.0	1.37	1ST	@	L226C
L228	59.3	-5.1	-1.32	2.2	1.01	53.0	-4.2	-1.25	1.3	.89	1ST	@	L228
L232	62.1	-2.3	-.58	2.8	1.30	55.1	-2.1	-.63	1.0	.71	1ST	@	L232
L233	69.1	4.7	1.22	1.8	.85	63.2	6.0	1.78	1.4	.97	1ST	@	L233
L236	57.3	-7.1	-1.83	2.9	1.36	49.6	-7.6	-2.26	1.8	1.22	1ST	@	L236
L237A	67.2	2.8	.72	1.7	.78	61.1	3.9	1.15	1.5	1.02	1ST	@	L237A
L237B	66.0	1.6	.41	1.3	.61	58.5	1.3	.39	1.2	.81	1ST	@	L237B
L238A	57.9	-6.5	-1.68	1.4	.66	52.9	-4.3	-1.27	1.3	.88	1ST	@	L238A
L241	69.7	5.3	1.37	2.7	1.27	69.6	12.4	3.68	1.5	.99	1ST	X	L241
L243	65.7	1.3	.34	2.5	1.17	56.3	-.9	-.26	1.7	1.18	1ST	@	L243
L244	67.8	3.4	.88	2.1	1.01	57.1	-.1	-.04	2.3	1.54	1SC	@	L244
L248	67.7	3.3	.84	1.3	.62	56.4	-.8	-.25	1.2	.81	1SJ	@	L 8
L249	67.7	3.3	.84	1.7	.81	60.6	3.4	1.01	1.1	.77	1ST	@	L 9
L254	65.5	1.1	.28	1.8	.83	58.5	1.3	.39	1.6	1.09	1ST	@	L254
L255	64.7	.3	.07	2.0	.91	55.9	-1.3	-.40	1.6	1.09	1ST	@	L255
L257A	65.7	1.3	.34	1.8	.86	59.3	2.1	.63	2.6	1.77	1SC	@	L257A

ANALYSIS T15-1 TABLE 1

TEARING STRENGTH, GRAMS

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

LAB CODE	SAMPLE H21 PRINTING 106 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	SAMPLE E10 WRITING 70 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	TEST D.= 15 VAR	F	LAB
L2578	66.9	2.5	.65	2.3	1.06	57.9	.7	.20	1.6	1.09	15C	@	L2578
L257C	65.3	.9	.24	1.8	.84	57.7	.5	.16	1.5	1.02	15C	@	L257C
L259	70.1	5.7	1.46	2.2	1.01	64.1	6.9	2.06	1.0	.68	15T	@	L259
L261	63.2	-1.2	-.31	2.5	1.15	56.0	-1.2	-.36	1.3	.90	15T	@	L261
L262	62.6	-1.8	-.46	.9	.43	56.7	-.5	-.16	.9	.62	15T	@	L262
L264	65.1	.7	.17	4.1	1.94	48.0	-9.2	-2.73	6.0	4.14	15T	X	L264
L273	65.7	1.3	.34	1.7	.78	65.1	7.9	2.33	1.0	.66	15T	X	L273
L275	68.5	4.1	1.07	2.6	1.21	58.1	.9	.26	1.2	.84	15T	@	L275
L277	58.8	-5.6	-1.44	1.5	.69	51.3	-5.9	-1.74	2.1	1.43	15T	@	L277
L278	69.9	5.5	1.43	3.4	1.58	61.7	4.5	1.32	2.3	1.57	15T	@	L278
L279	63.2	-1.2	-.31	5.4	2.53	53.9	-3.3	-.99	2.1	1.41	15T	@	L279
L280	68.4	4.0	1.03	1.1	.49	55.6	-1.6	-.47	.9	.62	15L	@	L280
L281	64.0	-.4	-.10	1.9	.90	59.9	2.7	.81	1.9	1.28	15T	@	L281
L285	62.1	-2.3	-.58	5.2	2.44	55.1	-2.1	-.61	1.6	1.12	15T	@	L285
L288	70.6	6.2	1.61	1.9	.89	63.1	5.9	1.75	1.3	.86	15Q	@	L288
L291	62.3	-2.1	-.55	1.3	.60	54.7	-2.5	-.73	1.3	.91	15A	@	L291
L299	67.3	2.9	.74	2.2	1.02	60.9	3.7	1.11	1.9	1.33	15T	@	L299
L303	53.0	-11.4	-2.93	1.9	.87	50.5	-6.7	-1.98	1.3	.89	15L	*	L303
L305	64.3	-.1	-.03	1.2	.57	61.0	3.8	1.13	1.1	.73	15T	@	L305
L309	63.9	-.5	-.14	4.5	2.09	58.1	.9	.28	1.6	1.09	15T	@	L309
L311	65.4	1.0	.26	4.3	2.03	56.5	-.7	-.22	1.1	.77	15T	@	L311
L312	62.7	-1.7	-.44	2.5	1.16	58.7	1.5	.43	1.2	.84	15T	@	L312
L315	61.3	-3.1	-.80	1.6	.76	54.1	-3.1	-.91	2.6	1.79	15T	@	L315
L321	57.7	-6.7	-1.71	1.8	.86	57.1	-.1	-.04	1.0	.71	15T	*	L321
L328	65.2	.8	.21	1.9	.89	52.6	-4.6	-1.36	1.7	1.18	15T	*	L328
L331	54.5	-9.9	-2.55	2.9	1.35	46.5	-10.7	-3.16	.8	.57	15T	*	L331
L334	61.9	-2.5	-.65	1.3	.61	54.9	-2.3	-.69	1.8	1.21	15T	@	L334
L336	65.0	.6	.16	1.5	.71	56.9	-.3	-.10	.9	.63	15T	@	L336
L344	60.1	-4.3	-1.10	2.3	1.09	53.6	-3.6	-1.07	1.9	1.29	15C	@	L344
L345	59.7	-4.7	-1.20	3.2	1.50	53.6	-3.6	-1.07	2.0	1.39	15T	@	L345
L352	66.5	2.2	.55	2.2	1.02	58.9	1.7	.49	1.1	.73	15C	@	L352
L360	67.2	2.8	.72	.7	.34	60.7	3.5	1.04	1.5	1.04	15T	@	L360
L362	62.6	-1.8	-.46	1.3	.61	56.6	-.6	-.18	1.5	.99	15T	@	L362
L376	64.7	.3	.07	1.0	.46	60.2	3.0	.89	1.6	1.10	15T	@	L376
L378	65.6	1.2	.31	1.3	.61	57.7	.5	.16	1.2	.80	15T	@	L378
L382	67.3	2.9	.76	1.9	.90	60.1	2.9	.87	.9	.63	15T	@	L382
L390	61.8	-2.6	-.67	3.3	1.53	55.6	-1.6	-.47	1.4	.93	15T	@	L390
L392	64.9	.5	.14	6.0	2.81	56.0	-1.2	-.36	2.0	1.37	15T	@	L392
L396M	65.0	.6	.16	1.6	.77	58.3	1.1	.34	1.1	.76	15T	@	L396M
L442	72.2	7.8	2.00	2.1	.98	66.7	9.5	2.81	1.7	1.18	15R	*	L442
L484	69.0	4.6	1.19	2.2	1.05	60.5	3.3	.99	1.8	1.21	15T	@	L484
L554	72.5	8.1	2.09	2.1	.97	64.4	7.2	2.13	.7	.50	15C	@	L554
L561	66.5	2.1	.55	3.8	1.76	65.0	7.8	2.31	1.6	1.10	15T	*	L561
L562	59.4	-5.0	-1.30	1.5	.70	53.7	-3.5	-1.03	1.1	.76	15T	@	L562
L565	65.0	.6	.16	2.0	.95	56.8	-.4	-.12	1.1	.74	15T	@	L565
L566	68.1	3.7	.96	3.6	1.68	61.7	4.5	1.34	2.8	1.93	15T	@	L566
L567	66.0	1.6	.41	2.4	1.12	59.1	1.9	.55	1.5	1.02	15C	@	L567
L576	69.4	5.0	1.29	2.6	1.21	58.7	1.5	.45	1.2	.80	15T	@	L576
L580	62.9	-1.5	-.38	1.4	.67	55.9	-1.3	-.38	1.2	.80	15T	@	L580
L581	68.1	3.7	.96	1.8	.84	60.1	2.9	.87	1.2	.85	15Q	@	L581
L587	61.6	-2.8	-.72	2.2	1.01	58.1	.9	.28	1.2	.81	15T	@	L587
L595	62.4	-2.0	-.51	2.0	.95	52.8	-4.4	-1.30	1.7	1.13	15T	@	L595
L599	69.5	5.1	1.32	3.5	1.66	60.9	3.7	1.11	1.4	.95	15T	@	L599
L600	64.3	-.1	-.03	1.5	.70	57.6	.4	.12	1.4	.93	15T	@	L600
L606	62.4	-2.0	-.51	2.7	1.26	56.3	-.9	-.28	1.3	.91	15T	@	L606

GR. MEAN = 64.4 GRAMS — GRAND MEAN = 57.2 GRAMS — TEST DETERMINATIONS = 15

SD MEANS = 3.9 GRAMS — SD OF MEANS = 3.4 GRAMS — 114 LABS IN GRAND MEANS

AVERAGE SDR = 2.1 GRAMS — AVERAGE SDR = 1.5 GRAMS

GR. MEAN = 631.5 MILLINEWTON — GRAND MEAN = 561.0 MILLINEWTON

L230	61.4	-3.0	-.78	2.5	1.18	54.1	-3.1	-.93	1.4	.95	15V	*	L230
L242	72.5	8.1	2.08	2.2	1.03	66.4	9.2	2.73	1.6	1.09	15U	*	L242
L251	63.5	-.9	-.22	1.1	.53	56.0	-1.2	-.36	1.3	.90	15K	*	L251
L301	64.5	.1	.04	2.1	.97	56.7	-.5	-.16	1.5	1.02	15X	*	L301
L575	66.1	1.7	.45	2.4	1.10	55.1	-2.1	-.61	1.0	.68	15V	*	L575
L610	64.7	.3	.07	2.5	1.16	57.7	.5	.16	2.3	1.54	15E	*	L610

TOTAL NUMBER OF LABORATORIES REPORTING = 126

Best Values: H21 65 ± 7 grams
E10 57 ± 5 grams

The following laboratories were omitted from the grand means because of extreme test results: 191, 207.

Data from the following laboratories appeared to be off by a multiplicative factor: 575. 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.

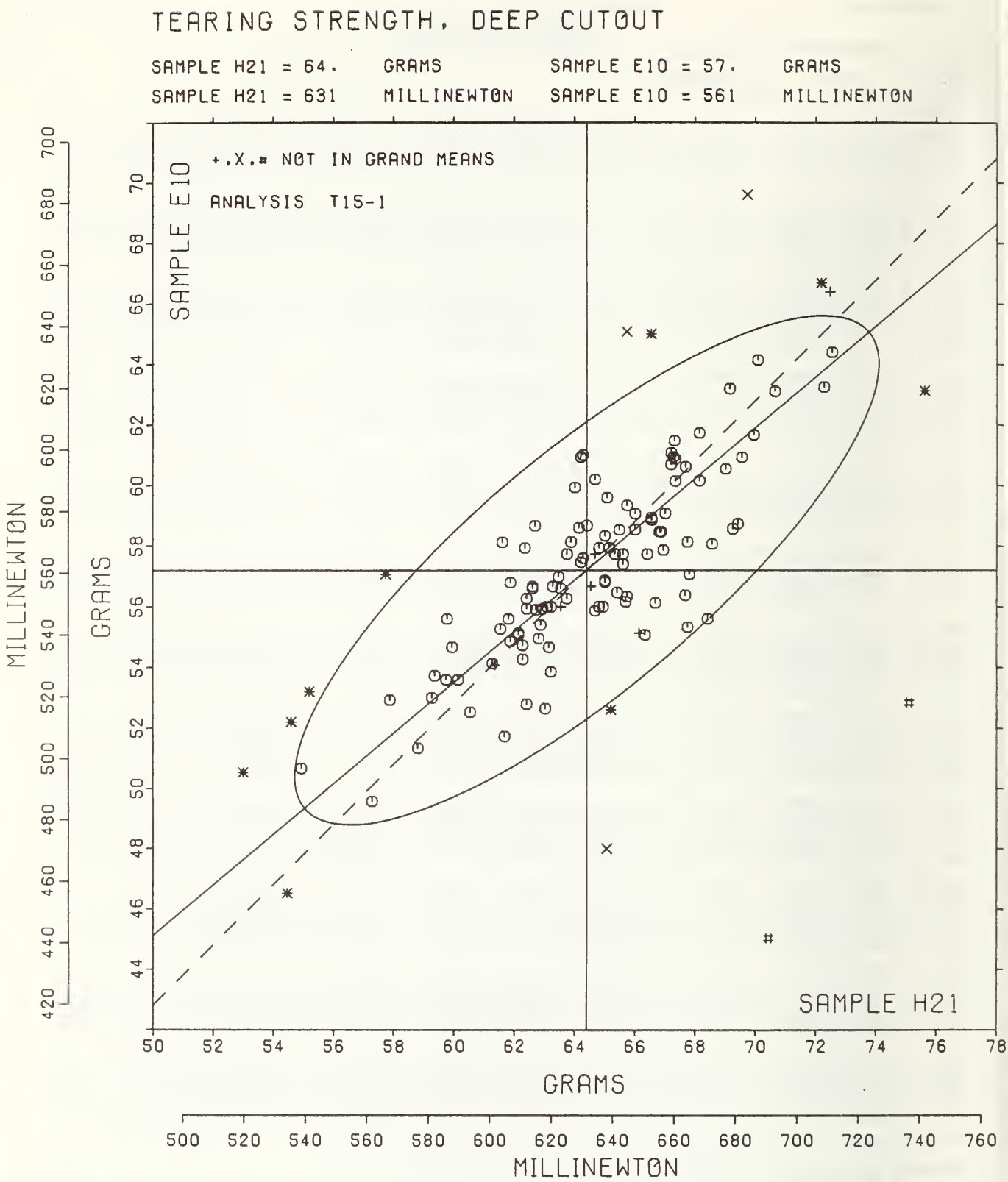
ANALYSIS T15-1 TABLE 2
TEARING STRENGTH, GRAMS
TAPPI STANDARD T414 TS-65, ANY MAKE ELMENDORF WITH DEEP CUTOUT IS STANDARD FOR THIS ANALYSIS

LAB CODE	F	MEANS H21	MEANS E10	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L303	*	53.0	50.5	-13.0	2.2	.88	15L	TEARING STRENGTH, STANDARD, LORENTZ-WETTRES
L331	*	54.5	46.5	-14.5	-1.8	.96	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L150	*	54.6	52.2	-10.7	2.5	.82	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L174S	A	54.9	50.7	-11.4	1.1	1.65	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L145	*	55.2	53.2	-9.6	2.8	1.79	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L236	A	57.3	49.6	-10.3	-1.3	1.29	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L321	*	57.7	57.1	-5.2	4.2	.78	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L238A	A	57.9	52.9	-7.7	.9	.77	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L277	A	58.8	51.3	-8.1	-.9	1.06	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L228	A	59.3	53.0	-6.6	.1	.91	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L562	A	59.4	53.7	-6.1	.6	.73	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L345	A	59.7	53.6	-5.9	.2	1.44	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L115	A	59.8	55.6	-4.6	1.7	.87	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L212	A	59.9	54.7	-5.0	.9	.99	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L344	A	60.1	53.6	-5.6	-.0	1.19	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L224	A	60.5	52.5	-6.0	-1.1	.76	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L315	A	61.3	54.1	-4.4	-.3	1.28	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L230	*	61.4	54.1	-4.3	-.4	1.06	15V	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)X2
L163	A	61.5	55.3	-3.4	.4	1.13	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L587	A	61.6	58.1	-1.5	2.5	.91	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L182A	A	61.7	51.7	-5.6	-2.4	1.00	15A	TEARING STRENGTH, STANDARD, APPITA
L390	A	61.8	55.6	-3.0	.4	1.23	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L148	A	61.9	56.8	-2.2	1.3	1.38	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L334	A	61.9	54.9	-3.4	-.2	.91	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L285	A	62.1	55.1	-3.1	-.1	1.78	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L232	A	62.1	55.1	-3.1	-.2	1.00	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L291	A	62.3	54.7	-3.2	-.5	.76	15A	TEARING STRENGTH, STANDARD, APPITA
L190C	A	62.3	54.3	-3.5	-.9	.70	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L103	A	62.3	57.9	-1.1	1.9	.73	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L606	A	62.4	56.3	-2.1	.6	1.09	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L596	A	62.4	52.8	-4.4	-2.1	1.04	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L190R	A	62.4	55.9	-2.3	.3	.73	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L362	A	62.6	56.6	-1.8	.7	.80	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L262	A	62.6	56.7	-1.7	.7	.52	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L312	A	62.7	58.7	-.4	2.2	1.00	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L162	A	62.7	55.9	-2.1	.1	.74	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L217	A	62.8	55.0	-2.7	-.7	.74	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L157	A	62.9	55.4	-2.3	-.4	.83	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L580	A	62.9	55.9	-1.9	-.0	.73	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L100	A	63.0	52.7	-4.0	-2.6	.76	15M	TEARING STRENGTH, STANDARD, T.M.MIRFIELD(APPITA-ELMENDORF)
L226C	A	63.1	56.0	-1.8	-.1	1.37	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L118	A	63.1	54.7	-2.6	-1.1	.72	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L279	A	63.2	53.9	-3.1	-1.8	1.97	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L261	A	63.2	56.0	-1.7	-.2	1.02	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L141	A	63.3	55.7	-1.2	.3	.99	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L122	A	63.5	57.0	-.9	.4	.78	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L251	*	63.5	56.0	-3.4	-.4	.71	15K	TEARING STRENGTH, STANDARD, LORENTZ-WETTRES, 20 C, 65% RH
L166	A	63.5	56.6	-1.0	.1	.86	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L211	A	63.7	57.7	-.2	.8	1.17	15R	TEARING STRENGTH, STANDARD,THWING-ELMENDORF,DIGITAL READOUT
L124	A	63.7	56.3	-1.1	-.3	.74	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L309	A	63.9	58.1	.2	1.1	1.59	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L281	A	64.0	59.9	1.5	2.3	1.09	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L128	A	64.1	58.6	.7	1.2	.60	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L183	A	64.2	57.5	.0	.3	1.01	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L173B	A	64.2	60.9	2.3	3.0	.68	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L600	A	64.3	57.6	.2	.4	.81	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L305	A	64.3	61.0	2.3	3.0	.65	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L158	A	64.4	58.7	.9	1.1	1.46	15R	TEARING STRENGTH, STANDARD,THWING-ELMENDORF,DIGITAL READOUT
L301	*	64.5	55.7	-.2	-.5	1.00	15X	TEARING STRENGTH, STANDARD: GIVE INSTRUMENT MAKE,MODEL
L610	*	64.7	57.7	.6	.2	1.35	15E	TEARING STRENGTH, STANDARD, THWING-ELMENDORF,AMBIENT COND.
L376	A	64.7	60.2	2.1	2.1	.78	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L255	A	64.7	55.9	-.6	-1.2	1.00	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L194	A	64.8	57.9	.8	.3	.62	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L226B	A	64.8	56.0	-.5	-1.2	.98	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L392	A	64.9	56.0	-.4	-1.3	2.09	15T	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 H21	MEANS E10	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L565	0	65.0	56.8	.2	-.7	.85	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L396M	0	65.0	58.3	1.2	.5	.77	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L336	0	65.0	56.9	.2	-.6	.67	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L121	0	65.1	59.6	2.1	1.4	1.05	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L264	X	65.1	48.0	-5.4	-7.5	3.04	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L153	0	65.1	57.9	1.0	.1	.89	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L328	*	65.2	52.6	-2.3	-4.0	1.03	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L257C	0	65.3	57.7	1.1	-.2	.93	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L311	0	65.4	56.5	.3	-1.2	1.40	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L254	0	65.5	58.5	1.7	.3	.96	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L182T	0	65.6	57.4	1.1	-.6	1.13	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L378	0	65.6	57.7	1.3	-.4	.70	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L223	0	65.7	56.2	.3	-1.6	.93	15R	TEARING STRENGTH, STANDARD,THWING-ELMENDORF,DIGITAL READOUT
L243	0	65.7	56.3	.5	-1.5	1.17	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L257A	0	65.7	59.3	2.4	.8	1.31	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L273	X	65.7	65.1	6.1	5.2	.72	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L237B	0	66.0	58.5	2.1	-.0	.71	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L567	0	66.0	59.1	2.4	.4	1.07	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L575	*	66.1	55.1	.0	-2.7	.89	15V	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)X2
L189	0	66.3	55.1	.1	-2.9	.84	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L176	0	66.4	57.7	1.9	-.9	1.13	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L561	*	66.5	65.0	6.7	4.6	1.43	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L213	0	66.5	58.9	2.8	-.1	.63	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L352	0	66.5	58.9	2.7	-.1	.88	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L185	0	66.7	56.1	1.1	-2.3	1.15	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L139	0	66.8	58.5	2.7	-.6	.85	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L126	0	66.9	58.5	2.7	-.6	.68	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L257B	0	66.9	57.9	2.4	-1.1	1.07	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L170	0	67.0	59.1	3.2	-.2	.18	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L360	0	67.2	60.7	4.4	.9	.69	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L237A	0	67.2	61.1	4.6	1.2	.90	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L299	0	67.3	60.9	4.6	1.0	1.18	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L206	0	67.3	61.5	5.0	1.4	.96	15R	TEARING STRENGTH, STANDARD,THWING-ELMENDORF,DIGITAL READOUT
L167	0	67.3	60.9	4.6	.9	1.05	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L382	0	67.3	60.1	4.1	.4	.76	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L248	0	67.7	56.4	2.0	-2.7	.71	15J	TEARING STRENGTH, STANDARD, LORENTZ-WETTRES
L249	0	67.7	60.6	4.7	.5	.79	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L107	0	67.7	58.1	3.2	-1.4	2.69	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L195	0	67.7	55.3	1.4	-3.6	.81	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L244	0	67.8	57.1	2.5	-2.3	1.27	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L581	0	68.1	60.1	4.8	-.2	.85	15Q	TEARING STRENGTH, STANDARD,THWING-ELMENDORF,AIR CLAMP,DIGITL
L566	0	68.1	61.7	5.8	1.1	1.80	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L280	0	68.4	55.6	2.0	-3.8	.56	15L	TEARING STRENGTH, STANDARD, LORENTZ-WETTRES
L275	0	68.5	58.1	3.7	-2.0	1.02	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L484	0	69.0	60.5	5.7	-.4	1.13	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L233	0	69.1	63.2	7.5	1.5	.91	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L159	0	69.2	58.6	4.6	-2.1	1.17	15L	TEARING STRENGTH, STANDARD, LORENTZ-WETTRES
L576	0	69.4	58.7	4.8	-2.0	1.00	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L599	0	69.5	60.9	6.3	-.4	1.30	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L241	X	69.7	69.6	12.1	6.1	1.13	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L278	0	69.9	61.7	7.1	-.1	1.57	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L259	0	70.1	64.1	8.8	1.7	.84	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L207	#	70.3	44.8	-3.5	-13.3	1.26	15R	TEARING STRENGTH, STANDARD,THWING-ELMENDORF,DIGITAL READOUT
L288	0	70.6	63.1	8.6	.5	.88	15Q	TEARING STRENGTH, STANDARD,THWING-ELMENDORF,AIR CLAMP,DIGITL
L442	*	72.2	66.7	12.1	2.3	1.08	15R	TEARING STRENGTH, STANDARD,THWING-ELMENDORF,DIGITAL READOUT
L134	0	72.3	63.3	9.9	-.4	1.02	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L242	*	72.5	66.4	12.1	1.8	1.06	15U	TEARING STRENGTH, STANDARD, AUSTRALIAN DPT. CO.
L554	0	72.5	64.4	10.9	.3	.74	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L191	#	74.9	52.6	5.1	-10.3	1.22	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L225	*	75.6	63.1	12.4	-2.7	.61	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L151	X	78.1	68.5	17.8	-.2	1.05	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
GMFANS:		64.4	57.2			1.00		
		95% ELLIPSE:		12.2	3.9	WITH GAMMA = 40 DEGREES		


TEARING STRENGTH, DEEP CUTOUT
SAMPLE H21 = 64. GRAMS
SAMPLE H21 = 631 MILLINEWTON
SAMPLE E10 = 57. GRAMS
SAMPLE E10 = 561 MILLINEWTON
+,X,* NOT IN GRAND MEANS
ANALYSIS T15-1
SAMPLE E10
GRAMS
MILLINEWTON
SAMPLE H21
GRAMS
MILLINEWTON

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 E32 MEAN	BROWN KRAFT 74 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE E63 MEAN	KRAFT ENVELOPE 75 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.F 15 VAR	F	LAB
L122	84.5	-1.6	-.43	2.2	.90	77.3	-1.0	-.28	2.1	.95	17N	O	L122
L148	85.9	-.2	-.05	2.4	.99	78.1	-.2	-.05	4.0	1.77	17N	O	L148
L174N	78.4	-7.7	-2.04	2.9	1.19	71.2	-7.1	-2.10	2.2	1.00	17N	O	L174N
L231	86.3	.3	.07	1.9	.78	82.2	3.9	1.16	2.4	1.07	17N	O	L231
L234	89.5	3.4	.90	2.1	.84	79.6	1.3	.39	2.3	1.03	17N	O	L234
L267	93.7	7.7	2.04	4.3	1.73	84.0	5.7	1.70	2.1	.96	17N	O	L267
L269	88.8	2.7	.73	2.5	.99	80.0	1.7	.51	2.1	.96	17N	O	L269
L301	82.8	-3.3	-.87	2.8	1.13	76.2	-2.1	-.62	1.7	.76	17N	O	L301
L308	87.3	1.2	.32	1.7	.69	79.9	1.6	.49	2.6	1.18	17N	O	L308
L324	86.9	.9	.23	2.9	1.18	80.4	2.1	.63	2.2	.97	17N	O	L324
L326	80.7	-5.4	-1.43	1.9	.76	72.7	-5.6	-1.65	1.7	.77	17N	O	L326
L339	73.8	-12.3	-3.26	2.0	.81	64.9	-13.4	-3.96	2.0	.89	17N	#	L339
L341	86.0	-.1	-.02	2.3	.92	78.1	-.2	-.07	2.0	.90	17N	O	L341
L366	87.7	1.7	.44	2.7	1.10	77.3	-1.0	-.28	2.8	1.25	17N	O	L366
L372	86.5	.4	.11	2.0	.79	78.9	.6	.17	1.0	.43	17N	O	L372
GR. MEAN =	86.1 GRAMS					GRAND MEAN =	78.3 GRAMS				TEST DETERMINATIONS =		1E
SD MEANS =	3.8 GRAMS					SD OF MEANS =	3.4 GRAMS				14 LABS IN GRAND MEANS		
	AVERAGE SDR =	2.5 GRAMS					AVERAGE SDR =	2.2 GRAMS					
GR. MEAN =	844.0 MILLINEWTON					GRAND MEAN =	767.7 MILLINEWTON						
L604	64.4	-21.7	-5.76	3.9	1.57	67.9	-10.4	-3.09	1.9	.86	17X	*	L604

