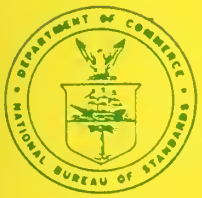
TECHNICAL ASSOCIATION OF THE
PULP AND PAPER INDUSTRY

COLLABORATIVE REFERENCE PROGRAM FOR PAPER

REPORT NO. 54S
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

Rev. 4/77

TECHNICAL ASSOCIATION OF THE
PULP AND PAPER INDUSTRY

COLLABORATIVE REFERENCE PROGRAM FOR PAPER

Report No. 54S
STRENGTH TESTS

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National Engineering Laboratory

NBSIR 78-1351

U. S. DEPARTMENT OF COMMERCE
National Bureau of Standards

INTRØDUCTIØN

Reports 54S and 54G comprise the last 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. Øn all plots, sample codes and unit of test have been shifted to new positions.

Notes and comments fo 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.

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

Jeffrey Horlick, Administrator
NBS-TAPPI Collaborative Reference Program
Øffice of Testing Laboratory Evaluation Technology

September 22, 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 ($\pm$) 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 H06 MEAN	PRINTING 89 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE H63 MEAN	PRINTING 77 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.* 15 VAR	F	LAB
L107	31.27	-1.33	-.71	2.05	1.26	16.47	-.31	-.20	.83	.69	10C	G	L107
L121	30.91	-1.69	-.90	2.24	1.38	16.81	.03	.02	1.27	1.05	10C	G	L121
L131	30.40	-2.19	-1.17	1.30	.80	14.60	-2.18	-1.41	1.24	1.03	10C	G	L131
L153	34.77	2.17	1.16	1.51	.93	17.40	.62	.41	1.71	1.42	10C	G	L153
L158	NO DATA REPORTED FOR SAMPLE H06					15.68	-1.10	-.71	1.64	1.36	10C	M	L158
L167	33.53	.94	.50	.81	.50	16.33	-.44	-.29	.84	.69	10C	G	L167
L191	29.03	-3.56	-1.90	1.13	.69	12.50	-4.28	-2.78	.65	.54	10C	*	L191
L203A	30.83	-1.76	-.94	1.23	.76	16.07	-.71	-.46	1.61	1.34	10C	G	L203A
L203B	32.97	.37	.20	.90	.55	15.13	-1.64	-1.07	1.45	1.20	10C	G	L203B
L207	35.18	2.59	1.38	1.85	1.13	19.13	2.36	1.53	1.20	1.00	10C	G	L207
L223A	36.87	4.27	2.28	1.67	1.03	19.59	2.82	1.83	1.57	1.30	10C	G	L223A
L225	33.47	.87	.47	1.55	.95	17.87	1.09	.71	1.30	1.08	10C	U	L225
L237A	30.77	-1.83	-.98	1.22	.75	16.10	-.68	-.44	1.07	.89	10C	G	L237A
L2378	31.60	-.99	-.53	1.34	.82	16.77	-.01	-.01	.59	.49	10C	G	L2378
L243	31.87	-.73	-.39	1.39	.86	18.03	1.26	.82	1.20	1.00	10C	G	L243
L248	31.31	-1.28	-.69	1.90	1.17	17.24	.46	.30	1.09	.90	10E	G	L248
L249	30.99	-1.60	-.85	.72	.44	16.14	-.64	-.41	1.03	.85	10C	G	L249
L261	31.07	-1.53	-.82	1.58	.97	14.97	-1.80	-1.17	1.33	1.10	10C	G	L261
L264	31.73	-.86	-.45	1.98	1.22	16.33	-.44	-.29	1.35	1.11	10C	G	L264
L268	31.93	-.66	-.35	1.91	1.17	16.93	.16	.10	1.10	.91	10C	G	L268
L279	32.50	-.09	-.05	1.45	.89	17.07	.29	.19	1.35	1.12	10C	G	L279
L299	39.87	7.27	3.88	2.12	1.30	16.60	1.82	1.19	1.54	1.27	10C	X	L299
L305	32.37	-.23	-.12	1.32	.81	16.70	-.08	-.05	1.24	1.02	10C	G	L305
L312	31.53	-1.06	-.57	.95	.59	17.07	.29	.19	.80	.66	10C	G	L312
L315	34.62	2.03	1.08	2.13	1.31	18.80	2.02	1.32	1.41	1.17	10C	G	L315
L321	40.07	7.47	3.99	4.11	2.53	18.10	1.32	.86	1.14	.94	10C	#	L321
L322	32.67	.07	.04	1.84	1.13	17.51	.73	.47	.89	.74	10C	G	L322
L326	31.63	-.96	-.51	1.38	.85	15.40	-1.38	-.89	.89	.74	10C	G	L326
L330	35.04	2.45	1.31	3.25	1.99	18.00	1.22	.80	1.26	1.04	10C	G	L330
L331	32.20	-.39	-.21	1.86	1.14	17.73	.95	.62	1.28	1.06	10C	G	L331
L333	30.60	-1.99	-1.06	1.80	1.11	13.93	-2.84	-1.85	1.05	.87	10C	G	L333
L339	32.13	-.46	-.25	1.30	.80	14.60	-2.18	-1.41	1.64	1.36	10C	G	L339
L344	34.87	2.27	1.21	2.57	1.58	16.43	-.34	-.22	1.22	1.01	10C	G	L344
L356	31.07	-1.53	-.82	1.50	.92	16.91	.14	.09	.92	.76	10C	G	L356
L358	34.06	1.47	.78	1.46	.89	15.97	-.81	-.53	.77	.64	10C	G	L358
L360	32.31	-.28	-.15	1.30	.80	16.17	-.61	-.40	1.19	.99	10C	G	L360
L390	36.13	3.54	1.89	2.39	1.46	19.20	2.42	1.58	1.37	1.14	10C	G	L390
L561	36.57	3.97	2.12	1.64	1.00	19.90	3.12	2.03	1.56	1.29	10C	G	L561
L568	31.49	-1.11	-.59	1.79	1.10	17.47	.69	.45	1.33	1.10	10C	G	L568
L599	33.37	.78	.42	.99	.61	18.24	1.46	.95	1.56	1.29	10C	G	L599
L601	34.70	2.11	1.12	1.89	1.16	16.89	.12	.08	1.09	.91	10C	G	L601
L618	30.80	-1.79	-.96	1.93	1.19	15.87	-.91	-.59	1.25	1.03	10C	G	L618
L626	NO DATA REPORTED FOR SAMPLE H06					16.10	-.68	-.44	1.33	1.10	10C	M	L626

GR. MEAN = 32.59 PSI — GRAND MEAN = 16.78 PSI — TEST DETERMINATIONS = 15
SD MEANS = 1.87 PSI — SD OF MEANS = 1.54 PSI — 39 LABS IN GRAND MEANS
AVERAGE SDR = 1.63 PSI — AVERAGE SDR = 1.21 PSI
GR. MEAN = 224.7 KILOPASCAL — GRAND MEAN = 115.7 KILOPASCAL

L128	33.40	.81	.43	1.50	.92	17.73	.96	.62	1.33	1.11	10B	*	L128
L250L	28.85	-3.74	-2.00	1.35	.83	16.43	-.34	-.22	.71	.59	10N	*	L250L
L251	33.11	.51	.27	1.83	1.12	18.12	1.35	.88	1.13	.94	10V	*	L251
L269	34.70	2.11	1.12	1.42	.87	19.77	2.99	1.94	1.76	1.46	10A	*	L269
L484	31.77	-.83	-.44	1.18	.72	16.83	.06	.04	.88	.73	10M	*	L484

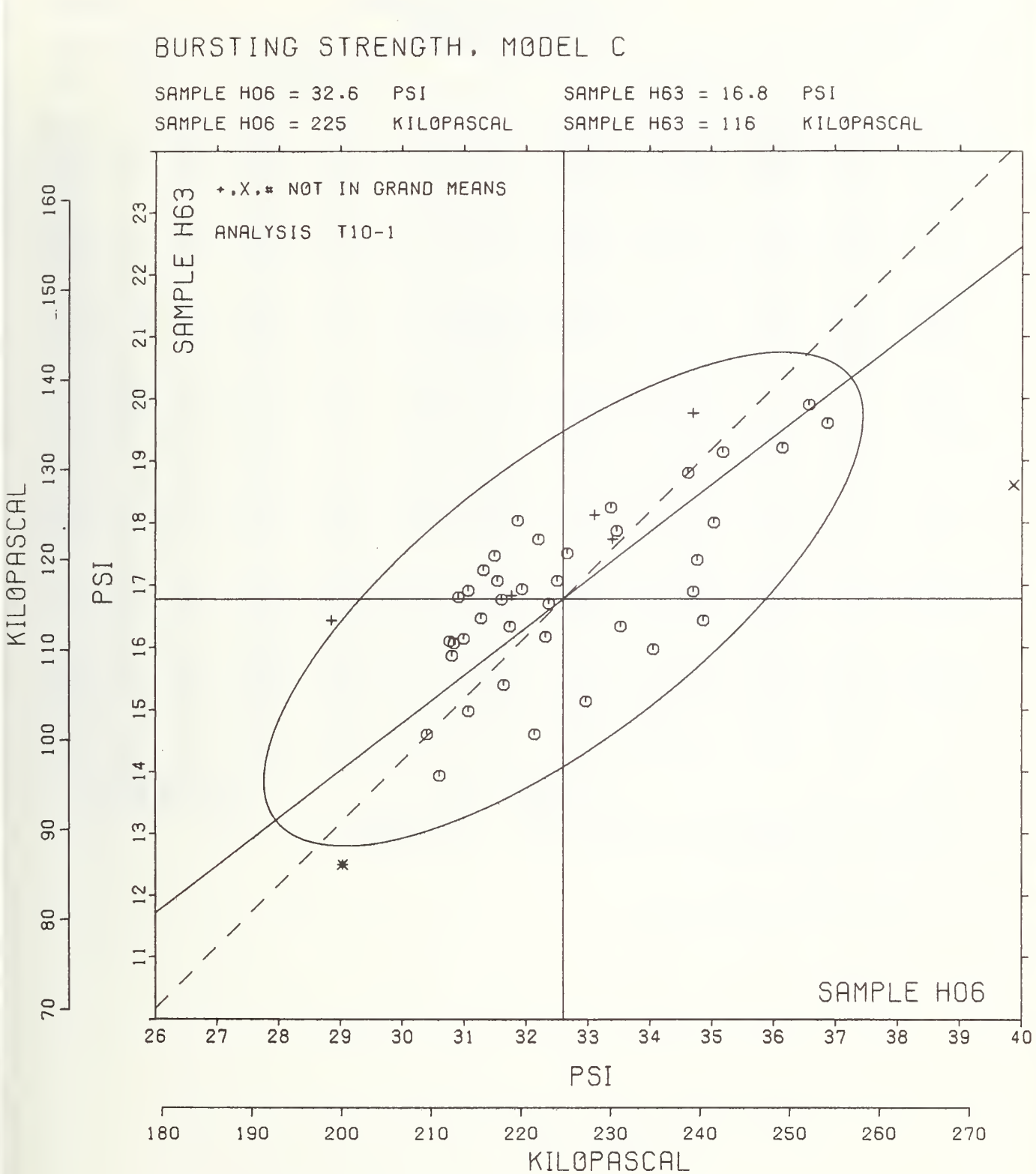
TOTAL NUMBER OF LABORATORIES REPORTING = 48

Best values: H06 32.6 ± 3.4 psi
H63 16.8 ± 2.4 psi

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

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

LAB CODE	F	MEANS H06	MEANS H63	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L626	M		16.10			1.10	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L158	M		15.68			1.36	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L250L	*	28.85	16.43	-3.18	2.00	.71	10N	BURSTING STRENGTH UP TO 45 PSI,LHOMARGY,MAN.CLAMP, 20C,65%RH
L191	*	29.03	12.50	-5.43	-1.23	.62	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L131	O	30.40	14.60	-3.06	-.39	.91	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L333	O	30.60	13.93	-3.31	-1.04	.99	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L237A	O	30.77	16.10	-1.86	.57	.82	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L618	O	30.80	15.87	-1.98	.37	1.11	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L203A	O	30.83	16.07	-1.83	.51	1.05	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L121	O	30.91	16.81	-1.32	1.05	1.21	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L249	O	30.99	16.14	-1.66	.47	.65	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L355	O	31.07	16.91	-1.13	1.04	.84	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L261	O	31.07	14.97	-2.31	-.50	1.03	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L107	O	31.27	16.47	-1.24	.56	.98	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L248	O	31.31	17.24	-.74	1.15	1.04	10E	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L568	O	31.49	17.47	-.46	1.22	1.10	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L312	O	31.53	17.07	-.66	.88	.62	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L237B	O	31.60	16.77	-.79	.60	.66	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L326	O	31.63	15.40	-1.60	-.51	.79	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L264	O	31.73	16.33	-.95	.17	1.17	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L484	*	31.77	16.83	-.62	.55	.73	10M	BURSTING STRENGTH UP TO 45 PSI,REGMED MT/MOT,MANUAL CLAMP
L243	O	31.87	18.03	.19	1.44	.93	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L268	O	31.93	16.93	-.43	.53	1.04	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L339	O	32.13	14.60	-1.69	-1.45	1.08	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L331	O	32.20	17.73	.27	1.00	1.10	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L360	O	32.31	16.17	-.59	-.31	.89	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L305	O	32.37	16.70	-.23	.08	.92	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L279	O	32.50	17.07	.10	.29	1.00	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L322	O	32.67	17.51	.50	.54	.93	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L203B	O	32.97	15.13	-.70	-1.53	.87	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L251	*	33.11	18.12	1.23	.76	1.03	10V	BURSTING STRENGTH UP TO 45 PSI, L-W,MANUAL CLAMP, 20C,65% RH
L599	O	33.37	18.24	1.51	.69	.95	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L128	*	33.40	17.73	1.22	.27	1.01	10B	BURSTING STRENGTH UP TO 45 PSI, PERKINS B, MANUAL CLAMP
L225	O	33.47	17.87	1.36	.33	1.02	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L167	O	33.53	16.33	.48	-.92	.60	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L358	O	34.06	15.97	.67	-1.53	.76	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L315	O	34.62	18.80	2.84	.37	1.24	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L269	*	34.70	19.77	3.49	1.09	1.17	10A	BURSTING STRENGTH UP TO 45 PSI, PERKINS A, MANUAL CLAMP
L501	O	34.70	16.89	1.74	-1.19	1.03	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L153	O	34.77	17.40	2.10	-.83	1.17	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L344	O	34.87	16.43	1.60	-1.65	1.30	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L330	O	35.04	18.00	2.69	-.52	1.52	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L207	O	35.18	19.13	3.49	.30	1.06	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L390	O	36.13	19.20	4.28	-.23	1.30	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L561	O	36.57	19.90	5.05	.06	1.15	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L223A	O	36.87	19.59	5.11	-.36	1.17	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L299	X	39.87	18.60	6.88	-2.98	1.29	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
L321	#	40.07	18.10	6.74	-3.49	1.73	10C	BURSTING STRENGTH UP TO 45 PSI, PERKINS C, MANUAL CLAMP
GMEANS:		32.59	16.78			1.00		
		95% ELLIPSE:		5.85	2.23	WITH GAMMA = 37 DEGREES		


BURSTING STRENGTH, MODEL C
SAMPLE H06 = 32.6 PSI
SAMPLE H06 = 225 KILOPASCAL
SAMPLE H63 = 16.8 PSI
SAMPLE H63 = 116 KILOPASCAL
+,X,* NOT IN GRAND MEANS
ANALYSIS T10-1
SAMPLE H63
PSI
KILOPASCAL
SAMPLE H06
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 H06 MEAN	PRINTING 89 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE H63 MEAN	PRINTING 77 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.- 15 VAR	P	LAB
L105	30.51	-1.78	-.94	1.57	.95	14.48	-2.38	-1.68	1.39	1.21	10D	@	L105
L115	34.80	2.51	1.33	2.11	1.27	17.37	.50	.36	1.01	.88	10D	@	L115
L118	33.27	.97	.52	1.79	1.08	18.76	1.90	1.34	1.08	.94	10D	@	L118
L122	31.20	-1.09	-.58	1.42	.86	16.60	-.26	-.19	1.12	.98	10P	@	L122
L125	41.67	9.37	4.96	3.94	2.38	15.07	-1.80	-1.27	3.18	2.77	10D	#	L125
L141	34.03	1.74	.92	2.26	1.36	16.47	-.40	-.28	1.09	.95	10D	@	L141
L148	33.07	.77	.41	1.58	.95	18.07	1.20	.85	1.16	1.01	10D	@	L148
L157	35.37	3.07	1.63	2.05	1.24	18.97	2.10	1.49	.99	.86	10D	@	L157
L159	28.79	-3.50	-1.85	.89	.54	15.77	-1.09	-.77	1.09	.95	10D	@	L159
L162	30.27	-2.03	-1.07	1.16	.70	15.87	-1.00	-.70	1.19	1.03	10D	@	L162
L163	30.87	-1.43	-.75	2.01	1.22	17.23	.37	.26	1.31	1.14	10D	@	L163
L166	33.70	1.41	.74	1.19	.72	17.93	1.07	.76	1.18	1.03	10D	@	L166
L176	33.33	1.04	.55	1.23	.75	18.00	1.14	.80	.00	.00	10D	@	L176
L185	34.13	1.84	.97	1.60	.96	18.27	1.40	.99	1.49	1.29	10D	@	L185
L190C	32.00	-.29	-.15	1.77	1.07	16.73	-.13	-.09	1.10	.96	10D	@	L190C
L190R	30.13	-2.16	-1.14	1.97	1.19	15.33	-1.53	-1.08	1.25	1.09	10D	@	L190R
L194	32.07	-.23	-.12	.94	.57	17.63	.77	.54	.66	.57	10D	@	L194
L217	30.33	-1.96	-1.04	2.32	1.40	15.80	-1.06	-.75	1.26	1.10	10F	@	L217
L224	33.87	1.57	.83	2.79	1.69	16.97	.10	.07	1.48	1.29	10D	@	L224
L226C	30.70	-1.59	-.84	1.89	1.14	15.00	-1.86	-1.32	1.22	1.07	10D	@	L226C
L233	30.90	-1.39	-.74	1.09	.66	16.89	.02	.02	.94	.82	10D	@	L233
L241	33.93	1.64	.87	1.94	1.17	18.79	1.92	1.36	1.21	1.05	10D	@	L241
L255	30.80	-1.49	-.79	1.01	.61	15.33	-1.53	-1.08	.62	.54	10D	@	L255
L257A	33.07	.77	.41	1.83	1.11	18.33	1.47	1.04	1.35	1.17	10D	@	L257A
L257B	33.80	1.51	.80	1.57	.95	18.00	1.14	.80	1.31	1.14	10D	@	L257B
L257C	33.87	1.57	.83	1.73	1.04	18.67	1.80	1.28	1.35	1.17	10D	@	L257C
L262	33.20	.91	.48	1.72	1.04	18.03	1.17	.83	.74	.65	10D	@	L262
L275	28.13	-4.16	-2.20	2.34	1.41	12.94	-3.92	-2.77	.98	.85	10D	*	L275
L280	34.59	2.29	1.21	1.31	.79	18.48	1.62	1.14	1.42	1.23	10D	@	L280
L285	34.33	2.04	1.08	2.13	1.28	16.20	-.66	-.47	1.08	.94	10D	@	L285
L309	32.37	.07	.04	1.39	.84	16.27	-.59	-.42	1.26	1.10	10D	@	L309
L341	32.53	.24	.13	1.06	.64	16.60	-.26	-.19	1.12	.98	10D	@	L341
L352	30.37	-1.93	-1.02	1.10	.66	16.36	-.50	-.36	.39	.34	10D	@	L352
L567	28.60	-3.69	-1.95	2.04	1.23	14.43	-2.43	-1.72	1.57	1.37	10D	@	L567
L575	34.07	1.78	.94	2.35	1.42	16.91	.05	.04	1.77	1.54	10D	@	L575
L581	32.03	-.26	-.14	1.39	.84	16.10	-.76	-.54	1.96	1.70	10D	@	L581
L587	33.50	1.21	.64	1.76	1.06	17.47	.60	.43	1.04	.91	10D	@	L587

GR. MEAN - 32.29 PSI GRAND MEAN - 16.86 PSI TEST DETERMINATIONS - 15

SD MEANS - 1.89 PSI SD OF MEANS - 1.41 PSI 36 LABS IN GRAND MEANS

AVERAGE SDR - 1.66 PSI AVERAGE SDR - 1.15 PSI

GR. MEAN - 222.7 KILOPASCAL GRAND MEAN - 116.3 KILOPASCAL

TOTAL NUMBER OF LABORATORIES REPORTING - 37

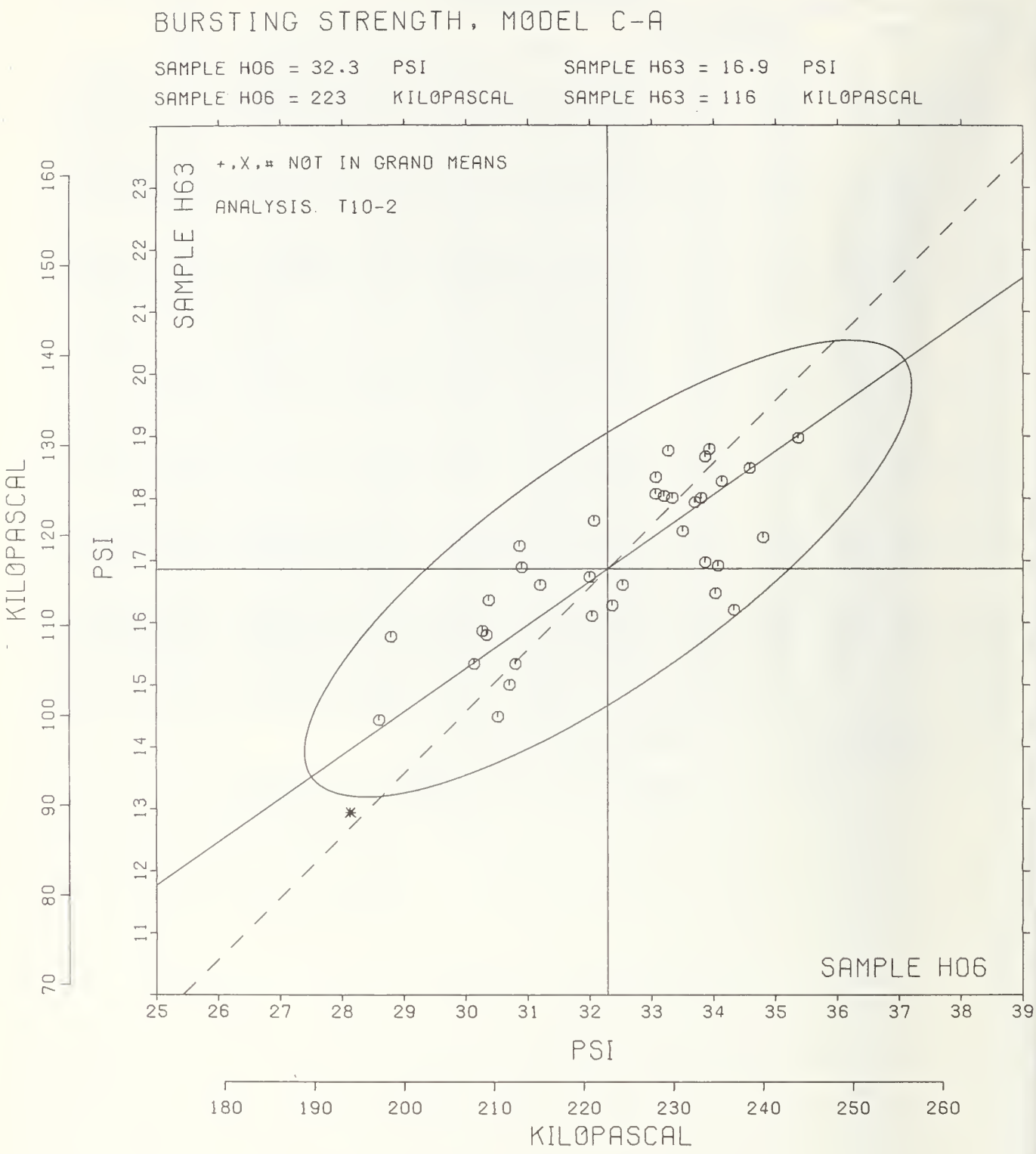
Best values: H06 32.4 ± 2.3 psi
H63 16.9 ± 2.0 psi

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 H06	MEANS H63	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L275	*	28.13	12.94	-5.66	-.84	1.13 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L567	O	28.60	14.43	-4.42	.12	1.30 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L159	O	28.79	15.77	-3.49	1.11	.74 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L190R	O	30.13	15.33	-2.65	-.02	1.14 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L162	O	30.27	15.87	-2.23	.34	.87 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L217	O	30.33	15.80	-2.21	.25	1.25 10F	BURSTING STRENGTH UP TO 45 PSI,PERKINS C, H.CLAMP,TRANSDUCER
L352	O	30.37	16.36	-1.87	.69	.50 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L105	O	30.51	14.48	-2.82	-.93	1.08 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L226C	O	30.70	15.00	-2.37	-.62	1.10 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L255	O	30.80	15.33	-2.10	-.40	.58 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L163	O	30.87	17.23	-.96	1.12	1.18 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L233	O	30.90	16.89	-1.13	.82	.74 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L122	O	31.20	16.60	-1.05	.41	.92 10F	BURSTING STRENGTH UP TO 45 PSI,PERKINS C, H.CLAMP,TRANSDUCER
L190C	O	32.00	16.73	-.31	.06	1.01 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L581	O	32.03	16.10	-.65	-.48	1.27 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L194	O	32.07	17.63	.26	.76	.57 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L309	O	32.37	16.27	-.28	-.53	.97 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L341	O	32.53	16.60	.05	-.35	.81 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L148	O	33.07	18.07	1.32	.54	.98 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L257A	O	33.07	18.33	1.48	.76	1.14 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L262	O	33.20	18.03	1.41	.44	.84 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L118	O	33.27	18.76	1.88	1.00	1.01 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L176	O	33.33	18.00	1.50	.34	.37 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L587	O	33.50	17.47	1.34	-.20	.99 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L166	O	33.70	17.93	1.77	.07	.87 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L257B	O	33.80	18.00	1.89	.07	1.04 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L224	O	33.87	16.97	1.35	-.82	1.49 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L257C	O	33.87	18.67	2.32	.58	1.11 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L241	O	33.93	18.79	2.45	.64	1.11 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L141	O	34.03	16.47	1.20	-1.32	1.15 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L575	O	34.07	16.91	1.49	-.98	1.48 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L185	O	34.13	18.27	2.31	.10	1.13 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L285	O	34.33	16.20	1.29	-1.71	1.11 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L280	O	34.59	18.48	2.81	.01	1.01 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L115	O	34.80	17.37	2.34	-1.02	1.08 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L157	O	35.37	18.97	3.72	-.03	1.05 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
L125	#	41.67	15.07	6.66	-6.84	2.58 10D	BURSTING STRENGTH UP TO 45 PSI, PERKINS CA OR C, AIR CLAMP
GMEANS:		32.29	16.86			1.00	
		95% ELLIPSE:		5.85	1.84	WITH GAMMA = 34 DEGREES	


BURSTING STRENGTH, MODEL C-A
SAMPLE H06 = 32.3 PSI
SAMPLE H06 = 223 KILOPASCAL
SAMPLE H63 = 16.9 PSI
SAMPLE H63 = 116 KILOPASCAL
+,X,# NOT IN GRAND MEANS
ANALYSIS T10-2
SAMPLE H63
PSI
KILOPASCAL
SAMPLE H06
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 H07 KRAFT 147 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	SAMPLE E74 TUBE WINDING 132 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	TEST D.- 15 VAR	F	LAB
L103	80.1	5.8	1.34	5.2	.79	73.9	1.4	.38	2.8	.57	11C	O	L103
L118	77.1	2.8	.65	9.3	1.41	76.1	3.6	.95	6.9	1.39	11D	O	L118
L122	69.1	-5.2	-1.20	7.9	1.20	67.0	-5.4	-1.43	4.8	.96	11F	O	L122
L128	72.7	-1.5	-.35	4.7	.71	71.1	-1.4	-.36	4.5	.91	11D	O	L128
L141	79.9	5.6	1.29	8.2	1.24	76.8	4.4	1.14	7.2	1.44	11D	O	L141
L148	74.7	.5	.11	7.9	1.20	71.2	-1.2	-.33	5.5	1.12	11D	O	L148
L159	70.4	-3.8	-.88	6.3	.95	64.5	-8.0	-2.09	5.5	1.10	11D	O	L159
L170	72.5	-1.8	-.41	2.7	.42	75.6	3.2	.83	3.5	.70	11C	O	L170
L174	81.9	7.6	1.76	7.5	1.14	79.5	7.0	1.84	4.8	.96	11D	O	L174
L176	63.9	-10.4	-2.40	7.5	1.14	70.9	-1.5	-.40	4.2	.85	11D	*	L176
L182	74.9	.7	.15	7.9	1.19	70.9	-1.6	-.41	6.6	1.34	11D	O	L182
L218	71.7	-2.5	-.58	6.9	1.04	74.0	1.6	.41	6.5	1.30	11D	O	L218
L237A	78.4	4.1	.96	2.6	.40	72.5	.1	.02	2.3	.46	11C	O	L237A
L237B	73.6	-.6	-.15	4.2	.64	73.1	.6	.16	3.3	.67	11C	O	L237B
L238A	76.7	2.4	.56	12.1	1.83	72.9	.4	.12	5.5	1.11	11Y	O	L238A
L243	70.7	-3.6	-.83	7.3	1.10	72.9	.5	.12	5.6	1.14	11C	O	L243
L248	74.3	-.0	-.00	8.1	1.22	68.1	-4.3	-1.13	3.6	.73	11E	O	L248
L273	80.9	6.6	1.52	9.1	1.37	73.4	1.0	.25	6.3	1.27	11C	O	L273
L279	72.7	-1.6	-.37	4.7	.71	76.9	4.5	1.17	4.4	.90	11C	O	L279
L280	70.9	-3.4	-.78	6.8	1.04	70.4	-2.1	-.55	4.3	.87	11D	O	L280
L294	74.9	.6	.14	5.0	.76	77.9	5.5	1.44	5.0	1.01	11C	O	L294
L303	68.6	-5.6	-1.30	5.3	.80	68.8	-3.6	-.95	3.4	.69	11C	O	L303
L330	75.9	1.6	.38	8.8	1.33	75.7	3.3	.85	6.6	1.33	11C	O	L330
L331	83.1	8.9	2.05	8.5	1.29	76.5	4.0	1.06	4.9	.99	11C	O	L331
L333	69.7	-4.6	-1.06	7.1	1.08	69.1	-3.4	-.89	5.2	1.05	11C	O	L333
L334	73.6	-.7	-.16	7.3	1.10	72.8	.4	.09	3.3	.65	11D	O	L334
L344	75.5	1.2	.28	4.5	.68	74.4	2.0	.52	5.6	1.12	11C	O	L344
L356	70.0	-4.3	-.98	8.0	1.21	71.1	-1.3	-.35	5.7	1.14	11C	O	L356
L362	73.3	-1.0	-.23	4.3	.65	66.0	-6.4	-1.68	2.9	.59	11D	O	L362
L565	72.1	-2.2	-.50	3.2	.48	70.6	-1.8	-.48	2.8	.57	11D	O	L565
L567	73.4	-.8	-.19	7.4	1.13	67.6	-4.8	-1.27	5.8	1.18	11D	O	L567
L575	74.4	.1	.02	5.9	.90	72.3	-.1	-.03	5.5	1.10	11D	O	L575
L604	82.2	7.9	1.83	7.0	1.06	80.4	8.0	2.10	7.6	1.54	11C	O	L604
L622	71.4	-2.9	-.66	6.1	.92	68.3	-4.2	-1.10	5.6	1.14	11E	O	L622