TOTAL NUMBER OF LABORATORIES REPORTING = 16

Best Values: E32 85 ± 7 grams
E63 78 ± 6 grams

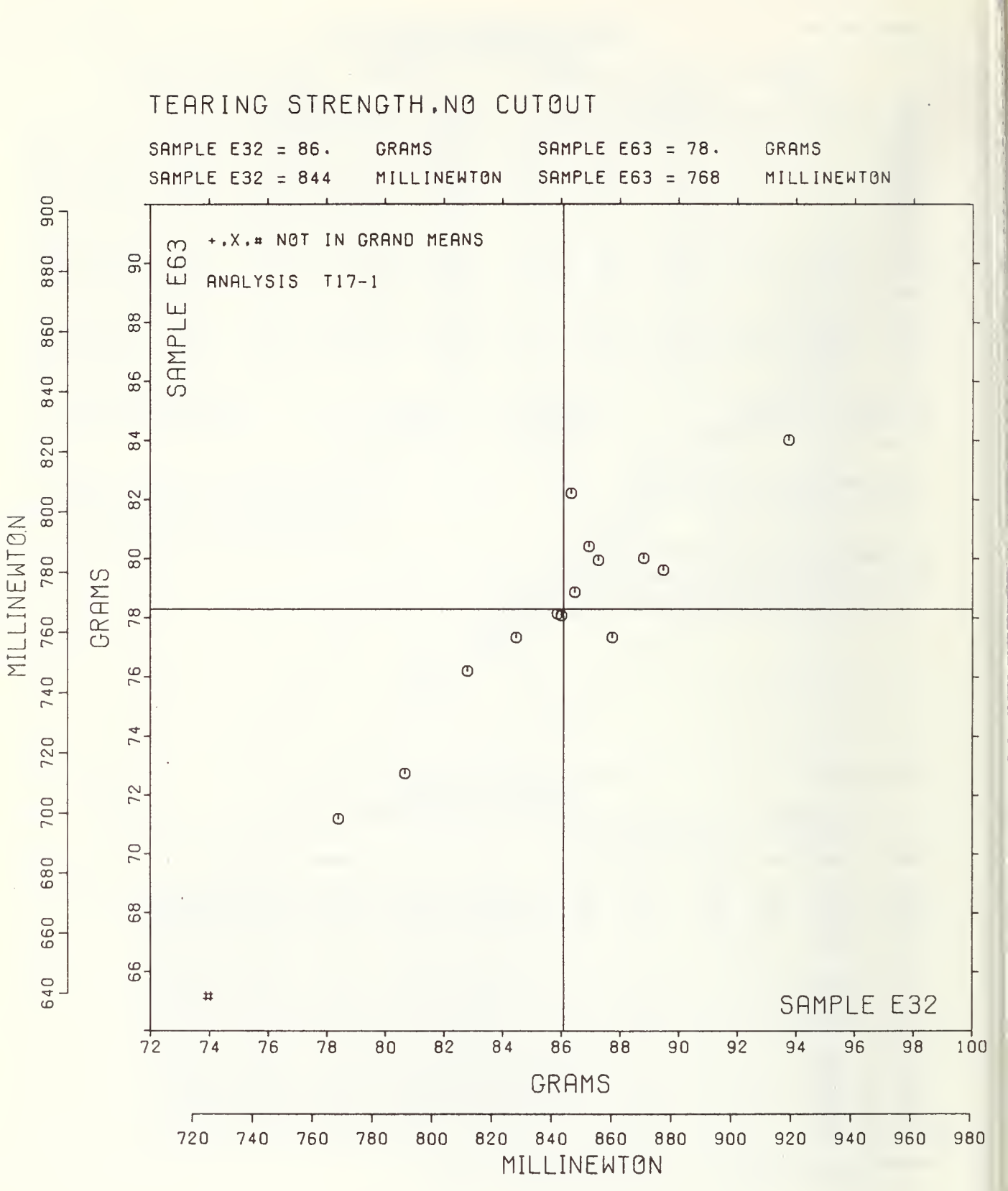
The following laboratories were omitted from the grand means because of extreme test results: 339.

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: 604.

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 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 E32	E63	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L604	*	64.4	67.9	-23.1	6.5	1.21	17X	TEARING STRENGTH, NO CUT OUT: GIVE INSTRUMENT MAKE,MODEL
L339	#	73.8	64.9	-18.0	-1.9	.85	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L174N	O	78.4	71.2	-10.4	-.2	1.10	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L326	O	80.7	72.7	-7.7	-.6	.76	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L301	O	82.8	76.2	-3.8	.6	.94	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L122	O	84.5	77.3	-1.8	.3	.93	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L148	O	85.9	78.1	-.3	.0	1.38	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L341	O	86.0	78.1	-.2	-.1	.91	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L231	O	86.3	82.2	2.8	2.8	.92	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L372	O	86.5	78.9	.7	.2	.61	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L324	O	86.9	80.4	2.0	1.0	1.08	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L308	O	87.3	79.9	2.0	.4	.94	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L366	O	87.7	77.3	.6	-1.8	1.18	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L269	O	88.8	80.0	3.2	-.5	.98	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L234	O	89.5	79.6	3.4	-1.3	.93	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L267	O	93.7	84.0	9.5	-.8	1.34	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
GMEANS:		86.1	78.3			1.00		
		95% ELLIPSE:		14.3	3.2	WITH GAMMA = 41 DEGREES		


TEARING STRENGTH,NO CUTOUT
SAMPLE E32 = 86. GRAMS
SAMPLE E32 = 844 MILLINEWTON
SAMPLE E63 = 78. GRAMS
SAMPLE E63 = 768 MILLINEWTON
+,X,# NOT IN GRAND MEANS
ANALYSIS T17-1
SAMPLE E63
SAMPLE E32
GRAMS
MILLINEWTON
66 68 70 72 74 76 78 80 82 84 86 88 90
640 660 680 700 720 740 760 780 800 820 840 860 880 900
72 74 76 78 80 82 84 86 88 90 92 94 96 98 100
720 740 760 780 800 820 840 860 880 900 920 940 960 980

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 H57 KRAFT 147 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	SAMPLE E63 KRAFT ENVELOPE 75 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	TEST D.* 20 VAR	F	LAB
L107	10.10	-.30	-.79	.60	.92	3.90	-.02	-.10	.13	.71	19A	O	L107
L122	10.38	-.02	-.06	.59	.90	3.67	-.25	-1.25	.19	1.07	19A	O	L122
L126	10.44	.04	.12	.59	.90	3.80	-.12	-.58	.15	.86	19A	O	L126
L151	10.15	-.25	-.66	.62	.95	3.66	-.26	-1.29	.14	.82	19A	O	L151
L153	10.74	.34	.90	.59	.91	3.95	.03	.15	.22	1.27	19P	O	L153
L157A	10.50	.10	.27	.55	.84	4.03	.11	.57	.19	1.09	19P	O	L157A
L157I	10.06	-.34	-.90	.79	1.20	3.85	-.07	-.35	.15	.83	19A	O	L157I
L167	10.97	.57	1.53	.68	1.04	4.36	.44	2.22	.14	.80	19G	O	L167
L174	10.33	-.07	-.20	.69	1.05	3.64	-.28	-1.41	.19	1.08	19A	O	L174
L182I	10.09	-.31	-.83	.61	.93	3.76	-.16	-.80	.14	.80	19D	O	L182I
L182L	9.92	-.48	-1.28	.47	.72	3.81	-.10	-.52	.19	1.10	19T	O	L182L
L207	10.01	-.39	-1.03	.11	.16	3.76	-.16	-.78	.20	1.13	19A	O	L207
L217A	10.74	.34	.90	.52	.79	3.95	.03	.14	.18	1.02	19A	O	L217A
L217P	10.09	-.31	-.81	.96	1.46	4.07	.16	.78	.21	1.19	19P	O	L217P
L224	10.39	-.01	-.03	.79	1.21	4.18	.26	1.30	.27	1.31	19A	O	L224
L225	10.49	.09	.23	.61	.93	3.96	.04	.20	.22	1.27	19P	O	L225
L234L	10.43	.03	.07	.69	1.06	4.02	.10	.52	.16	.91	19P	O	L234L
L237A	10.54	.14	.37	.59	.89	4.13	.21	1.04	.17	.96	19Q	O	L237A
L237B	10.90	.50	1.32	.67	1.02	4.11	.20	.99	.20	1.16	19A	O	L237B
L238A	10.36	-.04	-.10	.86	1.32	3.99	.08	.39	.23	1.33	19T	O	L238A
L243	9.86	-.54	-1.45	.82	1.24	3.71	-.21	-1.07	.12	.69	19A	O	L243
L257A	10.52	.12	.32	.29	.44	4.22	.30	1.49	.18	1.02	19P	O	L257A
L257B	10.37	-.03	-.07	.67	1.02	4.05	.13	.66	.18	1.02	19P	O	L257B
L257C	10.50	.10	.27	.74	1.12	4.05	.13	.67	.16	.93	19P	O	L257C
L264A	10.74	.34	.89	.67	1.03	3.28	-.64	-3.19	.24	1.36	19A	X	L264A
L264P	10.68	.28	.75	.62	.95	4.02	.10	.52	.18	1.00	19P	O	L264P
L265	10.55	.15	.40	.61	.93	3.90	-.02	-.11	.11	.64	19A	O	L265
L267	5.20	-5.20	-13.84	.32	.49	3.72	-.20	-.99	.12	.71	19A	#	L267
L273	11.11	.71	1.90	.81	1.23	3.92	.00	.02	.30	1.71	19P	O	L273
L280	9.34	-1.06	-2.82	.60	.91	3.67	-.25	-1.25	.15	.85	19G	*	L280
L281	10.43	.03	.09	.63	.96	3.86	-.05	-.26	.18	1.03	19G	O	L281
L305	1.87	-8.53	-22.72	.07	.10	.74	-3.18	-15.92	.02	.11	19P	#	L705
L312	10.51	.11	.29	.71	1.09	3.96	.04	.20	.13	.74	19D	O	L312
L318	9.93	-.47	-1.25	.55	.84	3.60	-.31	-1.57	.14	.79	19G	O	L318
L324	10.33	-.07	-.19	.62	.95	3.56	-.36	-1.80	.20	1.13	19A	O	L324
L334	10.41	.01	.03	.70	1.06	4.15	.24	1.18	.19	1.06	19P	O	L334
L336	10.50	.10	.27	.46	.70	3.71	-.20	-1.02	.17	.95	19G	O	L336
L356	11.05	.65	1.72	.65	.99	4.21	.29	1.47	.20	1.12	19P	O	L356
L392	10.45	.05	.14	.46	.70	4.11	.19	.94	.16	.92	19A	O	L392
L561	11.13	.73	1.94	.88	1.34	4.14	.23	1.14	.16	.93	19P	O	L561
L562	11.94	1.54	4.10	.75	1.15	4.25	.34	1.69	.15	.86	19P	#	L562
L565	10.09	-.31	-.83	.31	.47	4.32	.40	1.99	.17	.96	19T	*	L565
L568	10.25	-.15	-.39	.91	1.39	3.99	.07	.37	.15	.83	19P	O	L568
L575	10.64	.24	.64	.64	.97	3.71	-.21	-1.06	.16	.89	19D	O	L575
L576	10.49	.09	.25	.63	.96	3.77	-.15	-.76	.16	.89	19A	O	L576
L580	10.58	.18	.49	.81	1.24	3.77	-.14	-.72	.18	1.02	19G	O	L580
L581	11.14	.74	1.96	.94	1.43	3.98	.07	.33	.22	1.25	19A	O	L581
L582	10.09	-.31	-.81	.57	.87	3.60	-.32	-1.58	.19	1.09	19A	O	L582
L604	9.76	-.64	-1.70	1.05	1.60	3.92	-.00	-.00	.15	.85	19P	O	L604
L606	10.56	.16	.43	.57	.87	3.92	.00	.02	.16	.91	19P	O	L606
L610	9.88	-.52	-1.37	.58	.89	3.71	-.21	-1.03	.16	.89	19A	O	L610

GR. MEAN * 10.40 KILONEWTON/M — GRAND MEAN * 3.92 KILONEWTON/M — TEST DETERMINATIONS * 20

SD MEANS * .38 KILONEWTON/M — SD OF MEANS * .20 KILONEWTON/M — 47 LABS IN GRAND MEANS

AVERAGE SDR * .66 KILONEWTON/M — AVERAGE SDR * .18 KILONEWTON/M

GR. MEAN * 59.40 LB/INCH — GRAND MEAN * 22.37 LB/INCH

L251	9.90	-.50	-1.33	.63	.96	3.69	-.23	-1.15	.15	.84	19I	*	L251

TOTAL NUMBER OF LABORATORIES REPORTING * 52

Best Values: H57 10.3 ± 1.1 kilonewton per meter
E63 3.8 ± 0.4 kilonewton per meter

The following laboratories were omitted from the grand means because of extreme test results: 267, 562.

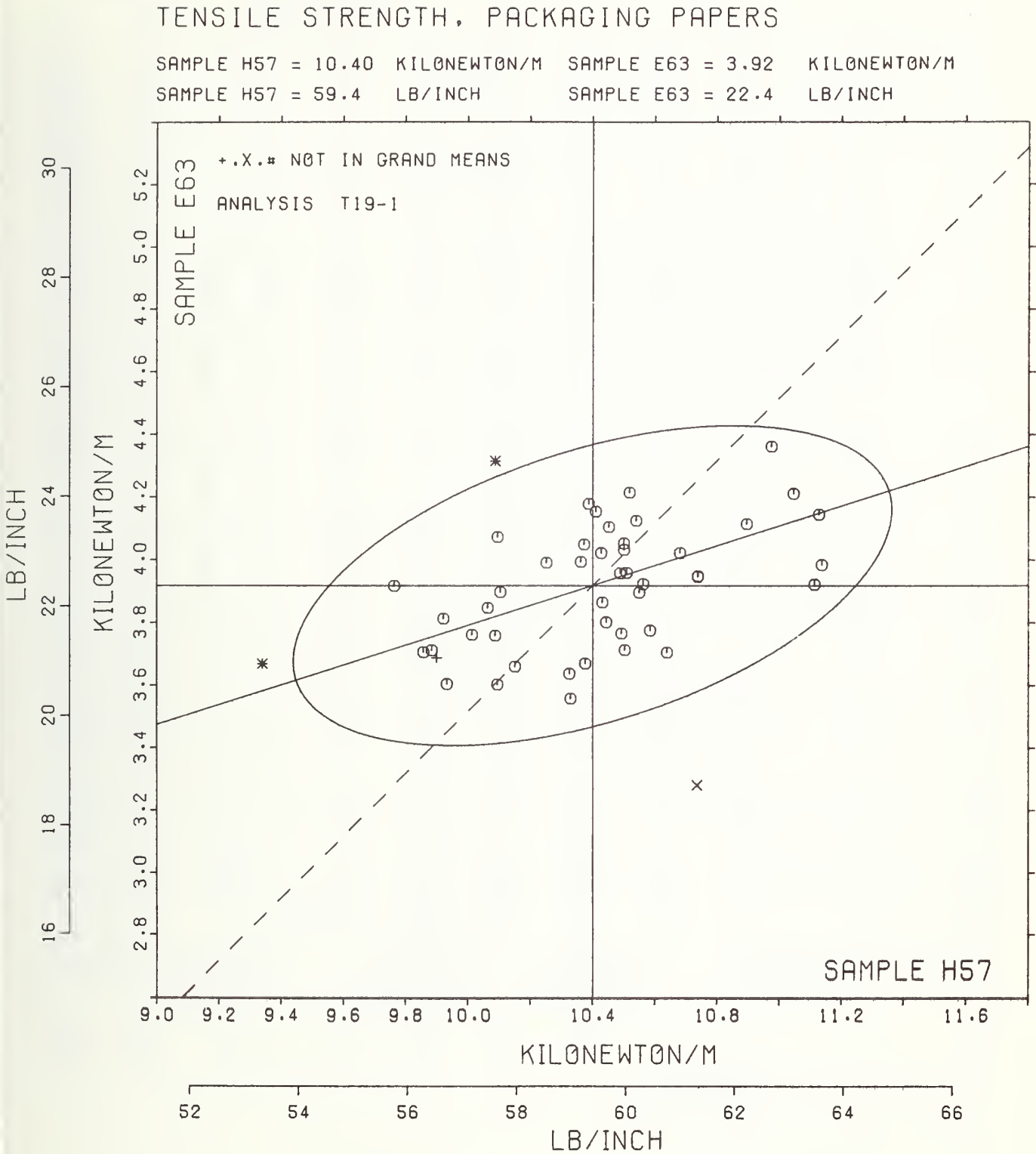
Data from the following laboratories appear to have been reported in incorrect units: 305.

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 H57	MEANS E63	COORDINATES MAJOR	COORDINATES MINOR	AVG R,SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L305	#	1.87	.74	-9.10	-.45	.11	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L267	#	5.20	3.72	-5.02	1.38	.60	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L280	*	9.34	3.67	-1.09	.08	.88	19G	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L604	6	9.76	3.92	-.61	.19	1.23	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L243	6	9.86	3.71	-.58	-.04	.97	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L610	6	9.88	3.71	-.55	-.04	.89	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L251	*	9.90	3.69	-.55	-.07	.90	191	TENSILE STRENGTH, PACKAGING PAPER, CRE, 20C, 65% RH
L182L	6	9.92	3.81	-.49	.05	.91	19T	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L318	6	9.93	3.60	-.54	-.16	.81	19G	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L207	6	10.01	3.76	-.42	-.03	.65	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L157I	6	10.06	3.85	-.34	.04	1.02	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L1821	6	10.09	3.76	-.35	-.06	.86	19D	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L565	*	10.09	4.32	-.18	.47	.72	19T	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L582	6	10.09	3.60	-.39	-.21	.98	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L217P	6	10.09	4.07	-.24	.24	1.33	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L107	6	10.10	3.90	-.29	.07	.81	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L151	6	10.15	3.66	-.32	-.17	.88	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L568	6	10.25	3.99	-.12	.12	1.11	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L174	6	10.33	3.64	-.16	-.25	1.07	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L324	6	10.33	3.56	-.18	-.32	1.04	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L238A	6	10.36	3.99	-.01	.08	1.32	19T	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L257B	6	10.37	4.05	.01	.13	1.02	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L122	6	10.38	3.67	-.10	-.23	.99	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L224	6	10.39	4.18	.07	.25	1.26	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L334	6	10.41	4.15	.08	.22	1.06	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L234L	6	10.43	4.02	.06	.09	.98	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L281	6	10.43	3.86	.01	-.06	1.00	19G	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L126	6	10.44	3.80	.01	-.12	.88	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L392	6	10.45	4.11	.11	.16	.81	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L225	6	10.49	3.96	.10	.01	1.10	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L576	6	10.49	3.77	.04	-.17	.93	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L257C	6	10.50	4.05	.14	.10	1.03	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L157A	6	10.50	4.03	.13	.08	.97	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L336	6	10.50	3.71	.04	-.23	.82	19G	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L312	6	10.51	3.96	.12	.01	.91	19D	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L257A	6	10.52	4.22	.20	.25	.73	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L237A	6	10.54	4.13	.20	.16	.93	19Q	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L265	6	10.55	3.90	.14	-.07	.78	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L606	6	10.56	3.92	.16	-.04	.89	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L580	6	10.58	3.77	.13	-.19	1.13	19G	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L575	6	10.64	3.71	.16	-.27	.93	19D	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L264P	6	10.68	4.02	.30	.01	.98	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L264A	X	10.74	3.28	.13	-.71	1.19	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L217A	6	10.74	3.95	.33	-.08	.90	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L153	6	10.74	3.95	.33	-.07	1.09	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L237B	6	10.90	4.11	.53	.04	1.09	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L167	6	10.97	4.36	.68	.25	.92	19G	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L356	6	11.05	4.21	.70	.08	1.05	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L273	6	11.11	3.92	.68	-.21	1.47	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L561	6	11.13	4.14	.76	-.00	1.14	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L581	6	11.14	3.98	.72	-.16	1.34	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L562	#	11.94	4.25	1.57	-.14	1.00	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
GMEANS:		10.40	3.92			1.00		
		95% ELLIPSE:		1.00	.43	WITH GAMMA = 17 DEGREES		


TENSILE STRENGTH, PACKAGING PAPERS
SAMPLE H57 = 10.40 KILONEWTON/M SAMPLE E63 = 3.92 KILONEWTON/M
SAMPLE H57 = 59.4 LB/INCH SAMPLE E63 = 22.4 LB/INCH
+.X.# NOT IN GRAND MEANS
ANALYSIS T19-1
SAMPLE E63
KILONEWTON/M
LB/INCH
SAMPLE H57
KILONEWTON/M
LB/INCH

TAPPI COLLABORATIVE REFERENCE PROGRAM
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 J03 MEAN	PRINTING 73 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE J07 MEAN	PRINTING 85 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.* 20 VAR	F	LAB
L100	3.72	-.01	-.08	.25	1.41	6.21	-.08	-.35	.50	1.61	20E	@	L100
L115	3.88	.15	.84	.14	.78	6.40	.11	.49	.18	.57	20D	@	L115
L118	3.63	-.10	-.57	.19	1.10	6.16	-.13	-.55	.29	.94	20A	@	L118
L122	3.68	-.05	-.29	.22	1.27	6.11	-.18	-.77	.27	.85	20A	@	L122
L124C	3.62	-.11	-.63	.16	.90	5.91	-.38	-1.63	.27	.86	20A	@	L124C
L125	4.01	.28	1.53	.17	.97	6.68	.40	1.69	.49	1.56	20C	@	L125
L131	3.80	.06	.35	.20	1.14	6.12	-.16	-.70	.38	1.21	20E	@	L131
L141T	3.60	-.14	-.74	.17	.98	6.11	-.18	-.77	.34	1.09	20A	#	L141T
L143	4.37	.64	3.48	.19	1.09	7.85	1.56	6.66	.37	1.18	20E	#	L143
L148	3.86	.12	.68	.21	1.21	6.52	.23	.99	.42	1.35	20A	@	L148
L159	3.55	-.18	-.98	.25	1.41	6.04	-.25	-1.07	.45	1.44	20A	@	L159
L163	3.78	.04	.25	.12	.70	6.37	.09	.37	.21	.66	20D	@	L163
L167	4.25	.52	2.86	.20	1.11	6.73	.44	1.88	.52	1.66	20G	*	L167
L176	3.15	-.58	-3.16	.39	2.18	5.32	-.97	-4.12	.57	1.83	20E	X	L176
L185	3.33	-.40	-2.19	.21	1.20	5.81	-.47	-2.02	.42	1.34	20C	@	L185
L190R	3.59	-.14	-.77	.21	1.21	6.23	-.06	-.26	.32	1.03	20A	@	L190R
L194	3.64	-.09	-.50	.13	.75	6.20	-.09	-.37	.19	.62	20A	@	L194
L206	3.39	-.34	-1.88	.28	1.59	6.24	-.05	-.20	.28	.89	20A	*	L206
L223B	3.81	.08	.45	.12	.67	6.55	.26	1.10	.21	.67	20A	@	L223B
L226C	3.77	.04	.22	.22	1.24	6.39	.10	.44	.72	2.30	20C	@	L226C
L230	3.66	-.07	-.41	.13	.75	6.08	-.20	-.86	.23	.75	20B	@	L230
L243	3.69	-.04	-.21	.18	.99	6.23	-.06	-.25	.15	.47	20A	@	L243
L255	3.75	.01	.08	.23	1.29	6.47	.18	.76	.35	1.13	20A	@	L255
L260	3.58	-.15	-.80	.17	.97	6.99	.71	3.01	.18	.57	20A	X	L260
L261	3.36	-.38	-2.06	.15	.88	6.14	-.15	-.64	.28	.89	20A	@	L261
L278	3.62	-.12	-.63	.15	.87	6.13	-.15	-.66	.29	.93	20A	@	L278
L291	3.92	.19	1.02	.39	2.19	7.35	1.06	4.53	.35	1.12	20A	X	L291
L309	3.91	.18	1.00	.22	1.23	6.42	.13	.55	.36	1.17	20E	@	L309
L315	3.69	-.04	-.21	.18	1.04	6.25	-.04	-.15	.29	.92	20A	@	L315
L318	3.50	-.23	-1.27	.13	.74	6.00	-.28	-1.21	.28	.89	20G	@	L318
L328	3.75	.02	.11	.17	.97	6.58	.29	1.24	.26	.82	20A	@	L328
L331	3.67	-.06	-.34	.22	1.26	6.24	-.05	-.19	.32	1.03	20A	@	L331
L333	3.74	.01	.03	.15	.86	6.25	-.04	-.16	.16	.50	20A	@	L333
L344	4.10	.37	2.01	.20	1.15	6.61	.33	1.39	.32	1.02	20A	@	L344
L352	3.05	-.68	-3.74	.16	.90	NO DATA REPORTED FOR SAMPLE J07					20A	M	L352
L360	3.75	.02	.12	.21	1.19	6.10	-.19	-.79	.43	1.37	20B	@	L360
L372	3.78	.05	.26	.13	.74	6.15	-.14	-.59	.28	.89	20A	@	L372
L378	3.58	-.15	-.81	.13	.72	6.10	-.19	-.82	.22	.72	20A	@	L378
L390	3.73	.00	.01	.20	1.12	6.46	.17	.72	.31	.99	20A	@	L390
L442	3.75	.02	.12	.15	.83	6.23	-.05	-.22	.18	.56	20G	@	L442
L557	6.06	2.33	12.76	.17	.97	10.34	4.06	17.29	.33	1.07	20C	#	L557
L559	3.94	.21	1.17	.18	1.00	6.76	.47	2.01	.30	.97	20C	@	L559
L560	6.61	2.88	15.79	.17	.98	10.47	4.18	17.82	1.12	3.60	20C	#	L560
L561	.19	-3.55	-19.45	.01	.08	.26	-6.03	-25.70	.03	.09	20A	#	L561
L563A	3.18	-.55	-3.04	.32	1.83	4.84	-1.45	-6.18	.79	2.54	20A	#	L563A
L567	3.78	.05	.26	.14	.78	6.42	.13	.55	.36	1.14	20A	@	L567
L574	3.86	.13	.69	.13	.76	6.62	.33	1.41	.35	1.11	20A	@	L574
L575	3.74	.01	.03	.14	.82	5.89	-.40	-1.68	.52	1.67	20D	*	L575
L587	3.76	.03	.16	.11	.63	NO DATA REPORTED FOR SAMPLE J07					20A	M	L587
L592	3.87	.14	.77	.16	.88	6.41	.13	.54	.22	.70	20A	@	L592

GR. MEAN * 3.73 KILONEWTON/M — GRAND MEAN * 6.29 KILONEWTON/M — TEST DETERMINATIONS * 20
SD MEANS * .18 KILONEWTON/M — SD OF MEANS * .23 KILONEWTON/M — 35 LABS IN GRAND MEANS
AVERAGE SDR * .18 KILONEWTON/M — AVERAGE SDR * .31 KILONEWTON/M
GR. MEAN *12.584 LB/15 MM — GRAND MEAN *21.206 LB/15 MM

L139	3.62	-.12	-.63	.17	.95	6.12	-.17	-.71	.33	1.04	20H	*	L139
L231	3.63	-.10	-.55	.25	1.44	6.38	.09	.37	.21	.66	20H	*	L231
L251	3.63	-.10	-.57	.21	1.17	5.82	-.46	-1.97	.29	.93	20I	*	L251

TOTAL NUMBER OF LABORATORIES REPORTING * 53

Best Values: J03 3.7 ± 0.3 kilonewton per meter
J07 6.2 ± 0.4 kilonewton per meter

The following laboratories were omitted from the grand means because of extreme test results: 143, 563A.

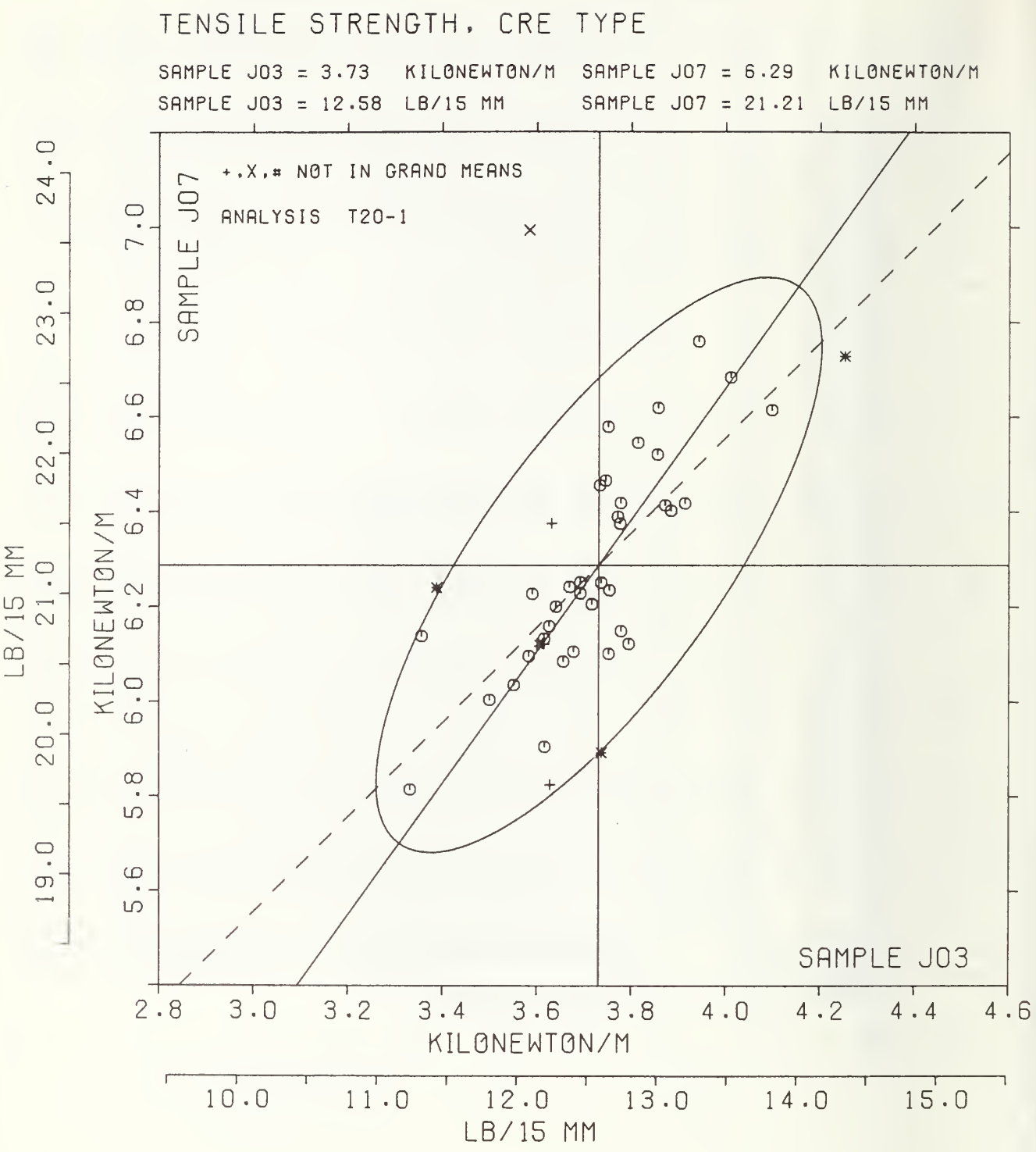
Data from the following laboratories were received too late for proper processing and inclusion in the grand means: 141.
Data from the following laboratories appear to have been reported in incorrect units: 557, 560, 561.

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	E	MEANS J03	MEANS J07	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L561	#	.19	.26	-6.96	-.64	.09	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L352	M	3.05				.90	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE
L176	X	3.15	5.32	-1.12	-.10	2.01	20E	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRF)
L563A	#	3.18	4.84	-1.50	-.40	2.18	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRF)
L185	O	3.33	5.81	-.62	.05	1.27	20C	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L261	O	3.36	6.14	-.34	.22	.88	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L206	*	3.39	6.24	-.24	.25	1.24	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L318	O	3.50	6.00	-.37	.02	.81	20G	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L159	O	3.55	6.04	-.31	-.00	1.42	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRF)
L378	O	3.58	6.10	-.24	.01	.72	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L260	X	3.58	6.99	.49	.53	.77	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRF)
L190R	O	3.59	6.23	-.13	.08	1.12	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L141T	#	3.60	6.11	-.23	.00	1.03	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L139	*	3.62	6.12	-.20	-.00	1.00	20H	TENSILE STRENGTH, PRINTING PAPER, CRE, SHORT TEST SPAN
L278	O	3.62	6.13	-.19	.00	.90	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRF)
L124C	O	3.62	5.91	-.38	-.13	.88	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L118	O	3.63	6.16	-.17	.01	1.02	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L251	*	3.63	5.82	-.44	-.19	1.05	20I	TENSILE STRENGTH, PRINTING PAPER, CRE, 20 C, 65% RH
L231	*	3.63	6.38	.01	.13	1.05	20H	TENSILE STRENGTH, PRINTING PAPER, CRE, SHORT TEST SPAN
L194	O	3.64	6.20	-.12	.02	.69	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L230	O	3.66	6.08	-.21	-.06	.75	20G	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L331	O	3.67	6.24	-.07	.02	1.15	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L122	O	3.68	6.11	-.18	-.06	1.06	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L243	O	3.69	6.23	-.07	-.00	.73	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L315	O	3.69	6.25	-.05	.01	.98	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L100	O	3.72	6.21	-.07	-.04	1.51	20E	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L390	O	3.73	6.46	.14	.10	1.05	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRF)
L333	O	3.74	6.25	-.03	-.03	.68	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L575	*	3.74	5.89	-.32	-.24	1.24	20D	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L255	O	3.75	6.47	.15	.09	1.21	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L328	O	3.75	6.58	.25	.15	.89	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L360	O	3.75	6.10	-.14	-.13	1.28	20B	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L442	O	3.75	6.23	-.03	-.05	.70	20G	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L587	M	3.76				.63	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE
L226C	O	3.77	6.39	.11	.03	1.77	20C	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L163	O	3.78	6.37	.10	.01	.68	20D	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L567	O	3.78	6.42	.13	.04	.96	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L372	O	3.78	6.15	-.08	-.12	.82	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRF)
L131	O	3.80	6.12	-.10	-.15	1.18	20E	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRF)
L223B	O	3.81	6.55	.26	.08	.67	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L148	O	3.86	6.52	.26	.03	1.28	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L574	O	3.86	6.62	.34	.09	.94	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L592	O	3.87	6.41	.18	-.04	.79	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L115	O	3.88	6.40	.18	-.06	.68	20D	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L309	O	3.91	6.42	.21	-.07	1.20	20E	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L291	X	3.92	7.35	.97	.47	1.65	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L559	O	3.94	6.76	.51	.10	.99	20C	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRF)
L125	O	4.01	6.68	.48	.00	1.26	20C	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L344	O	4.10	6.61	.48	-.11	1.08	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRF)
L167	*	4.25	6.73	.66	-.17	1.38	20G	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRF)
L143	#	4.37	7.85	1.64	.40	1.13	20E	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L557	#	6.06	10.34	4.65	.48	1.02	20C	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L560	#	6.61	10.47	5.07	.10	2.29	20C	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRF)
GMEANS:		3.73	6.29			1.00		
		95% ELLIPSE:		.72	.26	WITH GAMMA = 64 DEGREES		


TENSILE STRENGTH, CRE TYPE
SAMPLE J03 = 3.73 KILONEWTON/M
SAMPLE J03 = 12.58 LB/15 MM
SAMPLE J07 = 6.29 KILONEWTON/M
SAMPLE J07 = 21.21 LB/15 MM
+.X.* NOT IN GRAND MEANS
ANALYSIS T20-1
SAMPLE J07
KILONEWTON/M
LB/15 MM
SAMPLE J03
KILONEWTON/M
LB/15 MM
5.6
5.8
6.0
6.2
6.4
6.6
6.8
7.0
19.0
20.0
21.0
22.0
23.0
24.0
2.8
3.0
3.2
3.4
3.6
3.8
4.0
4.2
4.4
4.6
10.0
11.0
12.0
13.0
14.0
15.0

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 J03 MEAN	PRINTING 73 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE J07 MEAN	PRINTING 85 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.* 20 VAR	F	LAB
L103	3.88	.11	.45	.19	.92	6.29	-.03	-.07	.31	.88	20R	O	L103
L108	3.27	-.51	-2.15	.11	.56	7.04	.71	1.54	.34	.97	20P	X	L108
L121	3.72	-.06	-.27	.24	1.19	5.22	-1.10	-2.38	.24	.69	20P	X	L121
L124P	3.68	-.09	-.40	.23	1.10	6.23	-.10	-.21	.37	1.03	20P	O	L124P
L128	3.90	.12	.50	.14	.70	6.37	.04	.09	.44	1.23	20T	O	L128
L148	3.70	-.08	-.34	.27	1.33	6.07	-.26	-.56	.32	.91	20P	O	L148
L158	3.42	-.36	-1.54	.15	.75	5.46	-.86	-1.86	.39	1.09	20T	O	L158
L162	3.91	.13	.55	.17	.85	6.43	.11	.24	.49	1.37	20T	O	L162
L182L	3.69	-.09	-.37	.17	.81	6.20	-.12	-.27	.38	1.08	20T	O	L182L
L189	4.15	.37	1.55	.17	.84	6.74	.42	.90	.44	1.23	20R	O	L189
L191P	4.00	.22	.93	.21	1.04	6.36	.04	.09	.39	1.09	20P	O	L191P
L195	5.04	1.26	5.37	1.28	6.22	5.01	-1.31	-2.83	1.33	3.72	20R	#	L195
L212	3.60	-.18	-.77	.20	.96	6.01	-.31	-.68	.25	.71	20R	O	L212
L213	3.48	-.30	-1.26	.27	1.31	6.19	-.13	-.28	.32	.90	20T	O	L213
L218	3.72	-.06	-.24	.10	.47	6.43	.11	.23	.32	.89	20P	O	L218
L233	5.77	1.99	8.44	.28	1.36	3.44	-2.89	-6.22	.21	.59	20Q	#	L233
L241	.81	-2.97	-12.61	.05	.25	6.37	.04	.09	.27	.74	20R	#	L241
L242	3.66	-.12	-.49	.15	.73	5.80	-.53	-1.14	.35	.97	20Y	O	L242
L249	3.76	-.02	-.08	.14	.66	6.39	.07	.15	.21	.59	20P	O	L249
L254	3.53	-.25	-1.05	.17	.81	6.02	-.31	-.66	.22	.60	20P	O	L254
L259	4.10	.32	1.37	.27	1.33	7.03	.71	1.52	.19	.55	20P	O	L259
L262	3.81	.04	.15	.11	.52	6.41	.09	.20	.31	.88	20R	O	L262
L275	3.42	-.36	-1.54	.28	1.35	5.89	-.44	-.95	.27	.76	20R	O	L275
L279P	3.82	.04	.16	.20	.95	6.15	-.17	-.37	.60	1.68	20P	O	L279P
L285	3.26	-.52	-2.21	.25	1.20	4.97	-1.35	-2.91	.19	.53	20P	*	L285
L311	3.63	-.15	-.62	.25	1.23	5.95	-.37	-.80	.31	.88	20V	O	L311
L321	3.68	-.10	-.42	.24	1.16	6.72	.40	.85	.27	.77	20V	O	L321
L322	2.32	-1.46	-6.19	.46	2.23	7.04	.72	1.54	.56	1.56	20P	#	L322
L330	3.28	-.50	-2.11	.60	2.93	7.35	1.02	2.20	.31	.86	20P	X	L330
L337	4.04	.26	1.11	.17	.83	6.67	.35	.75	.34	.94	20V	O	L337
L356	3.97	.19	.80	.15	.75	6.77	.45	.96	.26	.72	20P	O	L356
L362	3.88	.10	.41	.26	1.25	6.04	-.28	-.61	.56	1.57	20R	O	L362
L370	4.18	.40	1.70	.29	1.40	7.33	1.01	2.18	.28	.78	20P	O	L370
L376	3.67	-.11	-.46	.27	1.30	6.07	-.26	-.55	.27	.76	20P	O	L376
L393	3.91	.13	.54	.17	.85	6.87	.54	1.17	.27	.76	20P	O	L393
L484	3.58	-.20	-.86	.21	1.04	6.00	-.33	-.70	.25	.69	20U	O	L484
L554	4.10	.32	1.36	.18	.86	6.88	.56	1.21	.25	.69	20T	O	L554
L556	4.13	.35	1.48	.21	1.03	6.95	.63	1.35	.46	1.28	20P	O	L556
L563P	4.02	.24	1.02	.32	1.54	6.64	.31	.67	.43	1.20	20P	O	L563P
L571	3.90	.13	.53	.35	1.69	6.63	.31	.66	.52	1.45	20P	O	L571
L585	3.64	-.14	-.58	.14	.70	6.43	.11	.23	.59	1.65	20V	O	L585
L599	3.45	-.33	-1.40	.19	.94	5.93	-.39	-.84	.52	1.44	20V	O	L599

GR. MEAN * 3.78 KILONEWTON/M GRAND MEAN * 6.32 KILONEWTON/M TEST DETERMINATIONS * 20

SD MEANS * .24 KILONEWTON/M SD OF MEANS * .46 KILONEWTON/M 35 LABS IN GRAND MEANS

AVERAGE SDR * .21 KILONEWTON/M AVERAGE SDR * .36 KILONEWTON/M

GR. MEAN *12.746 LB/15 MM GRAND MEAN *21.330 LB/15 MM

TOTAL NUMBER OF LABORATORIES REPORTING * 42

Best Values: J03 3.7 ± 0.4 kilonewton per meter
J07 6.3 ± 0.6 kilonewton per meter

The following laboratories were omitted from the grand means because of extreme test results: 241, 322.

The following laboratories appear to have interchanged samples: 233.

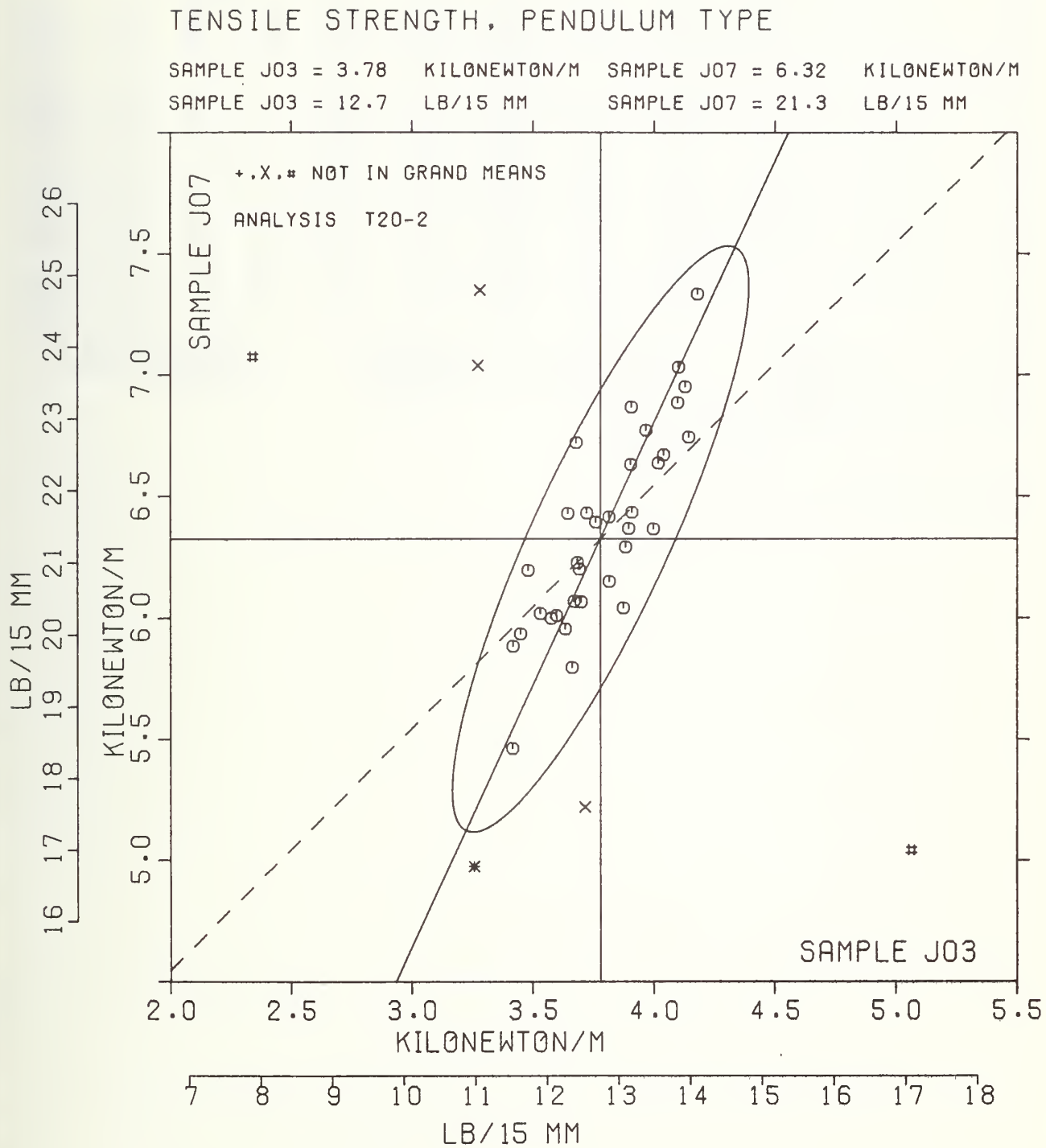
Data from the following laboratories were received too late for proper processing and inclusion in the grand means: 195.

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 J03	MEANS J07	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L241	#	.81	6.37	-1.21	2.71	.50	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L322	#	2.32	7.04	.04	1.63	1.89	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L285	*	3.26	4.97	-1.44	-.09	.87	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L108	X	3.27	7.04	.43	.76	.76	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L330	X	3.28	7.35	.72	.88	1.90	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L158	O	3.42	5.46	-.93	-.03	.92	20T	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L275	O	3.42	5.89	-.55	.14	1.06	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L599	O	3.45	5.93	-.49	.14	1.19	20V	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L213	O	3.48	6.19	-.24	.22	1.10	20T	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L254	O	3.53	6.02	-.38	.10	.71	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L484	O	3.58	6.00	-.38	.05	.87	20U	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L212	O	3.60	6.01	-.36	.03	.83	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L311	O	3.63	5.95	-.40	-.02	1.05	20V	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L585	O	3.64	6.43	.04	.17	1.17	20V	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L242	O	3.66	5.80	-.53	-.12	.85	20Y	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L376	O	3.67	6.07	-.28	-.01	1.03	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L321	O	3.68	6.72	.32	.26	.96	20V	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L124P	O	3.68	6.23	-.13	.04	1.07	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L182L	O	3.69	6.20	-.15	.03	.94	20T	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L148	O	3.70	6.07	-.27	-.04	1.12	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L121	X	3.72	5.22	-1.03	-.41	.94	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L218	O	3.72	6.43	.07	.10	.68	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L249	O	3.76	6.39	.05	.05	.63	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L262	O	3.81	6.41	.10	.01	.70	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L279P	O	3.82	6.15	-.14	-.11	1.31	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L362	O	3.88	6.04	-.22	-.21	1.41	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L103	O	3.88	6.29	.01	-.11	.90	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L128	O	3.90	6.37	.09	-.09	.96	20T	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L571	O	3.90	6.63	.33	.01	1.57	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L393	O	3.91	6.87	.54	.11	.80	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L162	O	3.91	6.43	.15	-.07	1.11	20T	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L355	O	3.97	6.77	.48	.02	.73	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L191P	O	4.00	6.36	.13	-.18	1.06	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L563P	O	4.02	6.64	.38	-.09	1.37	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L337	O	4.04	6.67	.42	-.09	.89	20V	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L554	O	4.10	6.88	.64	-.06	.78	20T	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L259	O	4.10	7.03	.78	.00	.94	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L556	O	4.13	6.95	.71	-.05	1.15	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
I189	O	4.15	6.74	.53	-.16	1.03	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L370	O	4.18	7.33	1.08	.06	1.09	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L195	#	5.04	5.01	-.66	-1.70	4.97	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L233	#	5.77	3.44	-1.78	-3.02	.97	20Q	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
GMEANS:		3.78	6.32			1.00		
		95% ELLIPSE:		1.32	.28	WITH GAMMA = 65 DEGREES		


TENSILE STRENGTH, PENDULUM TYPE
SAMPLE J03 = 3.78 KILONEWTON/M
SAMPLE J03 = 12.7 LB/15 MM
SAMPLE J07 = 6.32 KILONEWTON/M
SAMPLE J07 = 21.3 LB/15 MM
+.X.# NOT IN GRAND MEANS
ANALYSIS T20-2
SAMPLE J07
SAMPLE J03
KILONEWTON/M
LB/15 MM
2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5
5.0 5.5 6.0 6.5 7.0 7.5
7 8 9 10 11 12 13 14 15 16 17 18
16 17 18 19 20 21 22 23 24 25 26

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 H57 KRAFT 147 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	SAMPLE E63 KRAFT ENVELOPE 75 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	TEST D.* 20 VAR	F	LAB
L122	117.2	11.3	1.39	16.0	.99	87.1	4.5	.77	14.4	1.36	25P	@	L122
L126	107.7	1.8	.22	15.1	.93	84.2	1.6	.28	10.1	.96	25G	@	L126
L151	139.8	33.9	4.16	24.3	1.51	95.6	13.0	2.25	8.4	.80	25F	#	L151
L174	101.7	-4.2	-.51	14.4	.89	80.5	-2.1	-.36	10.1	.95	25Y	@	L174
L182	104.9	-1.0	-.13	14.5	.90	88.3	5.7	.98	8.8	.83	25B	@	L182
L234B	107.0	1.1	.14	18.0	1.12	91.5	8.9	1.53	13.7	1.30	25R	@	L234B
L237B	98.2	-7.7	-.95	13.2	.82	76.7	-5.9	-1.02	8.2	.78	25R	@	L237B
L243	90.4	-15.6	-1.91	17.6	1.09	82.4	-.2	-.04	8.9	.84	25Z	@	L243
L264	107.4	1.5	.18	12.4	.77	53.3	-29.4	-5.08	12.4	1.17	25F	#	L264
L265	116.6	10.7	1.31	16.7	1.03	80.1	-2.5	-.43	8.3	.79	25F	@	L265
L267	114.9	9.0	1.10	19.6	1.21	79.9	-2.7	-.47	9.1	.86	25F	@	L267
L273	115.4	9.5	1.17	15.4	.95	83.5	.8	.15	12.5	1.18	25F	@	L273
L280	96.9	-9.0	-1.10	15.7	.97	88.5	5.9	1.03	10.6	1.01	25B	@	L280
L312	137.3	31.4	3.86	13.9	.86	97.3	14.7	2.55	10.5	1.00	25J	#	L312
L318	109.2	3.3	.41	12.5	.77	88.2	5.6	.96	12.3	1.17	25A	@	L318
L336	109.3	3.4	.42	10.4	.64	71.4	-11.2	-1.94	10.8	1.02	25A	@	L336
L580	101.6	-4.3	-.53	17.7	1.09	83.7	1.0	.18	7.5	.71	25C	@	L580
L604	97.7	-8.3	-1.02	25.5	1.58	73.2	-9.4	-1.62	13.0	1.23	25A	@	L604