GR. MEAN - 74.3 PSI GRAND MEAN - 72.4 PSI TEST DETERMINATIONS - 15

SD MEANS - 4.3 PSI SD OF MEANS - 3.8 PSI 34 LABS IN GRAND MEANS

AVERAGE SDR - 6.6 PSI AVERAGE SDR - 5.0 PSI

GR. MEAN - 512.0 KILOPASCAL GRAND MEAN - 499.5 KILOPASCAL

L250L	69.5	-4.8	-1.11	4.6	.70	65.1	-7.3	-1.93	3.5	.71	11N	*	L250L
L251	71.3	-2.9	-.67	5.3	.80	68.2	-4.2	-1.10	6.6	1.33	11V	*	L251
L290	76.3	2.0	.46	5.5	.84	76.3	3.8	1.00	4.7	.94	11A	*	L290
L393	74.3	.1	.02	8.0	1.22	69.6	-2.8	-.75	7.3	1.47	11H	*	L393
L394	89.5	15.2	3.51	4.6	.70	85.5	13.0	3.42	5.2	1.04	11H	*	L394
L570	72.6	-1.7	-.38	6.2	.94	78.3	5.9	1.55	5.1	1.02	11H	*	L570
L576	81.4	7.1	1.65	2.2	.34	73.3	.9	.22	3.3	.67	11P	*	L576
L593	83.6	9.3	2.16	9.9	1.51	84.5	12.1	3.18	6.3	1.27	11J	*	L593

TOTAL NUMBER OF LABORATORIES REPORTING - 42

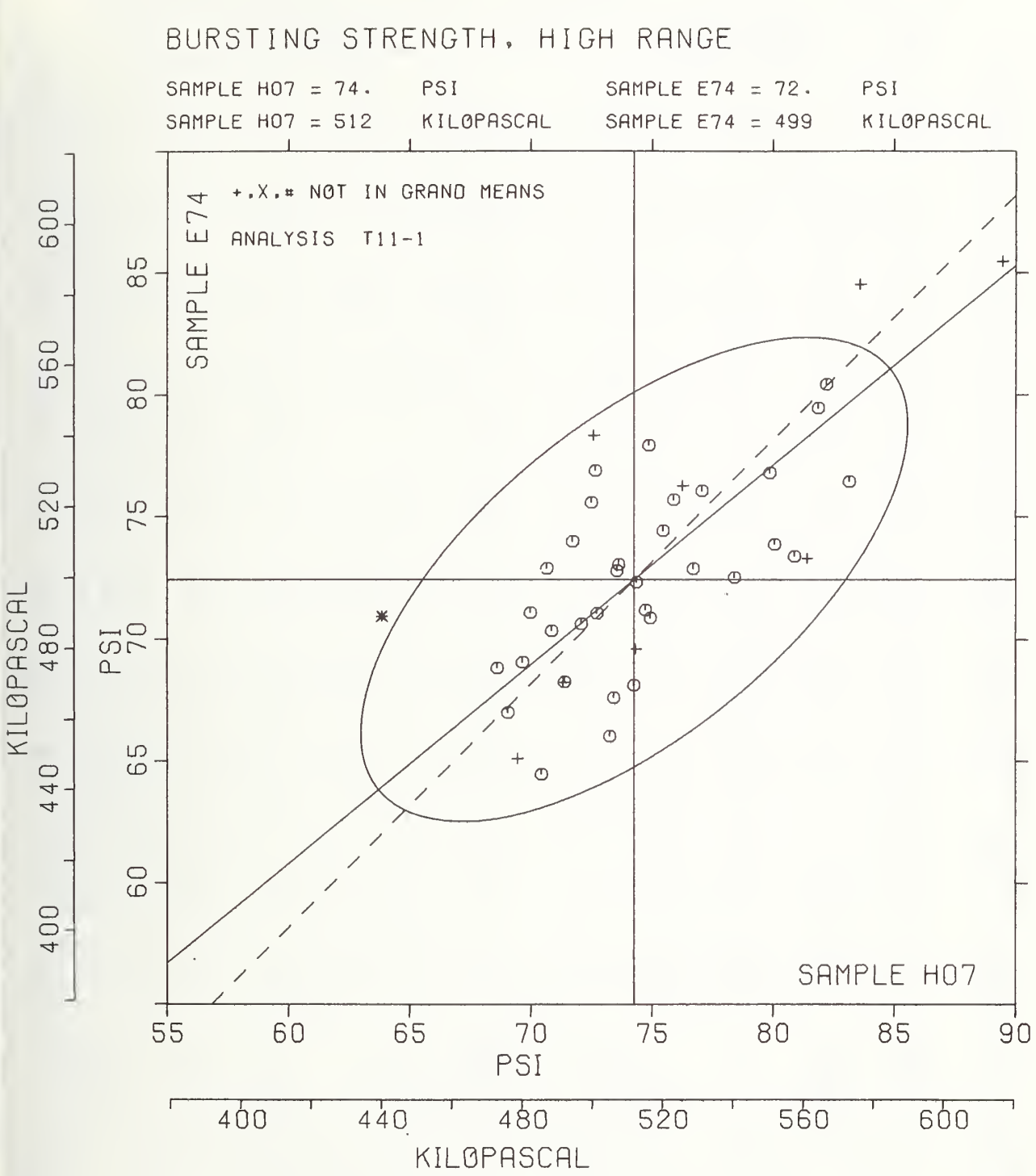
Best values: H07 74 ± 8 psi
E74 72 ± 6 psi

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 H07	MEANS E74	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L176	*	63.9	70.9	-9.0	5.4	.99	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L303	O	68.6	68.8	-6.6	.8	.75	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L122	O	69.1	67.0	-7.5	-.9	1.08	11F	BURSTING STRENGTH 40 - 100 PSI,PERKINS C, H.CLAMP,TRANSDUCER
L250L	*	69.5	65.1	-8.4	-2.6	.70	11N	BURSTING STRENGTH 40 - 100 PSI,LHOMARGY,MAN.CLAMP, 20C,65%RH
L333	O	69.7	69.1	-5.7	.3	1.07	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L356	O	70.0	71.1	-4.2	1.7	1.18	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L159	O	70.4	64.5	-8.0	-3.8	1.03	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L243	O	70.7	72.9	-2.5	2.6	1.12	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L280	O	70.9	70.4	-4.0	.5	.95	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L251	*	71.3	68.2	-4.9	-1.4	1.06	11V	BURSTING STRENGTH 40 - 100 PSI, L*W,MANUAL CLAMP, 20C,65% RH
L622	O	71.4	68.3	-4.9	-1.4	1.03	11E	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L218	O	71.7	74.0	-1.0	2.8	1.17	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L565	O	72.1	70.6	-2.8	-.0	.52	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L170	O	72.5	75.6	.6	3.6	.56	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L570	*	72.6	78.3	2.4	5.6	.98	11H	BURSTING STRENGTH 40 - 100 PSI, PERKINS AH, HYDRAULIC CLAMP
L279	O	72.7	76.9	1.6	4.5	.80	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L128	O	72.7	71.1	-2.1	-.1	.81	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L362	O	73.3	66.0	-4.8	-4.3	.62	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L567	O	73.4	67.6	-3.7	-3.2	1.15	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L334	O	73.6	72.8	-.3	.7	.88	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L237B	O	73.6	73.1	-.1	.9	.65	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L248	O	74.3	68.1	-2.7	-3.3	.97	11E	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L393	*	74.3	69.6	-1.7	-2.2	1.34	11H	BURSTING STRENGTH 40 - 100 PSI, PERKINS AH, HYDRAULIC CLAMP
L575	O	74.4	72.3	.0	-.2	1.00	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L148	O	74.7	71.2	-.4	-1.3	1.16	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L294	O	74.9	77.9	3.9	3.9	.88	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L182	O	74.9	70.9	-.5	-1.6	1.26	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L344	O	75.5	74.4	2.2	.6	.90	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L330	O	75.9	75.7	3.3	1.5	1.33	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L290	*	76.3	76.3	4.0	1.7	.89	11A	BURSTING STRENGTH 40 - 100 PSI, PERKINS A, MANUAL CLAMP
L238A	O	76.7	72.9	2.2	-1.2	1.47	11Y	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L118	O	77.1	76.1	4.5	1.0	1.40	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L237A	O	78.4	72.5	3.3	-2.5	.43	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L141	O	79.9	76.8	7.1	-.2	1.34	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L103	O	80.1	73.9	5.4	-2.6	.68	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L273	O	80.9	73.4	5.7	-3.4	1.32	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L576	*	81.4	73.3	6.1	-3.9	.51	11P	BURSTING STRENGTH 40 - 100 PSI, PERKINS LC, MANUAL CLAMP
L174	O	81.9	79.5	10.3	.6	1.05	11D	BURSTING STRENGTH 40 - 100 PSI, PERKINS CA, AIR CLAMP
L604	O	82.2	80.4	11.2	1.2	1.30	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L331	O	83.1	76.5	9.4	-2.5	1.14	11C	BURSTING STRENGTH 40 - 100 PSI, PERKINS C, MANUAL CLAMP
L593	*	83.6	84.5	14.9	3.5	1.39	11J	BURSTING STRENGTH 40 - 100 PSI, PERKINS JUMBO,HAND DRIVEN
L394	*	89.5	85.5	20.0	.5	.87	11H	BURSTING STRENGTH 40 - 100 PSI, PERKINS AH, HYDRAULIC CLAMP
GMEANS:		74.3	72.4			1.00		
		95% ELLIPSE:		13.6	6.4	WITH GAMMA = 39 DEGREES		


BURSTING STRENGTH, HIGH RANGE
SAMPLE H07 = 74. PSI
SAMPLE H07 = 512 KILOPASCAL
SAMPLE E74 = 72. PSI
SAMPLE E74 = 499 KILOPASCAL
+,X,* NOT IN GRAND MEANS
ANALYSIS T11-1
SAMPLE E74
SAMPLE H07
PSI
KILOPASCAL
55 60 65 70 75 80 85 90
400 440 480 520 560 600
60 65 70 75 80 85
400 440 480 520 560 600

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 E49 MEAN	OFFSET PRINTING 96 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE E75 MEAN	PRINTING 116 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.F 15 VAR	F	LAB
L103	74.3	-4.3	-1.35	1.7	.74	79.5	-6.3	-1.62	2.1	.77	15T	ó	L103
L105	78.9	.3	.11	4.8	2.07	89.2	3.5	.89	5.8	2.12	15T	ó	L105
L107	82.3	3.7	1.15	4.7	2.02	82.7	-3.1	-.79	4.5	1.63	15T	*	L107
L115	75.1	-3.5	-1.10	1.2	.53	82.3	-3.4	-.88	2.1	.77	15C	ó	L115
L118	75.4	-3.2	-1.00	2.0	.85	84.8	-.9	-.24	2.7	.96	15T	ó	L118
L121	77.5	-1.1	-.35	2.6	1.11	84.7	-1.1	-.28	2.6	.94	15T	ó	L121
L122	74.2	-4.4	-1.38	2.2	.95	82.1	-3.7	-.94	3.1	1.11	15C	ó	L122
L124	75.8	-2.8	-.87	1.9	.84	83.3	-2.5	-.64	2.7	.99	15T	ó	L124
L126	80.7	2.1	.67	1.4	.62	89.4	3.7	.94	1.7	.61	15T	ó	L126
L128	76.9	-1.7	-.52	1.8	.79	84.5	-1.2	-.31	2.6	.93	15T	ó	L128
L139	83.9	5.3	1.67	1.1	.48	92.7	7.0	1.80	1.9	.68	15T	ó	L139
L141	73.1	-5.5	-1.71	1.3	.55	78.7	-7.0	-1.81	4.0	1.45	15T	ó	L141
L148	77.6	-1.0	-.31	2.9	1.28	80.3	-5.5	-1.41	3.2	1.16	15T	ó	L148
L151	99.5	20.9	6.53	2.4	1.06	106.8	21.1	5.42	4.2	1.52	15C	#	L151
L153	78.9	.3	.11	2.0	.87	87.6	1.9	.48	2.8	1.03	15C	ó	L153
L157	77.1	-1.5	-.46	2.4	1.02	81.1	-4.6	-1.19	3.7	1.33	15T	ó	L157
L158	78.1	-.5	-.14	2.6	1.11	81.1	-4.7	-1.20	3.0	1.09	15R	ó	L158
L159	79.7	1.1	.36	2.1	.92	88.7	3.0	.77	2.4	.87	15L	ó	L159
L162	78.3	-.3	-.10	1.5	.64	86.5	.7	.19	1.8	.64	15T	ó	L162
L163	77.5	-1.1	-.35	1.2	.51	84.1	-1.7	-.43	3.2	1.17	15T	ó	L163
L166	77.4	-1.2	-.37	2.1	.91	82.3	-3.4	-.88	2.9	1.07	15T	ó	L166
L167	82.5	3.9	1.23	1.8	.76	86.5	.8	.20	2.2	.80	15C	ó	L167
L170	75.0	-3.6	-1.12	.0	.00	79.9	-5.9	-1.51	.9	.33	15T	ó	L170
L173B	81.3	2.7	.86	1.8	.78	86.5	.8	.20	2.1	.75	15T	ó	L173B
L174S	78.7	.1	.02	2.9	1.25	82.7	-3.1	-.79	2.0	.71	15T	ó	L174S
L176	23.2	-55.4	-17.31	.9	.37	24.1	-61.7	-15.88	1.0	.35	15T	#	L176
L182A	74.9	-3.7	-1.14	2.9	1.25	80.1	-5.6	-1.45	4.2	1.53	15A	ó	L182A
L182T	83.0	4.4	1.38	2.0	.87	89.7	4.0	1.03	2.8	1.02	15T	ó	L182T
L185	77.9	-.7	-.21	1.4	.60	85.1	-.7	-.17	3.2	1.16	15T	ó	L185
L189	74.3	-4.3	-1.35	1.4	.62	88.9	3.2	.82	3.2	1.17	15T	*	L189
L190C	76.8	-1.8	-.56	1.3	.55	84.0	-1.7	-.45	2.2	.80	15T	ó	L190C
L190R	76.9	-1.7	-.52	2.9	1.24	83.2	-2.5	-.66	3.1	1.11	15C	ó	L190R
L191	82.4	3.8	1.19	4.7	2.05	85.6	-.1	-.04	2.5	.92	15T	ó	L191
L194	84.4	5.8	1.82	2.4	1.04	92.8	7.1	1.83	2.8	1.02	15T	ó	L194
L195	83.9	5.3	1.65	2.0	.86	91.5	5.8	1.49	2.1	.77	15C	ó	L195
L206	80.1	1.5	.48	2.5	1.07	86.5	.8	.20	3.1	1.11	15R	ó	L206
L207	119.0	40.4	12.64	7.6	3.27	146.8	61.1	15.73	3.5	1.28	15R	#	L207
L211	74.1	-4.5	-1.41	2.1	.90	81.3	-4.4	-1.14	1.8	.65	15R	ó	L211
L213	85.5	6.9	2.15	2.5	1.08	94.1	8.3	2.14	2.7	.98	15T	ó	L213
L217	76.6	-2.0	-.61	9.2	3.97	81.6	-4.2	-1.07	3.0	1.10	15T	ó	L217
L223	77.8	-.8	-.26	2.7	1.16	88.6	2.8	.73	1.9	.69	15R	ó	L223
L225	79.6	1.0	.32	2.9	1.28	97.5	11.7	3.02	3.9	1.41	15T	X	L225
L226C	80.0	1.4	.44	2.1	.93	87.5	1.7	.44	3.5	1.27	15T	ó	L226C
L228	75.3	-3.3	-1.02	1.5	.67	81.1	-4.7	-1.20	3.4	1.22	15T	ó	L228
L230	80.4	1.8	.58	2.2	.97	89.5	3.8	.98	2.4	.86	15R	ó	L230
L233	82.8	4.2	1.32	2.7	1.18	91.3	5.6	1.44	2.8	1.02	15T	ó	L233
L236	76.9	-1.7	-.52	1.8	.79	82.1	-3.7	-.95	1.4	.50	15T	ó	L236
L237A	78.9	.3	.11	1.0	.45	86.3	.6	.15	1.6	.59	15T	ó	L237A
L237B	77.1	-1.5	-.48	1.3	.58	87.6	1.9	.48	2.4	.85	15T	ó	L237B
L238A	75.6	-3.0	-.93	1.9	.81	86.3	.5	.13	2.1	.77	15T	ó	L238A
L241	80.6	2.0	.63	1.6	.69	88.9	3.2	.82	1.8	.66	15T	ó	L241
L243	79.0	.4	.13	1.8	.78	85.2	-.5	-.14	2.1	.75	15T	ó	L243
L244	81.1	2.5	.77	2.3	.99	90.6	4.9	1.25	1.9	.70	15C	ó	L244
L248	76.2	-2.4	-.76	2.1	.92	84.7	-1.1	-.28	2.5	.91	15J	ó	L248
L249	79.9	1.3	.42	2.8	1.22	90.0	4.3	1.10	3.2	1.17	15T	ó	L249
L254	77.3	-1.3	-.39	2.4	1.02	84.4	-1.3	-.35	3.4	1.23	15T	ó	L254
L255	79.7	1.1	.34	1.1	.48	86.8	1.1	.27	1.9	.67	15T	ó	L255
L257A	78.5	-.1	-.02	2.4	1.06	81.6	-4.1	-1.07	2.0	.74	15C	ó	L257A
L257B	78.7	.1	.02	2.5	1.07	81.9	-3.9	-1.00	2.6	.93	15C	ó	L257B
L257C	78.4	-.2	-.06	2.9	1.28	82.4	-3.3	-.86	2.0	.74	15C	ó	L257C
L259	80.5	1.9	.59	4.4	1.91	86.7	.9	.24	2.4	.88	15T	ó	L259
L261	76.9	-1.7	-.52	1.8	.78	84.9	-.8	-.21	3.0	1.10	15T	ó	L261
L262	79.9	1.3	.40	1.2	.54	84.9	-.8	-.21	2.1	.78	15T	ó	L262
L264	81.3	2.7	.86	2.0	.84	87.2	1.5	.37	4.8	1.75	15T	ó	L264
L268	78.3	-.3	-.10	3.0	1.30	87.1	1.3	.34	2.4	.86	15T	ó	L268

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 E49 MEAN	OFFSET PRINTING 96 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE E75 MEAN	PRINTING 116 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.= 15 VAR	F	LAB
L273	83.0	4.4	1.38	2.0	.85	91.1	5.3	1.37	1.4	.52	15T	0	L273
L275	84.4	5.8	1.82	3.9	1.69	91.9	6.2	1.59	3.5	1.27	15T	0	L275
L278	82.4	3.8	1.19	2.9	1.28	92.5	6.8	1.75	3.7	1.33	15T	0	L278
L279	76.5	-2.1	-.64	.9	.40	81.2	-4.5	-1.17	1.5	.53	15T	0	L279
L280	78.6	.0	.00	2.0	.85	87.0	1.3	.32	2.6	.93	15L	0	L280
L281	79.3	.7	.21	1.6	.68	89.0	3.3	.84	3.0	1.10	15T	0	L281
L285	74.4	-4.2	-1.31	1.7	.75	81.2	-4.5	-1.17	2.5	.90	15T	0	L285
L288	78.2	-.4	-.12	1.7	.75	89.9	4.2	1.08	2.0	.71	15Q	0	L288
L290	85.9	7.3	2.27	2.3	.98	91.6	5.9	1.51	2.4	.89	15T	0	L290
L291	81.5	2.9	.92	2.3	1.01	90.9	5.2	1.34	1.8	.65	15A	0	L291
L299	82.1	3.5	1.11	1.4	.59	88.3	2.6	.67	2.8	1.02	15T	0	L299
L303	78.9	.3	.11	1.4	.62	88.0	2.3	.58	2.3	.83	15L	0	L303
L305	79.9	1.3	.40	3.1	1.36	87.9	2.1	.55	2.3	.84	15T	0	L305
L309	79.0	.4	.13	1.7	.75	85.4	-.3	-.09	2.6	.93	15T	0	L309
L312	77.9	-.7	-.23	6.4	2.77	84.3	-1.5	-.38	4.1	1.50	15T	0	L312
L315	75.7	-2.9	-.91	3.2	1.37	84.7	-1.0	-.26	2.9	1.07	15T	0	L315
L321	66.1	-12.5	-3.89	3.7	1.58	72.0	-13.7	-3.54	2.6	.95	15T	#	L321
L324	77.7	-.9	-.29	2.7	1.18	80.1	-5.6	-1.45	3.2	1.18	15T	0	L324
L328	79.1	.5	.17	1.9	.83	86.0	.3	.07	2.6	.93	15T	0	L328
L331	78.9	.3	.09	1.3	.56	90.1	4.4	1.13	6.2	2.26	15T	0	L331
L334	69.9	-8.7	-2.73	1.8	.76	81.7	-4.0	-1.03	2.2	.78	15T	*	L334
L336	75.1	-3.5	-1.10	1.8	.76	81.2	-4.5	-1.17	2.3	.85	15T	0	L336
L344	80.1	1.5	.48	1.6	.69	87.3	1.6	.41	3.1	1.12	15C	0	L344
L345	80.8	2.2	.69	2.2	.97	86.9	1.2	.31	3.1	1.13	15T	0	L345
L352	84.3	5.8	1.80	1.7	.75	93.5	7.7	1.98	1.9	.70	15C	0	L352
L360	80.0	1.4	.43	.8	.36	87.6	1.9	.49	3.5	1.28	15T	0	L360
L362	76.4	-2.2	-.68	3.4	1.47	81.5	-4.3	-1.10	2.7	.97	15T	0	L362
L366	71.9	-6.7	-2.10	2.1	.89	76.4	-9.3	-2.41	3.8	1.38	15T	0	L366
L376	82.0	3.4	1.07	2.0	.87	92.2	6.5	1.66	2.9	1.06	15T	0	L376
L382	100.9	22.3	6.97	4.1	1.77	88.4	2.7	.69	5.8	2.08	15T	#	L382
L390	78.3	-.3	-.10	2.3	.97	86.3	.5	.13	2.3	.82	15T	0	L390
L396M	86.1	7.5	2.36	5.2	2.25	88.3	2.5	.65	4.7	1.69	15T	*	L396M
L484	78.0	-.6	-.18	2.0	.87	85.3	-.4	-.11	3.1	1.12	15T	0	L484
L554	76.5	-2.1	-.64	2.1	.92	80.9	-4.8	-1.24	2.5	.92	15C	0	L554
L561	64.0	-14.6	-4.56	1.2	.52	72.1	-13.6	-3.51	1.8	.64	15T	#	L561
L562	80.0	1.4	.44	3.7	1.60	89.9	4.1	1.06	2.0	.74	15T	0	L562
L565	75.6	-3.0	-.93	2.9	1.25	82.7	-3.0	-.78	2.8	1.00	15T	0	L565
L566	76.1	-2.5	-.77	1.6	.69	77.7	-8.0	-2.06	2.6	.94	15T	0	L566
L567	87.3	8.7	2.71	2.1	.92	99.5	13.8	3.55	3.2	1.15	15C	#	L567
L575	74.5	-4.1	-1.29	2.0	.84	83.3	-2.4	-.62	3.5	1.28	15L	0	L575
L576	83.3	4.7	1.48	1.8	.76	87.6	1.9	.48	2.0	.72	15T	0	L576
L580	81.7	3.1	.98	1.0	.42	88.9	3.2	.82	1.4	.52	15T	0	L580
L581	78.4	-.2	-.06	1.3	.57	87.8	2.0	.52	3.7	1.34	15Q	0	L581
L587	78.1	-.5	-.14	1.8	.76	88.3	2.5	.65	2.6	.94	15T	0	L587
L596	35.1	-43.5	-13.60	1.8	.76	35.0	-50.7	-13.07	1.7	.63	15T	#	L596
L599	78.5	-.1	-.04	2.9	1.24	86.3	.5	.13	2.0	.72	15T	0	L599
L604	58.9	-19.7	-6.14	3.5	1.53	70.7	-15.1	-3.88	5.8	2.10	15T	#	L604
L606	75.1	-3.5	-1.10	1.7	.72	82.1	-3.6	-.93	2.7	.97	15T	0	L606
L610	38.5	-40.1	-12.52	1.0	.43	NO DATA REPORTED FOR SAMPLE E75					15E	M	L610
L618	71.5	-7.1	-2.23	12.2	5.26	80.9	-4.8	-1.24	10.7	3.88	15T	0	L618
L622	92.3	13.7	4.27	3.8	1.63	100.5	14.8	3.81	4.3	1.56	15T	#	L622
L626	74.3	-4.3	-1.35	1.4	.62	84.0	-1.7	-.45	3.1	1.11	15L	0	L626

GR. MEAN = 78.6 GRAMS — GRAND MEAN = 85.7 GRAMS — TEST DETERMINATIONS = 15

SD MEANS = 3.2 GRAMS — SD OF MEANS = 3.9 GRAMS — 105 LABS IN GRAND MEANS

AVERAGE SDR = 2.3 GRAMS — AVERAGE SDR = 2.8 GRAMS

GR. MEAN = 770.7 MILLINEWTON — GRAND MEAN = 840.9 MILLINEWTON

L224	74.2	-4.4	-1.37	4.1	1.76	82.1	-3.6	-.93	2.9	1.03	15V	*	L224
L250L	86.8	8.2	2.57	1.7	.76	90.8	5.0	1.29	2.9	1.06	15H	*	L250L
L251	75.1	-3.5	-1.08	3.4	1.46	83.1	-2.6	-.67	2.7	.98	15D	*	L251
L531	81.6	3.0	.94	3.4	1.47	85.3	-.4	-.11	3.5	1.28	15E	*	L531
L676	78.3	-.3	-.10	1.5	.64	85.7	-.0	-.00	2.4	.86	15V	*	L676

TOTAL NUMBER OF LABORATORIES REPORTING = 122

Best values: E49 79 ± 5 grams
E75 86 ± 6 grams

The following laboratories were omitted from the grand means because of extreme test results: 151, 207, 321, 382, 561, 567, 604, 622

Data from the following laboratories appear to be off by a multiplicative factor: 176, 596

Data from the following laboratories appeared to be off by a multiplicative factor: 224, 676. 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