GR. MEAN * 105.9 JOULES/SQ M GRAND MEAN * 82.6 JOULES/SQ M TEST DETERMINATIONS * 20

SD MEANS * 8.1 JOULES/SQ M SD OF MEANS * 5.8 JOULES/SQ M 15 LABS IN GRAND MEANS

AVERAGE SDR * 16.2 JOULES/SQ M AVERAGE SDR * 10.5 JOULES/SQ M

GR. MEAN * 7.255 FT.LB/SQ FT GRAND MEAN * 5.659 FT.LB/SQ FT

TOTAL NUMBER OF LABORATORIES REPORTING * 18

Best Values: H57 106 ± 11 joules per square meter

E63 83 ± 9 joules per square meter

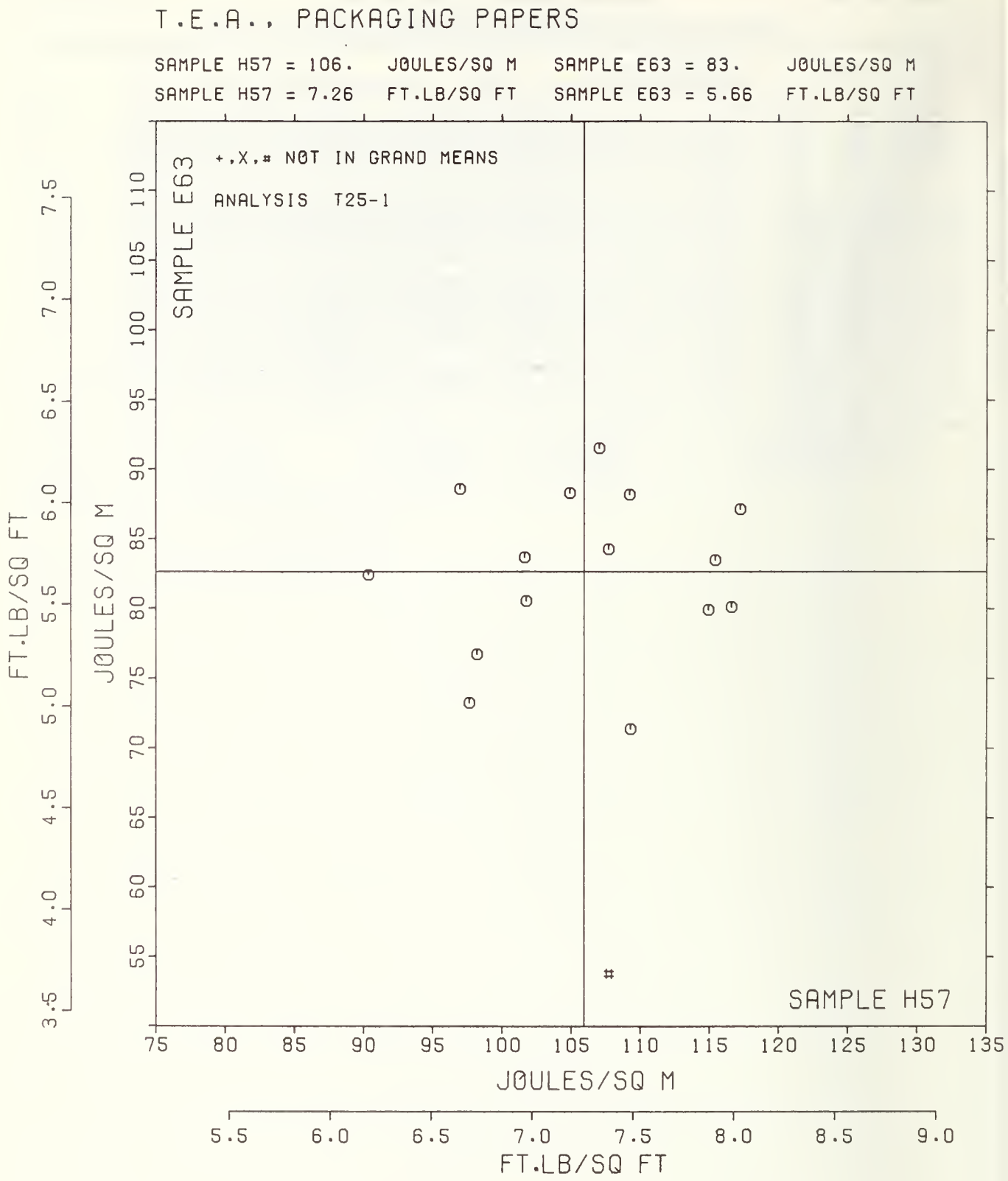
The following laboratories were omitted from the grand means because of extreme test results: 151, 264, 312.

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 H57	MEANS E63	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L243	@	90.4	82.4	-15.4	2.1	.97	25Z	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/LINE JAWS
L280	@	96.9	88.5	-8.0	7.2	.99	25B	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/PLAT JAWS
L604	@	97.7	73.2	-9.6	-8.0	1.40	25A	TENSILE ENERGY ABS.,PACKAGING PAPER,PLAT/PLAT JAWS
L237B	@	98.2	76.7	-8.5	-4.6	.80	25H	TENSILE ENERGY ABS.,PACKAGING PAPER,2-PIN STRAIN GAGE
L580	@	101.6	83.7	-4.1	1.7	.90	25C	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/LINE JAWS
L174	@	101.7	80.5	-4.4	-1.4	.92	25Y	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/PLAT JAWS
L182	@	104.9	88.3	-.2	5.8	.87	25B	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/PLAT JAWS
L234B	@	107.0	91.5	2.4	8.6	1.21	25H	TENSILE ENERGY ABS.,PACKAGING PAPER,2-PIN STRAIN GAGE
L264	#	107.4	53.3	-3.0	-29.2	.97	25F	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/PLAT JAWS
L126	@	107.7	84.2	2.0	1.3	.95	25G	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/LINE JAWS
L318	@	109.2	88.2	4.1	5.0	.97	25A	TENSILE ENERGY ABS.,PACKAGING PAPER,FLAT/FLAT JAWS
L336	@	109.3	71.4	1.7	-11.6	.83	25A	TENSILE ENERGY ABS.,PACKAGING PAPER,FLAT/FLAT JAWS
L267	@	114.9	79.9	8.5	-4.0	1.04	25F	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/FLAT JAWS
L273	@	115.4	83.5	9.5	-.6	1.07	25F	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/FLAT JAWS
L265	@	116.6	80.1	10.2	-4.1	.91	25F	TENSILE ENERGY ABS.,PACKAGING PAPER,FLAT/FLAT JAWS
L122	@	117.2	87.1	11.8	2.7	1.18	25P	TENSILE ENERGY ABS.,PACKAGING PAPER,PATTERNED FLAT JAWS
L312	#	137.3	97.3	33.2	9.8	.93	25J	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/FLAT JAWS
L151	#	139.8	95.6	35.4	7.8	1.15	25P	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/FLAT JAWS
GMEANS:		105.9	82.6			1.00		
		95% ELLIPSE:		23.4	16.4	WITH GAMMA = 8 DEGREES		


T.E.A., PACKAGING PAPERS
SAMPLE H57 = 106. JOULES/SQ M
SAMPLE E63 = 83. JOULES/SQ M
SAMPLE H57 = 7.26 FT.LB/SQ FT
SAMPLE E63 = 5.66 FT.LB/SQ FT
+,X,# NOT IN GRAND MEANS
ANALYSIS T25-1
SAMPLE E63
SAMPLE H57
JOULES/SQ M
FT.LB/SQ FT
75 80 85 90 95 100 105 110 115 120 125 130 135
55 60 65 70 75 80 85 90 95 100 105 110
3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5
5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0

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 J03 MEAN	PRINTING 73 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE J07 MEAN	PRINTING 85 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	VAR	F	LAB	TEST D.= 20
L100	36.7	2.0	.47	6.4	1.33	75.5	.8	.12	10.1	1.13	26A	@	L100	
L115	35.8	1.1	.25	2.6	.53	70.4	-4.3	-.62	7.0	.78	26C	@	L115	
L118	35.2	.4	.10	5.2	1.09	75.6	.8	.12	8.4	.94	26E	@	L118	
L122	37.8	3.0	.71	6.2	1.30	77.5	2.8	.40	8.2	.92	26L	@	L122	
L139	51.7	17.0	3.98	21.8	4.53	70.2	-4.6	-.66	8.9	1.00	26H	#	L139	
L159	33.3	-1.4	-.34	8.1	1.67	70.0	-4.7	-.68	12.8	1.43	26F	@	L159	
L163	36.2	1.5	.34	4.1	.86	76.6	1.8	.27	5.9	.66	26J	@	L163	
L185	27.3	-7.5	-1.76	5.4	1.13	63.7	-11.0	-1.60	11.8	1.32	26C	@	L185	
L206	26.5	-8.3	-1.95	7.5	1.56	67.0	-7.8	-1.13	12.1	1.35	26Y	@	L206	
L231	28.0	-6.8	-1.59	6.3	1.30	79.9	5.1	.75	7.0	.78	26F	*	L231	
L255	37.6	2.8	.67	6.6	1.37	84.4	9.6	1.40	10.8	1.21	26P	@	L255	
L309	37.5	2.7	.65	4.9	1.03	79.8	5.1	.74	10.8	1.21	26I	@	L309	
L318	36.9	2.1	.50	4.1	.86	76.8	2.0	.29	8.6	.96	26A	@	L318	
L372	33.6	-1.1	-.27	3.0	.62	68.2	-6.5	-.95	6.0	.67	26Y	@	L372	
L378	35.8	1.1	.26	4.8	.99	96.5	21.7	3.15	12.0	1.34	26A	#	L378	
L393	34.0	-.8	-.18	2.2	.46	73.9	-.8	-.12	5.6	.63	26V	@	L393	
L442	43.0	8.2	1.93	3.4	.70	87.2	12.5	1.81	5.5	.61	26B	@	L442	
L567	38.7	4.0	.94	3.8	.78	83.9	9.1	1.32	9.9	1.11	26A	@	L567	
L575	36.2	1.5	.35	4.0	.84	71.6	-3.1	-.46	11.3	1.27	26B	@	L575	
L587	36.0	1.3	.30	2.8	.58	NO DATA REPORTED FOR SAMPLE J07					26C	M	L587	
L592	31.3	-3.4	-.81	4.3	.88	63.3	-11.4	-1.66	7.1	.80	26G	@	L592	

GR. MEAN = 34.8 JOULES/SQ M GRAND MEAN = 74.7 JOULES/SQ M TEST DETERMINATIONS = 20

SD MEANS = 4.3 JOULES/SQ M SD OF MEANS = 6.9 JOULES/SQ M 18 LABS IN GRAND MEANS

AVERAGE SDR = 4.8 JOULES/SQ M AVERAGE SDR = 8.9 JOULES/SQ M

GR. MEAN = 2.381 FT.LB/SQ FT GRAND MEAN = 5.120 FT.LB/SQ FT

TOTAL NUMBER OF LABORATORIES REPORTING = 21

Best Values: J03 35 ± 7 joules per square meter

J07 75 ± 8 joules per square meter

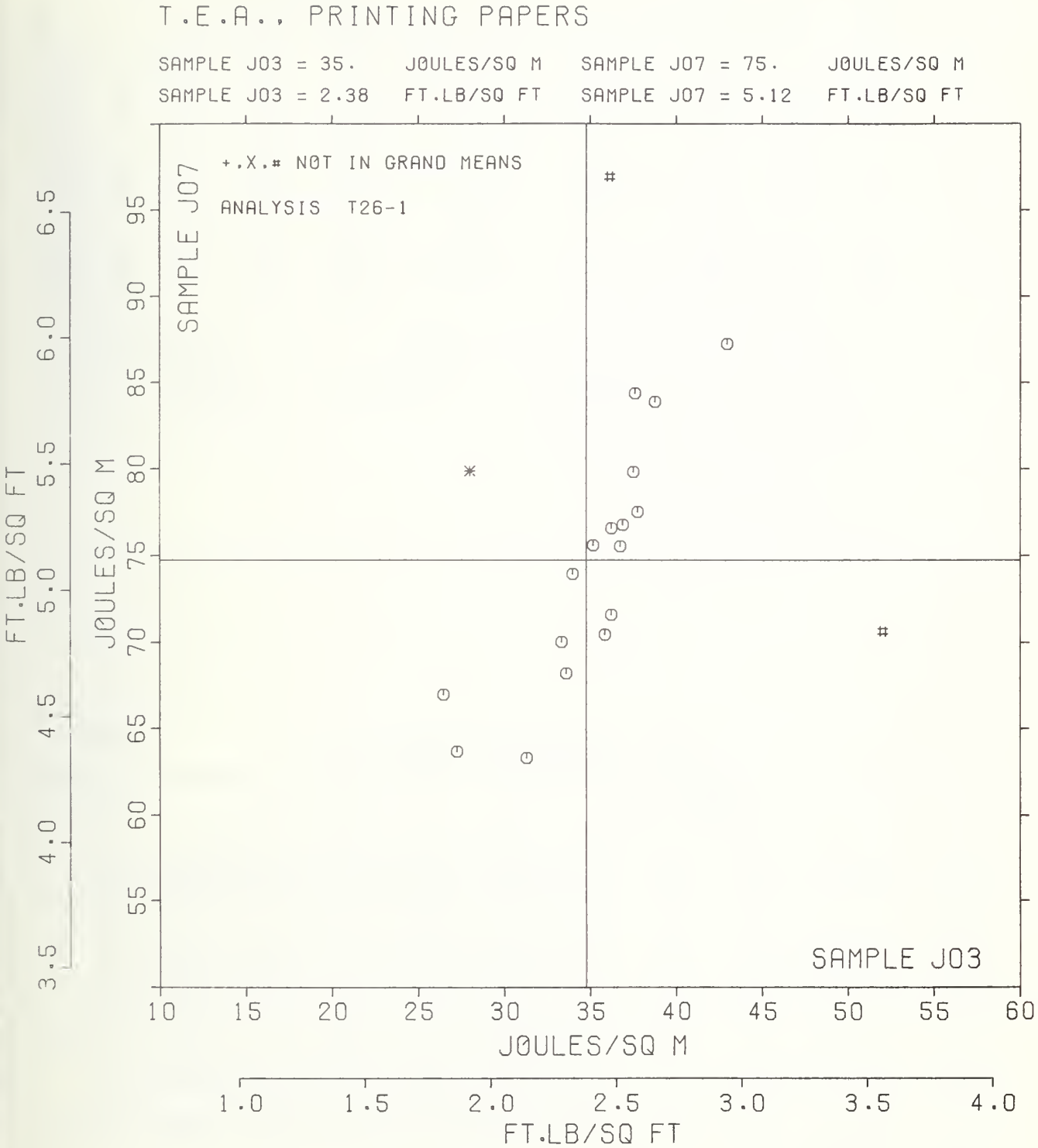
The following laboratories were omitted from the grand means because of extreme test results: 139, 378.

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	F	MEANS J03	MEANS J07	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L206	6	26.5	67.0	-10.7	3.8	1.46	26Y	TENSILE ENERGY ABS.,PRINTING PAPERS,LINE/FLAT JAWS
L185	6	27.3	63.7	-13.3	1.6	1.22	26C	TENSILE ENERGY ABS.,PRINTING PAPERS,LINE/LINE JAWS
L231	*	28.0	79.9	1.5	8.4	1.04	26E	TENSILE ENERGY ABS.,PRINTING PAPERS,FLAT/FLAT JAWS
L592	6	31.3	63.3	-11.7	-2.2	.84	26G	TENSILE ENERGY ABS.,PRINTING PAPERS,LINE/LINE JAWS
L159	6	33.3	70.0	-4.8	-.9	1.55	26F	TENSILE ENERGY ABS.,PRINTING PAPERS,LINE/FLAT JAWS
L372	6	33.6	68.2	-6.3	-2.0	.65	26Y	TENSILE ENERGY ABS.,PRINTING PAPERS,LINE/FLAT JAWS
L393	6	34.0	73.9	-1.1	.3	.54	26V	TENSILE ENERGY ABS.,PRINTING PAPERS,LINE/FLAT JAWS
L118	6	35.2	75.6	.9	.0	1.01	26E	TENSILE ENERGY ABS.,PRINTING PAPERS,FLAT/FLAT JAWS
L115	6	35.8	70.4	-3.3	-2.9	.66	26C	TENSILE ENERGY ABS.,PRINTING PAPERS,LINE/LINE JAWS
L378	#	35.8	96.5	19.8	9.0	1.17	26A	TENSILE ENERGY ABS.,PRINTING PAPERS,FLAT/FLAT JAWS
L587	M	36.0				.58	26C	TENSILE ENERGY ABS.,PRINTING PAPERS,LINE/LINE JAWS
L163	6	36.2	76.6	2.3	-.5	.76	26J	TENSILE ENERGY ABS.,PRINTING PAPERS,LINE/FLAT JAWS
L575	6	36.2	71.6	-2.1	-2.8	1.05	26B	TENSILE ENERGY ABS.,PRINTING PAPERS,LINE/FLAT JAWS
L100	6	36.7	75.5	1.6	-1.4	1.23	26A	TENSILE ENERGY ABS.,PRINTING PAPERS,FLAT/FLAT JAWS
L318	6	36.9	76.8	2.8	-1.0	.91	26A	TENSILE ENERGY ABS.,PRINTING PAPERS,FLAT/FLAT JAWS
L309	6	37.5	79.8	5.8	-.1	1.12	26I	TENSILE ENERGY ABS.,PRINTING PAPERS,FLAT/FLAT JAWS
L255	6	37.6	84.4	9.8	1.9	1.29	26P	TENSILE ENERGY ABS.,PRINTING PAPERS,PATTERNED FLAT JAWS
L122	6	37.8	77.5	3.8	-1.4	1.11	26L	TENSILE ENERGY ABS.,PRINTING PAPERS,PATTERNED FLAT JAWS
L567	6	38.7	83.9	9.9	.7	.95	26A	TENSILE ENERGY ABS.,PRINTING PAPERS,FLAT/FLAT JAWS
L442	6	43.0	87.2	14.9	-1.5	.65	26B	TENSILE ENERGY ABS.,PRINTING PAPERS,LINE/FLAT JAWS
L139	#	51.7	70.2	3.8	-17.2	2.76	26H	TENSILE ENERGY ABS.,PRINTING PAPERS,2-PIN STRAIN GAGE
GMEANS:		34.8	74.7			1.00		
		95% ELLIPSE:		21.2	7.5	WITH GAMMA = 62 DEGREES		


T.E.A., PRINTING PAPERS
SAMPLE J03 = 35. JOULES/SQ M
SAMPLE J03 = 2.38 FT.LB/SQ FT
SAMPLE J07 = 75. JOULES/SQ M
SAMPLE J07 = 5.12 FT.LB/SQ FT
+.X.# NOT IN GRAND MEANS
ANALYSIS T26-1
SAMPLE J07
SAMPLE J03
JOULES/SQ M
FT.LB/SQ FT
10 15 20 25 30 35 40 45 50 55 60
55 60 65 70 75 80 85 90 95
3.5 4.0 4.5 5.0 5.5 6.0 6.5
1.0 1.5 2.0 2.5 3.0 3.5 4.0

REPORT NO. S1S TAPPI COLLABORATIVE REFERENCE PROGRAM JANUARY 1978

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 H57 KRAFT 147 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	SAMPLE F63 KRAFT ENVELOPE 75 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	TEST D.F. 20 VAR	F	LAB
L122	1.79	.02	.12	.13	.82	3.20	-.01	-.03	.38	1.24	28P	@	L122
L126	1.61	-.17	-.94	.13	.83	2.97	-.24	-.94	.28	.93	28C	@	L126
L151	1.88	.11	.62	.19	1.19	3.60	.39	1.53	.41	1.35	28B	@	L151
L182	1.69	-.08	-.45	.12	.79	3.21	.00	.02	.23	.75	28B	@	L182
L243	1.43	-.34	-1.92	.22	1.39	3.02	-.19	-.73	.24	.78	28C	@	L243
L264	1.70	-.07	-.38	.15	.98	2.20	-1.01	-3.95	.37	1.23	28R	#	L264
L265	1.78	.01	.03	.17	1.11	2.85	-.36	-1.40	.23	.76	28A	@	L265
L267	1.79	.02	.13	.20	1.24	2.87	-.34	-1.31	.29	.96	28R	@	L267
L280	1.72	-.05	-.30	.17	1.08	3.36	.15	.60	.26	.87	28B	@	L280
L312	2.23	.46	2.61	.15	.95	3.42	.21	.82	.28	.91	28B	@	L312
L318	1.81	.04	.22	.13	.80	3.63	.42	1.62	.30	1.00	28A	@	L318
L324	1.67	-.10	-.58	.09	.58	2.91	-.30	-1.18	.42	1.39	28P	@	L324
L336	1.74	-.03	-.20	.11	.70	3.21	.00	.02	.31	1.02	28A	@	L336
L580	1.77	-.00	-.01	.28	1.76	3.37	.16	.63	.25	.81	28C	@	L580
L581	1.58	-.19	-1.06	.15	.96	1.70	-1.51	-5.89	.36	1.19	28A	#	L581
L582	1.89	.12	.67	.12	.75	3.30	.09	.35	.37	1.22	28A	@	L582
GR. MEAN =	1.77 PERCENT					GRAND MEAN =	3.21 PERCENT				TEST DETERMINATIONS =		20
SD MEANS =	.18 PERCENT					SD OF MEANS =	.26 PERCENT				14 LABS IN GRAND MEANS		
	AVERAGE SDR =		.16 PERCENT				AVERAGE SDR =		.30 PERCENT				
L153	2.20	.43	2.47	.11	.70	3.36	.15	.59	.37	1.23	28Q	*	L153

TOTAL NUMBER OF LABORATORIES REPORTING = 17

Best Values: H57 1.7 ± 0.3 percent
F63 3.2 ± 0.4 percent

The following laboratories were omitted from the grand means because of extreme test results: 264, 581.

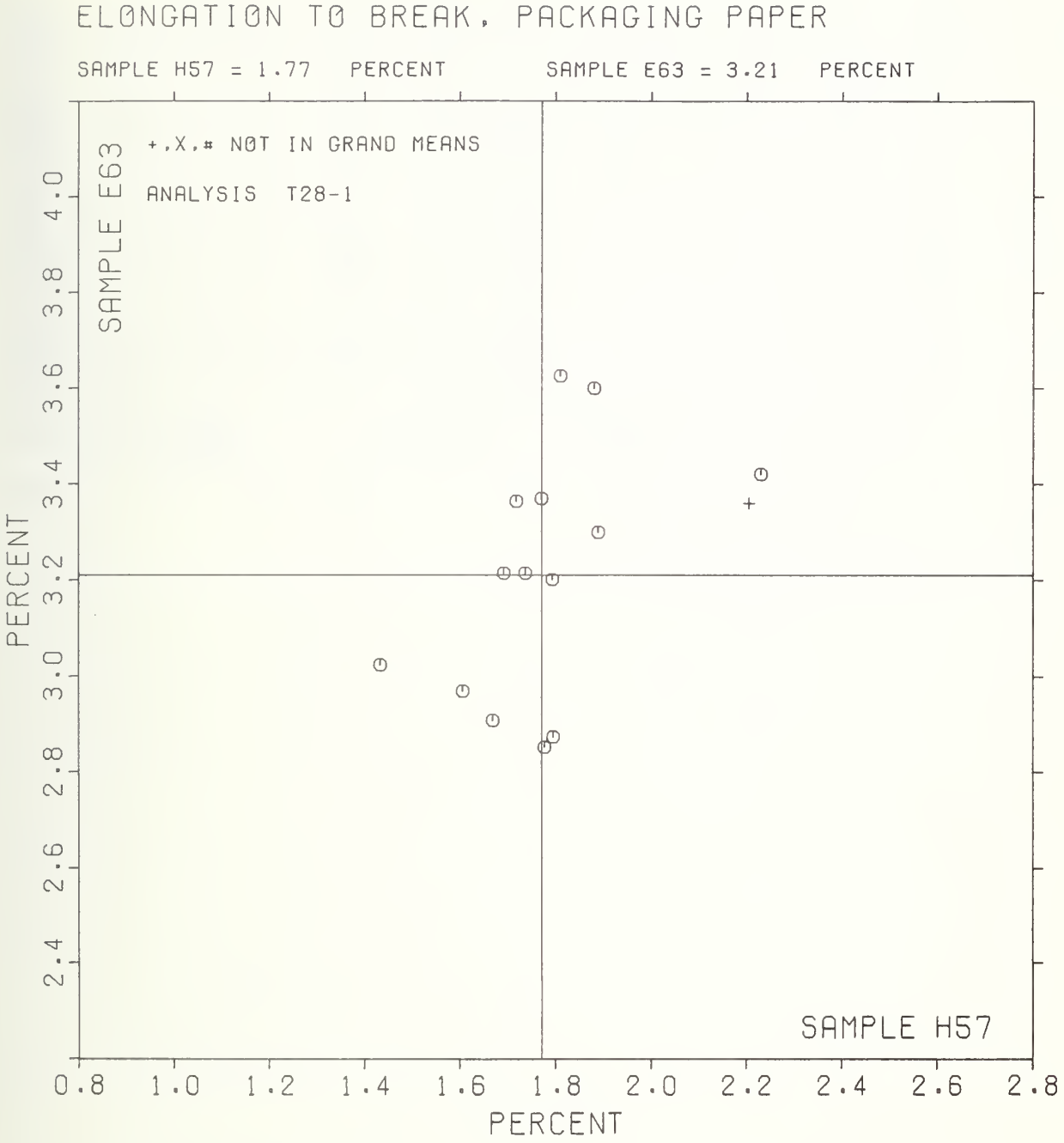
REPORT NO. S1S TAPPI COLLABORATIVE REFERENCE PROGRAM JANUARY 1978

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 H57	F63	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L243	@	1.43	3.02	-.31	.22	1.09	28C	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/LINE JAWS
L581	#	1.58	1.70	-1.44	-.48	1.07	28A	ELONGATION,PACKAGING PAPER,LOAD CELL,FLAT/FLAT JAWS
L126	@	1.61	2.97	-.29	.04	.88	28C	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/LINE JAWS
L324	@	1.67	2.91	-.32	-.04	.99	28P	ELONGATION,PACKAGING PAPER,LOAD CELL,PATTERNED FLAT JAWS
L182	@	1.69	3.21	-.02	.07	.77	28B	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
L264	#	1.70	2.20	-.94	-.38	1.10	28B	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
L280	@	1.72	3.36	.12	.12	.98	28R	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
L336	@	1.74	3.21	-.01	.03	.86	28A	ELONGATION,PACKAGING PAPER,LOAD CELL,FLAT/FLAT JAWS
L580	@	1.77	3.37	.14	.07	1.29	28C	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/LINE JAWS
L265	@	1.78	2.85	-.32	-.16	.93	28A	ELONGATION,PACKAGING PAPER,LOAD CELL,FLAT/FLAT JAWS
L122	@	1.79	3.20	.00	-.02	1.03	28P	ELONGATION,PACKAGING PAPER,LOAD CELL,PATTERNED FLAT JAWS
L267	@	1.79	2.87	-.29	-.17	1.10	28B	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
L318	@	1.81	3.63	.39	.14	.90	28A	ELONGATION,PACKAGING PAPER,LOAD CELL,FLAT/FLAT JAWS
L151	@	1.88	3.60	.40	.07	1.27	28B	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
L582	@	1.89	3.30	.13	-.07	.99	28A	ELONGATION,PACKAGING PAPER,LOAD CELL,FLAT/FLAT JAWS
L153	*	2.20	3.36	.32	-.33	.96	28Q	ELONGATION,PACKAGING PAPER,PENDULUM, PATTERNED FLAT JAWS
L312	@	2.23	3.42	.39	-.32	.93	28B	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
GMEANS:		1.77	3.21			1.00		
		95% ELLIPSE:		.80	.42	WITH GAMMA = 64 DEGREES		


ELONGATION TO BREAK, PACKAGING PAPER
SAMPLE H57 = 1.77 PERCENT
SAMPLE E63 = 3.21 PERCENT
+,X,# NOT IN GRAND MEANS
ANALYSIS T28-1
SAMPLE E63
PERCENT
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8
4.0
SAMPLE H57
0.8
1.0
1.2
1.4
1.6
1.8
2.0
2.2
2.4
2.6
2.8
PERCENT

TAPPI COLLABORATIVE REFERENCE PROGRAM
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 CODE	SAMPLE J03 MEAN	PRINTING 73 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE J07 MEAN	PRINTING 85 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.* 20 VAR	F	LAB
L100	1.52	-.02	-.16	.16	1.12	1.82	-.09	-.45	.13	.89	29A	O	L100
L118	1.56	.02	.16	.14	1.00	1.96	.05	.24	.11	.75	29A	O	L118
L122	1.58	.04	.30	.19	1.32	1.94	.03	.15	.09	.64	29P	O	L122
L141T	1.35	-.20	-1.42	.11	.73	1.67	-.24	-1.23	.15	1.05	29D	O	L141T
L176	1.23	-.31	-2.27	.22	1.54	1.60	-.31	-1.59	.26	1.79	29B	O	L176
L185	1.43	-.11	-.79	.14	.97	1.78	-.13	-.66	.17	1.16	29C	O	L185
L190R	1.43	-.11	-.78	.15	1.07	1.82	-.10	-.49	.16	1.07	29A	O	L190R
L231	1.72	.18	1.29	.20	1.38	2.27	.36	1.81	.14	.95	29A	O	L231
L255	1.60	.06	.42	.18	1.23	2.03	.12	.59	.18	1.20	29P	O	L255
L309	1.71	.16	1.20	.12	.84	2.13	.22	1.10	.13	.90	29A	O	L309
L318	1.72	.18	1.31	.13	.93	2.08	.17	.84	.13	.89	29A	O	L318
L344	1.57	.03	.19	.11	.77	1.79	-.13	-.64	.19	1.28	29A	O	L344
L372	1.46	-.08	-.62	.05	.33	1.67	-.24	-1.23	.11	.78	29B	O	L372
L378	1.63	.09	.64	.24	1.68	2.23	.32	1.60	.21	1.42	29A	O	L378
L442	1.72	.18	1.29	.10	.70	2.10	.19	.95	.10	.67	29A	O	L442
L561	20.34	18.80	136.72	1.47	10.21	37.68	35.77	181.31	2.30	15.75	29B	*	L561
L567	1.57	.02	.17	.10	.70	1.96	.05	.25	.10	.67	29A	O	L567
L575	1.54	.00	.02	.11	.76	1.86	-.05	-.26	.15	1.03	29A	O	L575
L587	1.46	-.08	-.58	.07	.46	NO DATA REPORTED FOR SAMPLE J07					29C	M	L587
L592	1.41	-.13	-.96	.14	.94	1.72	-.19	-.98	.13	.87	29C	O	L592
GR. MEAN *	1.54 PERCENT					GRAND MEAN *	1.91 PERCENT				TEST DETERMINATIONS *		20
SD MEANS *	.14 PERCENT					SD OF MEANS *	.20 PERCENT				18 LABS IN GRAND MEANS		
	AVERAGE SDR *			.14 PERCENT			AVERAGE SDR *			.15 PERCENT			
L242	2.16	.62	4.53	.11	.75	2.13	.22	1.12	.13	.90	29R	*	L242
L484	1.55	.01	.06	.29	2.00	1.74	-.17	-.86	.20	1.34	29R	*	L484

TOTAL NUMBER OF LABORATORIES REPORTING * 22

Best Values: J03 1.5 ± 0.2 percent
J07 1.9 ± 0.3 percent

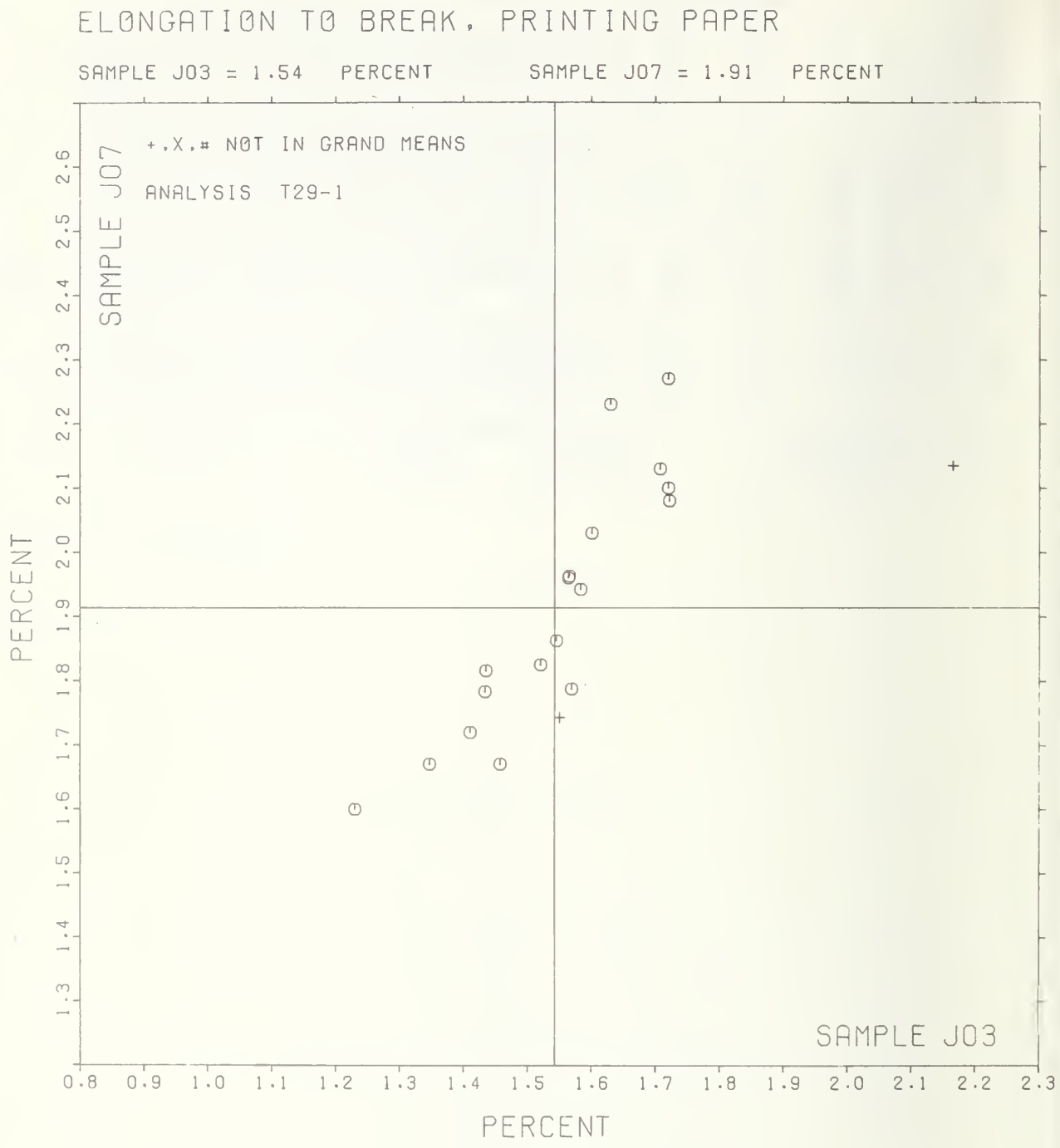
Data from the following laboratories were not understood: 561.

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 J03	MEANS J07	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L176	O	1.23	1.60	-.43	.08	1.66	29B	ELONGATION,PRINTING PAPERS,LOAD CELL,LINE/FLAT JAWS
L141T	O	1.35	1.67	-.31	.03	.89	29D	ELONGATION,PRINTING PAPERS,LOAD CELL,2-PIN STRAIN GAGE
L592	O	1.41	1.72	-.23	.00	.90	29C	ELONGATION,PPINTING PAPERS,LOAD CELL,LINE/LINE JAWS
L185	O	1.43	1.78	-.17	.02	1.06	29C	ELONGATION,PRINTING PAPERS,LOAD CELL,LINE/LINE JAWS
L190R	O	1.43	1.82	-.14	.04	1.07	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L372	O	1.46	1.67	-.25	-.07	.56	29B	ELONGATION,PRINTING PAPERS,LOAD CELL,LINE/FLAT JAWS
L587	M	1.46				.46	29C	ELONGATION,PRINTING PAPERS,LOAD CELL,LINE/LINE JAWS
L100	O	1.52	1.82	-.09	-.03	1.00	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L575	O	1.54	1.86	-.04	-.03	.89	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L484	*	1.55	1.74	-.14	-.10	1.67	29R	ELONGATION,PRINTING PAPERS,PENDULUM, FLAT/FLAT JAWS
L118	O	1.56	1.96	.05	.01	.87	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L567	O	1.57	1.96	.05	.01	.69	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L344	O	1.57	1.79	-.09	-.09	1.02	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L122	O	1.58	1.94	.05	-.02	.98	29P	ELONGATION,PRINTING PAPERS,LOAD CELL,PATTERNED FLAT JAWS
L255	O	1.60	2.03	.13	.02	1.22	29P	ELONGATION,PRINTING PAPERS,LOAD CELL,PATTERNED FLAT JAWS
L378	O	1.63	2.23	.31	.10	1.55	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L309	O	1.71	2.13	.27	-.02	.87	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L231	O	1.72	2.27	.40	.05	1.16	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L442	O	1.72	2.10	.25	-.04	.68	29B	ELONGATION,PRINTING PAPERS,LOAD CELL,LINE/FLAT JAWS
L318	O	1.72	2.08	.24	-.06	.91	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L242	*	2.16	2.13	.53	-.39	.83	29R	ELONGATION,PRINTING PAPERS,PENDULUM, FLAT/FLAT JAWS
L561	#	20.34	37.68	40.18	4.31	12.98	29B	ELONGATION,PRINTING PAPERS,LOAD CELL,LINE/FLAT JAWS
GMEANS:		1.54	1.91			1.00		
		95% ELLIPSE:		.65	.14	WITH GAMMA = 56 DEGREES		


ELONGATION TO BREAK, PRINTING PAPER
SAMPLE J03 = 1.54 PERCENT
SAMPLE J07 = 1.91 PERCENT
+,X,# NOT IN GRAND MEANS
ANALYSIS T29-1
SAMPLE J07
SAMPLE J03
PERCENT
PERCENT
1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3 2.4 2.5 2.6
0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3

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

LAB CODE	SAMPLE H23 MEAN	PRINTING 91 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE H35 MEAN	PRINTING 151 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.* 15 VAR	F	LAB
L100M	533.	128.	.91	91.	.97	103.	33.	1.00	19.	.81	30M	@	L100M
L100N	647.	242.	1.72	125.	1.34	59.	-10.	-.31	14.	.59	30N	@	L100N
L105	316.	-89.	-.64	61.	.66	34.	-36.	-1.08	9.	.38	30M	@	L105
L118	466.	61.	.43	91.	.98	68.	-1.	-.03	19.	.82	30D	@	L118
L121	459.	54.	.38	77.	.83	61.	-9.	-.27	25.	1.05	30M	@	L121
L122	790.	385.	2.74	164.	1.76	163.	93.	2.80	58.	2.44	30M	*	L122
L124	349.	-56.	-.40	76.	.82	69.	-1.	-.02	29.	1.22	30N	@	L124
L150	210.	-195.	-1.39	56.	.60	13.	-56.	-1.70	8.	.34	30M	@	L150
L158	116.	-289.	-2.06	49.	.52	19.	-51.	-1.53	7.	.29	30N	@	L158
L159	341.	-64.	-.46	87.	.94	106.	36.	1.09	35.	1.48	30N	@	L159
L162	409.	3.	.02	96.	1.03	53.	-17.	-.51	21.	.87	30M	@	L162
L163	301.	-104.	-.74	66.	.71	97.	27.	.81	38.	1.59	30N	@	L163
L176	413.	7.	.05	110.	1.18	116.	47.	1.41	33.	1.40	30N	@	L176
L182M	678.	273.	1.94	90.	.97	99.	29.	.88	26.	1.09	30M	@	L182M
L185	650.	245.	1.74	160.	1.72	113.	44.	1.32	26.	1.12	30N	@	L185
L190C	366.	-39.	-.28	104.	1.11	56.	-14.	-.42	26.	1.11	30N	@	L190C
L212	445.	39.	.28	92.	.98	57.	-12.	-.37	11.	.46	30M	@	L212
L223F	480.	74.	.53	97.	1.05	69.	-1.	-.02	23.	.98	30M	@	L223F
L230	410.	5.	.03	53.	.57	57.	-13.	-.38	18.	.76	30N	@	L230
L232	272.	-133.	-.95	248.	2.67	214.	145.	4.35	196.	8.30	30N	X	L232
L236	267.	-138.	-.98	74.	.80	40.	-30.	-.89	16.	.66	30N	@	L236
L238A	339.	-67.	-.47	117.	1.25	42.	-28.	-.84	19.	.79	30N	@	L238A
L238B	290.	-115.	-.82	65.	.70	38.	-31.	-.95	22.	.91	30D	@	L238B
L243	517.	111.	.79	134.	1.44	106.	36.	1.09	34.	1.46	30D	@	L243
L254	378.	-28.	-.20	92.	.99	63.	-6.	-.19	29.	1.21	30M	@	L254
L262	371.	-34.	-.24	83.	.89	52.	-18.	-.54	15.	.62	30N	@	L262
L275	482.	77.	.55	85.	.91	60.	-10.	-.30	40.	1.67	30N	@	L275
L278	275.	-130.	-.92	99.	1.06	96.	26.	.79	46.	1.96	30C	@	L278
L279	515.	109.	.78	65.	.69	79.	10.	.30	18.	.78	30N	@	L279
L285A	289.	-116.	-.82	67.	.72	50.	-20.	-.59	43.	1.81	30N	@	L285A
L285B	234.	-171.	-1.22	107.	1.15	21.	-49.	-1.46	18.	.77	30N	@	L285B
L299	417.	11.	.08	95.	1.02	46.	-24.	-.71	23.	.99	30N	@	L299
L321	1182.	777.	5.53	354.	3.80	205.	135.	4.07	61.	2.57	30M	#	L321
L326N	306.	-99.	-.70	60.	.65	134.	64.	1.93	13.	.57	30N	*	L326N
L339	77.	-328.	-2.33	31.	.34	4.	-66.	-1.98	1.	.05	30N	#	L339
L341	357.	-48.	-.34	79.	.85	49.	-21.	-.63	16.	.68	30C	@	L341
L366A	277.	-129.	-.91	106.	1.14	41.	-28.	-.86	12.	.52	30N	@	L366A
L376	361.	-44.	-.32	115.	1.24	42.	-27.	-.83	22.	.92	30N	@	L376
L378	529.	124.	.88	142.	1.53	73.	4.	.11	23.	.98	30N	@	L378
L388	457.	52.	.37	96.	1.03	56.	-14.	-.41	30.	1.25	30N	@	L388
L390	307.	-98.	-.70	88.	.95	34.	-35.	-1.06	18.	.78	30N	@	L390
L396M	407.	2.	.02	79.	.85	110.	40.	1.20	28.	1.20	30N	@	L396M
L396S	523.	118.	.84	69.	.74	855.	786.	23.65	170.	7.17	30T	#	L396S
L565	540.	135.	.96	220.	2.36	130.	60.	1.81	37.	1.58	30N	@	L565
L567	531.	126.	.89	72.	.77	77.	7.	.22	21.	.90	30N	@	L567
L589	117.	-288.	-2.05	34.	.36	60.	-9.	-.28	17.	.71	30N	@	L589
L599	484.	79.	.56	122.	1.31	83.	13.	.39	35.	1.49	30C	@	L599
GR. MEAN *	405. DOUBLE FOLDS					GRAND MEAN *	70. DOUBLE FOLDS				TEST DETERMINATIONS * 15		
SD MEANS *	141. DOUBLE FOLDS					SD OF MEANS *	33. DOUBLE FOLDS				43 LABS IN GRAND MEANS		
		AVERAGE SDR *		93. DOUBLE FOLDS				AVERAGE SDR *		24. DOUBLE FOLDS			
L143	55.	-351.	-2.49	18.	.19	91.	22.	.65	97.	4.11	30T	*	L143
L182S	375.	-30.	-.21	104.	1.11	422.	352.	10.60	170.	7.20	30S	*	L182S
L190D	218.	-188.	-1.33	34.	.37	465.	396.	11.91	139.	5.89	30S	*	L190D
L280	318.	-87.	-.62	131.	1.41	69.	-1.	-.02	29.	1.24	30K	*	L280
L326S	275.	-131.	-.93	66.	.71	523.	453.	13.65	231.	9.77	30S	*	L326S
L366B	388.	-17.	-.12	75.	.81	73.	4.	.11	70.	2.98	30T	*	L366B
L581	458.	53.	.38	53.	.57	589.	519.	15.63	209.	8.82	30T	*	L581

TOTAL NUMBER OF LABORATORIES REPORTING * 54

Best Values: H23 600 double folds
H35 100 double folds

The following laboratories were omitted from the grand means because of extreme test results: 321, 339.

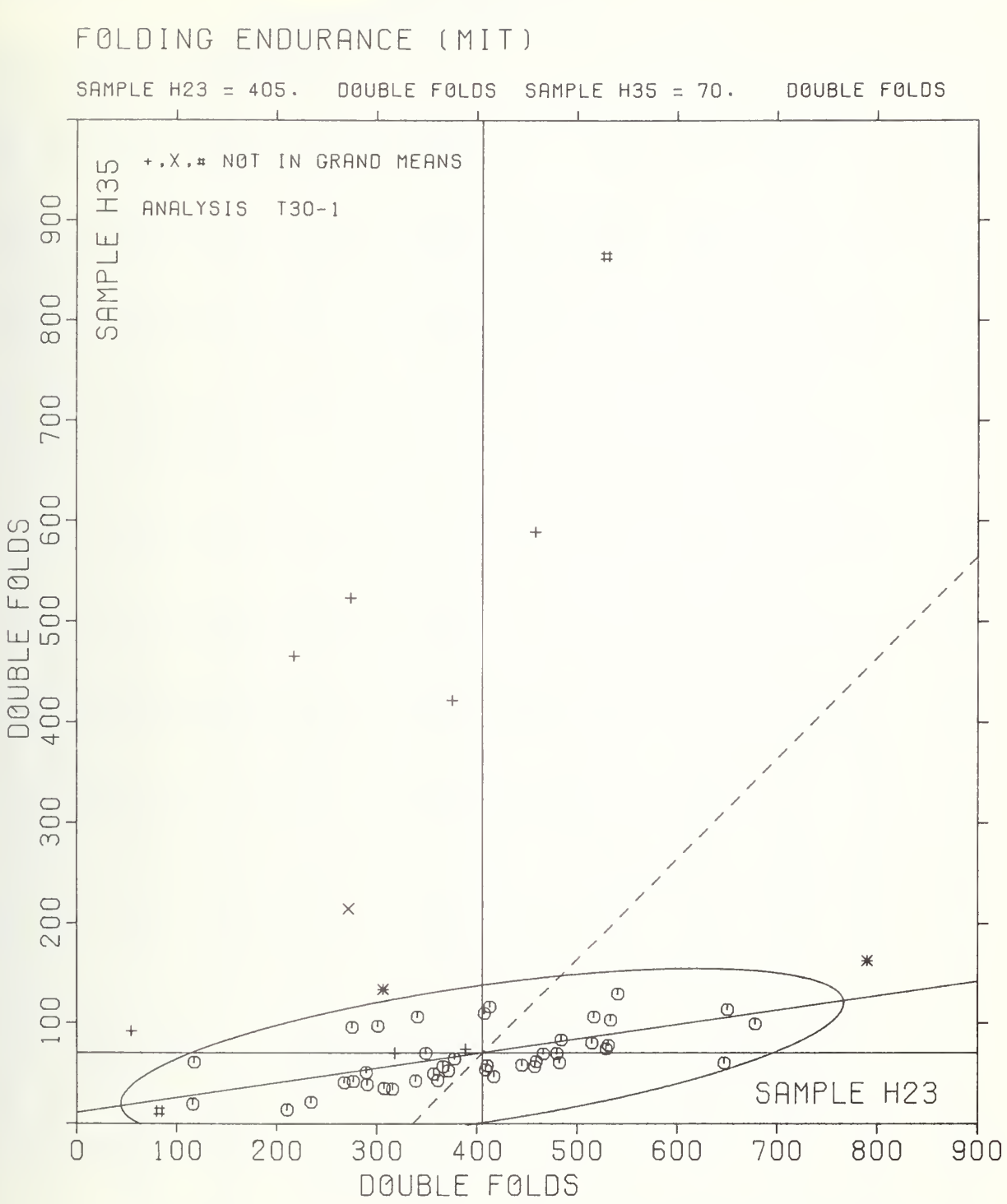
Data from laboratory 396S belongs in the lower portion of the table. The data was taken on a non-standard instrument (+ Flag).

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 44 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 H23	MEANS H35	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L143	*	55.	91.	-344.	72.	2.15	30T	FOLDING ENDURANCE, SCHOPPER, TMI
L339	#	77.	4.	-334.	-18.	.19	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L158	O	116.	19.	-294.	-8.	.40	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L589	O	117.	60.	-286.	32.	.54	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L150	O	210.	13.	-201.	-28.	.47	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L190D	*	218.	465.	-129.	419.	3.13	30S	FOLDING ENDURANCE, SCHOPPER, LEIPZIG
L285B	O	234.	21.	-176.	-23.	.96	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L236	O	267.	40.	-141.	-9.	.73	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L232	X	272.	214.	-111.	162.	5.49	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L326S	*	275.	523.	-64.	468.	5.24	30S	FOLDING ENDURANCE, SCHOPPER, LEIPZIG
L278	O	275.	96.	-125.	45.	1.51	30C	FOLDING ENDURANCE, MIT, CIRCULATING FAN IN CEILING
L366A	O	277.	41.	-131.	-10.	.83	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L285A	O	289.	50.	-117.	-3.	1.26	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L238B	O	290.	38.	-118.	-15.	.81	30D	FOLDING ENDURANCE, MIT, MODIFIED DRIVE TO REDUCE HEATING
L163	O	301.	97.	-99.	42.	1.15	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L326N	*	306.	134.	-89.	78.	.61	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L390	O	307.	34.	-102.	-21.	.86	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L105	O	316.	34.	-94.	-23.	.52	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L280	*	318.	69.	-86.	12.	1.32	30K	FOLDING ENDURANCE, KOHLER-MOLIN
L238A	O	339.	42.	-70.	-18.	1.02	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L159	O	341.	106.	-59.	45.	1.21	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L124	O	349.	69.	-56.	8.	1.02	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L341	O	357.	49.	-51.	-14.	.77	30C	FOLDING ENDURANCE, MIT, CIRCULATING FAN IN CEILING
L376	O	361.	42.	-48.	-21.	1.08	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L190C	O	366.	56.	-41.	-8.	1.11	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L262	O	371.	52.	-36.	-13.	.76	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L182S	*	375.	422.	21.	353.	4.16	30S	FOLDING ENDURANCE, SCHOPPER, LEIPZIG
L254	O	378.	63.	-28.	-2.	1.10	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L366B	*	388.	73.	-16.	6.	1.89	30T	FOLDING ENDURANCE, SCHOPPER, TMI
L396M	O	407.	110.	8.	39.	1.02	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L162	O	409.	53.	1.	-17.	.95	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L230	O	410.	57.	3.	-13.	.67	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L176	O	413.	116.	14.	45.	1.29	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L299	O	417.	46.	8.	-25.	1.00	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L212	O	445.	57.	37.	-18.	.72	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L388	O	457.	56.	50.	-21.	1.14	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L581	*	458.	589.	127.	506.	4.69	30T	FOLDING ENDURANCE, SCHOPPER, TMI
L121	O	459.	61.	52.	-17.	.94	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L118	O	466.	68.	60.	-10.	.90	30D	FOLDING ENDURANCE, MIT, MODIFIED DRIVE TO REDUCE HEATING
L223F	O	480.	69.	74.	-11.	1.01	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L275	O	482.	60.	75.	-21.	1.29	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L599	O	484.	83.	80.	1.	1.40	30C	FOLDING ENDURANCE, MIT, CIRCULATING FAN IN CEILING
L279	O	515.	79.	110.	-6.	.74	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L243	O	517.	106.	115.	20.	1.45	30D	FOLDING ENDURANCE, MIT, MODIFIED DRIVE TO REDUCE HEATING
L396S	#	523.	855.	230.	760.	3.96	30T	FOLDING ENDURANCE, SCHOPPER, TMI
L378	O	529.	73.	123.	-14.	1.25	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L567	O	531.	77.	125.	-11.	.84	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L100M	O	533.	103.	132.	14.	.89	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L565	O	540.	130.	142.	40.	1.97	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L100N	O	647.	59.	238.	-45.	.96	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L185	O	650.	113.	249.	8.	1.42	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L182M	O	678.	99.	274.	-10.	1.03	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L122	*	790.	163.	394.	36.	2.10	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L321	#	1182.	205.	788.	22.	3.19	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
GMEANS:		405.	70.			1.00		
		95% ELLIPSE:		365.	68.	WITH GAMMA = 8 DEGREES		