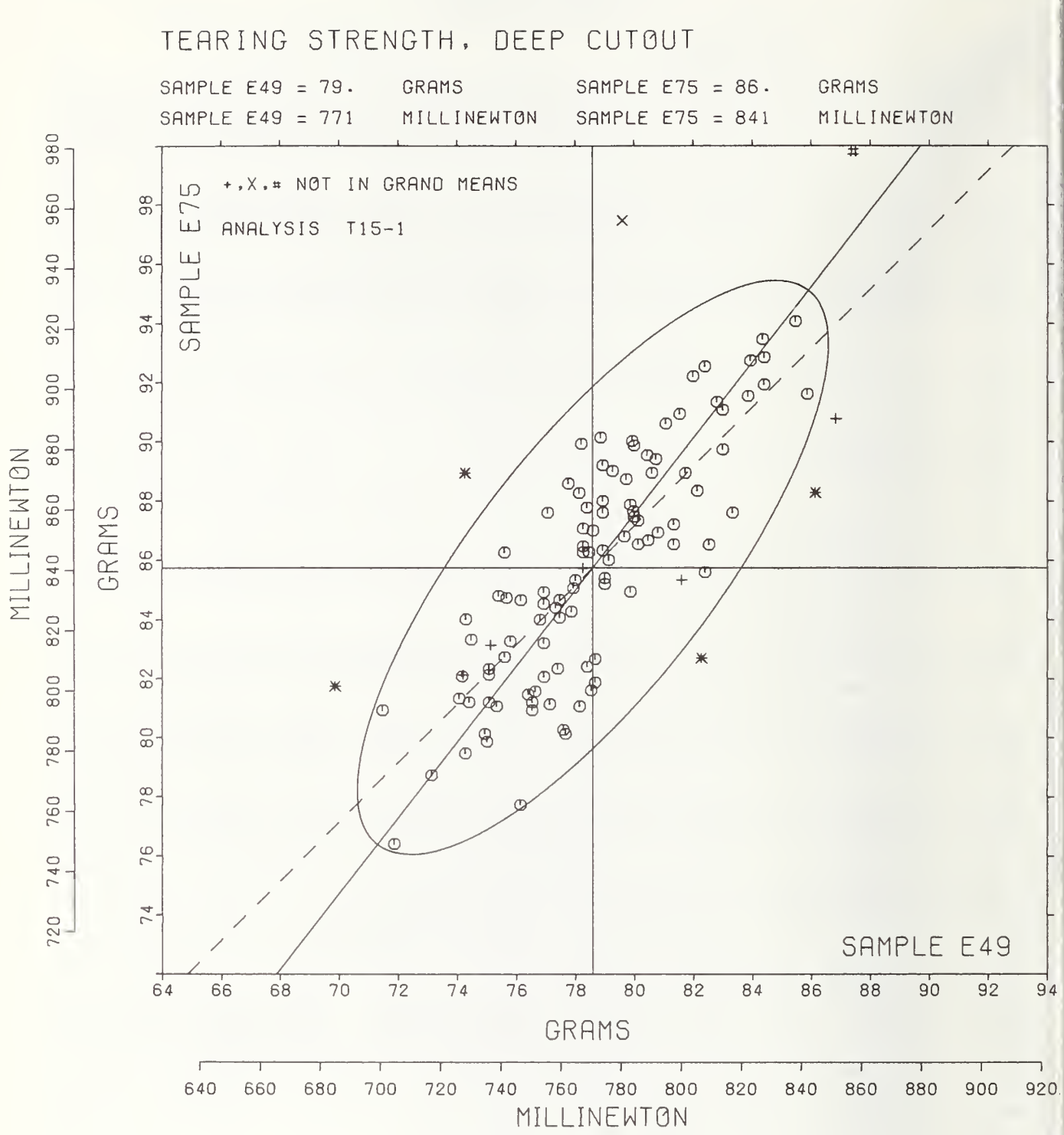
LAB CODE	F	MEANS E49	E75	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L176	#	23.2	24.1	-82.7	5.7	.36	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L596	#	35.1	35.0	-66.8	3.1	.69	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L610	M	38.5				.43	15B	TEARING STRENGTH, STANDARD, THWING-ELMENDORF,AMBIENT COND
L604	#	58.9	70.7	-24.0	6.2	1.81	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L561	#	64.0	72.1	-19.7	3.1	.58	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L321	#	66.1	72.0	-18.5	1.4	1.27	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L334	#	69.9	81.7	-8.5	4.4	.77	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L618	G	71.5	80.9	-8.2	2.7	4.57	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L366	G	71.9	76.4	-11.5	-.4	1.13	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L141	G	73.1	78.7	-8.9	-.0	1.01	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L211	G	74.1	81.3	-6.3	.9	.78	15R	TEARING STRENGTH, STANDARD,THWING-ELMENDORF,DIGITAL READOUT
L122	G	74.2	82.1	-5.6	1.2	1.03	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L224	*	74.2	82.1	-5.5	1.2	1.39	15V	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)X2
L189	#	74.3	88.9	-.1	5.4	.89	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L103	G	74.3	79.5	-7.6	-.5	.76	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L626	G	74.3	84.0	-4.0	2.3	.87	15L	TEARING STRENGTH, STANDARD, LORENTZ-WETTRES
L285	G	74.4	81.2	-6.2	.5	.82	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L575	G	74.5	83.3	-4.4	1.8	1.06	15L	TEARING STRENGTH, STANDARD, LORENTZ-WETTRES
L182A	G	74.9	80.1	-6.7	-.6	1.39	15A	TEARING STRENGTH, STANDARD, AFPITA
L170	G	75.0	79.9	-6.8	-.8	.17	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L606	G	75.1	82.1	-5.0	.6	.84	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L115	G	75.1	82.3	-4.9	.7	.65	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L336	G	75.1	81.2	-5.8	-.0	.80	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L251	*	75.1	83.1	-4.2	1.1	1.22	15D	TEARING STRENGTH, STANDARD, THWING-ELMENDORF, 20 C, 65% RH
L228	G	75.3	81.1	-5.7	-.3	.94	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L118	G	75.4	84.8	-2.7	1.9	.90	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L565	G	75.6	82.7	-4.2	.5	1.13	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L238A	G	75.6	86.3	-1.4	2.7	.79	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L315	G	75.7	84.7	-2.6	1.7	1.22	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L124	G	75.8	83.3	-3.7	.7	.91	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L566	G	76.1	77.7	-7.8	-3.0	.82	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L248	G	76.2	84.7	-2.4	1.2	.91	15J	TEARING STRENGTH, STANDARD, LORENTZ-WETTRES
L352	G	76.4	81.5	-4.7	-.9	1.22	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L554	G	76.5	80.9	-5.1	-1.3	.92	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L279	G	76.5	81.2	-4.8	-1.2	.47	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L217	G	76.6	81.6	-4.5	-1.0	2.53	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L190C	G	76.8	84.0	-2.5	.3	.67	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L128	G	76.9	84.5	-2.0	.6	.86	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L261	G	76.9	84.9	-1.7	.8	.94	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L190R	G	76.9	83.2	-3.0	-.3	1.18	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L236	G	76.9	82.1	-3.9	-1.0	.65	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L237B	G	77.1	87.6	.5	2.3	.72	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L157	G	77.1	81.1	-4.5	-1.7	1.17	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L254	G	77.3	84.4	-1.8	.2	1.12	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L166	G	77.4	82.3	-3.4	-1.2	.99	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L163	G	77.5	84.1	-2.0	-.1	.84	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L121	G	77.5	84.7	-1.5	.2	1.02	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L148	G	77.6	80.3	-4.9	-2.6	1.22	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L324	G	77.7	80.1	-5.0	-2.7	1.18	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L223	G	77.8	88.6	1.7	2.4	.92	15R	TEARING STRENGTH, STANDARD,THWING-ELMENDORF,DIGITAL READOUT
L312	G	77.9	84.3	-1.6	-.3	2.13	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L185	G	77.9	85.1	-.9	.1	.88	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L484	G	78.0	85.3	-.7	.2	.99	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L587	G	78.1	88.3	1.7	1.9	.85	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L158	G	78.1	81.1	-4.0	-2.5	1.10	15R	TEARING STRENGTH, STANDARD,THWING-ELMENDORF,DIGITAL READOUT
L288	G	78.2	89.9	3.1	2.9	.73	15Q	TEARING STRENGTH, STANDARD,THWING-ELMENDORF,AIR CLAMP,DIGITL
L676	*	78.3	85.7	-.2	.2	.75	15V	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)X2
L162	G	78.3	86.5	.4	.7	.64	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L390	G	78.3	86.3	.2	.6	.89	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L268	G	78.3	87.1	.8	1.1	1.08	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L581	G	78.4	87.8	1.5	1.4	.95	15Q	TEARING STRENGTH, STANDARD,THWING-ELMENDORF,AIR CLAMP,DIGITL
L257C	G	78.4	82.4	-2.8	-1.9	1.01	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L599	G	78.5	86.3	.3	.4	.98	15T	TEARING STRENGTH, STANDARD,THWING-ELMENDORF(SCALE TO 100)
L257A	G	78.5	81.6	-3.3	-2.5	.90	15C	TEARING STRENGTH, STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L280	G	78.6	87.0	1.0	.8	.89	15L	TEARING STRENGTH, STANDARD, LORENTZ-WETTRES

ANALYSIS T15-1 TABLE 2

TEARING STRENGTH, GRAMS

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

LAB CODE	P	MEANS E49	E75	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST	INSTRUMENT---CONDITIONS
L2578	O	78.7	81.9	-3.0	-2.4	1.00	15C	TEARING STRENGTH,	STANDARD, THWING-ELMENDORP (W.AIR CLAMP)
L174S	O	78.7	82.7	-2.4	-2.0	.98	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF(SCALE TO 100)
L331	O	78.9	90.1	3.6	2.5	1.41	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF(SCALE TO 100)
L237A	O	78.9	86.3	.7	.1	.52	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF(SCALE TO 100)
L105	O	78.9	89.2	2.9	1.9	2.10	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF(SCALE TO 100)
L153	O	78.9	87.6	1.7	.9	.95	15C	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L303	O	78.9	88.0	2.0	1.1	.73	15L	TEARING STRENGTH,	STANDARD, LORENTZ-WETTRES
L243	O	79.0	85.2	-.2	-.7	.77	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF(SCALE TO 100)
L309	O	79.0	85.4	-.0	-.5	.84	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF(SCALE TO 100)
L328	O	79.1	86.0	.5	-.3	.88	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF(SCALE TO 100)
L281	O	79.3	89.0	3.0	1.5	.89	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORP(SCALE TO 100)
L225	X	79.6	97.5	9.9	6.4	1.34	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF(SCALE TO 100)
L255	O	79.7	86.8	1.5	-.2	.58	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF(SCALE TO 100)
L159	O	79.7	88.7	3.1	.9	.89	15L	TEARING STRENGTH,	STANDARD, LORENTZ-WETTRES
L305	O	79.9	87.9	2.5	.3	1.10	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF(SCALE TO 100)
L262	O	79.9	84.9	.2	-1.5	.66	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF(SCALE TO 100)
L249	O	79.9	90.0	4.2	1.6	1.20	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF(SCALE TO 100)
L360	O	80.0	87.6	2.3	.1	.82	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORP(SCALE TO 100)
L226C	O	80.0	87.5	2.2	-.1	1.10	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF(SCALE TO 100)
L562	O	80.0	89.9	4.1	1.4	1.17	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF(SCALE TO 100)
L206	O	80.1	86.5	1.6	-.7	1.09	15R	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF, DIGITAL READOUT
L344	O	80.1	87.3	2.2	-.2	.90	15C	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L230	O	80.4	89.5	4.1	.9	.91	15R	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF, DIGITAL READOUT
L259	O	80.5	86.7	1.9	-.9	1.40	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF(SCALE TO 100)
L241	O	80.6	88.9	3.7	.4	.68	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF(SCALE TO 100)
L126	O	80.7	89.4	4.2	.6	.62	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORP(SCALE TO 100)
L345	O	80.8	86.9	2.3	-1.0	1.05	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF(SCALE TO 100)
L244	O	81.1	90.6	5.4	1.0	.84	15C	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L173R	O	81.3	86.5	2.3	-1.7	.76	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORP(SCALE TO 100)
L264	O	81.3	87.2	2.8	-1.3	1.30	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF(SCALE TO 100)
L291	O	81.5	90.9	5.9	.9	.83	15A	TEARING STRENGTH,	STANDARD, APPITA
L531	*	81.6	85.3	1.5	-2.6	1.37	15E	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF, AMBIENT COND.
L580	O	81.7	88.9	4.4	-.5	.47	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF(SCALE TO 100)
L376	O	82.0	92.2	7.2	1.3	.96	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF(SCALE TO 100)
L299	O	82.1	88.3	4.2	-1.2	.80	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORP(SCALE TO 100)
L107	*	82.3	82.7	-.1	-4.8	1.83	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF(SCALE TO 100)
L278	O	82.4	92.5	7.7	1.2	1.30	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF(SCALE TO 100)
L191	O	82.4	85.6	2.2	-3.1	1.48	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORP(SCALE TO 100)
L167	O	82.5	86.5	3.0	-2.6	.78	15C	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L233	O	82.8	91.3	7.0	.1	1.10	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF(SCALE TO 100)
L273	O	83.0	91.1	6.9	-.2	.69	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF(SCALE TO 100)
L182T	O	83.0	89.7	5.9	-1.0	.94	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF(SCALE TO 100)
L576	O	83.3	87.6	4.4	-2.6	.74	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF(SCALE TO 100)
L195	O	83.9	91.5	7.8	-.6	.82	15C	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L139	O	83.9	92.7	8.8	.1	.58	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORP(SCALE TO 100)
L352	O	84.3	93.5	9.6	.2	.73	15C	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L194	O	84.4	92.8	9.2	-.2	1.03	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF(SCALE TO 100)
L275	O	84.4	91.9	8.5	-.8	1.48	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF(SCALE TO 100)
L213	O	85.5	94.1	10.8	-.3	1.03	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF(SCALE TO 100)
L290	O	85.9	91.6	9.1	-2.1	.93	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF(SCALE TO 100)
L396M	*	86.1	88.3	6.6	-4.4	1.97	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORP(SCALE TO 100)
L250L	*	86.8	90.8	9.0	-3.4	.91	15H	TEARING STRENGTH,	STANDARD, HOMARGY, 20 C, 65% RH
L557	#	87.3	99.5	16.2	1.6	1.03	15C	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF (W.AIR CLAMP)
L622	#	92.3	100.5	20.1	-1.7	1.60	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORF(SCALE TO 100)
L151	#	99.5	106.8	29.4	-3.5	1.29	15C	TEARING STRENGTH,	STANDARD, THWING-ELMENDORP (W.AIR CLAMP)
L382	#	100.9	88.4	15.8	-15.9	1.93	15T	TEARING STRENGTH,	STANDARD, THWING-ELMENDORP(SCALE TO 100)
L207	#	119.0	146.8	73.0	5.7	2.28	15R	TEARING STRENGTH,	STANDARD, THWING-ELMENDORP, DIGITAL READOUT
GMEANS:		78.6	85.7			1.00			
		95% ELLIPSE:		11.9	4.1	WITH GAMMA = 52 DEGREES			


TEARING STRENGTH, DEEP CUTOUT
SAMPLE E49 = 79. GRAMS
SAMPLE E49 = 771 MILLINEWTON
SAMPLE E75 = 86. GRAMS
SAMPLE E75 = 841 MILLINEWTON
+,X,# NOT IN GRAND MEANS
ANALYSIS T15-1
SAMPLE E75
GRAMS
MILLINEWTON
SAMPLE E49
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 E49 OFFSET PRINTING 96 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	SAMPLE J41 PRINTING 86 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	TEST D.F 15 VAR	F	LAB
L122	82.1	1.4	.55	2.2	.91	66.1	.9	.28	4.5	1.53	17N	6	L122
L148	77.9	-2.9	-1.16	2.9	1.21	63.2	-2.0	-.62	2.7	.92	17N	6	L148
L174N	83.7	3.0	1.19	5.8	2.42	62.9	-2.2	-.70	3.5	1.20	17N	6	L174N
L231	79.6	-1.2	-.47	1.1	.44	62.3	-2.8	-.89	1.9	.64	17N	6	L231
L234	82.2	1.4	.57	3.4	1.45	70.1	5.0	1.56	3.9	1.32	17N	6	L234
L267	81.7	1.0	.39	1.7	.72	72.5	7.3	2.29	4.0	1.36	17N	6	L267
L269	81.0	.2	.09	1.8	.76	65.1	-.1	-.03	1.9	.66	17N	6	L269
L301A	81.7	.9	.36	2.2	.94	65.2	.0	.01	3.1	1.06	17N	6	L301A
L301B	77.9	-2.8	-1.14	2.2	.91	63.2	-2.0	-.62	2.4	.82	17N	6	L301B
L308	87.2	6.4	2.58	1.9	.80	68.8	3.6	1.14	2.5	.86	17N	6	L308
L326	79.2	-1.6	-.63	1.9	.81	66.2	1.0	.32	2.3	.79	17N	6	L326
L339	78.4	-2.4	-.95	3.4	1.43	61.5	-3.7	-1.16	3.4	1.16	17N	6	L339
L341	80.1	-.6	-.25	1.4	.57	62.9	-2.2	-.70	1.9	.65	17N	6	L341
L366	80.1	-.6	-.25	1.8	.74	65.5	.3	.09	4.5	1.53	17N	6	L366
L372	78.6	-2.2	-.87	2.1	.87	62.1	-3.1	-.96	1.4	.48	17N	6	L372

GR. MEAN = 80.8 GRAMS GRAND MEAN = 65.2 GRAMS TEST DETERMINATIONS = 15
SD MEANS = 2.5 GRAMS SD OF MEANS = 3.2 GRAMS 15 LABS IN GRAND MEANS
AVERAGE SDR = 2.4 GRAMS AVERAGE SDR = 2.9 GRAMS
GR. MEAN = 792.1 MILLINEWTON GRAND MEAN = 639.1 MILLINEWTON
TOTAL NUMBER OF LABORATORIES REPORTING = 15

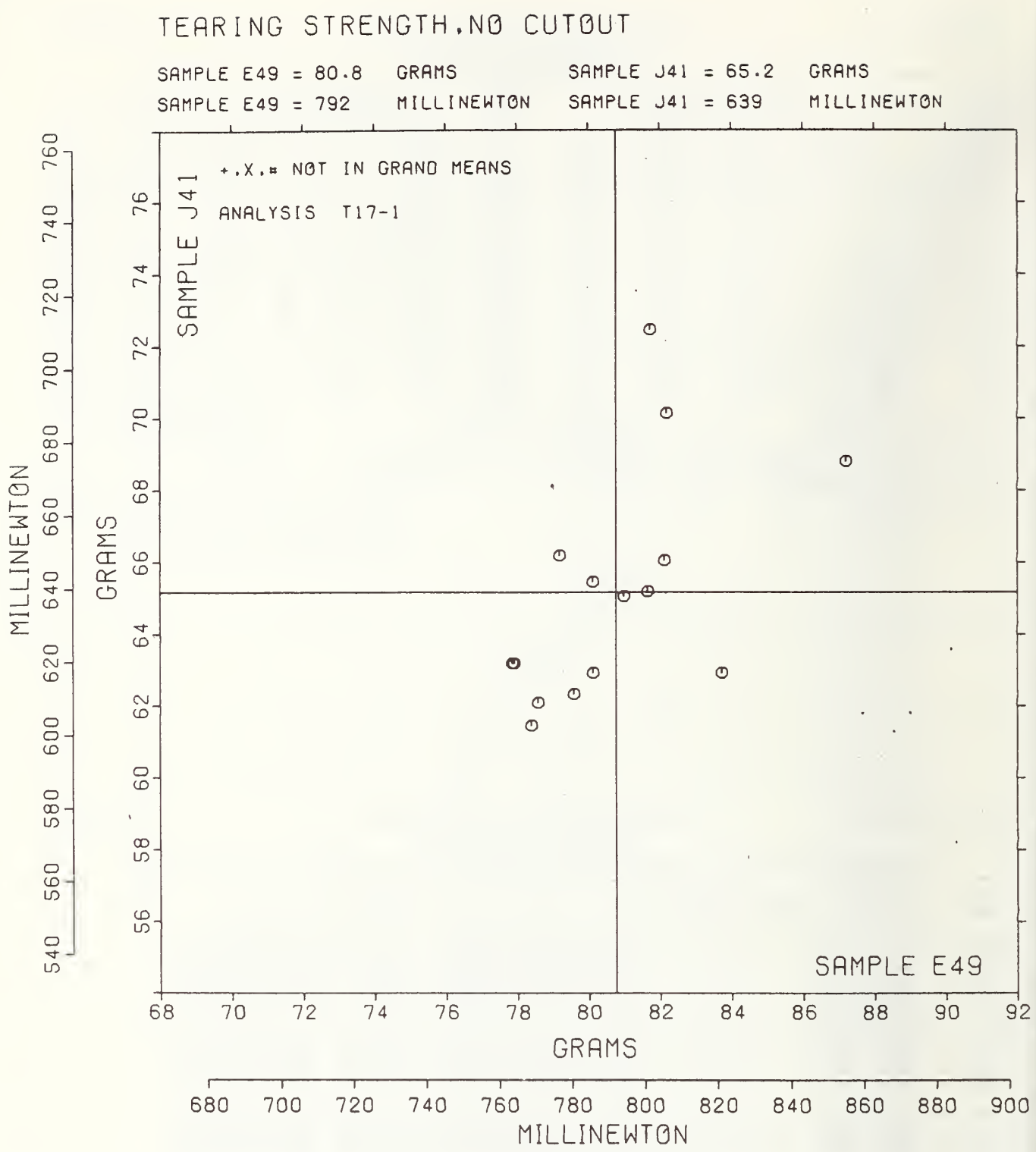
Best values: E49 81 ± 4 grams
J41 65 ± 5 grams

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 E49	J41	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L148	6	77.9	63.2	-3.2	1.4	1.07	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L301B	6	77.9	63.2	-3.2	1.3	.87	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L339	6	78.4	61.5	-4.4	-.0	1.30	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L372	6	78.6	62.1	-3.8	.1	.68	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L326	6	79.2	66.2	.0	1.9	.80	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L231	6	79.6	62.3	-3.0	-.6	.54	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L366	6	80.1	65.5	-.1	.7	1.14	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L341	6	80.1	62.9	-2.2	-.7	.61	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L269	6	81.0	65.1	.0	-.3	.71	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L301A	6	81.7	65.2	.5	-.7	1.00	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L267	6	81.7	72.5	6.6	3.2	1.04	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L122	6	82.1	66.1	1.5	-.7	1.22	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L234	6	82.2	70.1	4.9	1.5	1.38	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L174N	6	83.7	62.9	-.3	-3.7	1.81	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
L308	6	87.2	68.8	6.5	-3.4	.83	17N	TEARING STRENGTH, NO CUT OUT, THWING-ELMENDORF
GMEANS:		80.8	65.2			1.00		
		95% ELLIPSE:		10.3	5.3	WITH GAMMA = 56 DEGREES		


TEARING STRENGTH,NO CUTOUT
SAMPLE E49 = 80.8 GRAMS
SAMPLE E49 = 792 MILLINEWTON
SAMPLE J41 = 65.2 GRAMS
SAMPLE J41 = 639 MILLINEWTON
+,X,* NOT IN GRAND MEANS
ANALYSIS T17-1
SAMPLE J41
GRAMS
MILLINEWTON
SAMPLE E49
GRAMS
MILLINEWTON

ANALYSIS T19-1 TABLE 1

TENSILE BREAKING STRENGTH, KILONEWTONS PER METER - PACKAGING PAPER

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

	SAMPLE	KRAFT				SAMPLE	PRINTING				TEST D.- 20	
LAB	H10	147 GRAMS PER SQUARE METER				J15	149 GRAMS PER SQUARE METER					
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR F	LAB
L107	7.15	.03	.11	.40	.77	8.63	.11	.26	.35	1.05	19A O	L107
L122	6.84	-.28	-.94	.58	1.11	8.56	.04	.10	.25	.75	19A O	L122
L126	7.09	-.04	-.12	.48	.93	8.63	.11	.26	.24	.73	19A O	L126
L151	6.63	-.49	-1.63	.73	1.40	7.86	-.66	-1.54	.27	.82	19A O	L151
L153	7.54	.42	1.39	.42	.81	8.92	.40	.93	.38	1.14	19P O	L153
L157A	7.20	.08	.26	.50	.97	8.66	.14	.33	.37	1.13	19P O	L157A
L157I	7.49	.37	1.21	.46	.88	8.11	-.41	-.97	.37	1.11	19A O	L157I
L174	7.35	.23	.76	.48	.91	8.36	-.16	-.38	.28	.86	19A O	L174
L182I	7.07	-.05	-.17	.41	.78	8.11	-.41	-.95	.33	1.00	19D O	L182I
L182L	6.89	-.23	-.76	.74	1.42	8.65	.13	.31	.31	.93	19T O	L182L
L207	6.85	-.27	-.89	.52	.99	8.82	.30	.70	.28	.84	19A O	L207
L217P	7.19	.07	.24	.49	.94	8.64	.12	.27	.53	1.59	19P O	L217P
L224	.85	-6.27	-20.74	.06	.11	.72	-7.80	-18.25	.07	.22	19A #	L224
L225	7.09	-.03	-.10	.48	.93	8.59	.07	.16	.24	.72	19P O	L225
L234L	7.29	.17	.56	.55	1.07	8.25	-.27	-.62	.31	.93	19P O	L234L
L237A	7.05	-.07	-.22	.41	.79	7.94	-.58	-1.35	.48	1.44	19Q O	L237A
L237B	7.59	.47	1.56	.58	1.11	9.16	.64	1.50	.26	.80	19A O	L237B
L238A	6.98	-.14	-.47	.51	.99	8.39	-.13	-.30	.40	1.22	19T O	L238A
L243	6.68	-.44	-1.46	.59	1.14	8.43	-.10	-.22	.23	.70	19A O	L243
L257A	7.26	.14	.48	.35	.67	8.45	-.07	-.16	.31	.93	19P O	L257A
L257B	7.31	.19	.61	.45	.86	8.65	.13	.30	.25	.75	19P O	L257B
L257C	7.23	.11	.36	.34	.65	8.70	.18	.42	.41	1.25	19P O	L257C
L264A	7.05	-.08	-.25	.33	.64	9.15	.63	1.47	.36	1.08	19A O	L264A
L264P	7.40	.28	.93	.67	1.29	9.12	.60	1.40	.26	.78	19P O	L264P
L265	6.78	-.34	-1.14	.86	1.65	8.90	.37	.88	.22	.68	19A O	L265
L267	6.90	-.22	-.73	.53	1.03	8.52	.00	.01	.21	.65	19A O	L267
L268A	6.79	-.33	-1.10	.43	.83	7.99	-.53	-1.24	.69	2.07	19A O	L268A
L268P	7.47	.35	1.17	.41	.79	9.41	.89	2.08	.33	.99	19P O	L268P
L273	6.91	-.21	-.70	.63	1.21	7.38	-1.14	-2.66	.24	.74	19P *	L273
L280	7.01	-.11	-.37	.51	.98	7.65	-.87	-2.04	.39	1.19	19G O	L280
L281	7.01	-.11	-.35	.50	.95	8.33	-.19	-.44	.23	.71	19G O	L281
L305	7.18	.06	.21	.47	.91	8.58	.06	.15	.19	.58	19V O	L305
L312	6.79	-.33	-1.09	.56	1.08	8.48	-.04	-.09	.35	1.07	19D O	L312
L318	6.71	-.41	-1.36	.45	.87	7.87	-.65	-1.52	.29	.88	19G O	L318
L324	7.12	.00	.01	.43	.83	8.50	-.02	-.05	.21	.64	19A O	L324
L334	7.92	.80	2.65	.34	.65	8.78	.26	.61	.48	1.46	19P *	L334
L336	7.21	.09	.31	.33	.63	8.26	-.26	-.61	.49	1.47	19G O	L336
L356	7.33	.21	.71	.45	.86	8.61	.09	.22	.45	1.35	19P O	L356
L561	7.49	.36	1.21	.73	1.39	8.68	.16	.38	.26	.78	19P O	L561
L562	7.95	.82	2.73	.63	1.21	8.89	.37	.86	.53	1.62	19P *	L562
L565	7.31	.19	.63	.24	.45	8.46	-.06	-.13	.26	.77	19T O	L565
L568	7.06	-.07	-.22	.49	.95	8.21	-.31	-.72	.28	.85	19P O	L568
L575	6.73	-.39	-1.29	.66	1.27	8.55	.03	.07	.26	.80	19D O	L575
L576	7.17	.05	.18	.27	.53	8.54	.02	.05	.27	.81	19A O	L576
L580	6.83	-.29	-.96	.72	1.39	7.51	-1.01	-2.36	.31	.93	19G O	L580
L581	6.98	-.14	-.47	.57	1.10	8.75	.23	.53	.30	.90	19A O	L581
L582	6.77	-.35	-1.17	.63	1.21	8.38	-.14	-.33	.34	1.02	19A O	L582
L604	6.83	-.29	-.96	.90	1.72	8.78	.26	.61	.43	1.30	19P O	L604
L606	7.26	.14	.45	.44	.85	8.93	.40	.95	.35	1.07	19P O	L606
L607	7.06	-.06	-.21	.57	1.09	9.07	.55	1.29	.54	1.63	19A O	L607
L610	6.71	-.41	-1.37	.57	1.09	8.12	-.40	-.93	.24	.72	19A O	L610
L622	7.17	.05	.15	.76	1.46	9.20	.68	1.58	.37	1.12	19G O	L622
L676	7.61	.49	1.63	.54	1.03	8.93	.41	.95	.49	1.47	19A O	L676

GR. MEAN = 7.12 KILONEWTON/M — GRAND MEAN = 8.52 KILONEWTON/M — TEST DETERMINATIONS = 20

SD MEANS = .30 KILONEWTON/M — SD OF MEANS = .43 KILONEWTON/M — 52 LABS IN GRAND MEANS

AVERAGE SDR = .52 KILONEWTON/M — AVERAGE SDR = .33 KILONEWTON/M

GR. MEAN = 40.67 LB/INCH — GRAND MEAN = 48.66 LB/INCH

L250I	6.48	-.64	-2.11	.39	.76	7.33	-1.19	-2.79	.15	.44	19L *	L250I
L251	6.67	-.45	-1.49	.53	1.02	7.89	-.63	-1.47	.52	1.57	19I *	L251

TOTAL NUMBER OF LABORATORIES REPORTING = 55

Best values: H10 7.0 $\pm$ 0.5 kilonewton per meter
J15 8.5 $\pm$ 0.7 kilonewton per meter

Data from the following laboratories appear to be off by a multiplicative factor: 224

ANALYSIS T19-1 TABLE 2

TENSILE BREAKING STRENGTH, KILONEWTONS PER METER - PACKAGING PAPER

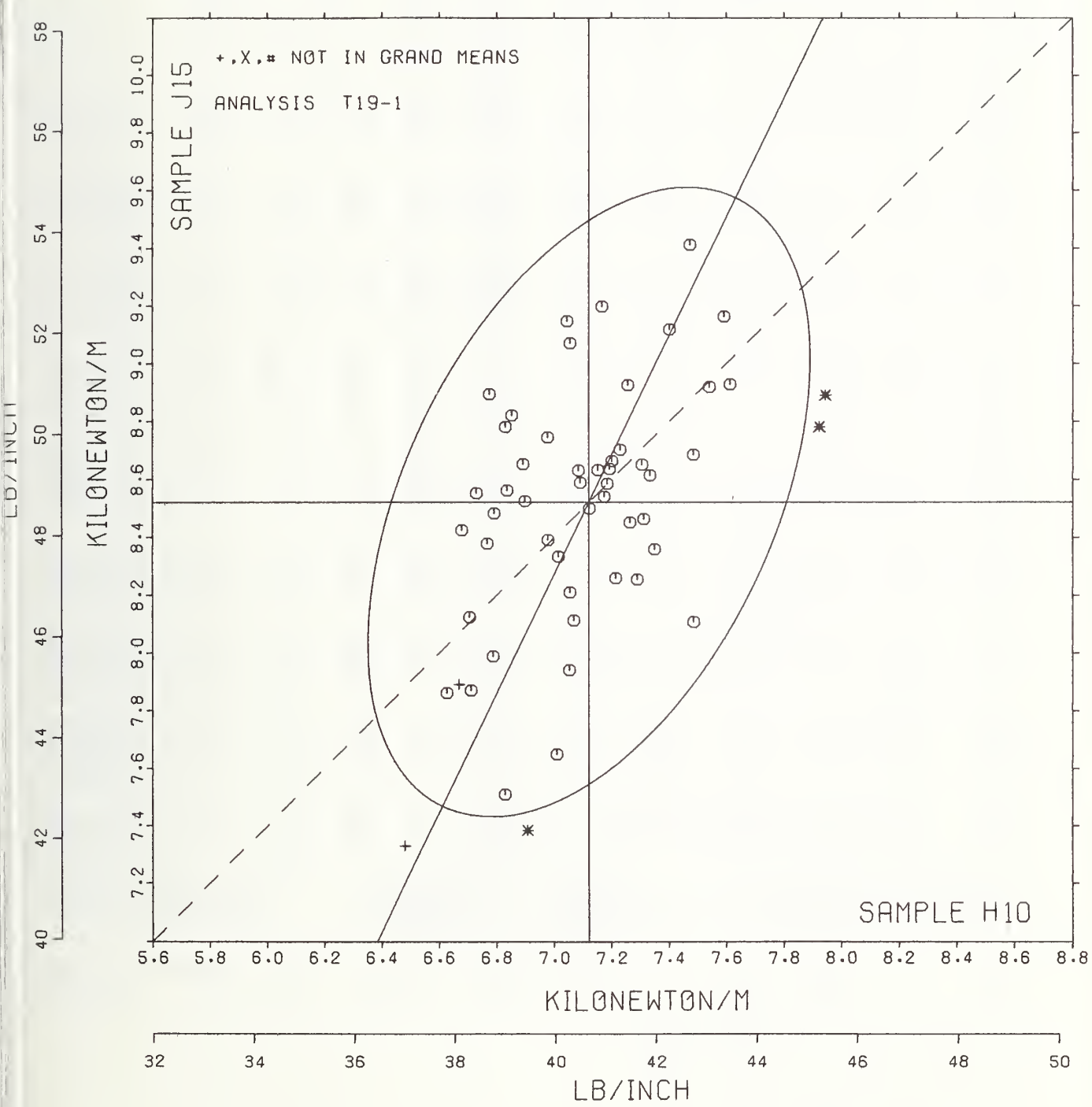
TAPPI STANDARDS T404 OS-76 AND T494 OS-70, TENSILE BREAKING STRENGTH, PENDULUM AND CRE TYPES