FOLDING ENDURANCE (MIT)
SAMPLE H23 = 405. DOUBLE FOLDS
SAMPLE H35 = 70. DOUBLE FOLDS
+,X,# NOT IN GRAND MEANS
ANALYSIS T30-1
SAMPLE H35
DOUBLE FOLDS
SAMPLE H23
DOUBLE FOLDS
0
100
200
300
400
500
600
700
800
900

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

LAB CODE	SAMPLE H23 MEAN	PRINTING 91 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE H35 MEAN	PRINTING 151 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.* 15 VAR	F	LAB
L100M	2.721	.130	.97	.079	.73	2.006	.237	1.00	.079	.47	30M	H	L100M
L100N	2.803	.213	1.58	.087	.81	1.764	-.004	-.02	.094	.56	30N	G	L100N
L105	2.491	-.099	-.74	.089	.82	1.511	-.258	-1.09	.132	.79	30M	G	L105
L118	2.660	.070	.52	.088	.82	1.816	.048	.20	.140	.84	30D	G	L118
L121	2.655	.065	.48	.081	.75	1.748	-.020	-.09	.188	1.12	30M	G	L121
L122	2.889	.298	2.22	.093	.86	2.179	.410	1.74	.187	1.12	30M	G	L122
L124	2.583	-.058	-.43	.096	.89	1.804	.036	.15	.181	1.08	30N	G	L124
L150	2.311	-.280	-2.08	.104	.96	1.059	-.710	-3.01	.240	1.44	30M	*	L150
L158	2.032	-.558	-4.15	.172	1.59	1.253	-.516	-2.19	.141	.85	30N	X	L158
L159	2.517	-.073	-.55	.126	1.16	2.003	.235	1.00	.142	.85	30N	G	L159
L162	2.599	.009	.07	.109	1.01	1.690	-.079	-.34	.174	1.04	30M	G	L162
L163	2.469	-.122	-.90	.098	.91	1.955	.187	.79	.166	.99	30N	G	L163
L176	2.599	.008	.06	.133	1.23	2.046	.277	1.18	.142	.85	30N	G	L176
L182M	2.828	.237	1.76	.056	.52	1.981	.212	.90	.114	.69	30M	G	L182M
L185	2.802	.211	1.57	.101	.93	2.044	.275	1.17	.101	.60	30N	G	L185
L190C	2.548	-.042	-.32	.119	1.10	1.701	-.068	-.29	.207	1.24	30N	G	L190C
L212	2.638	.048	.36	.097	.90	1.751	-.017	-.07	.082	.49	30M	G	L212
L223F	2.672	.082	.61	.092	.86	1.813	.044	.19	.162	.97	30M	G	L223F
L230	2.609	.019	.14	.058	.54	1.735	-.034	-.14	.135	.81	30N	G	L230
L232	2.096	-.494	-3.67	.653	6.04	2.079	.311	1.32	.538	3.22	30N	X	L232
L236	2.414	-.177	-1.31	.109	1.01	1.569	-.200	-.85	.180	1.08	30N	G	L236
L238A	2.505	-.085	-.64	.153	1.42	1.580	-.189	-.80	.196	1.17	30N	G	L238A
L238B	2.452	-.138	-1.03	.104	.96	1.519	-.250	-1.06	.244	1.46	30D	G	L238B
L243	2.700	.110	.82	.107	.99	2.007	.238	1.01	.127	.76	30D	G	L243
L254	2.563	-.027	-.20	.116	1.07	1.764	-.004	-.02	.188	1.13	30M	G	L254
L262	2.561	-.030	-.22	.091	.84	1.697	-.071	-.30	.124	.74	30N	G	L262
L275	2.677	.087	.64	.079	.73	1.693	-.075	-.32	.272	1.63	30N	G	L275
L278	2.412	-.178	-1.32	.164	1.52	1.941	.173	.73	.188	1.12	30C	G	L278
L279	2.708	.118	.88	.054	.50	1.890	.121	.51	.096	.57	30N	G	L279
L285A	2.450	-.141	-1.05	.108	1.00	1.568	-.201	-.85	.347	2.08	30N	G	L285A
L285B	2.313	-.277	-2.06	.255	2.36	1.208	-.561	-2.38	.307	1.84	30N	G	L285B
L299	2.608	.018	.13	.106	.98	1.614	-.154	-.66	.211	1.26	30N	G	L299
L321	3.057	.467	3.47	.116	1.07	2.293	.524	2.22	.134	.81	30M	#	L321
L326N	2.478	-.112	-.84	.089	.83	2.124	.355	1.51	.042	.25	30N	*	L326N
L339	1.847	-.743	-5.52	.205	1.90	.577	-1.191	-5.05	.123	.74	30N	#	L339
L341	2.542	-.048	-.36	.099	.92	1.666	-.103	-.44	.139	.83	30C	G	L341
L366A	2.412	-.178	-1.33	.168	1.55	1.595	-.173	-.73	.138	.83	30N	G	L366A
L376	2.534	-.056	-.42	.152	1.40	1.575	-.194	-.82	.216	1.29	30N	G	L376
L378	2.708	.118	.88	.120	1.11	1.847	.078	.33	.131	.79	30N	G	L378
L388	2.651	.061	.45	.095	.88	1.677	-.091	-.39	.273	1.64	30N	G	L388
L390	2.471	-.119	-.89	.123	1.14	1.494	-.275	-1.17	.192	1.15	30N	G	L390
L396M	2.603	.013	.09	.081	.75	2.026	.257	1.09	.113	.68	30N	G	L396M
L396S	2.715	.125	.93	.057	.53	2.924	1.155	4.90	.086	.52	30T	#	L396S
L565	2.704	.114	.85	.160	1.48	2.095	.326	1.39	.131	.78	30N	G	L565
L567	2.721	.131	.97	.062	.58	1.872	.103	.44	.115	.69	30N	G	L567
L589	2.052	-.539	-4.00	.132	1.22	1.766	-.003	-.01	.117	.70	30N	X	L589
L599	2.672	.082	.61	.107	.99	1.887	.119	.50	.158	.94	30C	G	L599
GR. MEAN *	2.590 LOG(10) FOLD					GRAND MEAN *	1.769 LOG(10) FOLD				TEST DETERMINATIONS *		15
SD MEANS *	.135 LOG(10) FOLD					SD OF MEANS *	.236 LOG(10) FOLD				41 LABS IN GRAND MEANS		
		AVERAGE SDR *		.108 LOG(10) FOLD				AVERAGE SDR *		.167 LOG(10) FOLD			
L143	1.714	-.876	-6.51	.151	1.39	1.632	-.137	-.58	.640	3.83	30T	*	L143
L182S	2.557	-.033	-.25	.131	1.21	2.591	.822	3.49	.182	1.09	30S	*	L182S
L190D	2.332	-.258	-1.92	.070	.65	2.650	.882	3.74	.127	.76	30S	*	L190D
L280	2.474	-.116	-.87	.157	1.45	1.810	.041	.17	.154	.93	30S	*	L280
L326S	2.428	-.163	-1.21	.101	.93	2.680	.911	3.87	.190	1.14	30S	*	L326S
L366B	2.581	-.010	-.07	.092	.85	1.726	-.043	-.18	.347	2.08	30T	*	L366B
L581	2.658	.068	.51	.050	.46	2.745	.977	4.14	.151	.90	30T	*	L581

TOTAL NUMBER OF LABORATORIES REPORTING * 54

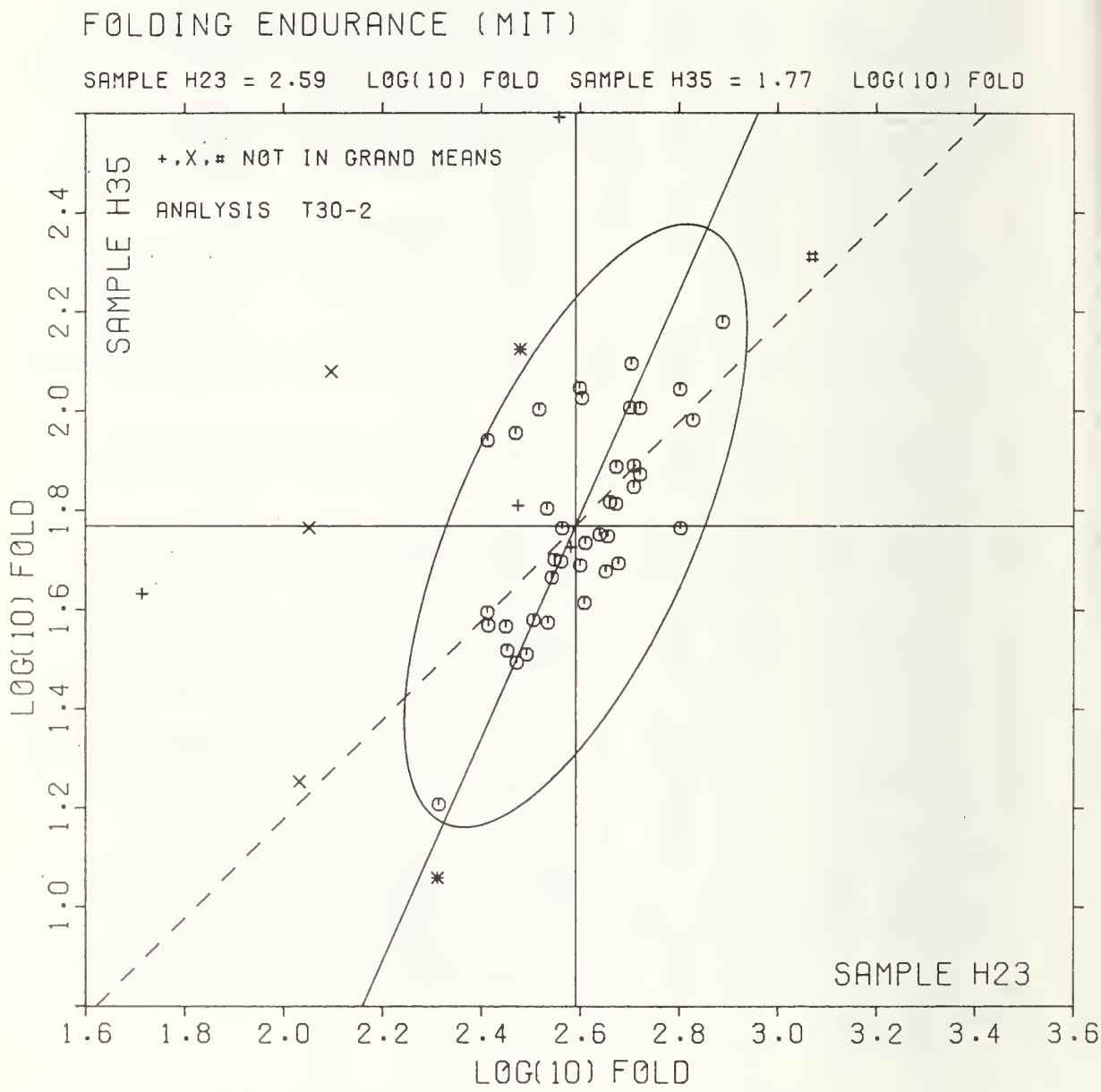
The ISO (International Standards Organization) is proposing that MIT folding endurance be reported as the logarithm (to the base 10) of the double fold instead of the double fold as in the past.

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

LAB CODE	F	MEANS H23	MEANS H35	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L143	*	1.714	1.632	-.481	.745	2.61	30T	FOLDING ENDURANCE, SCHOPPER, TMI
L339	#	1.847	.577	-1.390	.195	1.32	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L158	X	2.032	1.253	-.698	.301	1.22	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L589	X	2.052	1.766	-.222	.491	.96	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L232	X	2.096	2.079	.083	.678	4.63	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L150	*	2.311	1.059	-.762	-.033	1.20	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L285B	@	2.313	1.208	-.625	.025	2.10	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L190D	*	2.332	2.650	.701	.594	.70	30S	FOLDING ENDURANCE, SCHOPPER, LEIPZIG
L366A	@	2.412	1.595	-.231	.093	1.19	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L278	@	2.412	1.941	.085	.233	1.32	30C	FOLDING ENDURANCE, MIT, CIRCULATING FAN IN CEILING
L236	@	2.414	1.569	-.254	.080	1.04	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L326S	*	2.428	2.680	.766	.519	1.03	30S	FOLDING ENDURANCE, SCHOPPER, LEIPZIG
L285A	@	2.450	1.568	-.241	.047	1.54	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L238B	@	2.452	1.519	-.285	.025	1.21	30D	FOLDING ENDURANCE, MIT, MODIFIED DRIVE TO REDUCE HEATING
L163	@	2.469	1.955	.121	.187	.95	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L390	@	2.471	1.494	-.299	-.003	1.15	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L280	*	2.474	1.810	-.010	.123	1.19	30K	FOLDING ENDURANCE, KOHLER-MOLIN
L326N	*	2.478	2.124	.279	.247	.54	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L105	@	2.491	1.511	-.276	-.014	.80	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L238A	@	2.505	1.580	-.207	.001	1.30	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L159	@	2.517	2.003	.185	.162	1.01	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L124	@	2.533	1.804	.009	.067	.99	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L376	@	2.534	1.575	-.200	-.027	1.35	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L341	@	2.542	1.666	-.114	.002	.87	30C	FOLDING ENDURANCE, MIT, CIRCULATING FAN IN CEILING
L190C	@	2.548	1.701	-.079	.011	1.17	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L182S	*	2.557	2.591	.738	.365	1.15	30S	FOLDING ENDURANCE, SCHOPPER, LEIPZIG
L262	@	2.561	1.697	-.077	-.002	.79	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L254	@	2.563	1.764	-.015	.023	1.10	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L366B	*	2.581	1.726	-.043	-.009	1.47	30T	FOLDING ENDURANCE, SCHOPPER, TMI
L176	@	2.599	2.046	.257	.105	1.04	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L162	@	2.599	1.690	-.069	-.040	1.02	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L396M	@	2.603	2.026	.240	.093	.71	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L295	@	2.608	1.614	-.134	-.079	1.12	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L230	@	2.609	1.735	-.023	-.031	.67	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L212	@	2.638	1.751	.004	-.051	.69	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L388	@	2.651	1.677	-.059	-.093	1.26	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L121	@	2.655	1.748	.008	-.068	.94	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L581	*	2.658	2.745	.920	.335	.68	30T	FOLDING ENDURANCE, SCHOPPER, TMI
L118	@	2.660	1.816	.072	-.044	.83	30D	FOLDING ENDURANCE, MIT, MODIFIED DRIVE TO REDUCE HEATING
L223F	@	2.672	1.813	.074	-.057	.91	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L599	@	2.672	1.687	.142	-.027	.97	30C	FOLDING ENDURANCE, MIT, CIRCULATING FAN IN CEILING
L275	@	2.677	1.693	-.034	-.110	1.18	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L243	@	2.700	2.007	.262	-.004	.88	30D	FOLDING ENDURANCE, MIT, MODIFIED DRIVE TO REDUCE HEATING
L565	@	2.704	2.065	.345	.029	1.13	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L378	@	2.708	1.847	.119	-.076	.95	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L279	@	2.708	1.850	.159	-.058	.54	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L396S	#	2.715	2.924	1.106	.356	.52	30T	FOLDING ENDURANCE, SCHOPPER, TMI
L100M	@	2.721	2.006	.269	-.023	.60	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L567	@	2.721	1.872	.147	-.077	.63	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L185	@	2.802	2.044	.337	-.081	.77	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L100N	@	2.803	1.764	.082	-.196	.69	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L182M	@	2.828	1.981	.291	-.131	.60	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L122	@	2.889	2.179	.496	-.106	.99	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L321	#	3.057	2.293	.669	-.214	.94	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
GMEANS:		2.590	1.769			1.00		
		95% ELLIPSE:		.656	.243	WITH GAMMA = 66 DEGREES		


FOLDING ENDURANCE (MIT)
SAMPLE H23 = 2.59 LOG(10) FOLD SAMPLE H35 = 1.77 LOG(10) FOLD
+,X,# NOT IN GRAND MEANS
ANALYSIS T30-2
SAMPLE H35
LOG(10) FOLD
1.0 1.2 1.4 1.6 1.8 2.0 2.2 2.4
SAMPLE H23
1.6 1.8 2.0 2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6
LOG(10) FOLD

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 H70 MEAN	PRINTING 102 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE H68 MEAN	PRINTING 96 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.= 10 VAR	F	LAB
L100	288.	36.	3.02	25.	1.80	430.	-33.	-1.22	19.	.80	35G	X	L100
L118	248.	-4.	-.32	11.	.82	458.	-4.	-.16	23.	.99	35G	0	L118
L121	248.	-4.	-.30	16.	1.17	498.	35.	1.28	56.	2.37	35G	F	L121
L122	236.	-15.	-1.26	10.	.71	434.	-29.	-1.05	13.	.57	35G	0	L122
L132	242.	-10.	-.80	18.	1.31	480.	18.	.64	32.	1.35	35G	0	L132
L139	253.	1.	.10	11.	.82	447.	-16.	-.57	23.	1.00	35G	0	L139
L148	245.	-6.	-.51	11.	.76	459.	-4.	-.15	22.	.92	35G	0	L148
L153	255.	3.	.27	8.	.58	452.	-11.	-.40	36.	1.53	35G	0	L153
L159	242.	-9.	-.77	14.	1.04	456.	-6.	-.24	41.	1.73	35G	0	L159
L162	240.	-12.	-.96	16.	1.15	419.	-44.	-1.62	19.	.83	35G	0	L162
L163	259.	7.	.62	38.	2.72	466.	4.	.13	31.	1.30	35G	0	L163
L183	270.	18.	1.53	11.	.77	497.	34.	1.24	46.	1.97	35G	0	L183
L190C	258.	6.	.52	11.	.77	460.	-3.	-.10	10.	.41	35G	0	L190C
L195	271.	20.	1.66	7.	.54	486.	23.	.85	19.	.81	35G	0	L195
L212	256.	5.	.41	17.	1.19	469.	6.	.23	17.	.71	35G	0	L212
L223	244.	-8.	-.66	6.	.44	434.	-29.	-1.07	15.	.63	35G	0	L223
L224	269.	18.	1.47	18.	1.27	498.	35.	1.28	17.	.73	35G	0	L224
L232	165.	-87.	-7.24	7.	.50	266.	-197.	-7.23	14.	.61	35G	#	L232
L236	240.	-11.	-.94	12.	.83	407.	-56.	-2.06	12.	.51	35G	0	L236
L241	169.	-83.	-6.90	5.	.38	275.	-188.	-6.89	12.	.49	35G	#	L241
L249	244.	-7.	-.60	15.	1.08	453.	-10.	-.37	17.	.74	35G	0	L249
L254	137.	-115.	-9.55	6.	.44	236.	-227.	-8.31	14.	.60	35G	#	L254
L260	277.	25.	2.09	10.	.76	509.	46.	1.69	8.	.35	35G	0	L260
L285	182.	-69.	-5.76	9.	.65	292.	-171.	-6.27	19.	.83	35G	#	L285
L291	245.	-6.	-.54	14.	1.01	460.	-3.	-.09	16.	.68	35G	0	L291
L297	225.	-26.	-2.19	14.	.99	400.	-63.	-2.32	17.	.71	35G	0	L297
L308	236.	-15.	-1.25	13.	.92	474.	11.	.40	19.	.82	35G	0	L308
L321	245.	-6.	-.50	18.	1.33	447.	-16.	-.59	26.	1.09	35G	0	L321
L356	245.	-6.	-.54	11.	.79	456.	-7.	-.26	30.	1.27	35G	0	L356
L376	269.	17.	1.42	17.	1.21	515.	52.	1.90	9.	.38	35G	0	L376
L378	247.	-4.	-.34	10.	.74	468.	5.	.19	24.	1.01	35G	0	L378
L382	268.	16.	1.37	11.	.80	500.	37.	1.36	34.	1.44	35G	0	L382
L390	260.	8.	.70	34.	2.43	455.	-8.	-.30	24.	1.04	35G	0	L390
L396	261.	10.	.82	12.	.87	448.	-15.	-.54	18.	.75	35G	0	L396
L567	260.	8.	.70	12.	.88	490.	27.	.98	26.	1.10	35G	0	L567
L571	248.	-3.	-.25	20.	1.45	468.	5.	.18	49.	2.09	35G	0	L571
L575	242.	-10.	-.80	5.	.34	446.	-17.	-.61	13.	.55	35G	0	L575
L600	250.	-2.	-.15	7.	.50	467.	4.	.15	15.	.64	35G	0	L600
GR. MEAN =	252. GURLEY UNITS			GRAND MEAN =		463. GURLEY UNITS			TEST DETERMINATIONS = 10				
SD MEANS =	12. GURLEY UNITS			SD OF MEANS =		27. GURLEY UNITS			33 LABS IN GRAND MEANS				
	AVERAGE SDR = 14. GURLEY UNITS					AVERAGE SDR = 24. GURLEY UNITS							
L213	248.	-3.	-.28	18.	1.30	471.	8.	.30	31.	1.33	35H	*	L213

TOTAL NUMBER OF LABORATORIES REPORTING = 39

Best Values: H70 250 ± 20 Gurley units
H68 450 ± 45 Gurley units

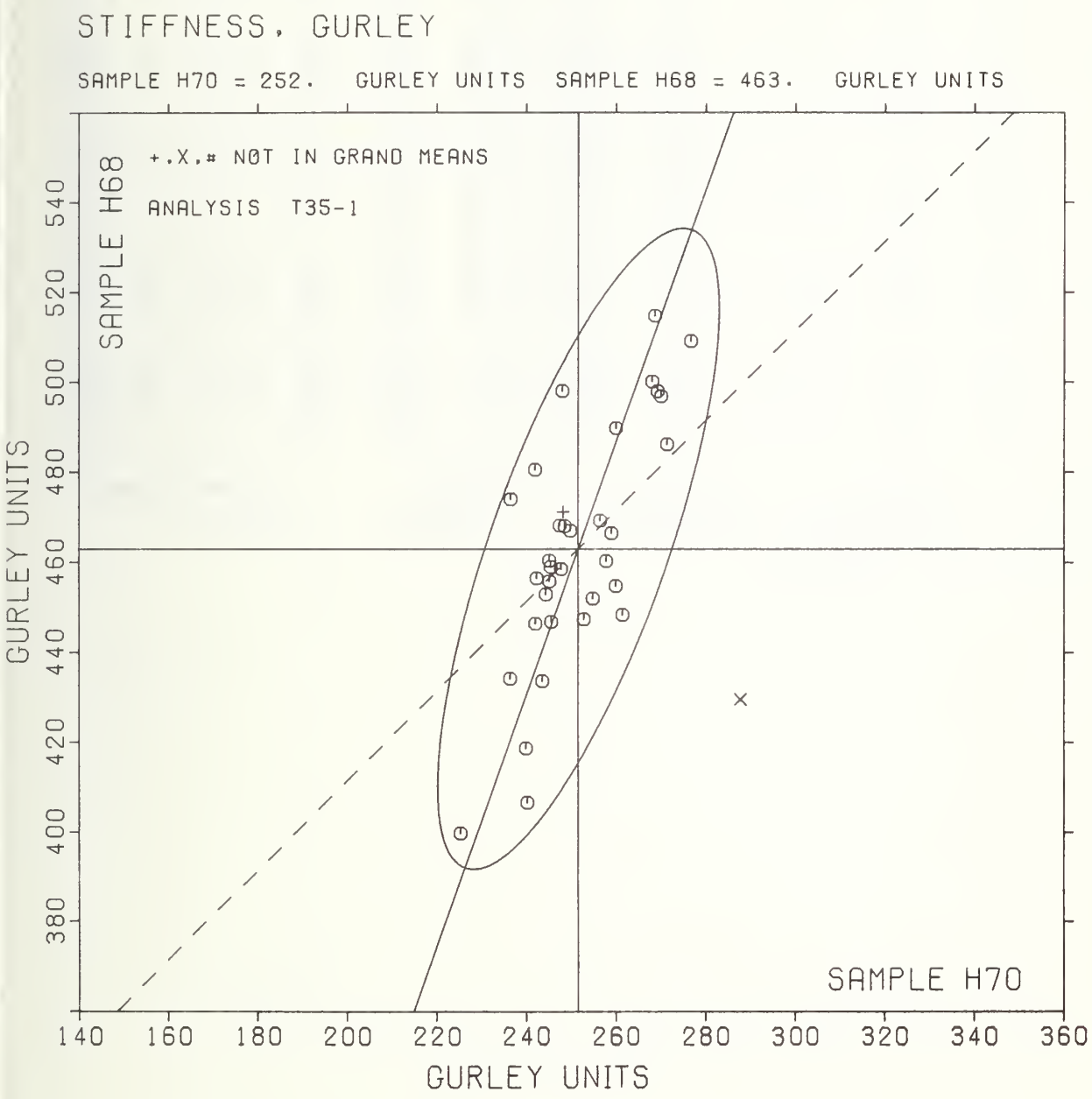
Data from the following laboratories appear to be off by a multiplicative factor, or may have been tested in the wrong direction: 232, 241, 254, 285.

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	F	MEANS H70	MEANS H68	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L254	#	137.	236.	-252.	32.	.52	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L232	#	165.	266.	-215.	16.	.56	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L241	#	169.	275.	-205.	15.	.44	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L285	#	182.	292.	-184.	8.	.74	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L297	@	225.	400.	-68.	4.	.85	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L122	@	236.	434.	-32.	5.	.64	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L308	@	236.	474.	5.	18.	.87	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L162	@	240.	419.	-46.	-4.	.99	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L236	@	240.	407.	-57.	-8.	.67	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L575	@	242.	446.	-19.	3.	.44	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L132	@	242.	480.	13.	15.	1.33	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L159	@	242.	456.	-9.	7.	1.38	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L223	@	244.	434.	-30.	-2.	.53	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L249	@	244.	453.	-12.	3.	.91	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L356	@	245.	456.	-9.	4.	1.03	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L291	@	245.	460.	-5.	5.	.85	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L148	@	245.	459.	-6.	4.	.84	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L321	@	245.	447.	-17.	0.	1.21	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L378	@	247.	468.	3.	6.	.88	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L118	@	248.	458.	-6.	2.	.90	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L121	@	248.	498.	32.	15.	1.77	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L213	*	248.	471.	7.	6.	1.32	35H	STIFFNESS, GURLEY (UNITS: MG/1X3 TEST PIECE), 20 C, 65% RH
L571	@	248.	468.	4.	5.	1.77	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L600	@	250.	467.	3.	3.	.57	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L139	@	253.	447.	-14.	-6.	.91	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L153	@	255.	452.	-9.	-7.	1.05	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L212	@	256.	469.	8.	-2.	.95	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L190C	@	258.	460.	-0.	-7.	.59	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L163	@	259.	466.	6.	-6.	2.01	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L567	@	260.	490.	28.	1.	.99	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L390	@	260.	455.	-5.	-11.	1.73	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L396	@	261.	448.	-11.	-14.	.81	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L382	@	268.	500.	40.	-3.	1.12	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L376	@	269.	515.	54.	1.	.79	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L224	@	269.	498.	39.	-5.	1.00	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L183	@	270.	497.	38.	-6.	1.37	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L195	@	271.	486.	28.	-11.	.67	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L260	@	277.	509.	52.	-8.	.55	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L100	X	288.	430.	-19.	-45.	1.30	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
GMEANS:		252.	463.			1.00		
		95% ELLIPSE:		75.	20.	WITH GAMMA = 70 DEGREES		


STIFFNESS, GURLEY
SAMPLE H70 = 252. GURLEY UNITS SAMPLE H68 = 463. GURLEY UNITS
+.X.* NOT IN GRAND MEANS
ANALYSIS T35-1
SAMPLE H68
GURLEY UNITS
380 400 420 440 460 480 500 520 540
SAMPLE H70
140 160 180 200 220 240 260 280 300 320 340 360
GURLEY UNITS

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

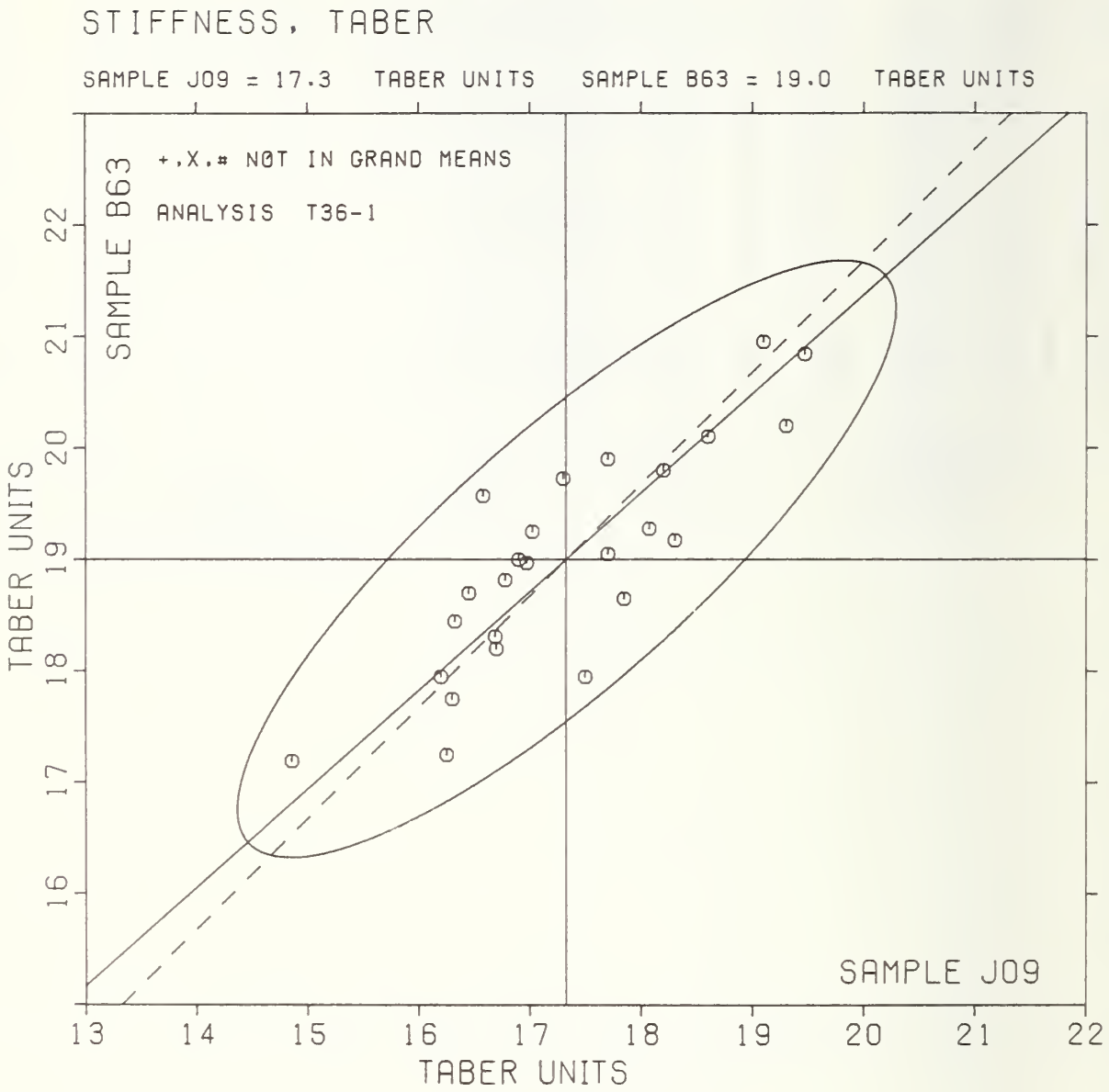
LAB CODE	SAMPLE J09 MEAN	PRINTING 149 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE B63 MEAN	KRAFT ENVELOPE 124 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.= 10 VAR	F	LAB
L107A	16.90	-.42	-.38	.88	.99	19.00	-.00	-.00	.94	1.14	36T	6	L107A
L123	16.70	-.62	-.56	.67	.76	18.20	-.80	-.80	.42	.51	36T	6	L123
L126	16.20	-1.12	-1.01	.48	.54	17.95	-1.05	-1.05	.44	.53	36T	6	L126
L149	18.20	.88	.79	.79	.89	19.80	.80	.80	.63	.76	36T	6	L149
L150	18.60	1.28	1.15	.61	.69	20.10	1.10	1.10	.74	.89	36T	6	L150
L158	17.50	.18	.16	.00	.00	17.95	-1.05	-1.05	1.14	1.38	36T	6	L158
L163	17.30	-.02	-.02	.87	.98	18.72	.72	.72	.42	.50	36T	6	L163
L173B	17.02	-.30	-.27	.53	.60	19.25	.25	.25	.41	.50	36T	6	L173B
L176	19.30	1.98	1.78	1.48	1.66	20.20	1.20	1.20	1.30	1.57	36T	6	L176
L182	16.69	-.63	-.57	.52	.58	18.31	-.69	-.69	.50	.61	36T	6	L182
L207	16.58	-.74	-.67	1.48	1.67	19.57	.57	.57	1.07	1.29	36T	6	L207
L212	19.10	1.78	1.60	.91	1.02	20.95	1.95	1.95	.98	1.19	36T	6	L212
L228	17.70	.38	.34	.67	.76	19.90	.90	.90	.57	.69	36T	6	L228
L242	16.97	-.35	-.32	.83	.93	18.97	-.03	-.03	.92	1.11	36T	6	L242
L243	16.45	-.87	-.79	.93	1.04	18.70	-.30	-.30	.75	.91	36T	6	L243
L260	18.07	.75	.67	.62	.70	19.28	.28	.28	.68	.83	36T	6	L260
L262	17.70	.38	.34	.63	.71	19.05	.05	.05	.44	.53	36T	6	L262
L273	16.30	-1.02	-.92	.67	.76	17.75	-1.25	-1.25	1.06	1.28	36T	6	L273
L281	18.30	.98	.88	.84	.95	19.17	.17	.17	.41	.49	36T	6	L281
L318	16.32	-1.00	-.90	.73	.82	18.45	-.55	-.55	.66	.80	36T	6	L318
L321	14.86	-2.46	-2.22	1.27	1.43	17.19	-1.81	-1.81	.67	.81	36T	6	L321
L324	16.78	-.54	-.49	.82	.92	18.82	-.18	-.18	.50	.60	36T	6	L324
L339	16.25	-1.07	-.97	1.95	2.19	17.25	-1.75	-1.75	2.15	2.59	36T	6	L339
L442	19.47	2.15	1.94	2.21	2.49	20.84	1.84	1.84	2.04	2.46	36T	6	L442
L570	19.50	2.18	1.96	1.18	1.33	23.20	4.20	4.19	2.82	3.41	36T	X	L570
L580	17.85	.53	.47	.78	.88	18.65	-.35	-.35	.85	1.03	36T	6	L580

GR. MEAN = 17.32 TABER UNITS — GRAND MEAN = 19.00 TABER UNITS — TEST DETERMINATIONS = 10
SD MEANS = 1.11 TABER UNITS — SD OF MEANS = 1.00 TABER UNITS — 25 LABS IN GRAND MEANS
AVERAGE SDR = .89 TABER UNITS — AVERAGE SDR = .83 TABER UNITS
TOTAL NUMBER OF LABORATORIES REPORTING = 26

Best Values: J09 17.1 ± 2.0 Taber units
B63 18.7 ± 1.5 Taber units

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

LAB CODE	F	MEANS J09	MEANS B63	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L321	0	14.86	17.19	-3.05	.28	1.12	36T	STIFFNESS, TABER
L126	0	16.20	17.95	-1.54	-.04	.54	36T	STIFFNESS, TABER
L339	0	16.25	17.25	-1.97	-.60	2.39	36T	STIFFNESS, TABER
L273	0	16.30	17.75	-1.60	-.26	1.02	36T	STIFFNESS, TABER
L318	0	16.32	18.45	-1.11	.25	.81	36T	STIFFNESS, TABER
L243	0	16.45	18.70	-.85	.35	.98	36T	STIFFNESS, TABER
L207	0	16.58	19.57	-.18	.92	1.48	36T	STIFFNESS, TABER
L182	0	16.69	18.31	-.93	-.10	.59	36T	STIFFNESS, TABER
L123	0	16.70	18.20	-1.00	-.19	.64	36T	STIFFNESS, TABER
L324	0	16.78	18.82	-.53	.23	.76	36T	STIFFNESS, TABER
L107A	0	16.90	19.00	-.32	.28	1.06	36T	STIFFNESS, TABER
L242	0	16.97	18.97	-.29	.21	1.02	36T	STIFFNESS, TABER
L173B	0	17.02	19.25	-.06	.39	.55	36T	STIFFNESS, TABER
L163	0	17.30	19.72	.46	.56	.74	36T	STIFFNESS, TABER
L158	0	17.50	17.95	-.57	-.90	.69	36T	STIFFNESS, TABER
L262	0	17.70	19.05	.31	-.21	.62	36T	STIFFNESS, TABER
L228	0	17.70	19.90	.88	.42	.72	36T	STIFFNESS, TABER
L580	0	17.85	18.65	.16	-.61	.96	36T	STIFFNESS, TABER
L260	0	18.07	19.28	.74	-.29	.76	36T	STIFFNESS, TABER
L149	0	18.20	19.80	1.18	.02	.83	36T	STIFFNESS, TABER
L281	0	18.30	19.17	.85	-.52	.72	36T	STIFFNESS, TABER
L150	0	18.60	20.10	1.68	-.02	.79	36T	STIFFNESS, TABER
L212	0	19.10	20.95	2.62	.28	1.11	36T	STIFFNESS, TABER
L176	0	19.30	20.20	2.27	-.41	1.61	36T	STIFFNESS, TABER
L442	0	19.47	20.84	2.83	-.05	2.48	36T	STIFFNESS, TABER
L570	X	19.50	23.20	4.41	1.70	2.37	36T	STIFFNESS, TABER
GMEANS:		17.32	19.00			1.00		
		95% ELLIPSE:		3.83	1.12	WITH GAMMA = 41 DEGREES		


STIFFNESS, TABER
SAMPLE J09 = 17.3 TABER UNITS
SAMPLE B63 = 19.0 TABER UNITS
+,X,# NOT IN GRAND MEANS
ANALYSIS T36-1
SAMPLE B63
TABER UNITS
16
17
18
19
20
21
22
SAMPLE J09
13
14
15
16
17
18
19
20
21
22
TABER UNITS

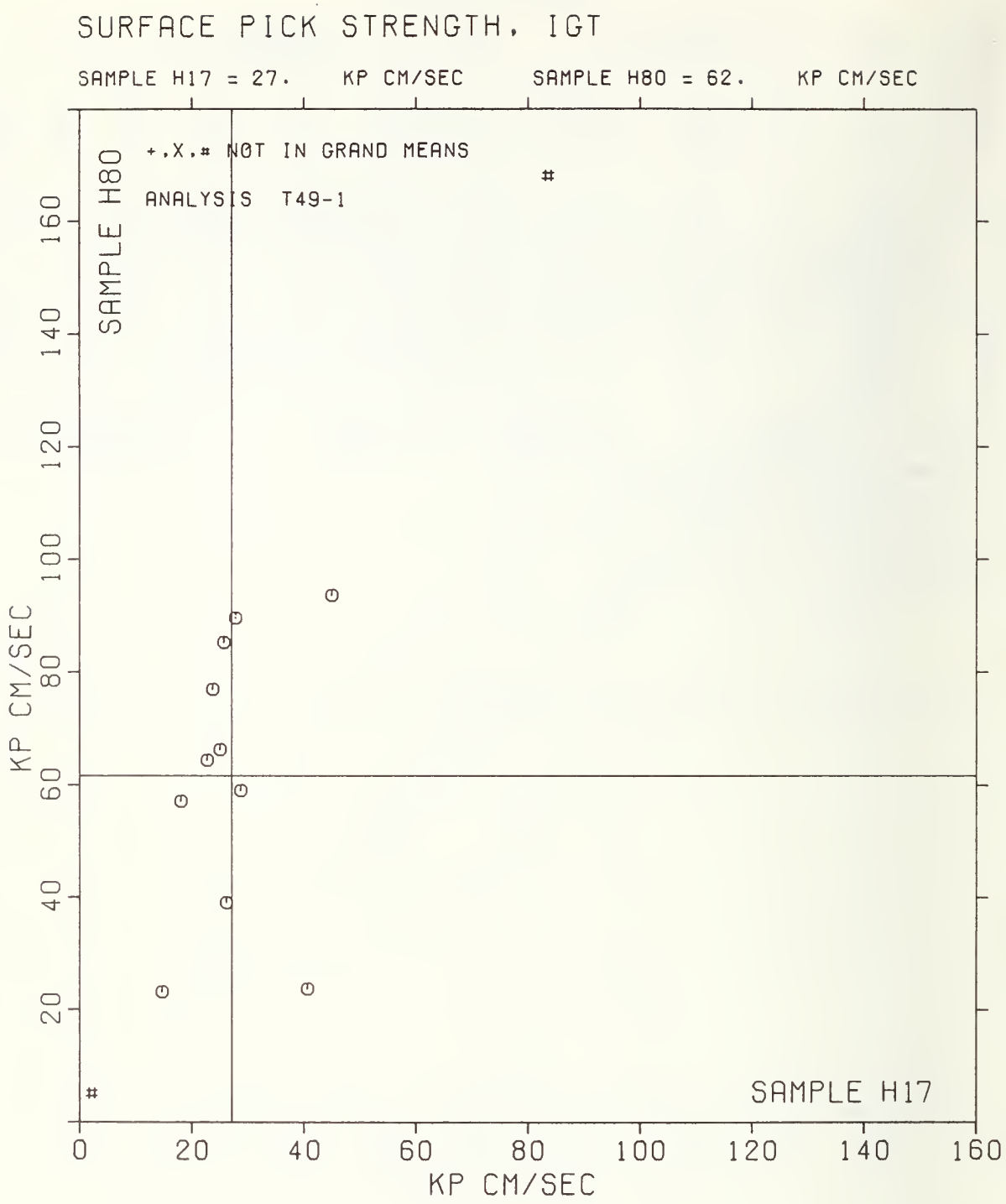
LAB CODE	SAMPLE H17 PRINTING 89 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	SAMPLE H80 PRINTING 84 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	TEST D.* 4 VAR	F	LAB
L107	23.7	-3.4	-.38	7.1	3.03	77.0	15.4	.62	.0	.00	49I	6	L107
L121	26.2	-1.0	-.11	.5	.23	39.0	-22.6	-.92	2.9	.73	49F	6	L121
L122	22.7	-4.4	-.50	.8	.34	64.4	2.7	.11	1.5	.39	49Q	6	L122
L149	27.8	.7	.07	1.8	.78	89.6	27.9	1.13	6.6	1.67	49L	6	L149
L182I	14.7	-12.5	-1.41	.3	.12	23.1	-38.6	-1.56	1.4	.34	49Q	6	L182I
L183	21.6	-5.5	-.62	.5	.21	NO DATA REPORTED FOR SAMPLE H80					49Q	M	L183
L190C	28.7	1.6	.18	2.5	1.07	59.0	-2.6	-.11	3.6	.90	49T	6	L190C
L207	25.7	-1.4	-.16	1.7	.73	85.2	23.6	.96	4.2	1.06	49I	6	L207
L242	18.1	-9.1	-1.03	1.5	.62	57.1	-4.5	-.18	4.8	1.20	49P	6	L242
L277	82.6	55.5	6.28	4.9	2.09	166.5	104.9	4.25	6.0	1.52	49I	#	L277
L280	1.2	-26.0	-2.94	.0	.01	3.6	-58.0	-2.35	.2	.04	49U	#	L280
L291	25.1	-2.1	-.23	3.1	1.34	66.2	4.6	.19	2.2	.55	49I	6	L291
L337	40.7	13.5	1.53	2.8	1.19	23.6	-38.0	-1.54	1.0	.26	49F	6	L337
L382	34.8	7.7	.87	1.6	.68	NO DATA REPORTED FOR SAMPLE H80					49I	M	L382
L388	45.0	17.9	2.02	3.6	1.54	93.6	32.0	1.30	15.6	3.91	49Q	6	L388
L600	21.8	-5.3	-.60	.8	.32	NO DATA REPORTED FOR SAMPLE H80					49I	M	L600

GR. MEAN = 27.1 KP CM/SEC — GRAND MEAN = 61.6 KP CM/SEC — TEST DETERMINATIONS = 4
SD MEANS = 8.8 KP CM/SEC — SD OF MEANS = 24.7 KP CM/SEC — 11 LABS IN GRAND MEANS
AVERAGE SDR = 2.3 KP CM/SEC — AVERAGE SDR = 4.0 KP CM/SEC

TOTAL NUMBER OF LABORATORIES REPORTING = 16

The following laboratories were omitted from the grand means because of extreme test results: 277.

Data from the following laboratories were not included in the grand means because no viscosity information was given: 280.


SURFACE PICK STRENGTH, IGT
SAMPLE H17 = 27. KP CM/SEC
SAMPLE H80 = 62. KP CM/SEC
+.X.# NOT IN GRAND MEANS
ANALYSIS T49-1
SAMPLE H80
SAMPLE H17
KP CM/SEC
KP CM/SEC
0
20
40
60
80
100
120
140
160

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

LAB CODE	SAMPLE H17 PRINTING 89 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	SAMPLE H80 PRINTING 84 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	TEST D.* 5 VAR	F	LAB
L105	6.20	.23	.21	.45	1.09	10.60	-.78	-.86	.55	1.10	50W	0	L105
L122	4.20	-1.77	-1.61	.45	1.09	10.00	-1.38	-1.52	.71	1.42	50W	0	L122
L158	6.20	.23	.21	.45	1.09	11.00	-.38	-.42	.71	1.42	50W	0	L158
L162	6.00	.03	.03	.00	.00	12.60	1.22	1.35	.55	1.10	50W	0	L162
L173A	5.00	-.97	-.88	.00	.00	11.00	-.38	-.42	.00	.00	50W	0	L173A
L182W	6.00	.03	.03	.00	.00	10.80	-.58	-.64	.45	.90	50W	0	L182W
L183	5.80	-.17	-.15	.45	1.09	12.00	.62	.68	.00	.00	50W	0	L183
L195	6.20	.23	.21	.45	1.09	11.00	-.38	-.42	.00	.00	50W	0	L195
L213	6.20	.23	.21	.45	1.09	11.20	-.18	-.20	.45	.90	50W	0	L213
L225	7.60	1.63	1.48	.55	1.33	13.00	1.62	1.79	.00	.00	50W	0	L225
L228	4.40	-1.57	-1.43	.55	1.33	9.80	-1.58	-1.74	1.10	2.21	50W	0	L228
L230	5.80	-.17	-.15	.45	1.09	10.40	-.98	-1.08	.89	1.80	50W	0	L230
L236	5.60	-.37	-.34	.55	1.33	12.00	.62	.68	1.00	2.01	50W	0	L236
L243	5.80	-.17	-.15	.45	1.09	8.60	-2.78	-3.07	.55	1.10	50W	#	L243
L285	7.80	1.83	1.67	.45	1.09	12.00	.62	.68	.00	.00	50W	0	L285
L339	8.20	2.23	2.03	.45	1.09	13.20	1.82	2.01	.45	.90	50W	0	L339
L366	6.40	.43	.39	.55	1.33	11.20	-.18	-.20	.45	.90	50W	0	L366
L378	5.80	-.17	-.15	.45	1.09	11.40	.02	.02	.55	1.10	50W	0	L378
L390	5.00	-.97	-.88	.00	.00	11.80	.42	.46	.45	.90	50W	0	L390
L561	6.80	.83	.76	1.10	2.67	11.20	-.18	-.20	1.10	2.21	50W	0	L561
L567	4.20	-1.77	-1.61	.45	1.09	11.40	.02	.02	.55	1.10	50W	0	L567

GR. MEAN = 5.97 WAX NUMBER GRAND MEAN = 11.38 WAX NUMBER TEST DETERMINATIONS = 5
SD MEANS = 1.10 WAX NUMBER SD OF MEANS = .91 WAX NUMBER 20 LABS IN GRAND MEANS
AVERAGE SDR = .41 WAX NUMBER AVERAGE SDR = .50 WAX NUMBER
TOTAL NUMBER OF LABORATORIES REPORTING = 21

Best Values: H17 6.0 ± 1.8 wax number
H80 11.2 ± 1.5 wax number

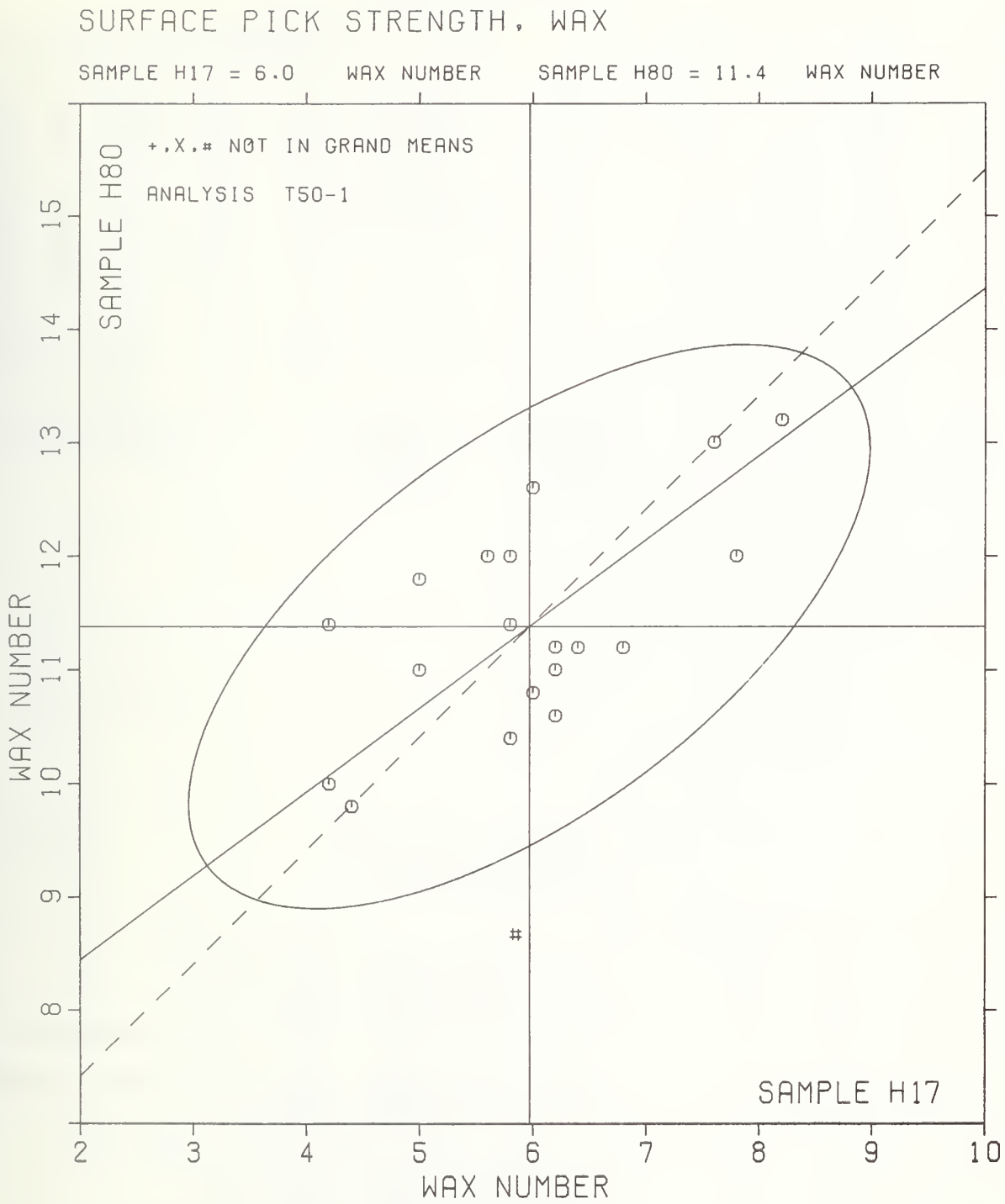
The following laboratories were omitted from the grand means because of extreme test results: 243.