LAB CODE	F	MEANS H10	J15	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L224	#	.85	.72	-9.75	2.24	.16	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L250I	*	6.48	7.33	-1.35	.06	.60	19L	TENSILE STRENGTH, PACKAGING PAPER, CRE, 20 C, 65% RH
L151	O	6.63	7.86	-.81	.16	1.11	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L251	*	6.67	7.89	-.76	.13	1.29	19I	TENSILE STRENGTH, PACKAGING PAPER, CRE, 20C, 65% RH
L243	O	6.68	8.43	-.28	.36	.92	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L610	O	6.71	8.12	-.54	.20	.90	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L318	O	6.71	7.87	-.76	.09	.87	19G	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L575	O	6.73	8.55	-.14	.37	1.04	19D	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L582	O	6.77	8.38	-.28	.26	1.11	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L265	O	6.78	8.90	.19	.47	1.16	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L268A	O	6.79	7.99	-.62	.07	1.45	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L312	O	6.79	8.48	-.18	.28	1.08	19D	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L580	O	6.83	7.51	-1.04	-.18	1.16	19G	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L604	O	6.83	6.78	.11	.37	1.51	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L122	O	6.84	8.56	-.09	.27	.93	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L207	O	6.85	8.82	.15	.37	.92	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L182L	O	6.89	8.65	.02	.26	1.18	19T	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L267	O	6.90	8.52	-.09	.20	.84	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L273	*	6.91	7.38	-1.12	-.30	.98	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L581	O	6.98	8.75	.14	.23	1.00	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L238A	O	6.98	8.39	-.18	.07	1.11	19T	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L280	O	7.01	7.65	-.83	-.26	1.08	19G	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L281	O	7.01	8.33	-.21	.01	.83	19G	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L264A	O	7.05	9.15	.53	.34	.86	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L237A	O	7.05	7.94	-.55	-.19	1.12	19Q	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L568	O	7.06	8.21	-.31	-.08	.90	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L607	O	7.06	9.07	.47	.30	1.36	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L182I	O	7.07	8.11	-.39	-.13	.89	19D	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L126	O	7.09	8.63	.08	.08	.83	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L225	O	7.09	8.59	.05	.06	.82	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L324	O	7.12	8.50	-.02	-.01	.74	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L107	O	7.15	8.63	.11	.02	.91	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L622	O	7.17	9.20	.63	.25	1.29	19O	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L576	O	7.17	8.54	.04	-.04	.67	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L305	O	7.18	8.58	.09	-.03	.74	19V	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L217P	O	7.19	8.64	.14	-.01	1.26	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L157A	O	7.20	8.66	.16	-.01	1.05	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L336	O	7.21	8.26	-.19	-.20	1.05	19G	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L257C	O	7.23	8.70	.21	-.02	.95	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L606	O	7.26	8.93	.42	.05	.96	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L257A	O	7.26	8.45	.00	-.16	.80	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L234L	O	7.29	8.25	-.17	-.27	1.00	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L257B	O	7.31	8.65	.20	-.11	.80	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L565	O	7.31	8.46	.03	-.20	.61	19T	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L356	O	7.33	8.61	.18	-.15	1.11	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L174	O	7.35	8.36	-.05	-.28	.89	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L264P	O	7.40	9.12	.66	.01	1.04	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L268P	O	7.47	9.41	.96	.07	.89	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L561	O	7.49	8.68	.31	-.26	1.09	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L157I	O	7.49	8.11	-.21	-.51	1.00	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L153	O	7.54	8.92	.54	-.20	.97	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L237B	O	7.59	9.16	.78	-.14	.95	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L676	O	7.61	8.93	.58	-.27	1.25	19A	TENSILE STRENGTH, PACKAGING PAPER, LOAD CELL (CRE)
L334	*	7.92	8.78	.58	-.61	1.05	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
L562	*	7.95	8.89	.69	-.58	1.41	19P	TENSILE STRENGTH, PACKAGING PAPER, PENDULUM TESTER
GMEANS:		7.12	8.52			1.00		
		95% ELLIPSE:		1.17	.64	WITH GAMMA = 64 DEGREES		

TENSILE STRENGTH, PACKAGING PAPERS

SAMPLE H10 = 7.12 KILONEWTON/M SAMPLE J15 = 8.52 KILONEWTON/M

SAMPLE H10 = 40.7 LB/INCH SAMPLE J15 = 48.7 LB/INCH



ANALYSIS T20-1 TABLE 1

TENSILE BREAKING STRENGTH, KILONEWTONS PER METER

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

	SAMPLE	RELEASE BASE M.F.				SAMPLE	PRINTING				TEST D.F. = 20		
LAB	B46	82 GRAMS PER SQUARE METER				J04	73 GRAMS PER SQUARE METER						
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L105	8.53	.21	.59	.49	1.02	3.66	.02	.09	.25	1.27	20A	O	L105
L115	8.14	-.18	-.50	.48	1.00	3.66	.03	.12	.14	.71	20D	O	L115
L118	8.67	.35	.98	.44	.91	3.88	.25	1.14	.13	.65	20A	O	L118
L122	8.47	.15	.41	.39	.81	3.80	.16	.76	.12	.61	20A	O	L122
L124C	8.52	.20	.57	.48	.99	3.56	-.07	-.35	.17	.87	20A	O	L124C
L125	9.25	.93	2.61	.36	.75	3.98	.34	1.56	.21	1.09	20C	*	L125
L131	8.90	.58	1.63	.44	.91	3.80	.16	.75	.25	1.29	20E	O	L131
L141T	8.37	.05	.14	.59	1.23	3.68	.04	.19	.17	.86	20A	O	L141T
L143	7.54	-.78	-2.21	.30	.62	6.59	2.95	13.64	.52	2.67	20E	#	L143
L148	8.13	-.19	-.54	.51	1.04	3.67	.03	.13	.20	1.03	20A	O	L148
L159	8.11	-.21	-.59	.57	1.17	3.43	-.21	-.97	.22	1.13	20A	O	L159
L163	8.39	.07	.19	.36	.74	3.77	.13	.61	.16	.81	20D	O	L163
L167	9.29	.97	2.73	.42	.86	4.24	.60	2.78	.16	.84	20C	*	L167
L176	3.74	-4.58	-12.90	.24	.49	1.64	-2.00	-9.24	.18	.92	20E	#	L176
L185	8.21	-.11	-.30	.36	.74	3.65	.01	.03	.20	1.02	20C	O	L185
L190R	8.37	.05	.13	.60	1.24	3.66	.02	.11	.16	.82	20A	O	L190R
L194	8.17	-.15	-.41	.37	.76	3.57	-.06	-.30	.17	.88	20A	O	L194
L206	8.18	-.14	-.40	.43	.89	3.42	-.22	-1.01	.20	1.02	20A	O	L206
L223B	8.29	-.03	-.09	.45	.93	3.69	.05	.22	.12	.62	20A	O	L223B
L226C	8.41	.09	.26	.65	1.33	3.63	-.01	-.04	.15	.78	20C	O	L226C
L230	7.78	-.54	-1.52	.37	.76	3.45	-.19	-.89	.24	1.22	20G	O	L230
L243	8.36	.05	.13	.48	.98	3.73	.09	.43	.22	1.11	20A	O	L243
L255	8.28	-.04	-.11	.57	1.17	3.50	-.14	-.63	.23	1.19	20A	O	L255
L260	8.35	.03	.10	.30	.63	3.66	.02	.10	.14	.71	20A	O	L260
L261	8.60	.28	.79	.60	1.24	3.85	.21	.97	.19	.98	20A	O	L261
L278	8.35	.03	.10	.36	.74	3.73	.09	.41	.17	.89	20A	O	L278
L291	8.23	-.09	-.26	.30	.62	3.25	-.39	-1.79	.23	1.20	20A	*	L291
L309	8.38	.06	.16	.43	.88	3.95	.31	1.43	.23	1.20	20E	O	L309
L315	8.24	-.08	-.23	.53	1.09	3.57	-.07	-.34	.21	1.06	20A	O	L315
L318	8.02	-.30	-.84	.41	.85	3.56	-.08	-.36	.14	.72	20G	O	L318
L328	7.79	-.53	-1.48	.41	.85	3.55	-.08	-.39	.19	.96	20A	O	L328
L331	7.66	-.66	-1.87	.46	.94	3.35	-.29	-1.34	.20	1.01	20A	O	L331
L333	8.36	.04	.12	.43	.89	3.63	-.01	-.05	.16	.81	20A	O	L333
L344	8.61	.30	.83	.39	.81	3.71	.07	.34	.26	1.36	20A	O	L344
L352	NO DATA REPORTED FOR SAMPLE B46					3.70	.06	.27	.21	1.07	20A	M	L352
L360	2.27	-6.05	-17.03	.02	.05	1.28	-2.36	-10.92	.10	.52	20B	#	L360
L390	7.68	-.64	-1.80	.93	1.91	3.87	.23	1.06	.31	1.60	20A	X	L390
L531	7.76	-.56	-1.58	.59	1.21	3.22	-.42	-1.93	.24	1.25	20A	O	L531
L557	7.90	-.42	-1.18	.46	.96	3.39	-.25	-1.16	.17	.86	20C	O	L557
L558	8.65	.33	.93	.91	1.87	3.88	.24	1.13	.27	1.41	20A	O	L558
L559	8.42	.10	.28	.27	.55	3.68	.04	.17	.12	.61	20A	O	L559
L560	7.56	-.76	-2.14	.09	.18	3.04	-.60	-2.75	.06	.29	20C	*	L560
L561	8.25	-.07	-.20	.47	.97	3.52	-.12	-.57	.27	1.37	20A	O	L561
L567	8.32	.00	.00	.46	.96	3.60	-.04	-.18	.29	1.48	20A	O	L567
L574	8.53	.21	.60	.42	.86	3.89	.25	1.15	.14	.74	20A	O	L574
L575	8.56	.24	.67	.54	1.11	3.77	.13	.58	.12	.60	20D	O	L575
L587	NO DATA REPORTED FOR SAMPLE B46					3.22	-.42	-1.95	.25	1.26	20A	M	L587
L592	8.45	.13	.38	.50	1.04	3.75	.11	.51	.18	.94	20A	O	L592
L618	7.93	-.39	-1.09	.95	1.95	3.50	-.14	-.66	.42	2.16	20A	O	L618

GR. MEAN = 8.32 KILONEWTON/M GRAND MEAN = 3.64 KILONEWTON/M TEST DETERMINATIONS = 20

SD MEANS = .36 KILONEWTON/M SD OF MEANS = .22 KILONEWTON/M 43 LABS IN GRAND MEANS

AVERAGE SDR = .48 KILONEWTON/M AVERAGE SDR = .19 KILONEWTON/M

GR. MEAN =28.058 LB/15 MM GRAND MEAN =12.273 LB/15 MM

L139	8.44	.12	.34	.51	1.06	3.73	.09	.42	.14	.73	20H	*	L139
L250I	7.30	-1.02	-2.88	.26	.54	3.15	-.49	-2.26	.13	.67	20L	*	L250I
L251	7.69	-.63	-1.78	.43	.88	3.24	-.40	-1.84	.28	1.46	20I	*	L251

TOTAL NUMBER OF LABORATORIES REPORTING = 52

Best values: B46 8.3 ± 0.6 kilonewton per meter
J04 3.7 ± 0.4 kilonewton per meter

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

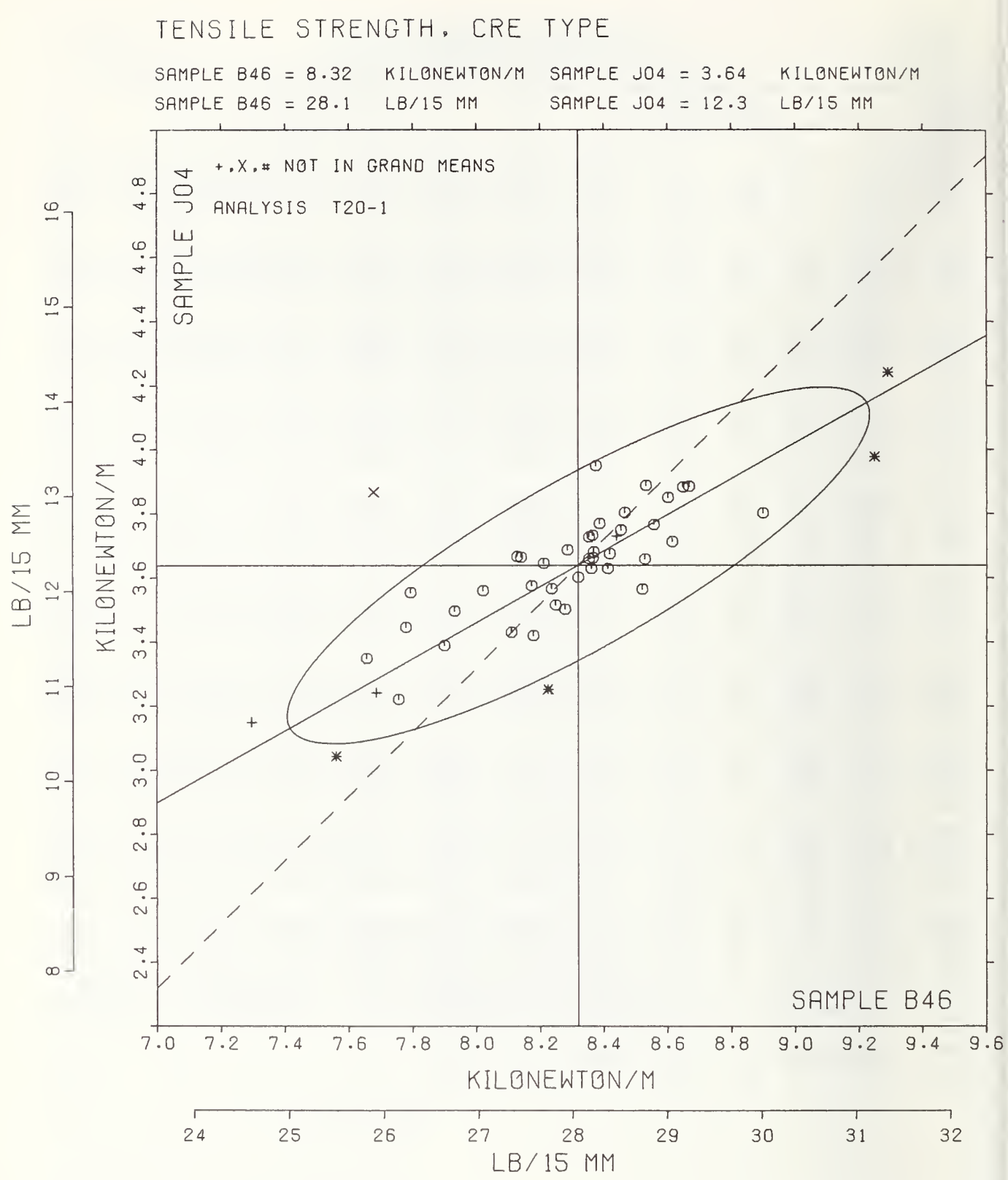
Data from the following laboratories appear to be off by a multiplicative factor: 176, 360

ANALYSIS T20-1 TABLE 2

TENSILE BREAKING STRENGTH, KILONEWTONS PER METER

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

LAB CODE	F	MEANS B46	MEANS J04	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L587	M		3.22			1.26	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE
L352	M		3.70			1.07	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE
L360	#	2.27	1.28	-6.43	.90	.28	20B	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L176	#	3.74	1.64	-4.97	.50	.71	20E	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L250I	*	7.30	3.15	-1.13	.07	.60	20L	TENSILE STRENGTH, PRINTING PAPER, CRE, 20 C, 65% RH
L143	#	7.54	6.59	.76	2.96	1.64	20E	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L560	*	7.56	3.04	-.95	-.15	.23	20C	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L331	O	7.66	3.35	-.72	.07	.98	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L390	X	7.68	3.87	-.43	.51	1.75	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L251	*	7.69	3.24	-.75	-.04	1.17	20I	TENSILE STRENGTH, PRINTING PAPER, CRE, 20 C, 65% RH
L531	O	7.76	3.22	-.69	-.09	1.23	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L230	O	7.78	3.45	-.56	.10	.99	20O	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L328	O	7.79	3.55	-.50	.18	.90	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L557	O	7.90	3.39	-.49	-.01	.91	20C	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L618	O	7.93	3.50	-.41	.06	2.06	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L318	O	8.02	3.56	-.30	.08	.78	20G	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L159	O	8.11	3.43	-.28	-.08	1.15	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L148	O	8.13	3.67	-.15	.12	1.04	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L115	O	8.14	3.66	-.14	.11	.85	20D	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L194	O	8.17	3.57	-.16	.02	.82	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L206	O	8.18	3.42	-.23	-.12	.95	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L185	O	8.21	3.65	-.09	.06	.88	20C	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L291	*	8.23	3.25	-.27	-.29	.91	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L315	O	8.24	3.57	-.11	-.02	1.07	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L561	O	8.25	3.52	-.12	-.07	1.17	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L255	O	8.28	3.50	-.10	-.10	1.18	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L223B	O	8.29	3.69	-.01	.06	.73	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L567	O	8.32	3.60	-.02	-.03	1.22	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L278	O	8.35	3.73	.07	.06	.82	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L260	O	8.35	3.66	.04	.00	.67	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L333	O	8.36	3.63	.03	-.03	.85	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L243	O	8.36	3.73	.09	.06	1.04	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L190R	O	8.37	3.66	.05	-.00	1.03	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L141T	O	8.37	3.68	.06	.01	1.04	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L309	O	8.38	3.95	.20	.24	1.04	20E	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L163	O	8.39	3.77	.12	.08	.77	20D	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L226C	O	8.41	3.63	.08	-.05	1.06	20C	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L559	O	8.42	3.68	.10	-.02	.58	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L139	*	8.44	3.73	.15	.02	.90	20H	TENSILE STRENGTH, PRINTING PAPER, CRE, SHORT TEST SPAN
L592	O	8.45	3.75	.17	.03	.99	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L122	O	8.47	3.80	.21	.07	.71	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L124C	O	8.52	3.55	.14	-.16	.93	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L105	O	8.53	3.66	.19	-.09	1.15	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L574	O	8.53	3.89	.31	.11	.80	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L575	O	8.56	3.77	.27	-.01	.85	20D	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L261	O	8.60	3.85	.35	.05	1.11	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L344	O	8.61	3.71	.29	-.08	1.08	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L558	O	8.65	3.88	.41	.05	1.64	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L118	O	8.67	3.88	.42	.04	.78	20A	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L131	O	8.90	3.80	.58	-.14	1.10	20E	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L125	*	9.25	3.98	.97	-.16	.92	20C	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
L167	*	9.29	4.24	1.14	.05	.85	20G	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, LOAD CELL (CRE)
GMEANS:		8.32	3.64			1.00		
		95% ELLIPSE:		1.04	.26	WITH GAMMA = 29 DEGREES		


TENSILE STRENGTH, CRE TYPE
SAMPLE B46 = 8.32 KILONEWTON/M SAMPLE J04 = 3.64 KILONEWTON/M
SAMPLE B46 = 28.1 LB/15 MM SAMPLE J04 = 12.3 LB/15 MM
+,X,# NOT IN GRAND MEANS
ANALYSIS T20-1
SAMPLE J04
SAMPLE B46
KILONEWTON/M
LB/15 MM
2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8 4.0 4.2 4.4 4.6 4.8
8 9 10 11 12 13 14 15 16
7.0 7.2 7.4 7.6 7.8 8.0 8.2 8.4 8.6 8.8 9.0 9.2 9.4 9.6
24 25 26 27 28 29 30 31 32

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	SAMPLE B46	RELEASE BASE M.F. 82 GRAMS PER SQUARE METER				SAMPLE J04	PRINTING 73 GRAMS PER SQUARE METER				TEST D.* 20		
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L103	8.72	.39	.65	.46	.97	3.96	.24	.95	.16	.84	20R	O	L103
L108	8.28	-.04	-.06	.40	.84	3.72	-.00	-.02	.14	.76	20P	O	L108
L121	6.57	-1.75	-2.92	.14	.30	3.25	-.48	-1.92	.24	1.26	20P	*	L121
L124P	8.97	.64	1.07	.47	1.00	3.79	.06	.26	.16	.84	20P	O	L124P
L128	8.49	.17	.28	.65	1.38	3.56	-.16	-.65	.39	2.07	20T	O	L128
L148	7.83	-.49	-.82	1.19	2.51	3.49	-.23	-.93	.19	1.03	20P	O	L148
L158	8.49	.15	.27	.24	.51	3.25	-.47	-1.90	.22	1.19	20T	X	L158
L162	7.67	-.65	-1.09	.40	.84	3.52	-.21	-.83	.13	.72	20*	O	L162
L182L	8.49	.16	.27	.43	.90	3.73	.01	.02	.16	.88	20T	O	L182L
L189	9.04	.71	1.19	.57	1.21	4.00	.27	1.10	.13	.69	20R	O	L189
L191P	8.34	.02	.03	.52	1.11	3.67	-.06	-.23	.16	.85	20P	O	L191P
L195	8.21	-.12	-.19	.46	.97	3.78	.06	.22	.18	.97	20R	O	L195
L213	8.43	.11	.18	.54	1.15	3.71	-.02	-.07	.14	.74	20T	O	L213
L218	8.56	.24	.40	.43	.91	3.81	.08	.34	.14	.74	20P	O	L218
L233	NO DATA REPORTED FOR SAMPLE B46					3.57	-.15	-.61	.20	1.07	20Q	M	L233
L241	1.79	-6.53	-10.87	.12	.25	.83	-2.89	-11.66	.06	.30	20R	#	L241
L249	8.07	-.25	-.41	.29	.62	3.60	-.12	-.49	.18	.98	20P	O	L249
L254	7.68	-.64	-1.07	.37	.79	3.35	-.38	-1.53	.21	1.10	20P	O	L254
L259	8.88	.56	.93	.52	1.11	3.97	.25	1.01	.17	.93	20P	O	L259
L262	8.81	.49	.81	.35	.75	3.90	.17	.69	.21	1.14	20R	O	L262
L275	7.14	-1.19	-1.98	.50	1.06	3.34	-.38	-1.53	.15	.78	20R	O	L275
L279P	8.50	.17	.29	.48	1.01	3.83	.11	.43	.25	1.35	20P	O	L279P
L285	5.93	-2.40	-3.99	.29	.62	3.20	-.52	-2.10	.25	1.36	20P	#	L285
L290	8.38	.06	.10	.39	.83	3.47	-.26	-1.04	.29	1.54	20P	O	L290
L321	7.18	-1.14	-1.90	.49	1.04	3.39	-.33	-1.33	.15	.80	20V	O	L321
L322	6.19	-2.13	-3.54	.71	1.49	2.65	-1.07	-4.32	.19	1.00	20P	X	L322
L330	8.42	.10	.16	.45	.96	3.68	-.04	-.18	.18	.97	20P	O	L330
L356	8.58	.26	.43	.58	1.23	3.95	.23	.91	.20	1.06	20P	O	L356
L362	8.27	-.05	-.09	.49	1.03	3.80	.08	.31	.17	.92	20R	O	L362
L370	9.13	.81	1.34	.50	1.06	4.12	.39	1.59	.15	.79	20P	O	L370
L376	8.39	.07	.11	.40	.85	3.52	-.20	-.81	.18	.94	20P	O	L376
L393	9.02	.69	1.15	.29	.62	4.03	.30	1.21	.11	.61	20P	O	L393
L484	8.05	-.27	-.45	.49	1.05	3.62	-.11	-.44	.28	1.49	20U	O	L484
L554	9.17	.84	1.41	.47	1.00	4.37	.64	2.60	.21	1.11	20P	*	L554
L556	8.85	.53	.88	.47	.99	3.98	.25	1.02	.15	.81	20P	O	L556
L585	7.73	-.59	-.99	.34	.71	3.55	-.18	-.72	.19	1.04	20V	O	L585
L599	8.11	-.21	-.35	.41	.87	3.62	-.10	-.42	.23	1.23	20V	O	L599
L626	8.69	.37	.62	.30	.64	3.84	.12	.48	.26	1.39	20T	O	L626

GR. MEAN = 8.32 KILONEWTON/M GRAND MEAN = 3.72 KILONEWTON/M TEST DETERMINATIONS = 20

SD MEANS = .60 KILONEWTON/M SD OF MEANS = .25 KILONEWTON/M 33 LABS IN GRAND MEANS

AVERAGE SDR = .47 KILONEWTON/M AVERAGE SDR = .19 KILONEWTON/M

GR. MEAN =28.068 LB/15 MM GRAND MEAN =12.562 LB/15 MM

TOTAL NUMBER OF LABORATORIES REPORTING = 38

Best values: B46 8.4 ± 0.8
J04 3.7 ± 0.4

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

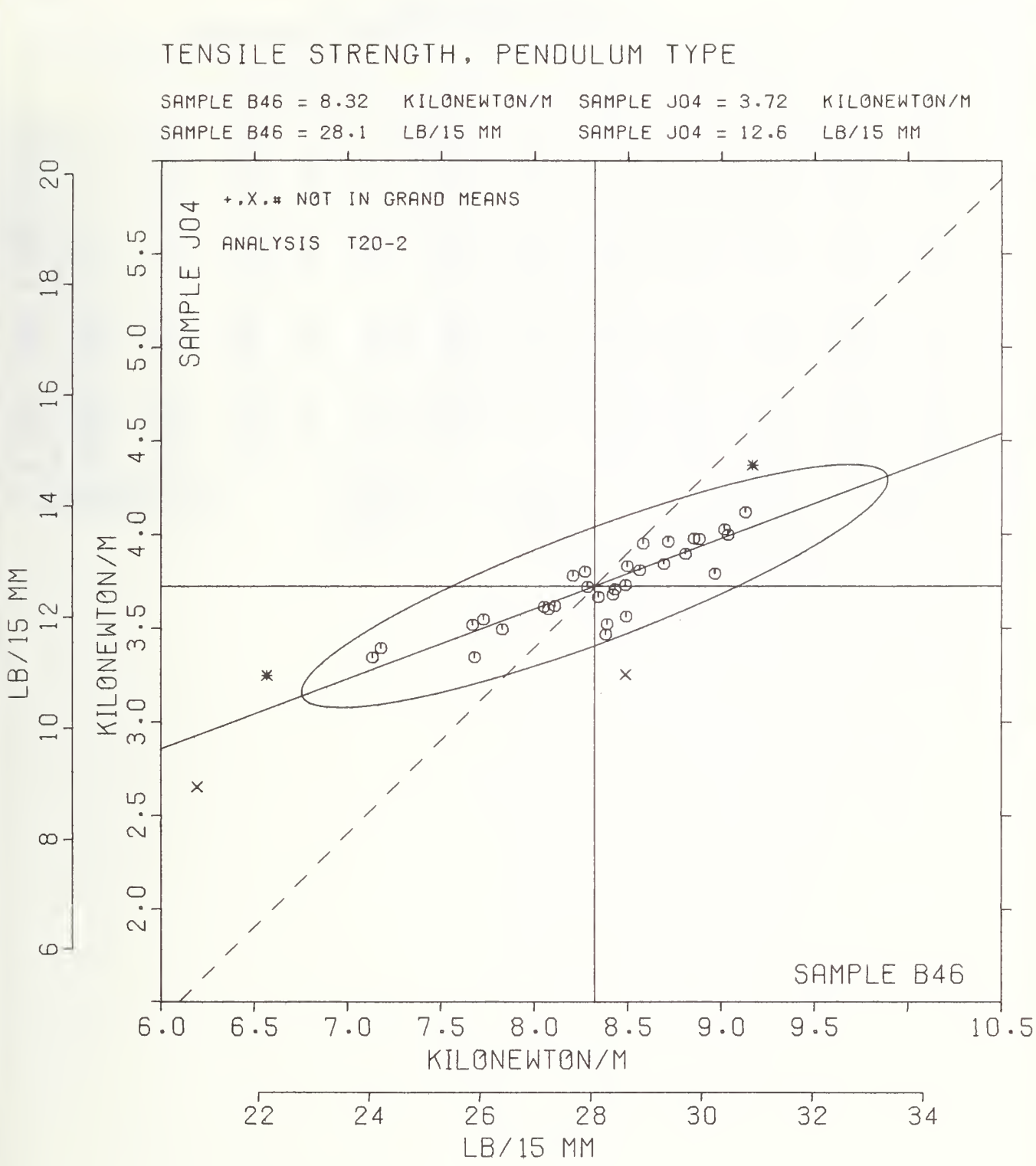
Data from the following laboratories appear to be off by a multiplicative factor: 241

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 B46	MEANS J04	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L233	M		3.57			1.07	20Q	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTE
L241	#	1.79	.83	-7.13	-.42	.27	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L285	#	5.93	3.20	-2.43	.35	.99	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L322	X	6.19	2.65	-2.37	-.26	1.25	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L121	*	6.57	3.25	-1.81	.17	.78	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L275	6	7.14	3.34	-1.24	.06	.92	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L321	6	7.18	3.39	-1.19	.09	.92	20V	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L162	6	7.67	3.52	-.68	.04	.78	20*	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L254	6	7.68	3.35	-.73	-.13	.94	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L585	6	7.73	3.55	-.62	.04	.87	20V	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L148	6	7.83	3.49	-.54	-.04	1.77	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L484	6	8.05	3.62	-.29	-.01	1.27	20U	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L249	6	8.07	3.60	-.27	-.03	.80	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L599	6	8.11	3.62	-.24	-.02	1.05	20V	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L195	6	8.21	3.78	-.09	.09	.97	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L362	6	8.27	3.80	-.02	.09	.97	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L108	6	8.28	3.72	-.04	.01	.80	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L191P	6	8.34	3.67	-.00	-.06	.98	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L290	6	8.38	3.47	-.03	-.26	1.19	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L376	6	8.39	3.52	-.01	-.21	.90	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L330	6	8.42	3.68	.08	-.08	.97	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L213	6	8.43	3.71	.10	-.05	.95	20T	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L182L	6	8.49	3.73	.16	-.05	.89	20T	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L158	X	8.49	3.25	-.01	-.50	.85	20T	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L128	6	8.49	3.56	.10	-.21	1.73	20T	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L279P	6	8.50	3.83	.20	.04	1.18	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L218	6	8.56	3.81	.25	-.01	.82	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L356	6	8.58	3.95	.32	.12	1.14	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L626	6	8.69	3.84	.39	-.02	1.02	20T	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L103	6	8.72	3.96	.45	.08	.90	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L262	6	8.81	3.90	.51	-.01	.95	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L556	6	8.85	3.98	.59	.05	.90	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L259	6	8.88	3.97	.61	.04	1.02	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L124P	6	8.97	3.79	.62	-.16	.92	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L393	6	9.02	4.03	.76	.04	.61	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L189	6	9.04	4.00	.76	.00	.95	20R	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L370	6	9.13	4.12	.89	.09	.92	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
L554	*	9.17	4.37	1.02	.31	1.06	20P	TENSILE STRENGTH, PRIMARILY PRINTING PAPERS, PENDULUM TESTER
GMEANS:		8.32	3.72			1.00		
		95% ELLIPSE:		1.67	.30	WITH GAMMA = 20 DEGREES		


TENSILE STRENGTH, PENDULUM TYPE
SAMPLE B46 = 8.32 KILONEWTON/M SAMPLE J04 = 3.72 KILONEWTON/M
SAMPLE B46 = 28.1 LB/15 MM SAMPLE J04 = 12.6 LB/15 MM
+,X,* NOT IN GRAND MEANS
ANALYSIS T20-2
SAMPLE J04
SAMPLE B46
KILONEWTON/M
LB/15 MM
2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5
6 8 10 12 14 16 18 20
6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10.5
22 24 26 28 30 32 34

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)

	SAMPLE	KRAFT				SAMPLE	PRINTING				TEST D.* 20		
LAB	H10	147 GRAMS PER SQUARE METER				J15	149 GRAMS PER SQUARE METER						
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L122	203.7	8.1	.53	41.8	1.35	135.5	20.2	1.32	10.1	.80	25P	&	L122
L126	205.3	9.6	.64	31.4	1.01	125.8	10.5	.68	9.6	.76	25G	&	L126
L151	190.2	-5.4	-.36	40.3	1.30	125.1	9.8	.64	10.4	.82	25F	&	L151
L174	209.6	14.0	.92	17.9	.58	106.4	-9.0	-.59	9.3	.74	25Y	&	L174
L182	204.1	8.5	.56	24.3	.78	115.1	-.3	-.02	15.1	1.20	25B	&	L182
L234A	226.7	31.0	2.05	26.3	.85	120.2	4.9	.32	13.0	1.03	25H	&	L234A
L237B	174.6	-21.0	-1.39	27.5	.89	114.7	-.7	-.04	7.6	.60	25H	&	L237B
L243	186.9	-8.7	-.57	46.4	1.50	122.0	6.7	.44	5.5	.44	25Z	&	L243
L250	202.8	7.2	.48	23.9	.77	117.4	2.1	.13	10.1	.80	25A	&	L250
L264	185.7	-10.0	-.66	16.5	.53	116.6	1.3	.08	10.3	.82	25F	&	L264
L267	196.6	.9	.06	34.7	1.12	134.4	19.0	1.24	11.5	.91	25F	&	L267
L268	173.5	-22.1	-1.45	30.1	.97	100.2	-15.2	-.99	26.9	2.13	25B	&	L268
L273	216.0	20.4	1.34	36.6	1.18	128.0	12.7	.83	14.4	1.14	25F	&	L273
L280	203.0	7.4	.49	32.8	1.06	100.9	-14.5	-.94	20.4	1.62	25B	&	L280
L312	203.2	7.6	.50	37.6	1.21	136.0	20.7	1.35	11.9	.94	25J	&	L312
L318	202.3	6.7	.44	29.0	.94	120.9	5.6	.36	13.1	1.04	25A	&	L318
L336	180.2	-15.4	-1.02	19.9	.64	100.3	-15.1	-.98	17.8	1.41	25A	&	L336
L580	174.1	-21.5	-1.42	46.7	1.51	79.3	-36.1	-2.35	8.7	.69	25C	&	L580
L604	187.6	-8.0	-.53	18.0	.58	58.4	-57.0	-3.72	19.0	1.51	25A	#	L604
L676	178.4	-17.3	-1.14	24.6	.79	92.8	-22.6	-1.47	13.9	1.10	25G	&	L676

GR. MEAN = 195.6 JOULES/SQ M — GRAND MEAN = 115.3 JOULES/SQ M — TEST DETERMINATIONS = 20

SD MEANS = 15.2 JOULES/SQ M — SD OF MEANS = 15.3 JOULES/SQ M — 19 LABS IN GRAND MEANS

AVERAGE SDR = 31.0 JOULES/SQ M — AVERAGE SDR = 12.6 JOULES/SQ M

GR. MEAN = 13.40 FT.LB/SQ FT — GRAND MEAN = 7.90 FT.LB/SQ FT

TOTAL NUMBER OF LABORATORIES REPORTING = 20

Best values: H10 196 ± 22 joules per square meter
J15 116 ± 20 joules per square meter

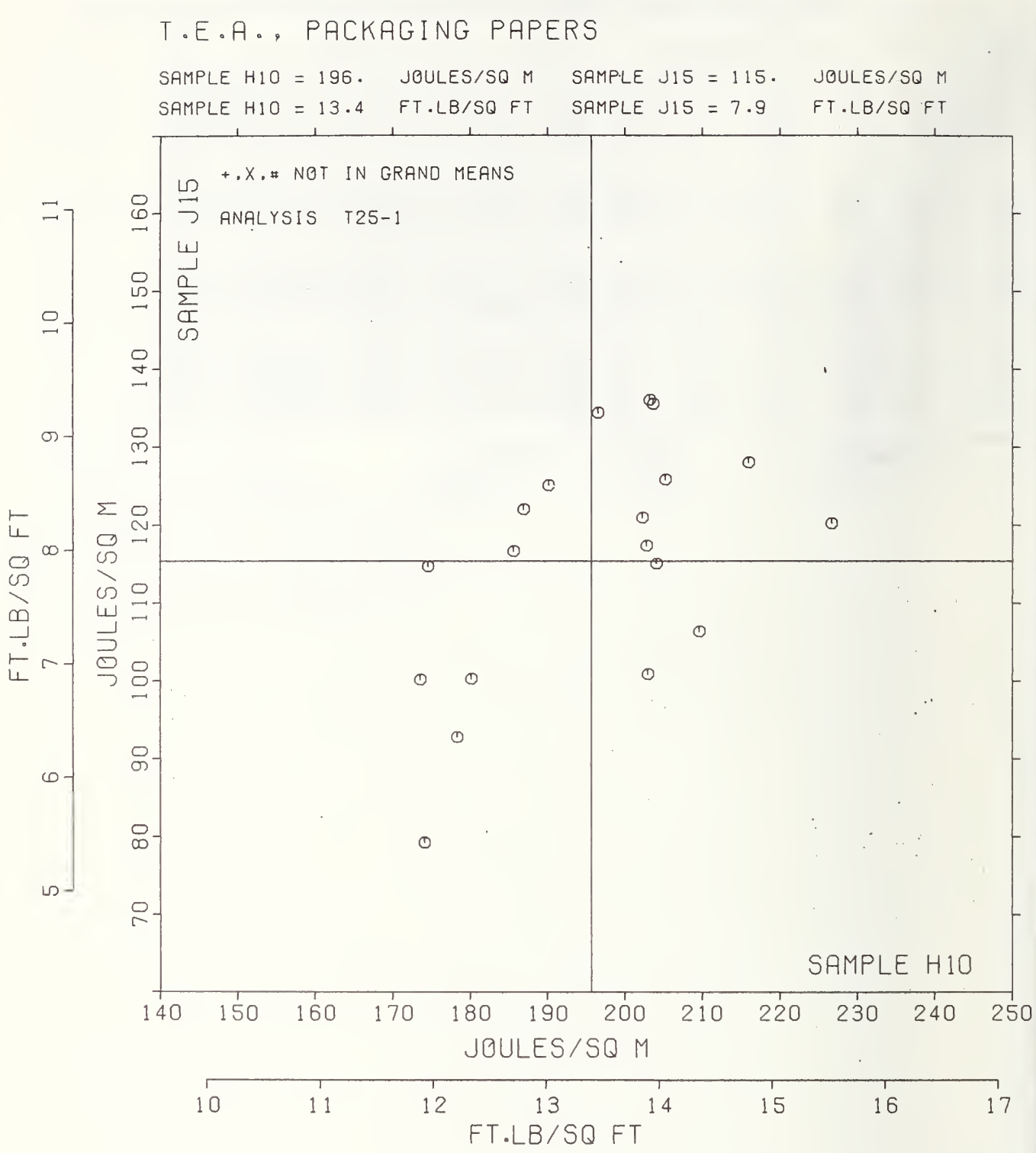
The following laboratories were omitted from the grand means because of extreme test results: 604

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	P	MEANS H10	J15	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L268	O	173.5	100.2	-26.3	5.1	1.55	25B	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/PLAT JAWS
L5B0	O	174.1	79.3	-40.B	-10.0	1.10	25C	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/LINE JAWS
L237B	O	174.6	114.7	-15.2	14.5	.75	25H	TENSILE ENERGY ABS.,PACKAGING PAPER,2-PIN STRAIN GAGE
L676	O	178.4	92.B	-2B.2	-3.5	.93	25G	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/LINB JAWS
L336	O	1B0.2	100.3	-21.6	.5	1.03	25A	TENSILE ENERGY ABS.,PACKAGING PAPER,FLAT/PLAT JAWS
L264	O	1B5.7	116.6	-6.1	8.0	.67	25P	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/PLAT JAWS
L243	O	186.9	122.0	-1.3	10.9	.97	25Z	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/LINE JAWS
L604	#	1B7.6	5B.4	-46.2	-34.3	1.04	25A	TENSILE ENERGY ABS.,PACKAGING PAPER,PLAT/PLAT JAWS
L151	O	190.2	125.1	3.2	10.7	1.06	25P	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/PLAT JAWS
L267	O	196.6	134.4	14.2	12.7	1.02	25P	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/PLAT JAWS
L318	O	202.3	120.9	8.6	-.8	.99	25A	TENSILE ENERGY ABS.,PACKAGING PAPER,FLAT/FLAT JAWS
L250	O	202.8	117.4	6.5	-3.7	.79	25A	TENSILE ENERGY ABS.,PACKAGING PAPER,PLAT/FLAT JAWS
L2B0	O	203.0	100.9	-5.2	-15.4	1.34	25B	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/PLAT JAWS
L312	O	203.2	136.0	20.1	9.1	1.0B	25J	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/PLAT JAWS
L122	O	203.7	135.5	20.0	8.4	1.08	25P	TENSILE ENERGY ABS.,PACKAGING PAPER,PATTERNED FLAT JAWS
L182	O	204.1	115.1	5.7	-6.3	.99	25B	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/PLAT JAWS
L126	O	205.3	125.8	14.2	.5	.89	25G	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/LINB JAWS
L174	O	209.6	106.4	3.4	-16.3	.66	25Y	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/FLAT JAWS
L273	O	216.0	128.0	23.3	-5.7	1.16	25F	TENSILE ENERGY ABS.,PACKAGING PAPER,LINE/FLAT JAWS
L234A	O	226.7	120.2	25.2	-1B.7	.94	25H	TENSILE ENERGY ABS.,PACKAGING PAPER,2-PIN STRAIN GAGE
GMEANS:		195.6	115.3			1.00		
		95% ELLIPSE:		52.3	2B.3	WITH GAMMA = 45 DEGREES		


T.E.A., PACKAGING PAPERS
SAMPLE H10 = 196. JOULES/SQ M
SAMPLE H10 = 13.4 FT.LB/SQ FT
SAMPLE J15 = 115. JOULES/SQ M
SAMPLE J15 = 7.9 FT.LB/SQ FT
+,X,# NOT IN GRAND MEANS
ANALYSIS T25-1
SAMPLE J15
SAMPLE H10
JOULES/SQ M
FT.LB/SQ FT

ANALYSIS T26-1 TABLE 1

TENSILE ENERGY ABSORPTION, JOULES PER SQUARE METER - PRINTING PAPER

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

	SAMPLE	RELEASE BASE M.F.				SAMPLE	PRINTING				TEST D.- 20	
LAB	B46	82 GRAMS PER SQUARE METER				J04	73 GRAMS PER SQUARE METER					
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR F	LAB
L115	101.3	-1.1	-.13	7.9	.74	37.8	1.9	.46	2.3	.55	26C O	L115
L118	106.7	4.3	.48	8.9	.83	37.7	1.8	.43	3.9	.92	26E O	L118
L122	110.4	8.0	.89	10.2	.95	41.5	5.5	1.35	3.7	.86	26L O	L122
L139	94.8	-7.6	-.85	15.6	1.46	33.6	-2.4	-.59	4.1	.95	26H O	L139
L163	102.3	-.1	-.01	9.7	.91	36.6	.6	.14	4.7	1.10	26J O	L163
L167	92.8	-9.6	-1.08	4.0	.38	42.5	6.5	1.59	1.6	.37	26D O	L167
L185	99.9	-2.5	-.28	9.2	.86	32.5	-3.5	-.86	5.4	1.26	26C O	L185
L206	95.7	-6.8	-.76	10.8	1.00	29.5	-6.5	-1.59	4.9	1.15	26Y O	L206
L250	96.8	-5.6	-.62	8.7	.82	33.6	-2.3	-.57	4.1	.96	26A O	L250
L255	124.4	22.0	2.47	18.9	1.77	35.5	-.5	-.12	6.4	1.49	26P O	L255
L309	116.4	14.0	1.57	14.4	1.35	42.2	6.2	1.52	6.5	1.52	26I O	L309
L318	104.7	2.3	.26	12.0	1.12	39.9	3.9	.96	4.6	1.06	26A O	L318
L393	99.8	-2.7	-.30	8.1	.76	34.0	-2.0	-.49	2.7	.64	26V O	L393
L557	97.5	-4.9	-.55	10.8	1.01	30.3	-5.7	-1.39	4.6	1.08	26A O	L567
L575	105.1	2.7	.30	11.0	1.03	36.4	.4	.10	4.0	.92	26A O	L575
L587	NO DATA REPORTED FOR SAMPLE B46					3.2	-32.8	-8.01	.2	.06	26C M	L587
L592	89.9	-12.5	-1.40	10.9	1.02	32.1	-3.9	-.95	5.0	1.17	26H O	L592

GR. MEAN - 102.4 JOULES/SQ M GRAND MEAN - 36.0 JOULES/SQ M TEST DETERMINATIONS - 20

SD MEANS - 8.9 JOULES/SQ M SD OF MEANS - 4.1 JOULES/SQ M 16 LABS IN GRAND MEANS

AVERAGE SDR - 10.7 JOULES/SQ M AVERAGE SDR - 4.3 JOULES/SQ M

GR. MEAN - 7.016 FT.LB/SQ FT GRAND MEAN - 2.464 FT.LB/SQ FT

TOTAL NUMBER OF LABORATORIES REPORTING - 17

Best values: B46 100 ± 12 joules per square meter
J04 36 ± 6 joules per square meter

ANALYSIS T26-1 TABLE 2

TENSILE ENERGY ABSORPTION, JOULES PER SQUARE METER - PRINTING PAPER

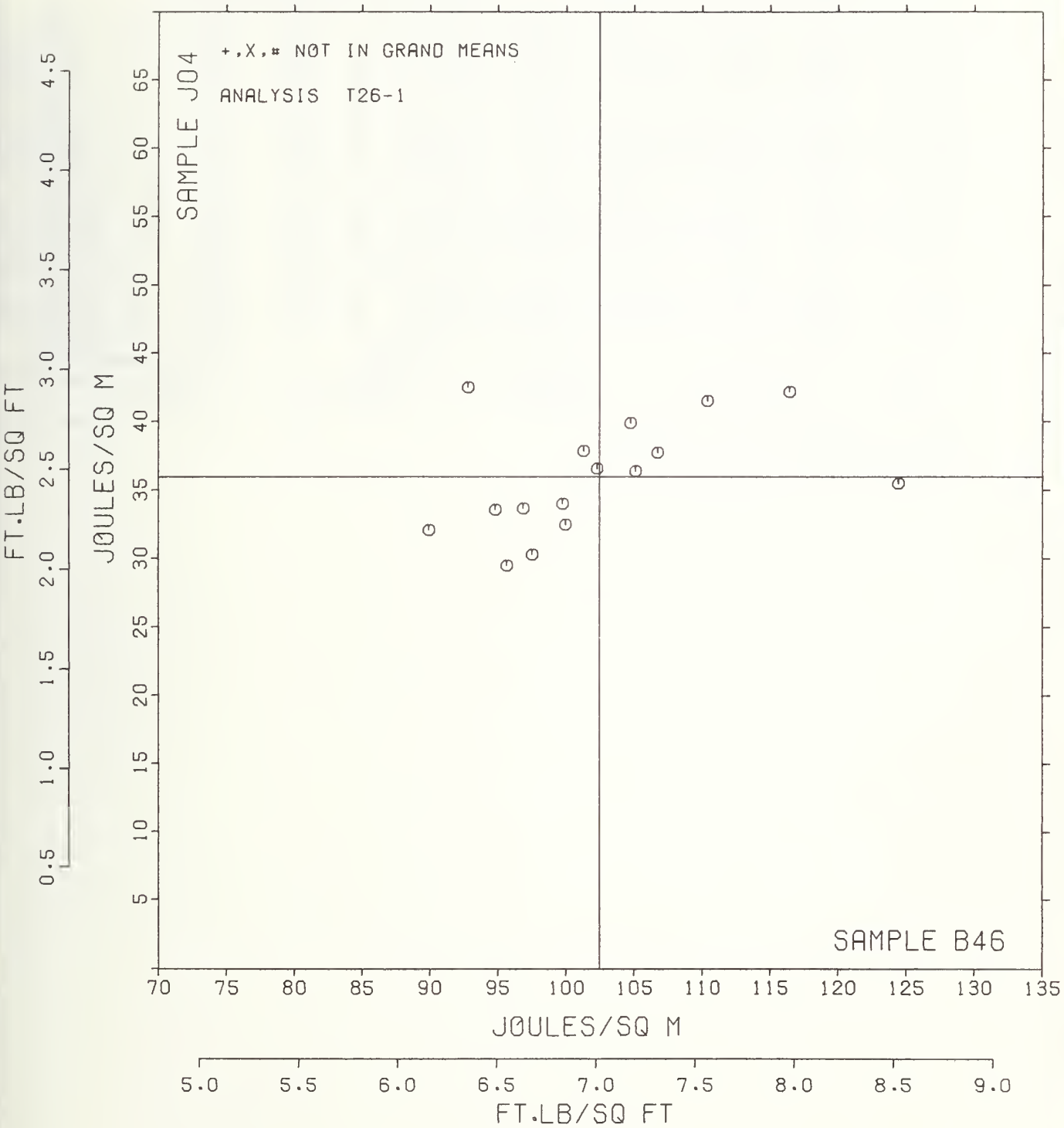
TAPPI STANDARD T494 OS-70, TENSILE BREAKING PROPERTIES OF PAPER & PAPERBOARD (CONSTANT RATE OF ELONGATION)

LAB		MEANS		COORDINATES		AVG			
CODE	F	E46	J04	MAJOR	MINOR	R,SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS	
L587	M		3.2			.06	26C	TENSILE ENERGY AES.,PRINTING PAPERS,LINE/LINE JAWS	
L592	O	89.9	32.1	-13.0	-.9	1.09	26H	TENSILE ENERGY AES.,PRINTING PAPERS,2-PIN STRAIN GAGE	
L167	O	92.8	42.5	-7.8	8.5	.37	26D	TENSILE ENERGY AES.,PRINTING PAPERS,2-PIN STRAIN GAGE	
L139	O	94.8	33.6	-7.9	-.6	1.20	26H	TENSILE ENERGY AES.,PRINTING PAPERS,2-PIN STRAIN GAGE	
L206	O	95.7	29.5	-8.1	-4.7	1.08	26Y	TENSILE ENERGY AES.,PRINTING PAPERS,LINE/FLAT JAWS	
L250	O	96.8	33.6	-6.0	-1.0	.89	26A	TENSILE ENERGY AES.,PRINTING PAPERS,FLAT/FLAT JAWS	
L567	O	97.5	30.3	-6.1	-4.4	1.05	26A	TENSILE ENERGY AES.,PRINTING PAPERS,FLAT/FLAT JAWS	
L393	O	99.8	34.0	-3.1	-1.3	.70	26V	TENSILE ENERGY AES.,PRINTING PAPERS,LINE/FLAT JAWS	
L185	O	99.9	32.5	-3.2	-2.8	1.06	26C	TENSILE ENERGY AES.,PRINTING PAPERS,LINE/LINE JAWS	
L115	O	101.3	37.8	-.7	2.1	.64	26C	TENSILE ENERGY AES.,PRINTING PAPERS,LINE/LINE JAWS	
L163	O	102.3	36.6	.0	.6	1.00	26J	TENSILE ENERGY ABS.,PRINTING PAPERS,LINE/FLAT JAWS	
L318	O	104.7	39.9	3.1	3.3	1.09	26A	TENSILE ENERGY ABS.,PRINTING PAPERS,FLAT/FLAT JAWS	
L575	O	105.1	36.4	2.7	-.2	.98	26A	TENSILE ENERGY AES.,PRINTING PAPERS,FLAT/FLAT JAWS	
L118	O	106.7	37.7	4.6	.7	.88	26E	TENSILE ENERGY AES.,PRINTING PAPERS,FLAT/FLAT JAWS	
L122	O	110.4	41.5	9.0	3.5	.90	26L	TENSILE ENERGY AES.,PRINTING PAPERS,PATTERNED PLAT JAWS	
L309	O	116.4	42.2	15.0	2.8	1.44	26I	TENSILE ENERGY AES.,PRINTING PAPERS,PLAT/FLAT JAWS	
L255	O	124.4	35.5	21.3	-5.6	1.63	26P	TENSILE ENERGY ABS.,PRINTING PAPERS,PATTERNED FLAT JAWS	
GMEANS:		102.4	36.0			1.00			
		95% ELLIPSE:		25.9	10.2	WITH GAMMA = 13 DEGREES			

T.E.A., PRINTING PAPERS

SAMPLE B46 = 102. JOULES/SQ M SAMPLE J04 = 36. JOULES/SQ M

SAMPLE B46 = 7.02 FT.LB/SQ FT SAMPLE J04 = 2.46 FT.LB/SQ FT



TAPPI COLLABORATIVE REFERENCE PROGRAM
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 H10 MEAN	KRAFT 147 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE J15 MEAN	PRINTING 149 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
											TEST D.- 20		
L122	4.31	.19	.76	.60	1.23	2.35	.21	.98	.13	.80	28P	ó	L122
L126	4.15	.03	.13	.43	.88	2.12	-.02	-.11	.12	.74	28C	ó	L126
L151	4.44	.32	1.28	.58	1.19	2.38	.24	1.11	.16	1.01	28B	ó	L151
L182	4.23	.11	.45	.35	.72	2.12	-.02	-.10	.19	1.19	28B	ó	L182
L243	3.89	-.23	-.89	.48	.99	2.11	-.03	-.15	.06	.39	28C	ó	L243
L264	3.91	-.20	-.79	.24	.50	2.14	.00	.02	.17	1.09	28B	ó	L264
L265	3.64	-.48	-1.88	.67	1.37	2.13	-.01	-.05	.07	.45	28A	ó	L265
L267	4.07	-.05	-.18	.46	.93	2.32	.18	.83	.13	.85	28B	ó	L267
L268	3.75	-.37	-1.44	.46	.95	1.90	-.24	-1.09	.33	2.11	28B	ó	L268
L280	4.41	.30	1.18	.37	.77	2.17	.03	.16	.20	1.29	28B	ó	L280
L312	4.16	.05	.20	.49	1.01	2.39	.25	1.18	.15	.94	28B	ó	L312
L318	4.60	.48	1.90	.39	.80	2.34	.20	.91	.14	.89	28A	ó	L318
L324	4.15	.03	.14	.47	.97	2.09	-.05	-.23	.10	.62	28P	ó	L324
L336	4.16	.04	.17	.31	.64	2.01	-.13	-.59	.25	1.58	28A	ó	L336
L580	3.92	-.20	-.77	.68	1.40	1.80	-.34	-1.55	.13	.84	28C	ó	L580
L581	4.08	-.04	-.15	.52	1.07	2.24	.10	.45	.13	.86	28A	ó	L581
L582	4.35	.23	.91	.65	1.34	2.32	.18	.85	.16	1.03	28A	ó	L582
L676	3.86	-.25	-.99	.61	1.25	1.57	-.57	-2.62	.21	1.34	28C	ó	L676
GR. MEAN -	4.12 PERCENT					GRAND MEAN -	2.14 PERCENT				TEST DETERMINATIONS - 20		
SD MEANS -	.25 PERCENT					SD OF MEANS -	.22 PERCENT				18 LABS IN GRAND MEANS		
		AVERAGE SDR -	.49 PERCENT				AVERAGE SDR -	.16 PERCENT					
L153	5.12	1.01	3.98	.29	.60	3.08	.94	4.36	.18	1.15	28Q	*	L153

TOTAL NUMBER OF LABORATORIES REPORTING - 19

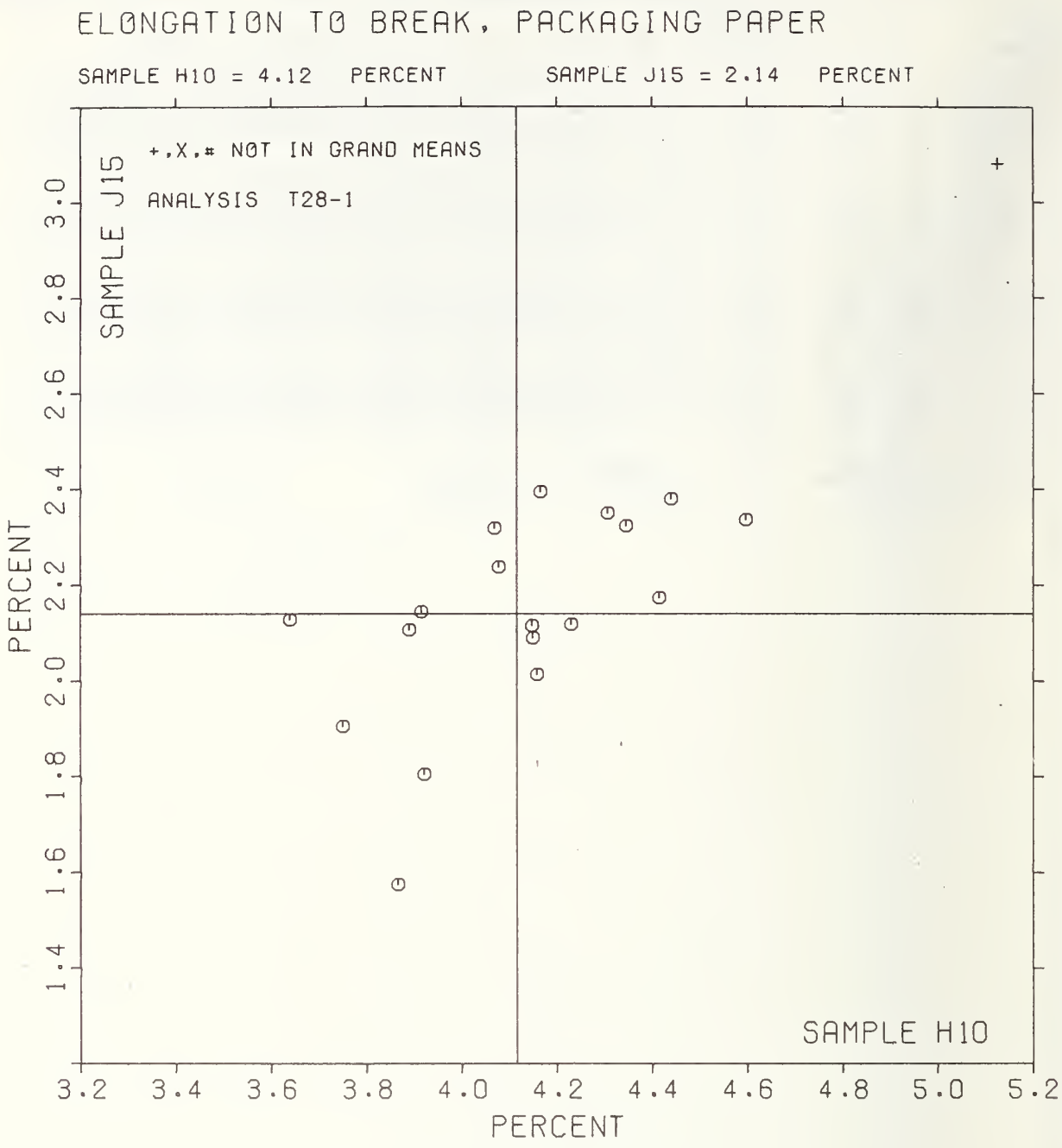
Best values: H10 4.1 ± 0.4 percent
J15 2.2 ± 0.3 percent