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 H17	MEANS H80	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L567	O	4.20	11.40	-1.41	1.07	1.10	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L122	O	4.20	10.00	-2.24	-.06	1.26	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L228	O	4.40	9.80	-2.20	-.34	1.77	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L390	O	5.00	11.80	-.53	.91	.45	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L173A	O	5.00	11.00	-1.01	.27	.00	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L236	O	5.60	12.00	.07	.72	1.67	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L378	O	5.80	11.40	-.12	.12	1.10	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
I183	O	5.80	12.00	.23	.60	.55	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L243	#	5.80	8.60	-1.79	-2.13	1.10	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L230	O	5.80	10.40	-.72	-.69	1.45	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L162	O	6.00	12.60	.75	.96	.55	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L182W	O	6.00	10.80	-.32	-.48	.45	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L105	O	6.20	10.60	-.28	-.76	1.10	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L158	O	6.20	11.00	-.04	-.44	1.26	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L213	O	6.20	11.20	.08	-.28	1.00	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L195	O	6.20	11.00	-.04	-.44	.55	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L366	O	6.40	11.20	.24	-.40	1.12	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L561	O	6.80	11.20	.56	-.64	2.44	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L225	O	7.60	13.00	2.27	.33	.67	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L285	O	7.80	12.00	1.84	-.59	.55	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L339	O	8.20	13.20	2.88	.14	1.00	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
GMEANS:		5.97	11.38			1.00		
		95% ELLIPSE:		3.54	1.64	WITH GAMMA = 36 DEGREES		


SURFACE PICK STRENGTH, WAX
SAMPLE H17 = 6.0 WAX NUMBER
SAMPLE H80 = 11.4 WAX NUMBER
+,X,# NOT IN GRAND MEANS
ANALYSIS T50-1
SAMPLE H80
WAX NUMBER
SAMPLE H17
WAX NUMBER
2
3
4
5
6
7
8
9
10
8
9
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14
15

REPORT NO. 51S

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T91-1 TABLE 1
CONCORA (CORRUGATING MEDIUM TEST-CMT)
TAPPI STANDARD T809 OS-71

JANUARY 1978

LAB CODE	SAMPLE E62 MEAN	LINERBOARD 127 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE E55 MEAN	LINERBOARD 125 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L100	238.	12.	.82	18.	1.24	194.	17.	1.16	12.	1.01	91B	O	L100
L176	224.	-2.	-.13	16.	1.08	171.	-6.	-.38	13.	1.11	91I	O	L176
L182	231.	5.	.32	10.	.66	173.	-3.	-.23	12.	1.02	91T	O	L182
L185	231.	5.	.35	16.	1.09	194.	17.	1.18	11.	.93	91A	O	L185
L218	203.	-23.	-1.51	12.	.82	158.	-19.	-1.31	10.	.81	91I	O	L218
L242	214.	-11.	-.75	10.	.65	178.	2.	.11	11.	.89	91G	O	L242
L248	169.	-56.	-3.74	7.	.49	220.	43.	2.96	14.	1.16	918	#	L248
L255	200.	-26.	-1.73	37.	2.55	156.	-21.	-1.41	23.	1.93	91I	O	L255
L269	217.	-9.	-.61	13.	.91	166.	-11.	-.75	10.	.79	91I	O	L269
L289	235.	9.	.60	14.	.98	185.	9.	.59	13.	1.10	91I	O	L289
L329	238.	13.	.84	9.	.64	189.	12.	.83	13.	1.11	91I	O	L329
L336	252.	26.	1.74	15.	1.02	197.	20.	1.35	14.	1.13	91I	O	L336
L394	229.	3.	.19	8.	.52	175.	-2.	-.14	4.	.30	91R	O	L394
L484	211.	-14.	-.96	19.	1.29	158.	-19.	-1.32	9.	.77	91H	O	L484
L575	245.	19.	1.28	11.	.73	194.	17.	1.19	14.	1.13	91H	O	L575
L666	219.	-7.	-.46	12.	.82	164.	-13.	-.87	12.	.97	91S	O	L666

TEST D.* 10

GR. MEAN * 226. NEWTONS — GRAND MEAN * 177. NEWTONS — TEST DETERMINATIONS * 10
SD MEANS * 15. NEWTONS — SD OF MEANS * 15. NEWTONS — 15 LABS IN GRAND MEANS
AVERAGE SDR * 15. NEWTONS — AVERAGE SDR * 12. NEWTONS
GR. MEAN * 50.75 POUNDS — GRAND MEAN * 39.76 POUNDS
TOTAL NUMBER OF LABORATORIES REPORTING * 16

Best Values: E62 230 ± 20 newtons
E55 180 ± 22 newtons

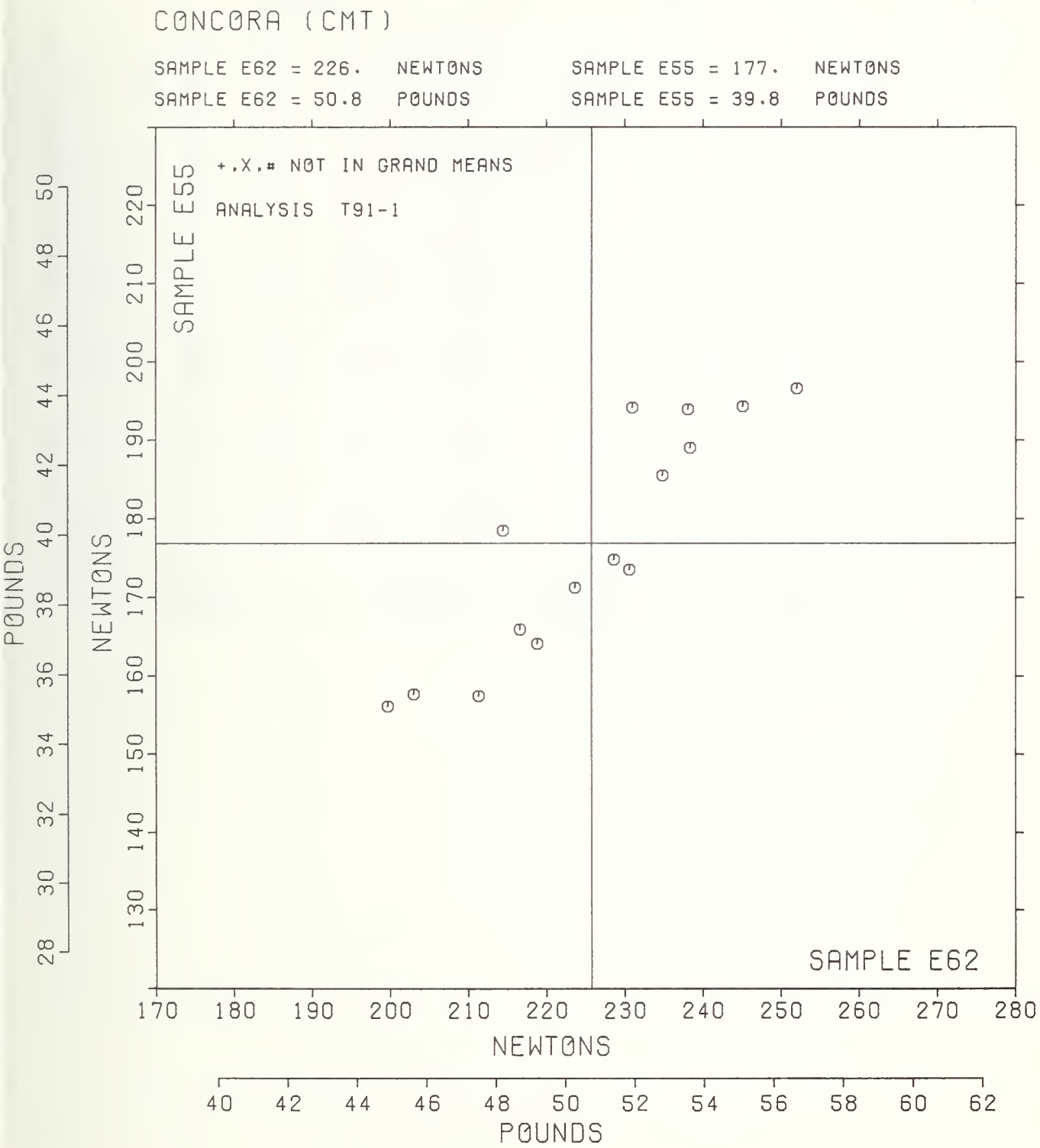
The following laboratories appear to have interchanged samples: 248.

REPORT NO. 51S

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T91-1 TABLE 2
CONCORA (CORRUGATING MEDIUM TEST-CMT)
TAPPI STANDARD T809 OS-71

JANUARY 1978

LAB CODE	F	MEANS E62	E55	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L248	#	169.	220.	-10.	70.	.82	91B	FLAT CRUSH STRENGTH, CONCORA, INSTRON
L255	O	200.	156.	-33.	3.	2.24	91I	FLAT CRUSH STRENGTH, CONCORA, H*D
L218	O	203.	158.	-30.	2.	.81	91I	FLAT CRUSH STRENGTH, CONCORA, H*D
L484	O	211.	158.	-24.	-4.	1.03	91H	FLAT CRUSH STRENGTH, CONCORA, H*D
L242	O	214.	178.	-7.	9.	.77	91G	FLAT CRUSH STRENGTH, CONCORA, GAYDON FLAT CRUSH TESTER
L269	O	217.	166.	-14.	-1.	.85	91I	FLAT CRUSH STRENGTH, CONCORA, H*D
L666	O	219.	164.	-14.	-4.	.89	91S	FLAT CRUSH STRENGTH, CONCORA, TOYO SEIKI (METHOD JIS-P-8126)
L176	O	224.	171.	-5.	-3.	1.09	91I	FLAT CRUSH STRENGTH, CONCORA, H*D
L394	O	229.	175.	1.	-3.	.41	91R	FLAT CRUSH STRENGTH, CONCORA, TMI
L182	O	231.	173.	1.	-6.	.84	91T	FLAT CRUSH STRENGTH, CONCORA, TMI
L185	O	231.	194.	16.	9.	1.01	91A	FLAT CRUSH STRENGTH, CONCORA, INSTRON
L289	O	235.	185.	13.	-0.	1.04	91I	FLAT CRUSH STRENGTH, CONCORA, H*D
L100	O	238.	194.	21.	4.	1.13	91H	FLAT CRUSH STRENGTH, CONCORA, H*D
L329	O	238.	189.	18.	-0.	.87	91I	FLAT CRUSH STRENGTH, CONCORA, H*D
L575	O	245.	194.	26.	-1.	.93	91H	FLAT CRUSH STRENGTH, CONCORA, H*D
L336	O	252.	197.	33.	-4.	1.08	91I	FLAT CRUSH STRENGTH, CONCORA, H*D
GMEANS:		226.	177.			1.00		
		95% ELLIPSE:		59.	13.	WITH GAMMA * 44 DEGREES		


CONCORA (CMT)
SAMPLE E62 = 226. NEWTONS
SAMPLE E62 = 50.8 POUNDS
SAMPLE E55 = 177. NEWTONS
SAMPLE E55 = 39.8 POUNDS
+,X,# NOT IN GRAND MEANS
ANALYSIS T91-1
SAMPLE E55
SAMPLE E62
NEWTONS
POUNDS
130 140 150 160 170 180 190 200 210 220
28 30 32 34 36 38 40 42 44 46 48 50
170 180 190 200 210 220 230 240 250 260 270 280
40 42 44 46 48 50 52 54 56 58 60 62

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

LAB CODE	SAMPLE E62 LINERBOARD 127 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	SAMPLE E55 LINERBOARD 125 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	TEST D.= 10 VAR	F	LAB
L100	216.	14.	.44	28.	1.70	220.	25.	.91	24.	1.37	96H	@	L100
L107	123.	-79.	-2.43	20.	1.19	150.	-45.	-1.60	18.	1.07	96P	@	L107
L114	210.	8.	.26	14.	.86	210.	15.	.53	21.	1.21	96P	@	L114
L122	153.	-49.	-1.51	18.	1.11	135.	-60.	-2.14	23.	1.36	96P	@	L122
L124	201.	-1.	-.02	21.	1.29	171.	-24.	-.85	22.	1.25	96P	@	L124
L126	216.	14.	.44	13.	.77	210.	15.	.54	15.	.88	96P	@	L126
L127	231.	30.	.92	11.	.69	181.	-14.	-.51	12.	.72	96P	*	L127
L141	232.	30.	.94	22.	1.35	208.	13.	.48	18.	1.06	96P	@	L141
L157	202.	0.	.01	11.	.64	189.	-6.	-.20	18.	1.05	96P	@	L157
L171	198.	-3.	-.11	27.	1.64	209.	14.	.51	18.	1.06	96H	@	L171
L176	155.	-46.	-1.43	32.	1.94	164.	-31.	-1.09	18.	1.04	96P	@	L176
L182	252.	50.	1.55	6.	.38	234.	39.	1.39	11.	.62	96H	@	L182
L191	185.	-17.	-.52	30.	1.80	189.	-6.	-.22	28.	1.62	96P	@	L191
L242	235.	34.	1.05	12.	.74	236.	42.	1.49	12.	.70	96G	@	L242
L303	219.	17.	.54	10.	.59	207.	12.	.44	15.	.87	96H	@	L303
L305	984.	782.	24.16	37.	2.28	884.	689.	24.62	26.	1.50	96P	*	L305
L307	173.	-28.	-.87	13.	.79	174.	-21.	-.74	10.	.58	96P	@	L307
L329	190.	-12.	-.36	13.	.78	187.	-8.	-.28	14.	.81	96P	@	L329
L336	173.	-28.	-.87	8.	.47	181.	-13.	-.48	14.	.84	96P	@	L336
L350	228.	26.	.81	12.	.72	220.	25.	.89	17.	.97	96P	@	L350
L363	216.	15.	.45	8.	.46	206.	11.	.40	11.	.67	96P	@	L363
L484	147.	-54.	-1.68	15.	.93	145.	-50.	-1.77	21.	1.23	96R	@	L484
L553	191.	-10.	-.32	17.	1.05	194.	-1.	-.03	18.	1.02	96P	@	L553
L562	199.	-3.	-.08	23.	1.40	188.	-7.	-.24	25.	1.43	96P	@	L562
L570	189.	-13.	-.40	17.	1.02	182.	-13.	-.46	15.	.88	96T	@	L570
L575	266.	64.	1.99	17.	1.04	242.	47.	1.69	21.	1.25	96H	@	L575
L603	230.	29.	.89	12.	.74	218.	23.	.81	12.	.68	96P	@	L603
L610	214.	13.	.40	12.	.73	233.	38.	1.37	9.	.51	96P	@	L610
L663	199.	-2.	-.07	13.	.82	171.	-23.	-.84	17.	.99	96P	@	L663

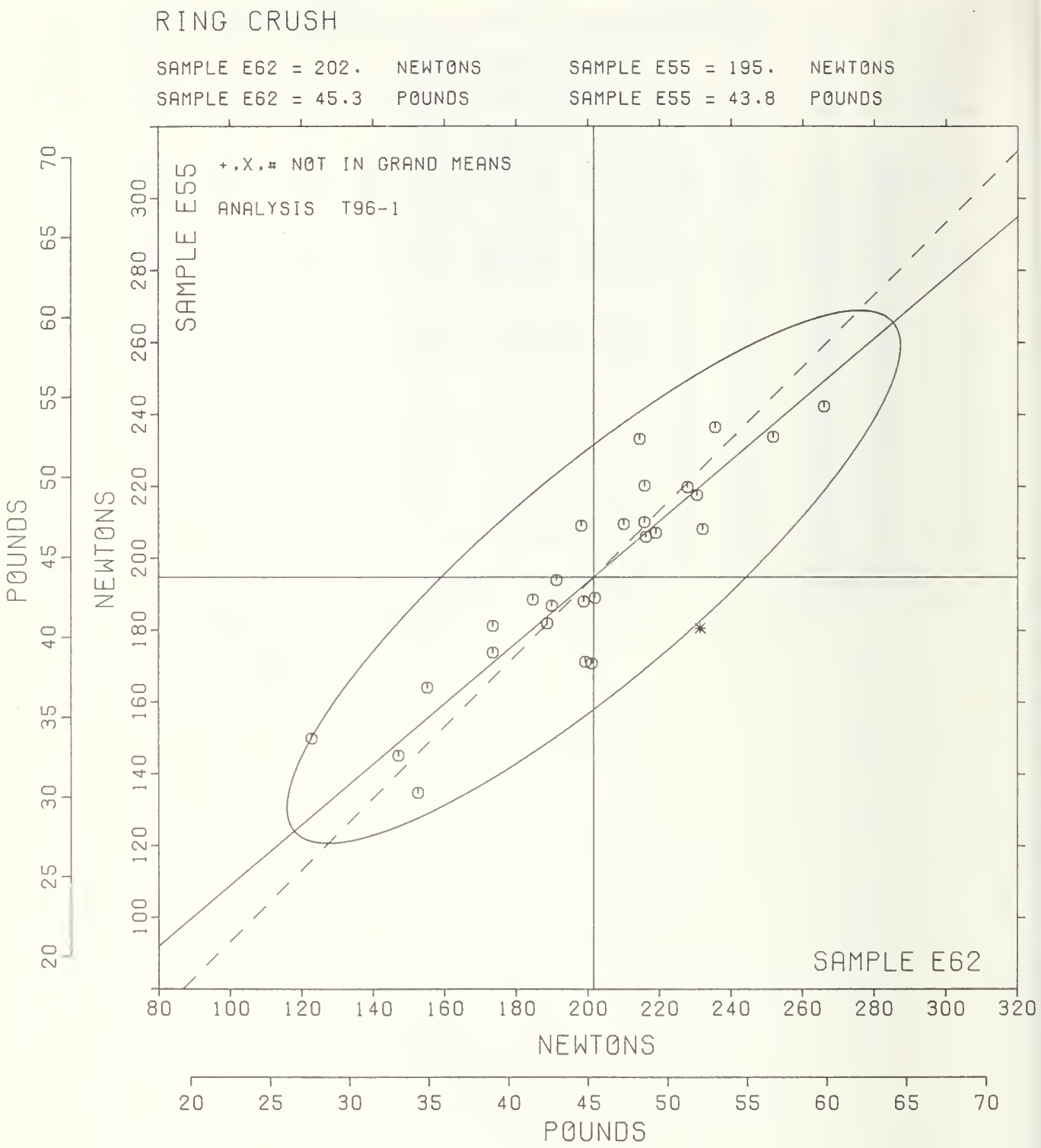
GR. MEAN = 202. NEWTONS — GRAND MEAN = 195. NEWTONS — TEST DETERMINATIONS = 10
SD MEANS = 32. NEWTONS — SD OF MEANS = 28. NEWTONS — 28 LABS IN GRAND MEANS
AVERAGE SDR = 16. NEWTONS — AVERAGE SDR = 17. NEWTONS
GR. MEAN = 45.31 POUNDS — GRAND MEAN = 43.78 POUNDS
TOTAL NUMBER OF LABORATORIES REPORTING = 29

Best Values: E62 210 ± 40 newtons
E55 200 ± 40 newtons

Data from the following laboratories appear to have been reported in incorrect units: 305.

ANALYSIS T96-1 TABLE 2
RING CRUSH (COMPRESSION RESISTANCE OF PAPERBOARD)
TAPPI STANDARD T472 SU-68

LAB CODE	F	MEANS E62	E55	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L107	0	123.	150.	-89.	17.	1.13	96P	RING CRUSH, H AND D
L484	0	147.	145.	-74.	-3.	1.08	96R	RING CRUSH, REGMED
L122	0	153.	135.	-76.	-14.	1.24	96P	RING CRUSH, H AND D
L176	0	155.	164.	-55.	7.	1.49	96P	RING CRUSH, H AND D
L336	0	173.	181.	-30.	8.	.66	96P	RING CRUSH, H AND D
L307	0	173.	174.	-35.	2.	.68	96P	RING CRUSH, H AND D
L191	0	185.	189.	-17.	6.	1.71	96P	RING CRUSH, H AND D
L570	0	189.	182.	-18.	-1.	.95	96T	RING CRUSH, TMI
L329	0	190.	187.	-14.	1.	.79	96P	RING CRUSH, H AND D
L553	0	191.	194.	-8.	6.	1.04	96P	RING CRUSH, H AND D
L171	0	198.	209.	7.	13.	1.35	96H	RING CRUSH, H AND D
L562	0	199.	188.	-6.	-3.	1.41	96P	RING CRUSH, H AND D
L663	0	199.	171.	-17.	-16.	.90	96P	RING CRUSH, H AND D
L124	0	201.	171.	-16.	-18.	1.27	96P	RING CRUSH, H AND D
L157	0	202.	189.	-3.	-5.	.85	96P	RING CRUSH, H AND D
L114	0	210.	210.	16.	6.	1.04	96P	RING CRUSH, H AND D
L610	0	214.	233.	35.	21.	.62	96P	RING CRUSH, H AND D
L126	0	216.	210.	21.	2.	.83	96P	RING CRUSH, H AND D
L100	0	216.	220.	27.	10.	1.54	96H	RING CRUSH, H AND D
L393	0	216.	206.	18.	-1.	.57	96P	RING CRUSH, H AND D
L303	0	219.	207.	21.	-2.	.73	96H	RING CRUSH, H AND D
L350	0	228.	220.	36.	2.	.85	96P	RING CRUSH, H AND D
L603	0	230.	218.	37.	-1.	.71	96P	RING CRUSH, H AND D
L127	*	231.	181.	14.	-30.	.71	96P	RING CRUSH, H AND D
L141	0	232.	208.	32.	-9.	1.20	96P	RING CRUSH, H AND D
L242	0	235.	236.	53.	10.	.72	96G	RING CRUSH, GAYDON FLAT CRUSH TESTER
L182	0	252.	234.	63.	-3.	.50	96H	RING CRUSH, H AND D
L575	0	266.	242.	80.	-5.	1.15	96H	RING CRUSH, H AND D
L305	#	984.	884.	1042.	21.	1.89	96P	RING CRUSH, H AND D
GMEANS:		202.	195.			1.00		
		95% ELLIPSE:		110.	29.	WITH GAMMA = 40 DEGREES		


RING CRUSH
SAMPLE E62 = 202. NEWTONS
SAMPLE E62 = 45.3 POUNDS
SAMPLE E55 = 195. NEWTONS
SAMPLE E55 = 43.8 POUNDS
+.X.# NOT IN GRAND MEANS
ANALYSIS T96-1
SAMPLE E55
SAMPLE E62
NEWTONS
POUNDS
80 100 120 140 160 180 200 220 240 260 280 300 320
20 25 30 35 40 45 50 55 60 65 70
100 120 140 160 180 200 220 240 260 280 300
20 25 30 35 40 45 50 55 60 65 70

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		H62	16.93	1.42	1.12	15	45	53	10	.98	3.98
T10-1	PSI	H39	35.54	2.20	2.13					1.87	6.18
BURSTING STRENGTH, MODEL C-A		H62	17.71	.81	1.15	15	36	39	10	1.01	2.31
T10-2	PSI	H39	36.13	1.46	2.01					1.76	4.17
BURSTING STRENGTH, HIGH RANGE		H40	54.3	1.9	2.6	15	36	45	10	2.3	5.5
T11-1	PSI	H07	73.7	4.5	6.8					5.9	12.8
TEARING STRENGTH, DEEP CUTOUT		H21	64.4	3.9	2.1	15	114	126	10	1.9	10.8
T15-1	GRAMS	E10	57.2	3.4	1.5					1.3	9.4
TEARING STRENGTH, NO CUTOUT		E32	86.1	3.8	2.5	15	14	16	10	2.2	10.5
T17-1	GRAMS	E63	78.3	3.4	2.2					2.0	9.4
TENSILE STRENGTH, PACKAGING PAPERS		H57	10.40	.38	.66	20	47	52	12	.52	1.09
T19-1	KILONEWTON/M	E63	3.92	.20	.18					.14	.56
TENSILE STRENGTH, CRE TYPE		J03	3.73	.18	.18	20	39	53	12	.14	.51
T20-1	KILONEWTON/M	J07	6.29	.23	.31					.25	.67
TENSILE STRENGTH, PENDULUM TYPE		J03	3.78	.24	.21	20	35	42	12	.16	.66
T20-2	KILONEWTON/M	J07	6.32	.46	.36					.29	1.30
T.E.A., PACKAGING PAPERS		H57	105.9	8.1	16.2	20	15	18	12	12.9	24.0
T25-1	JOULES/SQ M	E63	82.6	5.8	10.5					8.4	16.9
T.E.A., PRINTING PAPERS		J03	34.8	4.3	4.8	20	18	21	12	3.9	12.0
T26-1	JOULES/SQ M	J07	74.7	6.9	8.9					7.1	19.6
ELONGATION TO BREAK, PACKAGING PAPER		H57	1.77	.18	.16	20	14	17	12	.13	.49
T28-1	PERCENT	E63	3.21	.26	.30					.24	.72
ELONGATION TO BREAK, PRINTING PAPER		J03	1.54	.14	.14	20	18	22	12	.12	.39
T29-1	PERCENT	J07	1.91	.20	.15					.12	.55
FOLDING ENDURANCE (MIT)		H23	405.	141.	93.	15	43	54	10	82.	392.
T30-1	DOUBLE FOLDS	H35	70.	33.	24.					21.	93.
FOLDING ENDURANCE (MIT)		H23	2.590	.135	.108	15	41	54	10	.095	.377
T30-2	LOG(10) FOLD	H35	1.769	.236	.167					.146	.658
STIFFNESS, GURLEY		H70	252.	12.	14.	10	33	39	10	12.	33.
T35-1	GURLEY UNITS	H68	463.	27.	24.					21.	76.
STIFFNESS, TABER		J09	17.32	1.11	.89	10	25	26	5	1.10	3.17
T36-1	TABER UNITS	B63	19.00	1.00	.83					1.03	2.87
SURFACE PICK STRENGTH, IGT		H17	27.1	8.8	2.3	4	11	16	4	3.2	24.5
T49-1	KP CM/SEC	H80	61.6	24.7	4.0					5.5	68.4
SURFACE PICK STRENGTH, WAX		H17	5.97	1.10	.41	5	20	21	5	.51	3.04
T50-1	WAX NUMBER	H80	11.38	.91	.50					.61	2.51
CONCORA (CMT)		E62	226.	15.	15.	10	15	16	10	13.	42.
T91-1	NEWTONS	E55	177.	15.	12.					11.	41.
RING CRUSH		E62	202.	32.	16.	10	28	29	10	14.	90.
T96-1	NEWTONS	E55	195.	28.	17.					15.	78.

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16. ABSTRACT *(A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here.)*

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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Collaborative reference program; Laboratory evaluation; Paper; Precision; Reference samples, Testing calibration.

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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.