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 H10	MEANS J15	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L265	6	3.64	2.13	-.38	.28	.91	28A	ELONGATION,PACKAGING PAPER,LOAD CELL,FLAT/FLAT JAWS
L268	6	3.75	1.90	-.43	.04	1.53	28B	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
L676	6	3.86	1.57	-.54	-.30	1.30	28C	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/LINE JAWS
L243	6	3.89	2.11	-.20	.11	.69	28C	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/LINE JAWS
L264	6	3.91	2.14	-.16	.13	.79	28B	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
L580	6	3.92	1.80	-.36	-.15	1.12	28C	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/LINE JAWS
L267	6	4.07	2.32	.07	.17	.89	28B	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
L581	6	4.08	2.24	.03	.10	.96	28A	ELONGATION,PACKAGING PAPER,LOAD CELL,FLAT/FLAT JAWS
L126	6	4.15	2.12	.01	-.04	.81	28C	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/LINE JAWS
L324	6	4.15	2.09	-.00	-.06	.80	28P	ELONGATION,PACKAGING PAPER,LOAD CELL,PATTERNED FLAT JAWS
L336	6	4.16	2.01	-.04	-.13	1.11	28A	ELONGATION,PACKAGING PAPER,LOAD CELL,FLAT/FLAT JAWS
L312	6	4.16	2.39	.19	.17	.97	28B	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
L182	6	4.23	2.12	.08	-.09	.95	28B	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
L122	6	4.31	2.35	.28	.05	1.01	28P	ELONGATION,PACKAGING PAPER,LOAD CELL,PATTERNED FLAT JAWS
L582	6	4.35	2.32	.29	.01	1.19	28A	ELONGATION,PACKAGING PAPER,LOAD CELL,FLAT/FLAT JAWS
L280	6	4.41	2.17	.26	-.15	1.03	28B	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
L151	6	4.44	2.38	.40	-.01	1.10	28B	ELONGATION,PACKAGING PAPER,LOAD CELL,LINE/FLAT JAWS
L318	6	4.60	2.34	.50	-.14	.85	28A	ELONGATION,PACKAGING PAPER,LOAD CELL,FLAT/FLAT JAWS
L153	*	5.12	3.08	1.37	.13	.87	28Q	ELONGATION,PACKAGING PAPER,PENDULUM, PATTERNED FLAT JAWS
GMEANS:		4.12	2.14			1.00		
		95% ELLIPSE:		.83	.40	WITH GAMMA = 37 DEGREES		


ELONGATION TO BREAK, PACKAGING PAPER
SAMPLE H10 = 4.12 PERCENT
SAMPLE J15 = 2.14 PERCENT
+,X,* NOT IN GRAND MEANS
ANALYSIS T28-1
SAMPLE J15
PERCENT
1.4
1.6
1.8
2.0
2.2
2.4
2.6
2.8
3.0
SAMPLE H10
3.2
3.4
3.6
3.8
4.0
4.2
4.4
4.6
4.8
5.0
5.2
PERCENT

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 B46 MEAN	RELEASE BASE M.F. 82 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE J04 MEAN	PRINTING 73 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.= 20 VAR	F	LAB
L105	1.84	-.16	-.77	.20	1.32	1.40	-.12	-.67	.13	.86	29A	O	L105
L118	2.03	.03	.13	.13	.84	1.59	.07	.38	.13	.89	29A	O	L118
L122	2.14	.14	.66	.13	.87	1.76	.23	1.28	.12	.83	29P	O	L122
L141T	1.76	-.24	-1.15	.16	1.01	1.38	-.14	-.77	.13	.92	29D	O	L141T
L176	2.21	.22	1.02	.23	1.51	1.68	.16	.86	.28	1.95	29B	O	L176
L185	1.93	-.07	-.31	.11	.71	1.42	-.10	-.57	.15	1.01	29C	O	L185
L190R	1.93	-.07	-.31	.15	.95	1.53	.01	.04	.14	.95	29A	O	L190R
L255	2.34	.34	1.61	.15	.99	1.58	.06	.31	.17	1.20	29P	*	L255
L309	2.39	.39	1.85	.20	1.30	1.87	.35	1.91	.15	1.00	29A	O	L309
L318	2.18	.19	.88	.15	.99	1.72	.20	1.09	.11	.75	29A	O	L318
L344	1.89	-.11	-.50	.14	.88	1.47	-.05	-.26	.15	1.03	29A	O	L344
L561	1.70	-.29	-1.40	.18	1.20	1.27	-.25	-1.38	.17	1.16	29B	O	L561
L567	1.78	-.22	-1.04	.12	.80	1.22	-.30	-1.66	.14	.95	29A	O	L567
L575	1.98	-.02	-.11	.12	.78	1.54	.02	.10	.11	.77	29A	O	L575
L587	NO DATA REPORTED FOR SAMPLE B46					1.59	.07	.37	.15	1.05	29C	M	L587
L592	1.88	-.12	-.57	.13	.84	1.40	-.12	-.66	.14	.94	29D	O	L592
GR. MEAN =	2.00 PERCENT				GRAND MEAN =	1.52 PERCENT				TEST DETERMINATIONS =	20		
SD MEANS =	.21 PERCENT				SD OF MEANS =	.18 PERCENT				15 LABS IN GRAND MEANS			
	AVERAGE SDR =	.15 PERCENT				AVERAGE SDR =	.15 PERCENT						
L484	2.46	.46	2.18	.29	1.88	2.09	.57	3.12	.21	1.45	29R	*	L484
L626	1.95	-.05	-.23	.15	.98	1.56	.04	.20	.16	1.08	29R	*	L626

TOTAL NUMBER OF LABORATORIES REPORTING = 18

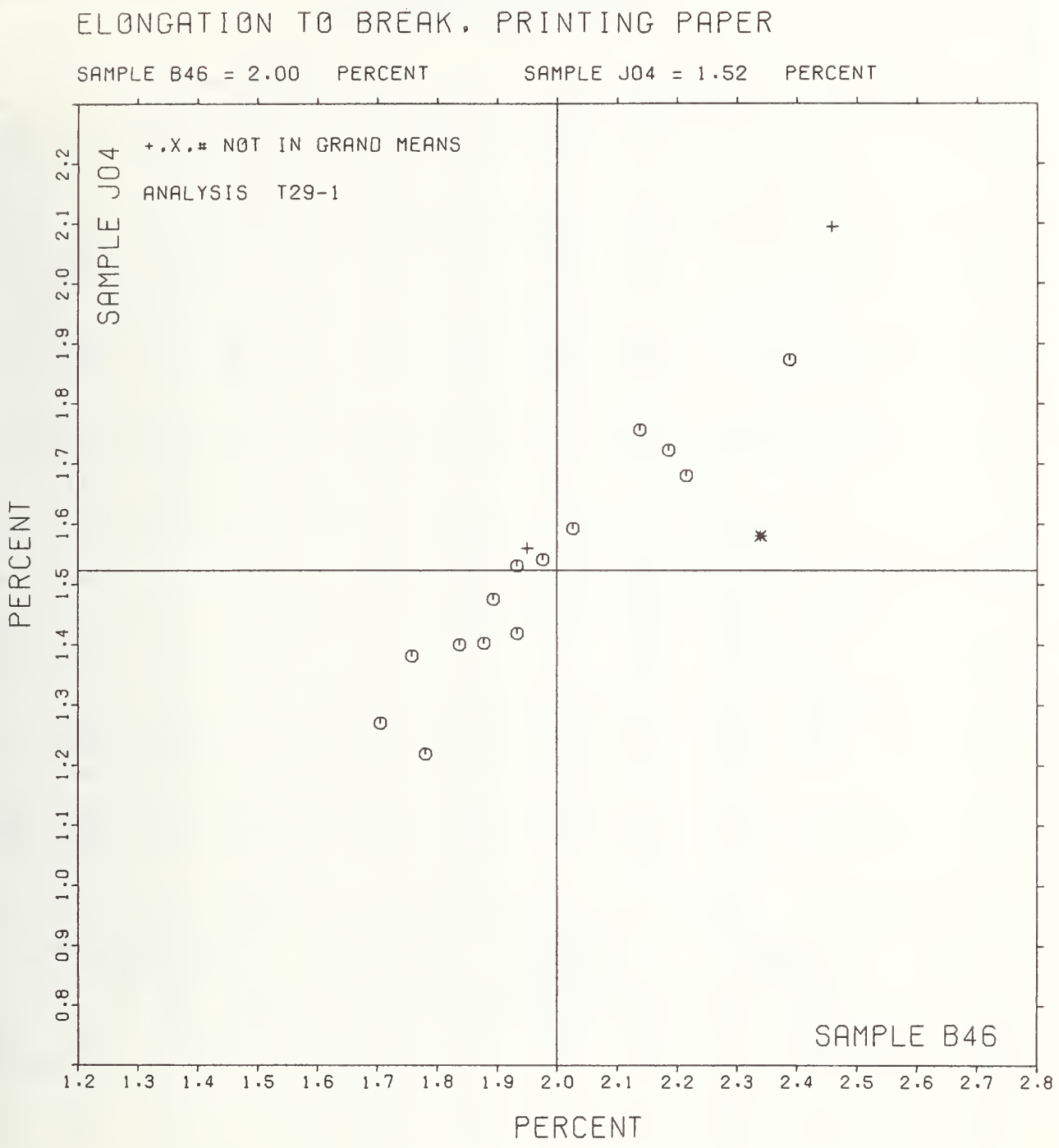
Best values: B46 2.0 ± 0.3 percent
J04 1.5 ± 0.3 percent

ANALYSIS T29-1 TABLE 2

ELONGATION TO BREAK, PERCENT - PRINTING PAPER

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

LAB CODE	F	MEANS B46	MEANS J04	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L587	M		1.59			1.05	29C	ELONGATION,PRINTING PAPERS,LOAD CELL,LINE/LINE JAWS
L561	O	1.70	1.27	-.39	-.00	1.18	29B	ELONGATION,PRINTING PAPERS,LOAD CELL,LINE/FLAT JAWS
L141T	O	1.76	1.38	-.28	.05	.97	29D	ELONGATION,PRINTING PAPERS,LOAD CELL,2-PIN STRAIN GAGE
L567	O	1.78	1.22	-.36	-.09	.88	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L105	O	1.84	1.40	-.20	.01	1.09	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L592	O	1.88	1.40	-.17	-.01	.89	29D	ELONGATION,PRINTING PAPERS,LOAD CELL,2-PIN STRAIN GAGE
L344	O	1.89	1.47	-.11	.03	.95	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,PLAT/FLAT JAWS
L190R	O	1.93	1.53	-.04	.05	.95	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,PLAT/FLAT JAWS
L185	O	1.93	1.42	-.12	-.04	.86	29C	ELONGATION,PRINTING PAPERS,LOAD CELL,LINE/LINE JAWS
L626	*	1.95	1.56	-.01	.06	1.03	29R	ELONGATION,PRINTING PAPERS,PENDULUM, FLAT/FLAT JAWS
L575	O	1.98	1.54	-.01	.03	.77	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L118	O	2.03	1.59	.07	.04	.86	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L122	O	2.14	1.76	.26	.09	.85	29P	ELONGATION,PRINTING PAPERS,LOAD CELL,PATTERNED FLAT JAWS
L318	O	2.18	1.72	.27	.03	.87	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L176	O	2.21	1.68	.27	-.02	1.73	29B	ELONGATION,PRINTING PAPERS,LOAD CELL,LINE/FLAT JAWS
L255	*	2.34	1.58	.30	-.18	1.09	29P	ELONGATION,PRINTING PAPERS,LOAD CELL,PATTERNED PLAT JAWS
L309	O	2.39	1.87	.52	.01	1.15	29A	ELONGATION,PRINTING PAPERS,LOAD CELL,FLAT/FLAT JAWS
L484	*	2.46	2.09	.72	.14	1.66	29R	ELONGATION,PRINTING PAPERS,PENDULUM, FLAT/FLAT JAWS
GMEANS:		2.00	1.52			1.00		
		95% ELLIPSE:		.78	.18	WITH GAMMA = 40 DEGREES		


ELONGATION TO BREAK, PRINTING PAPER
SAMPLE B46 = 2.00 PERCENT
SAMPLE J04 = 1.52 PERCENT
+,X,* NOT IN GRAND MEANS
ANALYSIS T29-1
SAMPLE J04
SAMPLE B46
PERCENT
PERCENT
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
1.2 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 2.7 2.8

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

LAB CODE	SAMPLE J44 MEAN	PRINTING 116 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE J29 MEAN	PRINTING 102 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.- 15 VAR	F	LAB
L105	66.1	8.5	.40	27.8	.99	21.9	-.6	-.15	8.0	1.12	30M	O	L105
L118	33.1	-24.4	-1.16	15.9	.57	29.1	6.5	1.55	20.9	2.94	30D	*	L118
L121	37.3	-20.3	-.96	23.0	.82	29.4	6.8	1.63	24.5	3.44	30M	*	L121
L122	76.9	19.3	.91	41.5	1.48	30.5	7.9	1.89	15.3	2.16	30M	O	L122
L124	43.3	-14.3	-.68	22.2	.79	25.7	3.2	.76	12.0	1.68	30M	O	L124
L158	26.8	-30.8	-1.46	12.8	.46	15.3	-7.3	-1.74	4.8	.68	30N	O	L158
L159	49.0	-8.6	-.41	24.3	.87	23.0	.4	.10	7.0	.98	30N	O	L159
L162	49.5	-8.1	-.39	22.4	.80	18.8	-3.8	-.90	4.2	.59	30M	O	L162
L163	42.1	-15.4	-.73	15.0	.54	16.7	-5.9	-1.41	4.8	.68	30N	O	L163
L176	63.1	5.5	.26	25.9	.92	26.5	4.0	.95	13.9	1.95	30N	O	L176
L182M	97.5	39.9	1.90	42.5	1.52	29.3	6.8	1.62	14.0	1.97	30M	O	L182M
L185	73.4	15.8	.75	28.1	1.00	24.3	1.8	.42	5.1	.72	30N	O	L185
L190C	68.3	10.7	.51	37.5	1.34	25.3	2.8	.66	12.5	1.76	30N	O	L190C
L223F	63.9	6.3	.30	29.3	1.05	23.3	.8	.18	6.1	.86	30M	O	L223F
L230	61.9	4.3	.20	25.5	.91	18.0	-4.6	-1.09	6.1	.86	30N	O	L230
L236	50.5	-7.1	-.34	10.5	.38	18.1	-4.5	-1.07	4.7	.66	30N	O	L236
L238A	75.7	18.1	.86	39.3	1.41	21.9	-.6	-.15	3.3	.47	30M	O	L238A
L238B	37.8	-19.8	-.94	21.3	.76	17.1	-5.4	-1.30	3.6	.51	30D	O	L238B
L243	103.9	46.3	2.20	56.6	2.02	25.7	3.2	.76	4.4	.62	30D	O	L243
L254	47.2	-10.4	-.49	38.2	1.36	18.0	-4.6	-1.09	4.9	.68	30M	O	L254
L262	49.4	-8.2	-.39	9.5	.34	19.9	-2.6	-.63	4.7	.66	30N	O	L262
L275	68.9	11.3	.54	47.6	1.70	23.1	.6	.14	6.4	.90	30N	O	L275
L278	55.8	-1.8	-.08	26.9	.96	23.9	1.4	.33	4.9	.69	30C	O	L278
L279	57.7	.1	.00	10.9	.39	22.3	-.3	-.07	4.5	.64	30M	O	L279
L285A	40.0	-17.6	-.83	17.6	.63	17.3	-5.3	-1.27	5.5	.77	30N	O	L285A
L285B	27.2	-30.4	-1.44	17.9	.64	22.9	.3	.07	19.1	2.69	30N	O	L285B
L299	46.0	-11.6	-.55	25.9	.92	16.8	-5.8	-1.38	4.4	.62	30N	O	L299
L321	25.8	-31.8	-1.51	6.4	.23	109.1	86.6	20.67	59.3	8.33	30M	#	L321
L326N	30.3	-27.2	-1.29	21.5	.77	23.1	.6	.14	20.6	2.90	30N	O	L326N
L339	14.5	-43.1	-2.05	10.2	.36	9.3	-13.2	-3.16	2.2	.31	30N	#	L339
L341	45.5	-12.0	-.57	23.9	.85	25.1	2.6	.61	6.4	.90	30C	O	L341
L366A	42.3	-15.2	-.72	25.8	.92	22.8	.2	.06	5.0	.70	30N	O	L366A
L376	34.7	-22.8	-1.08	31.0	1.11	18.9	-3.7	-.88	3.7	.52	30N	O	L376
L388	71.4	13.8	.66	46.9	1.68	22.5	-.1	-.02	5.6	.79	30N	O	L388
L390	26.3	-31.3	-1.49	6.2	.22	15.0	-7.6	-1.81	2.3	.32	30N	O	L390
L396M	76.4	18.8	.89	21.6	.77	27.7	5.1	1.22	6.5	.91	30N	O	L396M
L531	78.9	21.3	1.01	65.2	2.33	22.7	.1	.02	6.3	.89	30M	O	L531
L565	81.1	23.5	1.11	31.0	1.11	22.9	.3	.07	7.1	.99	30N	O	L565
L567	80.3	22.7	1.08	31.6	1.13	27.9	5.4	1.28	5.0	.70	30N	O	L567
L589	52.8	-4.8	-.23	27.5	.98	18.8	-3.8	-.90	4.0	.56	30N	O	L589
L599	58.9	1.3	.06	25.9	.93	23.3	.8	.18	6.3	.89	30C	O	L599
L622	112.3	54.7	2.59	41.9	1.50	27.7	5.2	1.23	12.5	1.75	30M	*	L622
GR. MEAN =	57.6 DOUBLE FOLDS					GRAND MEAN =	22.6 DOUBLE FOLDS				TEST DETERMINATIONS =		15
SD MEANS =	21.1 DOUBLE FOLDS					SD OF MEANS =	4.2 DOUBLE FOLDS				40 LABS IN GRAND MEANS		
		AVERAGE SDR =	28.0 DOUBLE FOLDS				AVERAGE SDR =	7.1 DOUBLE FOLDS					
L143	46.8	-10.8	-.51	29.6	1.06	24.6	2.0	.49	7.4	1.05	30T	*	L143
L162S	11.7	-45.8	-2.18	5.6	.20	31.8	9.2	2.20	43.1	6.06	30S	*	L162S
L190D	18.5	-39.1	-1.86	10.3	.37	20.9	-1.7	-.41	4.5	.64	30S	*	L190D
L280	19.8	-37.8	-1.79	9.8	.35	17.5	-5.0	-1.20	5.2	.74	30K	*	L280
L326S	20.5	-37.1	-1.76	6.5	.23	18.4	-4.2	-.99	3.5	.49	30S	*	L326S
L366B	8.5	-49.1	-2.33	3.8	.13	9.4	-13.1	-3.14	1.9	.27	30T	*	L366B
L396S	10.6	-47.0	-2.23	3.4	.12	13.1	-9.4	-2.25	4.2	.59	30T	*	L396S
L581	10.6	-47.0	-2.23	7.1	.25	10.0	-12.6	-3.00	1.8	.25	30T	*	L581

TOTAL NUMBER OF LABORATORIES REPORTING = 50

Best values: J44 60 ± 40 double folds
J29 25 ± 8 double folds

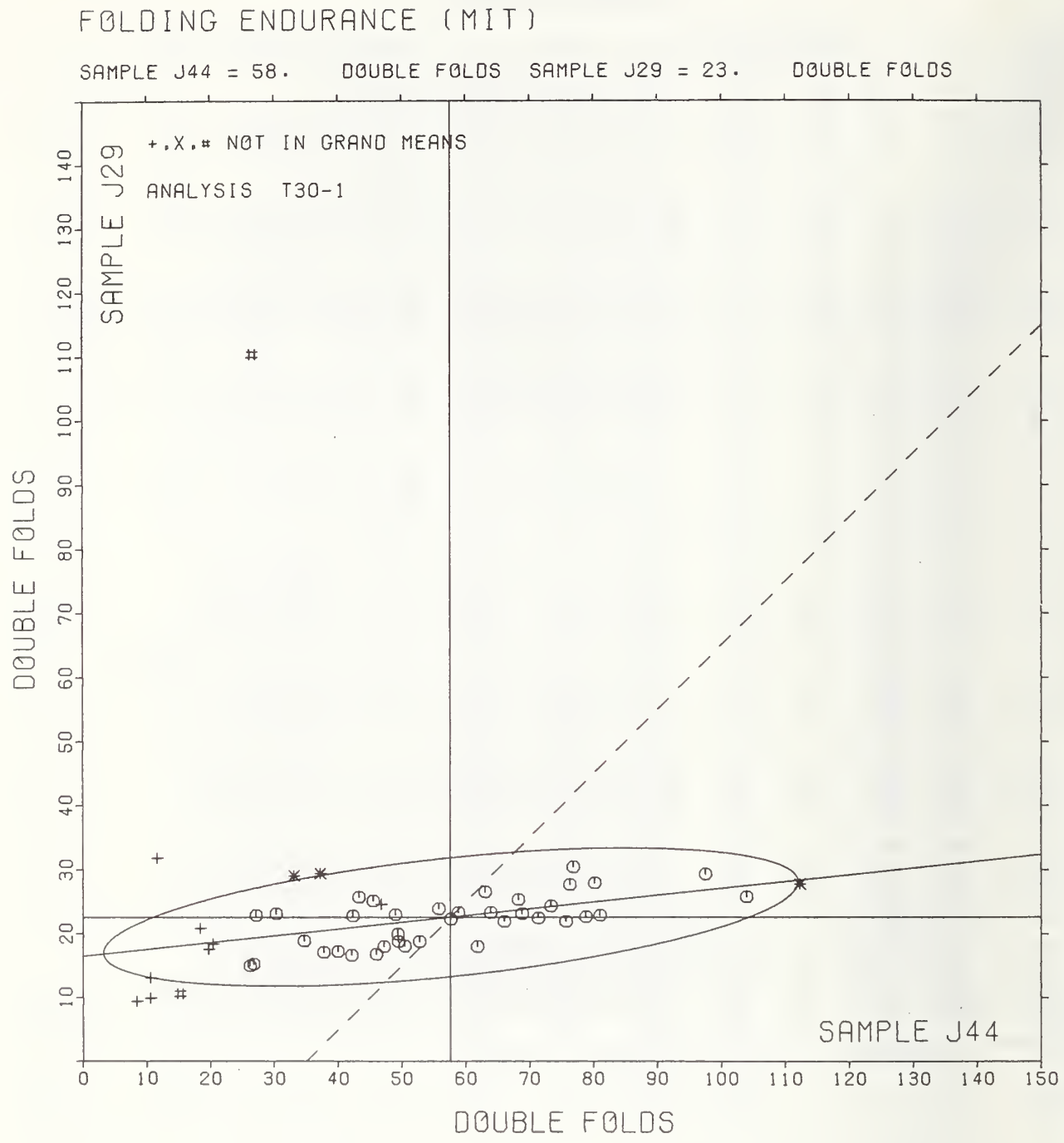
The following laboratories were omitted from the grand means because of extreme test results:
321, 339

The ISO (International Standards Organization) is propoaing 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.

Pleaae aee page 45 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 J44	J29	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L366B	•	8.5	9.4	-50.2	-7.9	.20	30T	FOLDING ENDURANCE, SCHOPPER, TMI
L581	•	10.6	10.0	-48.0	-7.6	.25	30T	FOLDING ENDURANCE, SCHOPPER, TMI
L396S	•	10.6	13.1	-47.7	-4.4	.35	30T	FOLDING ENDURANCE, SCHOPPER, TMI
L182S	•	11.7	31.8	-44.6	14.0	3.13	30S	FOLDING ENDURANCE, SCHOPPER, LEIPZIG
L339	#	14.5	9.3	-44.3	-8.6	.34	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L190D	•	18.5	20.9	-39.1	2.4	.50	30S	FOLDING ENDURANCE, SCHOPPER, LEIPZIG
L280	•	19.8	17.5	-38.1	-1.0	.54	30K	FOLDING ENDURANCE, KOHLER-MOLIN
L326S	•	20.5	18.4	-37.3	-.2	.36	30S	FOLDING ENDURANCE, SCHOPPER, LEIPZIG
L321	#	25.8	109.1	-22.5	89.4	4.28	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L390	o	26.3	15.0	-31.9	-4.2	.27	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L158	o	26.8	15.3	-31.4	-4.0	.57	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L285B	o	27.2	22.9	-30.2	3.5	1.66	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L326N	o	30.3	23.1	-27.0	3.4	1.84	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L118	*	33.1	29.1	-23.6	9.0	1.76	30D	FOLDING ENDURANCE, MIT, MODIFIED DRIVE TO REDUCE HEATING
L376	o	34.7	18.9	-23.1	-1.3	.82	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L121	*	37.3	29.4	-19.5	8.9	2.13	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L238B	o	37.8	17.1	-20.2	-3.3	.63	30D	FOLDING ENDURANCE, MIT, MODIFIED DRIVE TO REDUCE HEATING
L285A	o	40.0	17.3	-18.0	-3.4	.70	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L163	o	42.1	16.7	-16.0	-4.2	.61	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L366A	o	42.3	22.8	-15.1	1.8	.81	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L124	o	43.3	25.7	-13.9	4.7	1.24	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L341	o	45.5	25.1	-11.7	3.8	.88	30C	FOLDING ENDURANCE, MIT, CIRCULATING FAN IN CEILING
L299	o	46.0	16.8	-12.1	-4.5	.77	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L143	•	46.8	24.6	-10.5	3.2	1.05	30T	FOLDING ENDURANCE, SCHOPPER, TMI
L254	o	47.2	18.0	-10.8	-3.5	1.02	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L159	o	49.0	23.0	-8.5	1.3	.92	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L262	o	49.4	19.9	-8.4	-1.8	.50	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L162	o	49.5	18.8	-8.5	-2.9	.69	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L236	o	50.5	18.1	-7.6	-3.7	.52	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L589	o	52.8	18.8	-5.2	-3.2	.77	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L278	o	55.8	23.9	-1.6	1.5	.83	30C	FOLDING ENDURANCE, MIT, CIRCULATING FAN IN CEILING
L279	o	57.7	22.3	.1	-.3	.51	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L599	o	58.9	23.3	1.4	.6	.91	30C	FOLDING ENDURANCE, MIT, CIRCULATING FAN IN CEILING
L230	o	61.9	18.0	3.8	-5.0	.88	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L176	o	63.1	26.5	5.9	3.4	1.44	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L223F	o	63.9	23.3	6.4	.1	.95	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L105	o	66.1	21.9	8.4	-1.5	1.06	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L190C	o	68.3	25.3	11.0	1.6	1.55	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L275	o	68.9	23.1	11.3	-.6	1.30	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L388	o	71.4	22.5	13.7	-1.6	1.23	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L185	o	73.4	24.3	15.9	.1	.86	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L238A	o	75.7	21.9	18.0	-2.5	.94	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L396M	o	76.4	27.7	19.2	3.1	.84	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L122	o	76.9	30.5	20.0	5.8	1.82	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L531	o	78.9	22.7	21.2	-2.1	1.61	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L567	o	80.3	27.9	23.1	3.0	.92	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L565	o	81.1	22.9	23.4	-2.2	1.05	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L182M	o	97.5	29.3	40.4	2.5	1.75	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L243	o	103.9	25.7	46.4	-1.7	1.32	30D	FOLDING ENDURANCE, MIT, MODIFIED DRIVE TO REDUCE HEATING
L622	*	112.3	27.7	54.9	-.6	1.63	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
GMEANS:		57.6	22.6			1.00		
		95% ELLIPSE:		54.7	9.2	WITH GAMMA = 6 DEGREES		


FOLDING ENDURANCE (MIT)
SAMPLE J44 = 58. DOUBLE FOLDS SAMPLE J29 = 23. DOUBLE FOLDS
+,X,# NOT IN GRAND MEANS
ANALYSIS T30-1
SAMPLE J29
DOUBLE FOLDS
SAMPLE J44
DOUBLE FOLDS
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
10 20 30 40 50 60 70 80 90 100 110 120 130 140

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 J44 MEAN	PRINTING 116 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE J29 MEAN	PRINTING 102 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.- 15 VAR	F	LAB
L105	1.78	.10	.60	.20	.94	1.32	-.01	-.07	.14	1.11	30M	6	L105
L118	1.48	-.20	-1.19	.19	.87	1.40	.08	.98	.22	1.68	30D	6	L118
L121	1.49	-.19	-1.15	.29	1.38	1.36	.04	.46	.30	2.33	30M	6	L121
L122	1.83	.15	.91	.23	1.06	1.45	.13	1.66	.16	1.23	30M	6	L122
L124	1.58	-.10	-.58	.23	1.06	1.38	.06	.72	.16	1.23	30M	6	L124
L158	1.37	-.31	-1.85	.24	1.13	1.16	-.16	-2.07	.14	1.07	30N	6	L158
L159	1.65	-.03	-.20	.20	.96	1.34	.02	.27	.13	1.00	30N	6	L159
L162	1.65	-.03	-.16	.20	.92	1.26	-.06	-.76	.09	.72	30M	6	L162
L163	1.59	-.09	-.51	.18	.83	1.21	-.11	-1.49	.11	.82	30N	6	L163
L176	1.76	.08	.50	.19	.89	1.39	.07	.90	.15	1.16	30N	6	L176
L182M	1.95	.27	1.63	.19	.89	1.44	.12	1.52	.14	1.07	30M	6	L182M
L185	1.84	.16	.94	.17	.79	1.38	.05	.70	.09	.71	30N	6	L185
L190C	1.76	.08	.49	.28	1.33	1.37	.05	.62	.16	1.23	30N	6	L190C
L223F	1.76	.08	.46	.23	1.06	1.35	.03	.41	.11	.85	30M	6	L223F
L230	1.75	.07	.42	.21	.97	1.24	-.09	-1.13	.13	1.00	30N	6	L230
L236	1.69	.01	.08	.09	.44	1.24	-.08	-1.04	.11	.89	30N	6	L236
L238A	1.81	.13	.80	.26	1.22	1.34	.01	.17	.07	.51	30M	6	L238A
L238B	1.52	-.16	-.94	.22	1.03	1.22	-.10	-1.28	.09	.73	30D	6	L238B
L243	1.95	.27	1.60	.27	1.28	1.41	.08	1.07	.07	.56	30D	6	L243
L254	1.58	-.10	-.58	.28	1.30	1.24	-.08	-1.09	.13	.99	30M	6	L254
L262	1.69	.01	.04	.08	.39	1.29	-.03	-.45	.10	.78	30N	6	L262
L275	1.71	.03	.20	.37	1.74	1.35	.02	.32	.13	.98	30N	6	L275
L278	1.70	.02	.14	.20	.92	1.37	.05	.63	.08	.62	30C	6	L278
L279	1.75	.07	.44	.08	.38	1.34	.02	.21	.09	.71	30M	6	L279
L285A	1.57	-.11	-.67	.17	.81	1.22	-.11	-1.39	.14	1.10	30N	6	L285A
L285B	1.37	-.31	-1.86	.23	1.09	1.28	-.05	-.62	.26	1.98	30N	6	L285B
L299	1.60	-.08	-.50	.25	1.18	1.21	-.11	-1.43	.11	.83	30N	6	L299
L321	1.40	-.28	-1.69	.11	.52	1.98	.66	8.53	.24	1.85	30M	#	L321
L326N	1.38	-.30	-1.80	.31	1.48	1.28	-.04	-.50	.23	1.80	30N	6	L326N
L339	1.07	-.61	-3.63	.28	1.29	.96	-.37	-4.74	.11	.84	30N	#	L339
L341	1.60	-.08	-.47	.23	1.09	1.39	.06	.84	.11	.81	30C	6	L341
L366A	1.57	-.11	-.65	.22	1.02	1.35	.02	.32	.10	.76	30N	6	L366A
L376	1.44	-.24	-1.44	.28	1.31	1.27	-.06	-.73	.10	.74	30N	6	L376
L388	1.75	.07	.42	.33	1.53	1.34	.01	.19	.12	.90	30N	6	L388
L390	1.41	-.27	-1.63	.10	.49	1.17	-.15	-1.97	.07	.54	30N	6	L390
L396M	1.86	.19	1.11	.13	.63	1.43	.11	1.41	.10	.75	30N	6	L396M
L531	1.82	.14	.82	.25	1.16	1.33	.01	.14	.16	1.22	30M	6	L531
L565	1.87	.19	1.16	.20	.92	1.34	.02	.23	.13	.99	30N	6	L565
L567	1.87	.19	1.17	.17	.78	1.44	.12	1.51	.08	.61	30N	6	L567
L589	1.67	-.01	-.05	.21	1.00	1.27	-.06	-.75	.09	.68	30N	6	L589
L599	1.73	.05	.27	.21	.99	1.35	.03	.39	.12	.92	30C	6	L599
L622	2.02	.34	2.07	.16	.73	1.41	.08	1.09	.18	1.39	30M	6	L622
GR. MEAN =	1.68 LOG(10) FOLD			GRAND MEAN =		1.32 LOG(10) FOLD			TEST DETERMINATIONS =		15		
SD MEANS =	.17 LOG(10) FOLD			SD OF MEANS =		.08 LOG(10) FOLD			40 LABS IN GRAND MEANS				
	AVERAGE SDR =	.21 LOG(10) FOLD				AVERAGE SDR =	.13 LOG(10) FOLD						
L143	1.57	-.11	-.65	.33	1.54	1.37	.05	.67	.12	.95	30T	*	L143
L182S	1.02	-.66	-3.97	.23	1.06	1.36	.04	.53	.28	2.15	30S	*	L182S
L190D	1.20	-.48	-2.87	.25	1.17	1.31	-.01	-.16	.09	.67	30S	*	L190D
L280	1.24	-.44	-2.64	.24	1.14	1.22	-.10	-1.28	.14	1.07	30K	*	L280
L326S	1.29	-.39	-2.32	.13	.60	1.26	-.07	-.84	.08	.61	30S	*	L326S
L366B	.89	-.79	-4.76	.20	.92	.97	-.36	-4.62	.09	.68	30T	*	L366B
L396S	1.00	-.68	-4.05	.14	.66	1.10	-.23	-2.94	.14	1.12	30T	*	L396S
L581	.95	-.73	-4.38	.26	1.21	.99	-.33	-4.28	.08	.62	30T	*	L581

TOTAL NUMBER OF LABORATORIES REPORTING = 50

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.

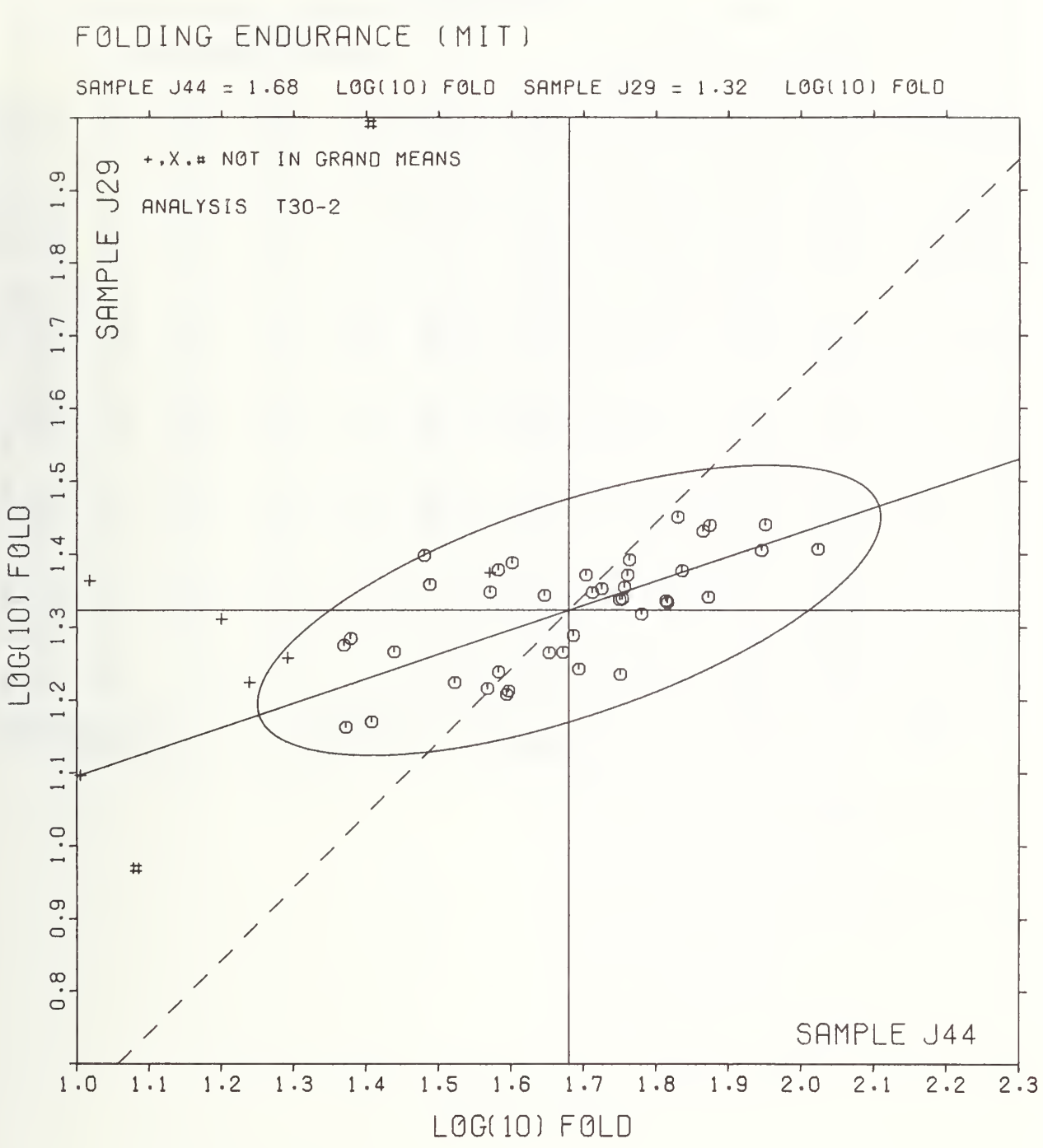
Raw data (Folding number in double folds)	log (base 10) of raw data
207	2.32
166	2.22
151	2.18
332	2.52
260	2.41
137	2.14
199	2.30
230	2.36
210	2.31
mean of raw data	mean of logs "Folding endurance"

ANALYSIS T30-2 TABLE 2

FOLDING ENDURANCE (MIT)

DATA IS LOG(BASE 10) OF THE DOUBLE FOLD MEASUREMENT

LAB CODE	F	MEANS J44	MEANS J29	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L366B	+	.89	.97	-.86	-.09	.80	30T	FOLDING ENDURANCE, SCHOPPER, TMI
L581	+	.95	.99	-.80	-.08	.92	30T	FOLDING ENDURANCE, SCHOPPER, TMI
L396S	+	1.00	1.10	-.71	-.00	.89	30T	FOLDING ENDURANCE, SCHOPPER, TMI
L182S	+	1.02	1.36	-.61	.25	1.61	30S	FOLDING ENDURANCE, SCHOPPER, LEIPZIG
L339	#	1.07	.96	-.69	-.15	1.06	30N	FOLDING ENDURANCE, MIT, NO CENTRIPUGAL FAN
L190D	+	1.20	1.31	-.46	.14	.92	30S	FOLDING ENDURANCE, SCHOPPER, LEIPZIG
L280	+	1.24	1.22	-.45	.05	1.10	30K	FOLDING ENDURANCE, KOHLER-MOLIN
L326S	+	1.29	1.26	-.39	.06	.61	30S	FOLDING ENDURANCE, SCHOPPER, LEIPZIG
L285B	O	1.37	1.28	-.31	.05	1.54	30N	FOLDING ENDURANCE, MIT, NO CENTRIPUGAL FAN
L158	O	1.37	1.16	-.34	-.05	1.10	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL PAN
L326N	O	1.38	1.28	-.30	.06	1.64	30N	FOLDING ENDURANCE, MIT, NO CENTRIPUGAL FAN
L321	#	1.40	1.98	-.06	.71	1.18	30M	FOLDING ENDURANCE, MIT, WITH CENTRIPUGAL FAN
L390	O	1.41	1.17	-.31	-.06	.52	30N	FOLDING ENDURANCE, MIT, NO CENTRIPUGAL PAN
L376	O	1.44	1.27	-.25	.02	1.03	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL PAN
L118	O	1.48	1.40	-.16	.13	1.27	30D	FOLDING ENDURANCE, MIT, MODIFIED DRIVE TO REDUCE HEATING
L121	O	1.49	1.36	-.17	.09	1.85	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L238B	O	1.52	1.22	-.18	-.04	.88	30D	FOLDING ENDURANCE, MIT, MODIFIED DRIVE TO REDUCE HEATING
L285A	O	1.57	1.22	-.14	-.07	.96	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL PAN
L143	+	1.57	1.37	-.09	.08	1.24	30T	FOLDING ENDURANCE, SCHOPPER, TMI
L356A	O	1.57	1.35	-.10	.06	.89	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L124	O	1.58	1.38	-.07	.08	1.15	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L254	O	1.58	1.24	-.12	-.05	1.15	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L163	O	1.59	1.21	-.12	-.08	.83	30N	FOLDING ENDURANCE, MIT, NO CENTRIPUGAL PAN
L299	O	1.60	1.21	-.11	-.08	1.00	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L341	O	1.60	1.39	-.05	.09	.95	30C	FOLDING ENDURANCE, MIT, CIRCULATING FAN IN CEILING
L159	O	1.65	1.34	-.03	.03	.98	30N	FOLDING ENDURANCE, MIT, NO CENTRIPUGAL FAN
L162	O	1.65	1.26	-.04	-.05	.82	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L589	O	1.67	1.27	-.03	-.05	.84	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L262	O	1.69	1.29	-.00	-.03	.59	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL PAN
L236	O	1.69	1.24	-.01	-.08	.66	30N	FOLDING ENDURANCE, MIT, NO CENTRIPUGAL FAN
L278	O	1.70	1.37	.04	.04	.77	30C	FOLDING ENDURANCE, MIT, CIRCULATING FAN IN CEILING
L275	O	1.71	1.35	.04	.01	1.36	30N	FOLDING ENDURANCE, MIT, NO CENTRIPUGAL FAN
L599	O	1.73	1.35	.05	.01	.95	30C	FOLDING ENDURANCE, MIT, CIRCULATING FAN IN CEILING
L368	O	1.75	1.34	.07	-.01	1.22	30N	FOLDING ENDURANCE, MIT, NO CENTRIPUGAL PAN
L230	O	1.75	1.24	.04	-.10	.98	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L279	O	1.75	1.34	.08	-.01	.55	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL PAN
L223F	O	1.76	1.35	.08	.01	.96	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL PAN
L190C	O	1.76	1.37	.09	.02	1.28	30N	FOLDING ENDURANCE, MIT, NO CENTRIPUGAL PAN
L176	O	1.76	1.39	.10	.04	1.03	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL PAN
L105	O	1.78	1.32	.09	-.04	1.02	30M	FOLDING ENDURANCE, MIT, WITH CENTRIPUGAL FAN
L238A	O	1.81	1.34	.13	-.03	.86	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L531	O	1.82	1.33	.13	-.03	1.19	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L122	O	1.83	1.45	.18	.07	1.15	30M	FOLDING ENDURANCE, MIT, WITH CENTRIPUGAL FAN
L185	O	1.84	1.38	.17	.00	.75	30N	FOLDING ENDURANCE, MIT, NO CENTRIPUGAL FAN
L396M	O	1.86	1.43	.21	.04	.69	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L565	O	1.87	1.34	.19	-.04	.96	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L567	O	1.87	1.44	.22	.05	.70	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L243	O	1.95	1.41	.28	-.01	.92	30D	FOLDING ENDURANCE, MIT, MODIPIED DRIVE TO REDUCE HEATING
L182M	O	1.95	1.44	.29	.03	.98	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL PAN
L622	O	2.02	1.41	.35	-.03	1.06	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL PAN
GMEANS:		1.68	1.32			1.00		
		95% ELLIPSE:		.45	.15	WITH GAMMA = 18 DEGREES		


FOLDING ENDURANCE (MIT)
SAMPLE J44 = 1.68 LOG(10) FOLD
SAMPLE J29 = 1.32 LOG(10) FOLD
+,X,# NOT IN GRAND MEANS
ANALYSIS T30-2
SAMPLE J29
LOG(10) FOLD
SAMPLE J44
LOG(10) FOLD
0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9
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

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 H67 MEAN	PRINTING 84 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE H69 MEAN	PRINTING 96 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.= 10 VAR	P	LAB
L118	484.	1.	.05	30.	1.04	446.	-4.	-.15	21.	.99	35G	0	L118
L121	510.	27.	.94	19.	.68	488.	38.	1.31	23.	1.10	35G	0	L121
L122	497.	15.	.50	33.	1.15	461.	10.	.36	35.	1.66	35G	0	L122
L132	411.	-72.	-2.47	40.	1.40	420.	-30.	-1.06	38.	1.79	35G	*	L132
L139	477.	-6.	-.19	19.	.66	446.	-4.	-.15	16.	.76	35G	0	L139
L148	484.	1.	.04	18.	.62	437.	-13.	-.46	18.	.85	35G	0	L148
L153	485.	2.	.08	35.	1.24	422.	-29.	-1.01	20.	.95	35G	0	L153
L159	469.	-13.	-.46	20.	.69	441.	-9.	-.33	23.	1.09	35G	0	L159
L162	444.	-39.	-1.34	27.	.94	417.	-34.	-1.17	28.	1.33	35G	0	L162
L163	493.	10.	.36	33.	1.14	463.	13.	.44	11.	.50	35G	0	L163
L190C	452.	-30.	-1.05	13.	.46	432.	-18.	-.63	14.	.67	35G	0	L190C
L195	595.	112.	3.86	17.	.59	567.	117.	4.08	32.	1.52	35G	#	L195
L223	461.	-22.	-.75	21.	.72	430.	-20.	-.72	10.	.45	35G	0	L223
L224	729.	247.	8.49	19.	.65	807.	357.	12.46	62.	2.92	35G	#	L224
L236	468.	-15.	-.51	29.	1.01	428.	-23.	-.79	25.	1.19	35G	0	L236
L241	543.	60.	2.07	41.	1.45	495.	45.	1.56	17.	.80	35G	0	L241
L249	466.	-17.	-.58	20.	.71	456.	6.	.20	23.	1.06	35G	0	L249
L254	472.	-11.	-.37	29.	1.02	428.	-22.	-.77	16.	.75	35G	0	L254
L260	496.	13.	.44	27.	.95	432.	-18.	-.65	8.	.38	35G	0	L260
L268	437.	-46.	-1.57	36.	1.27	415.	-35.	-1.24	16.	.76	35G	0	L268
L285	296.	-187.	-6.43	22.	.75	280.	-170.	-5.94	14.	.66	35G	#	L285
L291	522.	39.	1.36	24.	.83	472.	22.	.75	25.	1.19	35G	0	L291
L297	455.	-28.	-.95	26.	.90	393.	-57.	-2.00	16.	.76	35G	0	L297
L308	477.	-6.	-.20	24.	.84	476.	25.	.88	17.	.82	35G	0	L308
L321	780.	297.	10.22	53.	1.85	749.	299.	10.44	41.	1.95	35G	#	L321
L356	474.	-8.	-.29	24.	.85	423.	-27.	-.96	17.	.81	35G	0	L356
L376	514.	31.	1.07	47.	1.64	487.	37.	1.28	35.	1.64	35G	0	L376
L382	529.	46.	1.59	34.	1.19	486.	36.	1.25	18.	.85	35G	0	L382
L390	498.	16.	.54	36.	1.28	480.	30.	1.04	54.	2.53	35G	0	L390
L396	495.	12.	.41	28.	.99	458.	8.	.27	12.	.55	35G	0	L396
L567	487.	5.	.16	42.	1.45	498.	47.	1.65	33.	1.55	35G	0	L567
L575	515.	32.	1.11	37.	1.29	482.	31.	1.09	21.	1.00	35G	0	L575
GR. MEAN =	483. GURLEY UNITS				GRAND MEAN =	450. GURLEY UNITS				TEST DETERMINATIONS = 10			
SD MEANS =	29. GURLEY UNITS				SD OF MEANS =	29. GURLEY UNITS				28 LABS IN GRAND MEANS			
	AVERAGE SDR =	29. GURLEY UNITS				AVERAGE SDR =	21. GURLEY UNITS						
L213	492.	9.	.31	30.	1.06	445.	-5.	-.19	8.	.40	35H	*	L213

TOTAL NUMBER OF LABORATORIES REPORTING = 33

Best values: H67 490 ± 50 Gurley units
H69 450 ± 40 Gurley units

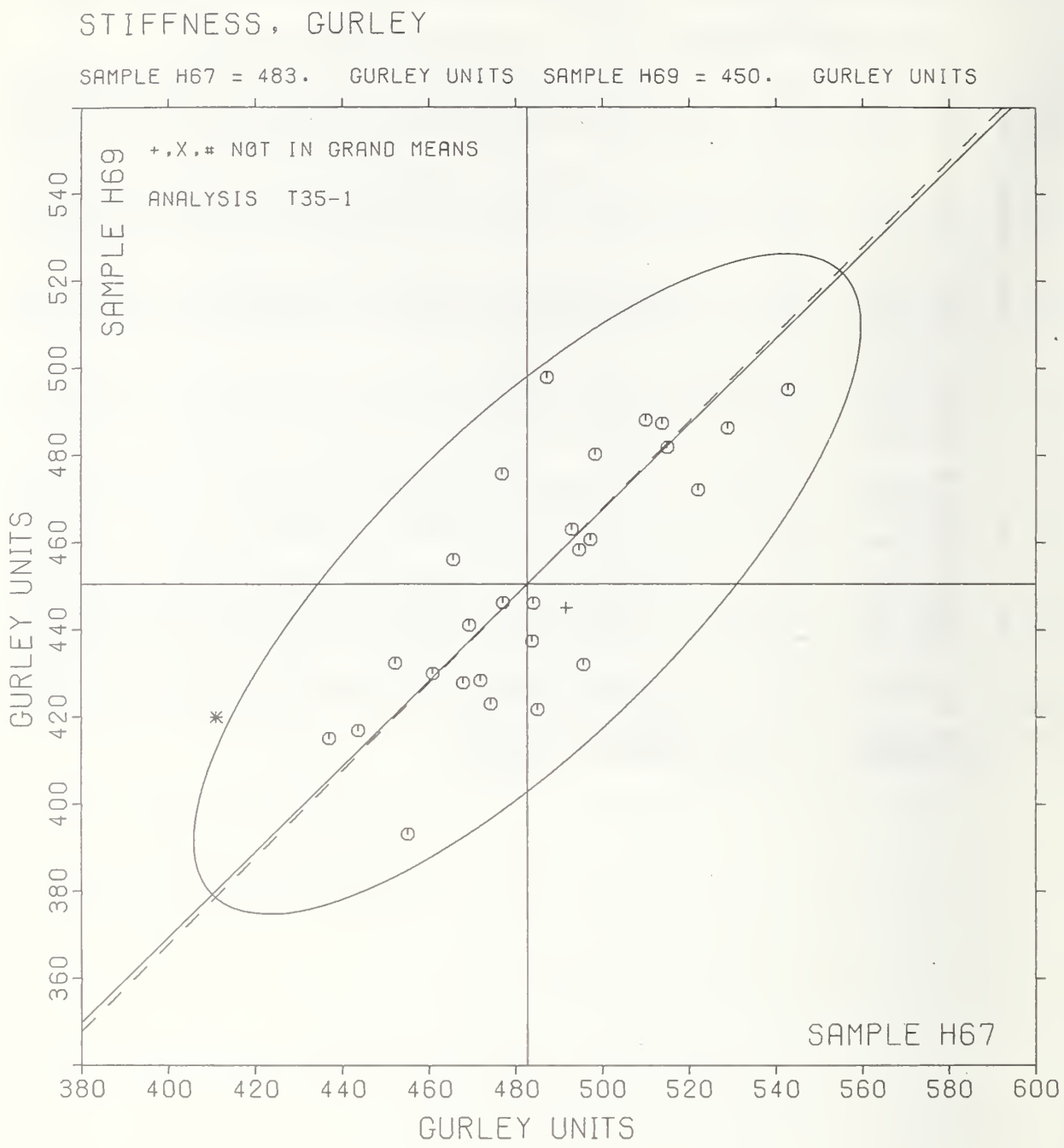
The following laboratories were omitted from the grand means because of extreme test results:
195, 224, 285, 321

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 H67	MEANS H69	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L285	#	296.	280.	-252.	9.	.71	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L132	*	411.	420.	-73.	28.	1.60	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L268	@	437.	415.	-57.	7.	1.02	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L162	@	444.	417.	-51.	3.	1.13	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L190C	@	452.	432.	-34.	8.	.57	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L297	@	455.	393.	-60.	-22.	.83	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L223	@	461.	430.	-30.	1.	.59	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L249	@	466.	456.	-8.	16.	.88	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L236	@	468.	428.	-26.	-6.	1.10	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L159	@	469.	441.	-16.	3.	.89	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L254	@	472.	428.	-23.	-8.	.88	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L355	@	474.	423.	-25.	-14.	.83	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L308	@	477.	476.	14.	22.	.83	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L139	@	477.	446.	-7.	1.	.71	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L148	@	484.	437.	-8.	-10.	.74	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L118	@	484.	446.	-2.	-4.	1.01	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L153	@	485.	422.	-18.	-22.	1.10	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L567	@	487.	498.	36.	31.	1.50	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L213	*	492.	445.	3.	-10.	.73	35H	STIFFNESS, GURLEY (UNITS: MG/1X3 TEST PIECE), 20 C, 65% RH
L163	@	493.	463.	16.	2.	.82	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L396	@	495.	458.	14.	-3.	.77	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L260	@	496.	432.	-4.	-22.	.66	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L122	@	497.	461.	18.	-3.	1.40	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L390	@	498.	480.	32.	10.	1.90	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L121	@	510.	488.	46.	8.	.89	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L376	@	514.	487.	48.	4.	1.64	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L575	@	515.	482.	45.	-0.	1.14	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L291	@	522.	472.	43.	-12.	1.01	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L382	@	529.	486.	58.	-7.	1.02	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L241	@	543.	495.	74.	-10.	1.13	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L195	#	595.	567.	162.	5.	1.06	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L224	#	729.	807.	426.	82.	1.79	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
L321	#	780.	749.	421.	6.	1.90	35G	STIFFNESS, GURLEY (UNITS: MG/1X3 -ACTUALLY 3.5- TEST PIECE)
GMEANS:		483.	450.			1.00		
		95% ELLIPSE:		102.	36.	WITH GAMMA = 44 DEGREES		


STIFFNESS, GURLEY
SAMPLE H67 = 483. GURLEY UNITS SAMPLE H69 = 450. GURLEY UNITS
+,X,# NOT IN GRAND MEANS
ANALYSIS T35-1
SAMPLE H69
GURLEY UNITS
360 380 400 420 440 460 480 500 520 540
SAMPLE H67
380 400 420 440 460 480 500 520 540 560 580 600
GURLEY UNITS

ANALYSIS T36-1 TABLE 1

TABER STIFFNESS

TAPPI STANDARD T489 OS-76, RESULTS EXPRESSED IN GRAM CENTIMETERS

LAB CODE	SAMPLE E25 KRAFT 121 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	SAMPLE J10 PRINTING 149 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L107A	9.87	2.26	2.07	.47	1.08	9.00	-7.58	-10.14	.30	.37	36T	#	L107A
L122	8.43	.83	.76	.27	.62	16.35	-.23	-.30	.44	.55	36T	0	L122
L123	9.90	2.29	2.10	.57	1.30	18.40	1.82	2.44	.70	.88	36T	0	L123
L126	7.43	-.18	-.16	.25	.56	15.88	-.70	-.93	.70	.88	36T	0	L126
L158	6.05	-1.56	-1.42	.39	.89	16.25	-.33	-.44	1.32	1.66	36T	0	L158
L163	6.72	-.88	-.81	.51	1.17	16.10	-.48	-.64	.84	1.06	36T	0	L163
L173B	8.11	.50	.46	.64	1.46	15.50	-1.08	-1.44	.67	.84	36T	0	L173B
L176	19.90	12.29	11.25	1.61	3.71	12.35	-4.23	-5.66	1.06	1.33	36T	#	L176
L182	7.73	.12	.11	.47	1.07	16.97	.39	.52	.88	1.11	36T	0	L182
L207	8.32	.72	.66	.37	.85	16.44	-.14	-.18	.62	.78	36T	0	L207
L228	6.60	-1.01	-.92	.38	.87	16.00	-.58	-.77	1.83	2.29	36T	0	L228
L243	7.50	-.11	-.10	.47	1.08	16.50	-.08	-.10	.75	.94	36T	0	L243
L260	8.03	.42	.39	.27	.62	17.12	.54	.73	.36	.45	36T	0	L260
L262	8.15	.54	.50	.24	.56	17.00	.42	.57	.53	.66	36T	0	L262
L268	7.87	.26	.24	.38	.87	17.11	.53	.71	.40	.50	36T	0	L268
L273	8.00	.39	.36	.33	.77	17.15	.57	.77	.91	1.15	36T	0	L273
L281	7.97	.37	.34	.58	1.34	17.10	.52	.70	.39	.50	36T	0	L281
L290	5.92	-1.69	-1.54	.22	.51	16.15	-.43	-.57	1.16	1.45	36T	0	L290
L318	7.90	.29	.27	.32	.73	15.65	-.93	-1.24	.49	.61	36T	0	L318
L321	9.00	1.39	1.28	1.29	2.97	16.75	.17	.23	1.69	2.12	36T	0	L321
L324	6.47	-1.14	-1.04	.42	.98	17.39	.81	1.09	.74	.93	36T	0	L324
L339	5.06	-2.54	-2.32	.43	1.00	15.15	-1.43	-1.91	1.06	1.33	36T	0	L339
L570	8.40	.79	.73	.52	1.19	17.40	.82	1.10	.52	.65	36T	0	L570
L580	7.75	.14	.13	.26	.61	16.35	-.23	-.30	.53	.67	36T	0	L580
L616	20.25	12.64	11.57	.79	1.82	15.50	-1.08	-1.44	1.05	1.32	36T	#	L616

GR. MEAN = 7.61 TABER UNITS GRAND MEAN = 16.58 TABER UNITS TEST DETERMINATIONS = 10

SD MEANS = 1.09 TABER UNITS SD OF MEANS = .75 TABER UNITS 22 LABS IN GRAND MEANS

AVERAGE SDR = .44 TABER UNITS AVERAGE SDR = .80 TABER UNITS

L250	7.42	-.18	-.17	.47	1.08	14.65	-1.93	-2.58	.41	.52	36U	*	L250

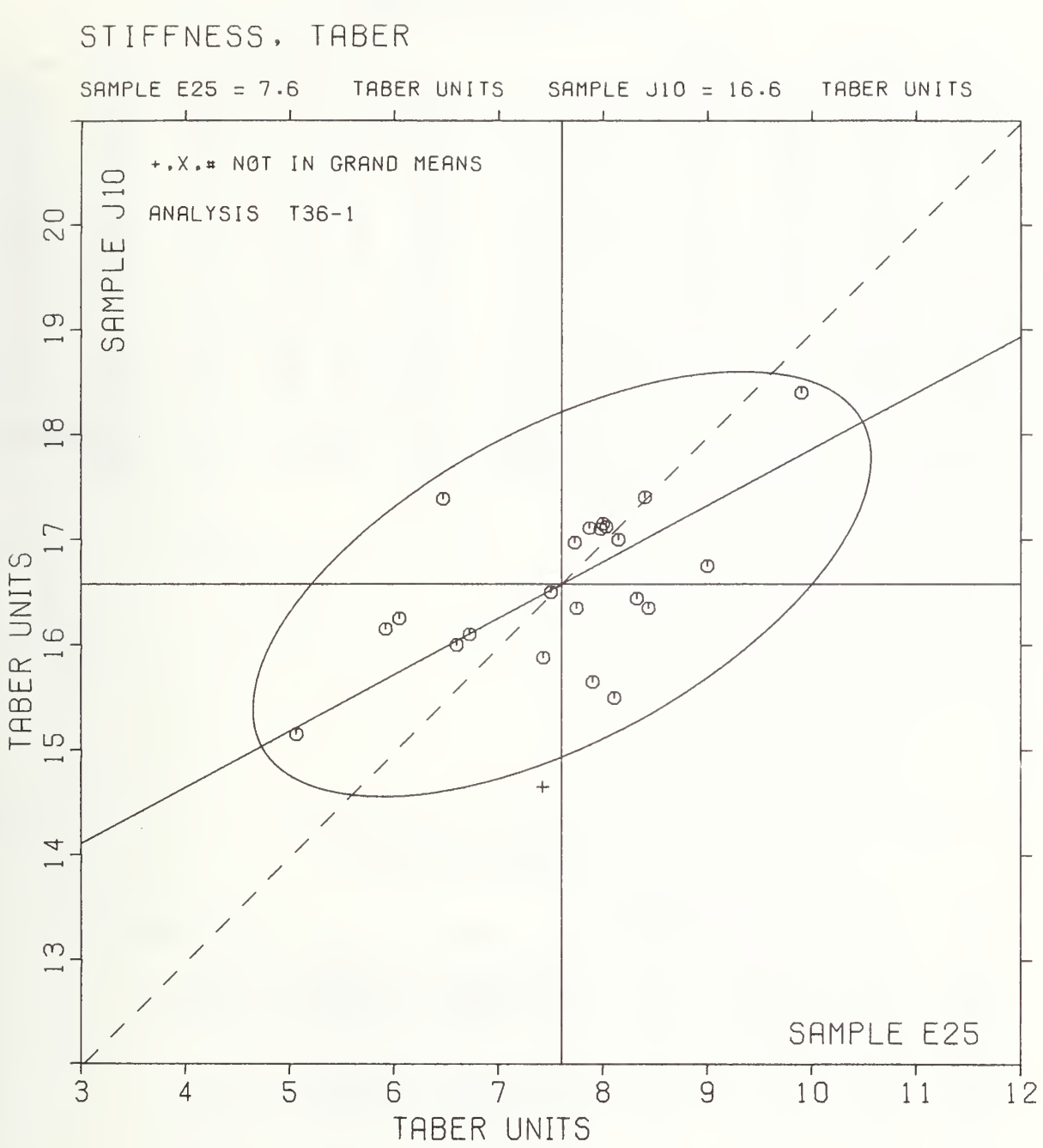
TOTAL NUMBER OF LABORATORIES REPORTING = 26

Best values: E25 7.7 ± 1.8 Taber units
J10 16.6 ± 1.1 Taber units

The following laboratories were omitted from the grand means because of extreme test results:
107A, 176, 616

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

LAB CODE	F	MEANS E25	MEANS J10	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L339	0	5.06	15.15	-2.91	-.06	1.16	36T	STIFFNESS, TABER
L290	0	5.92	16.15	-1.69	.42	.98	36T	STIFFNESS, TABER
L158	0	6.05	16.25	-1.53	.45	1.28	36T	STIFFNESS, TABER
L324	0	6.47	17.39	-.62	1.25	.95	36T	STIFFNESS, TABER
L228	0	6.60	16.00	-1.16	-.03	1.58	36T	STIFFNESS, TABER
L163	0	6.72	16.10	-1.00	-.00	1.11	36T	STIFFNESS, TABER
L250	*	7.42	14.65	-1.07	-1.61	.80	36U	STIFFNESS, TABER, 20 C, 65% RH
L126	0	7.43	15.88	-.49	-.53	.72	36T	STIFFNESS, TABER
L243	0	7.50	16.50	-.13	-.02	1.01	36T	STIFFNESS, TABER
L182	0	7.73	16.97	.29	.29	1.09	36T	STIFFNESS, TABER
L580	0	7.75	16.35	.02	-.27	.64	36T	STIFFNESS, TABER
L268	0	7.87	17.11	.48	.34	.69	36T	STIFFNESS, TABER
L318	0	7.90	15.65	-.18	-.96	.67	36T	STIFFNESS, TABER
L281	0	7.97	17.10	.57	.29	.92	36T	STIFFNESS, TABER
L273	0	8.00	17.15	.62	.32	.96	36T	STIFFNESS, TABER
L260	0	8.03	17.12	.63	.28	.54	36T	STIFFNESS, TABER
L173B	0	8.11	15.50	-.07	-1.19	1.15	36T	STIFFNESS, TABER
L262	0	8.15	17.00	.68	.11	.61	36T	STIFFNESS, TABER
L207	0	8.32	16.44	.57	-.46	.81	36T	STIFFNESS, TABER
L570	0	8.40	17.40	1.09	.35	.92	36T	STIFFNESS, TABER
L122	0	8.43	16.35	.62	-.59	.58	36T	STIFFNESS, TABER
L321	0	9.00	16.75	1.31	-.51	2.54	36T	STIFFNESS, TABER
L107A	#	9.87	9.00	-1.59	-7.75	.73	36T	STIFFNESS, TABER
L123	0	9.90	18.40	2.88	.52	1.09	36T	STIFFNESS, TABER
L176	#	19.90	12.35	8.83	-9.54	2.52	36T	STIFFNESS, TABER
L616	#	20.25	15.50	10.63	-6.93	1.57	36T	STIFFNESS, TABER
GMEANS:		7.61	16.58			1.00		
		95% ELLIPSE:		3.26	1.49	WITH GAMMA = 28 DEGREES		


STIFFNESS, TABER
SAMPLE E25 = 7.6 TABER UNITS
SAMPLE J10 = 16.6 TABER UNITS
+,X,* NOT IN GRAND MEANS
ANALYSIS T36-1
SAMPLE J10
TABER UNITS
SAMPLE E25
TABER UNITS
13
14
15
16
17
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12

ANALYSIS T49-1 TABLE 1
SURFACE PICK STRENGTH, IGT

LAB CODE	SAMPLE H82 MEAN	PRINTING 106 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE H79 MEAN	PRINTING 151 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.* 4 VAR	F	LAB
L121	57.5	-6.2	-.19	9.6	2.84	437.5	382.8	13.55	31.8	12.90	49F	#	L121
L122	61.5	-2.3	-.07	3.4	1.00	61.0	6.3	.22	3.7	1.52	49Q	O	L122
L182I	16.0	-47.7	-1.47	1.7	.50	21.0	-33.7	-1.19	2.1	.85	49Q	O	L182I
L190C	49.7	-14.0	-.43	1.7	.51	54.0	-.7	-.02	.8	.33	49T	O	L190C
L207	124.7	61.0	1.88	6.1	1.82	128.7	74.1	2.62	9.4	3.83	49I	#	L207
L242	78.5	14.8	.46	6.8	2.02	45.8	-8.9	-.31	2.0	.79	49P	O	L242
L243	115.5	51.8	1.60	9.0	2.66	99.7	45.1	1.59	3.9	1.57	49T	O	L243
L274	88.2	24.5	.76	.0	.00	88.2	33.5	1.19	.0	.00	49I	O	L274
L280	3.7	-60.0	-1.85	.0	.00	1.8	-52.9	-1.87	.3	.14	49U	#	L280
L291	77.9	14.2	.44	5.7	1.69	67.2	12.5	.44	5.6	2.29	49I	O	L291
L382	69.3	5.6	.17	1.2	.37	41.1	-13.6	-.48	3.5	1.44	49D	O	L382
L388	153.9	90.2	2.78	16.2	4.80	118.8	64.1	2.27	.0	.00	49Q	#	L388
L484	917.5	853.8	26.33	141.5	41.94	562.5	507.8	17.97	36.9	14.98	49P	#	L484
L616	300.0	236.3	7.29	.0	.00	221.2	166.6	5.89	25.3	10.28	49M	#	L616
L643	16.8	-46.9	-1.45	.9	.27	14.2	-40.5	-1.43	.5	.21	49I	O	L643

GR. MEAN = 63.7 KP CM/SEC GRAND MEAN = 54.7 KP CM/SEC TEST DETERMINATIONS = 4
SD MEANS = 32.4 KP CM/SEC SD OF MEANS = 28.3 KP CM/SEC 9 LABS IN GRAND MEANS
AVERAGE SDR = 3.4 KP CM/SEC AVERAGE SDR = 2.5 KP CM/SEC
TOTAL NUMBER OF LABORATORIES REPORTING = 15

The following laboratories were omitted from the grand means because of extreme test results:
182, 207, 243, 388, 643

Data from the following laboratories were omitted from the grand means because no viscosity values were reported: 121, 484

Data from the following laboratories were omitted from the grand means because the values were outside the range of the instrument: 280, 616

ANALYSIS T49-1 TABLE 2
SURFACE PICK STRENGTH, IGT

LAB CODE	F	MEANS H82	H79	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L280	#	3.7	1.8	-80.0	-1.0	.07	49U	SURFACE PICK STRENGTH,IGT, OIL
L182I	O	16.0	21.0	-58.2	5.5	.67	49Q	SURFACE PICK STRENGTH,IGT, IGT OIL
L643	O	16.8	14.2	-62.0	-.1	.24	49I	SURFACE PICK STRENGTH,IGT, PIB FLUID
L190C	O	49.7	54.0	-11.1	8.6	.42	49T	SURFACE PICK STRENGTH,IGT, IPC FLUID
L121	#	57.5	437.5	244.7	294.4	7.87	49F	SURFACE PICK STRENGTH,IGT, INK
L122	O	61.5	61.0	2.4	6.2	1.26	49Q	SURFACE PICK STRENGTH,IGT, IGT OIL
L382	O	69.3	41.1	-4.6	-14.0	.90	49D	SURFACE PICK STRENGTH,IGT, INK
L291	O	77.9	67.2	19.0	.2	1.99	49I	SURFACE PICK STRENGTH,IGT, PIB FLUID
L242	O	78.5	45.8	5.4	-16.4	1.41	49P	SURFACE PICK STRENGTH,IGT, IGT OIL
L274	O	88.2	88.2	40.4	9.5	.00	49I	SURFACE PICK STRENGTH,IGT, PIB PLUID
L243	O	115.5	99.7	68.6	.4	2.11	49T	SURFACE PICK STRENGTH,IGT, IPC PLUID
L207	#	124.7	128.7	94.5	16.4	2.82	49I	SURFACE PICK STRENGTH,IGT, PIB PLUID
L388	#	153.9	118.8	110.2	-10.1	2.40	49Q	SURFACE PICK STRENGTH,IGT, IGT OIL
L616	#	300.0	221.2	287.8	-27.6	5.14	49M	SURFACE PICK STRENGTH,IGT, PIB PLUID
L484	#	917.5	562.5	978.5	-171.1	28.46	49P	SURFACE PICK STRENGTH,IGT, IGT OIL
GMEANS:		63.7	54.7			1.00		
		95% ELLIPSE:		138.2	30.7	WITH GAMMA = 40 DEGREES		

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 H82 MEAN	PRINTING 106 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE H79 MEAN	PRINTING 151 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.- 5 VAR	F	LAB
L105	11.80	-.03	-.03	.45	.97	11.00	1.29	1.04	.71	1.83	50W	O	L105
L122	13.20	1.37	1.10	.45	.97	10.40	.69	.56	.55	1.42	50W	O	L122
L158	11.60	-.23	-.19	.55	1.19	9.40	-.31	-.25	.89	2.31	50W	O	L158
L162	12.00	.17	.14	.00	.00	9.20	-.51	-.41	.45	1.16	50W	O	L162
L173A	11.00	-.83	-.67	.00	.00	8.20	-1.51	-1.21	.45	1.16	50W	O	L173A
L182W	11.20	-.63	-.51	.45	.97	11.00	1.29	1.04	.00	.00	50W	O	L182W
L195	12.20	.37	.30	.84	1.82	9.60	-.11	-.08	.55	1.42	50W	O	L195
L213	12.00	.17	.14	.00	.00	10.00	.29	.24	.00	.00	50W	O	L213
L225	14.00	2.17	1.75	.00	.00	9.60	-.11	-.08	.55	1.42	50W	O	L225
L228	11.40	-.43	-.35	.55	1.19	9.00	-.71	-.57	.00	.00	50W	O	L228
L230	11.60	-.23	-.19	.55	1.19	8.80	-.91	-.73	.84	2.16	50W	O	L230
L236	9.20	-2.63	-2.12	.45	.97	14.80	5.09	4.11	1.64	4.25	50W	#	L236
L243	9.00	-2.83	-2.28	.71	1.54	9.00	-.71	-.57	.00	.00	50W	O	L243
L285	12.20	.37	.30	.45	.97	9.80	.09	.08	.45	1.16	50W	O	L285
L339	10.60	-1.23	-.99	1.34	2.92	13.00	3.29	2.66	.71	1.83	50W	*	L339
L366	13.40	1.57	1.26	.55	1.19	10.60	.89	.72	.55	1.42	50W	O	L366
L390	9.60	-2.23	-1.80	.55	1.19	7.60	-2.11	-1.70	.55	1.42	50W	O	L390
L561	12.80	.97	.78	1.10	2.39	10.00	.29	.24	.00	.00	50W	O	L561
L567	12.20	.37	.30	1.10	2.39	8.00	-1.71	-1.37	.00	.00	50W	O	L567
L616	13.00	1.17	.94	.00	.00	10.20	.49	.40	.45	1.16	50W	O	L616

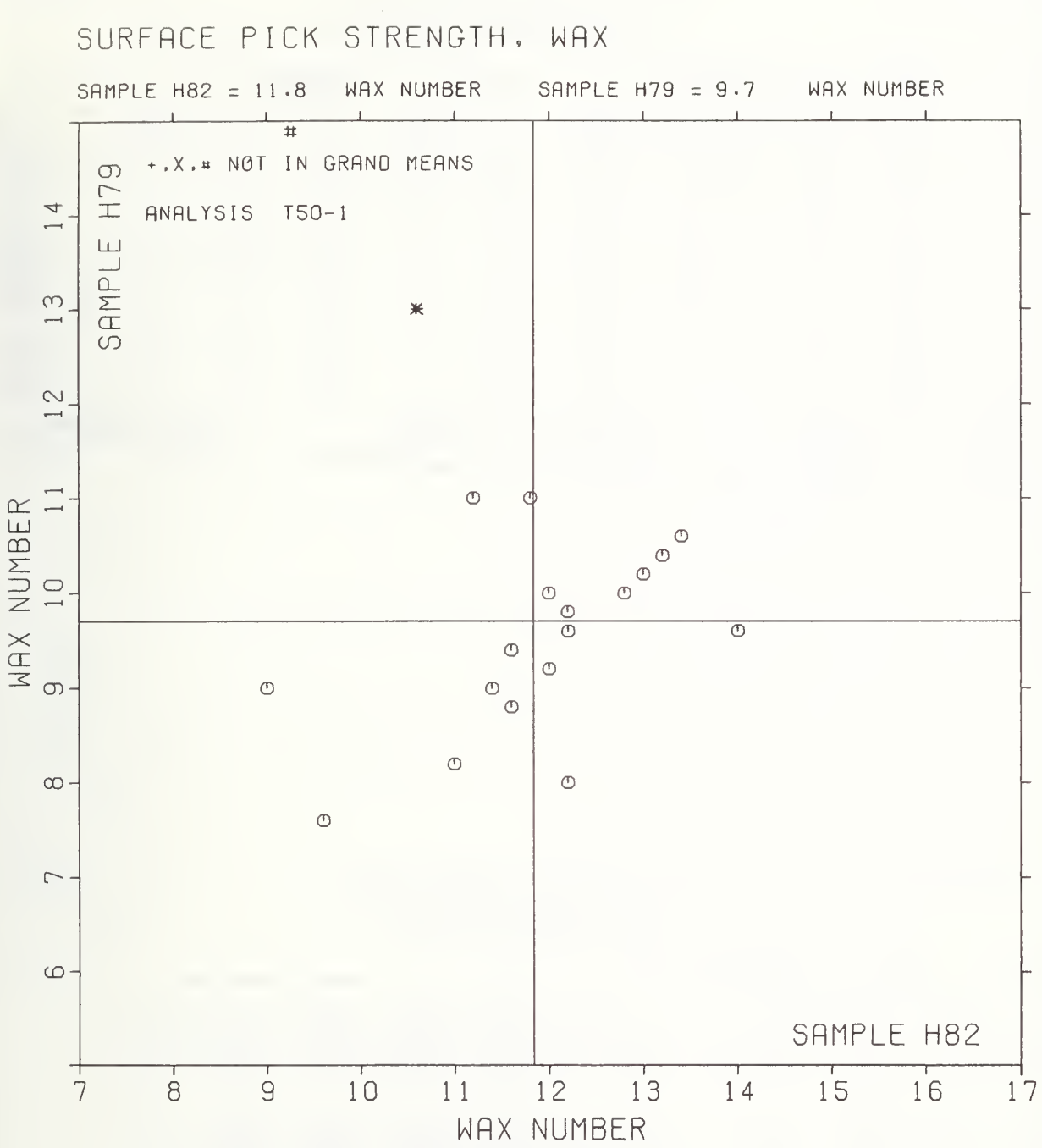
GR. MEAN = 11.83 WAX NUMBER GRAND MEAN = 9.71 WAX NUMBER TEST DETERMINATIONS = 5
SD MEANS = 1.24 WAX NUMBER SD OF MEANS = 1.24 WAX NUMBER 19 LABS IN GRAND MEANS
AVERAGE SDR = .46 WAX NUMBER AVERAGE SDR = .39 WAX NUMBER
TOTAL NUMBER OF LABORATORIES REPORTING = 20

Best values: H82 11.8 ± 2.2 wax number
H79 9.7 ± 2.0 wax number

The following laboratories were omitted from the grand means because of extreme test results: 236

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 H82	MEANS H79	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L243	O	9.00	9.00	-2.50	1.50	.77	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L236	*	9.20	14.80	1.74	5.46	2.61	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L390	O	9.60	7.60	-3.07	.09	1.30	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L339	*	10.60	13.00	1.46	3.20	2.38	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L173A	O	11.00	8.20	-1.65	-.48	.58	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L182W	O	11.20	11.00	.47	1.36	.49	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L228	O	11.40	9.00	-.80	-.19	.60	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L158	O	11.60	9.40	-.38	-.05	1.75	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L230	O	11.60	8.80	-.80	-.48	1.68	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L105	O	11.80	11.00	.89	.94	1.40	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L213	O	12.00	10.00	.33	.09	.00	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L162	O	12.00	9.20	-.24	-.48	.58	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L567	O	12.20	8.00	-.95	-1.47	1.19	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L195	O	12.20	9.60	.19	-.34	1.62	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L285	O	12.20	9.80	.33	-.19	1.06	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L561	O	12.80	10.00	.89	-.48	1.19	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L616	O	13.00	10.20	1.18	-.48	.58	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L122	O	13.20	10.40	1.46	-.48	1.19	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L366	O	13.40	10.60	1.74	-.48	1.30	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
L225	O	14.00	9.60	1.46	-1.61	.71	50W	SURFACE PICK STRENGTH, WAX (TAPPI T459 OS75)
GMEANS:		11.83	9.71			1.00		
		95% ELLIPSE:		3.77	3.03	WITH GAMMA = 45 DEGREES		


SURFACE PICK STRENGTH, WAX
SAMPLE H82 = 11.8 WAX NUMBER
SAMPLE H79 = 9.7 WAX NUMBER
+.X.# NOT IN GRAND MEANS
ANALYSIS T50-1
SAMPLE H79
WAX NUMBER
SAMPLE H82
WAX NUMBER
6
7
8
9
10
11
12
13
14
15
16
17

REPORT NO. 54S — TAPPI COLLABORATIVE REFERENCE PROGRAM — JUNE 1978

ANALYSIS T91-1 TABLE 1

CONCORA (CORRUGATING MEDIUM TEST-CMT)

TAPPI STANDARD T809 OS-71

LAB CODE	SAMPLE E71 TUBE WINDING 132 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	SAMPLE E72 LINERBOARD 127 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L176	345.	18.	.38	23.	1.44	242.	21.	.93	13.	1.10	91P	O	L176
L182	354.	26.	.56	12.	.77	247.	25.	1.13	16.	1.30	91N	O	L182
L185	374.	47.	1.00	20.	1.26	233.	11.	.51	12.	1.03	91A	O	L185
L218	304.	-24.	-.51	12.	.75	188.	-33.	-1.49	8.	.65	91P	O	L218
L248	347.	20.	.42	18.	1.11	224.	2.	.09	13.	1.07	91B	O	L248
L255	276.	-52.	-1.10	25.	1.55	213.	-9.	-.38	11.	.88	91P	O	L255
L269	331.	3.	.07	12.	.72	221.	-1.	-.04	14.	1.16	91P	O	L269
L289	338.	10.	.22	13.	.82	243.	22.	.97	18.	1.50	91P	O	L289
L329	361.	34.	.72	18.	1.11	222.	1.	.04	14.	1.19	91P	O	L329
L336	206.	-122.	-2.59	13.	.83	173.	-49.	-2.16	7.	.56	91P	O	L336
L394	307.	-20.	-.43	9.	.53	226.	4.	.19	7.	.60	91P	O	L394
L484	298.	-30.	-.63	14.	.84	198.	-24.	-1.05	10.	.85	91N	O	L484
L575	387.	59.	1.26	14.	.90	249.	28.	1.23	17.	1.40	91N	O	L575
L622	357.	29.	.63	22.	1.39	222.	1.	.04	9.	.72	91P	O	L622

GR. MEAN = 327. NEWTONS — GRAND MEAN = 222. NEWTONS — TEST DETERMINATIONS = 10

SD MEANS = 47. NEWTONS — SD OF MEANS = 22. NEWTONS — 14 LABS IN GRAND MEANS

AVERAGE SDR = 16. NEWTONS — AVERAGE SDR = 12. NEWTONS

GR. MEAN = 73.62 POUNDS — GRAND MEAN = 49.81 POUNDS

TOTAL NUMBER OF LABORATORIES REPORTING = 14

Best values: E71 345 ± 60 newtons
E72 225 ± 30 newtons

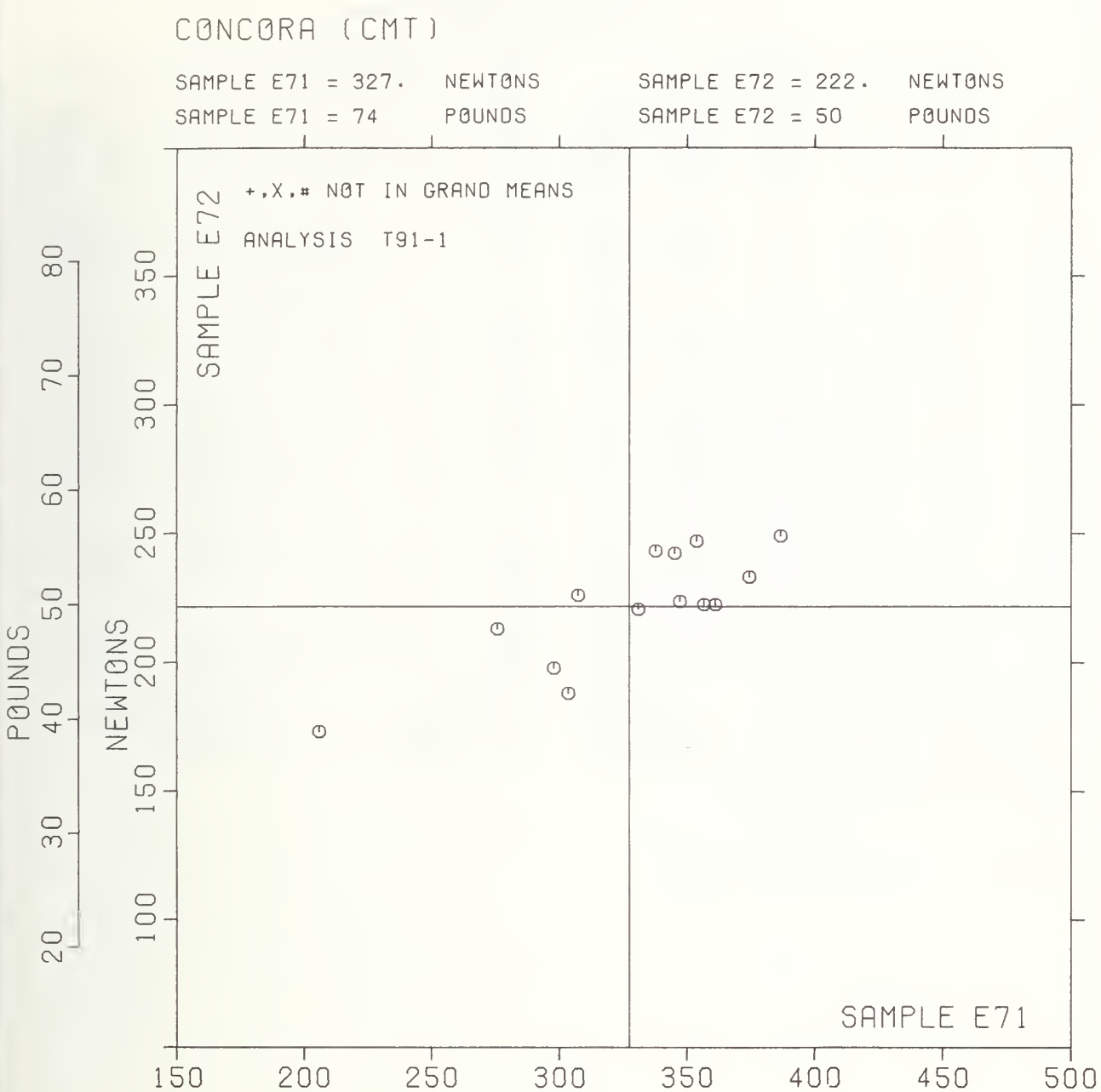
REPORT NO. 54S — TAPPI COLLABORATIVE REFERENCE PROGRAM — JUNE 1978

ANALYSIS T91-1 TABLE 2

CONCORA (CORRUGATING MEDIUM TEST-CMT)

TAPPI STANDARD T809 OS-71

LAB CODE	F	MEANS E71	E72	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L336	O	206.	173.	-131.	3.	.69	91P	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L255	O	276.	213.	-51.	12.	1.21	91P	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L484	O	298.	198.	-36.	-10.	.85	91N	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L218	O	304.	188.	-35.	-22.	.70	91P	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L394	O	307.	226.	-17.	12.	.56	91P	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L269	O	331.	221.	3.	-2.	.94	91P	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L289	O	338.	243.	18.	16.	1.16	91P	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L176	O	345.	242.	24.	12.	1.27	91P	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L248	O	347.	224.	19.	-6.	1.09	91B	FLAT CRUSH STRENGTH, CONCORA, INSTRON
L182	O	354.	247.	34.	13.	1.04	91N	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L622	O	357.	222.	27.	-11.	1.05	91P	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L329	O	361.	222.	31.	-12.	1.15	91P	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
L185	O	374.	233.	48.	-8.	1.14	91A	FLAT CRUSH STRENGTH, CONCORA, INSTRON
L575	O	387.	249.	65.	2.	1.15	91N	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH
GMEANS:		327.	222.			1.00		
		95% ELLIPSE:		147.	34.	WITH GAMMA = 22 DEGREES		


CONCORA (CMT)
SAMPLE E71 = 327. NEWTONS
SAMPLE E71 = 74 POUNDS
SAMPLE E72 = 222. NEWTONS
SAMPLE E72 = 50 POUNDS
+,X,# NOT IN GRAND MEANS
ANALYSIS T91-1
SAMPLE E72
SAMPLE E71
POUNDS
NEWTONS
NEWTONS
POUNDS
20 30 40 50 60 70 80
100 150 200 250 300 350
150 200 250 300 350 400 450 500
40 50 60 70 80 90 100 110

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T96-1 TABLE 1
RING CRUSH (COMPRESSION RESISTANCE OF PAPERBOARD)
TAPPI STANDARD T818 OS-76

LAB CODE	SAMPLE E71 TUBE WINDING 132 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	SAMPLE E72 LINERBOARD 127 GRAMS PER SQUARE METER MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
											TEST D.F. 10		
L107	221.	-12.	-.43	20.	1.27	181.	-22.	-.73	16.	1.13	96P	O	L107
L114	206.	-27.	-.94	14.	.89	195.	-7.	-.24	12.	.83	96P	O	L114
L122	193.	-41.	-1.41	20.	1.27	135.	-67.	-2.22	24.	1.68	96P	*	L122
L124	212.	-22.	-.75	24.	1.56	181.	-21.	-.70	19.	1.32	96P	O	L124
L126	236.	3.	.10	12.	.77	216.	14.	.45	9.	.66	96P	O	L126
L127	232.	-2.	-.06	15.	.99	218.	15.	.50	12.	.84	96P	O	L127
L141	231.	-3.	-.10	24.	1.53	195.	-8.	-.27	15.	1.03	96P	O	L141
L157	228.	-5.	-.18	10.	.62	191.	-11.	-.38	15.	1.06	96P	O	L157
L171	229.	-5.	-.16	15.	.99	202.	-1.	-.03	16.	1.15	96N	O	L171
L176	202.	-31.	-1.09	12.	.74	164.	-39.	-1.27	20.	1.44	96P	O	L176
L182	247.	14.	.47	15.	.99	227.	25.	.82	8.	.59	96N	O	L182
L191	203.	-31.	-1.06	23.	1.45	181.	-21.	-.70	23.	1.65	96P	O	L191
L303	252.	18.	.63	15.	.95	218.	16.	.51	13.	.93	96N	O	L303
L305	262.	29.	.99	9.	.61	226.	24.	.78	10.	.69	96P	O	L305
L307	190.	-44.	-1.51	13.	.84	166.	-37.	-1.21	9.	.65	96P	O	L307
L329	268.	35.	1.21	15.	.96	240.	37.	1.22	6.	.46	96P	O	L329
L336	346.	112.	3.89	24.	1.54	248.	46.	1.50	10.	.72	96P	#	L336
L350	234.	0.	.00	12.	.74	250.	47.	1.54	13.	.92	96P	X	L350
L393	246.	13.	.44	11.	.71	217.	14.	.47	10.	.72	96P	O	L393
L484	212.	-22.	-.75	26.	1.66	169.	-34.	-1.10	19.	1.34	96R	O	L484
L553	197.	-36.	-1.26	14.	.91	174.	-28.	-.93	19.	1.36	96P	O	L553
L562	237.	4.	.13	24.	1.56	197.	-6.	-.19	25.	1.74	96P	O	L562
L570	245.	11.	.39	9.	.59	201.	-2.	-.05	8.	.55	96P	O	L570
L575	260.	27.	.93	10.	.67	234.	32.	1.05	9.	.62	96N	O	L575
L603	310.	77.	2.66	16.	1.01	280.	78.	2.56	8.	.58	96P	*	L603
L610	250.	17.	.57	8.	.54	223.	21.	.68	10.	.71	96P	O	L610
L623	273.	39.	1.36	13.	.86	234.	32.	1.05	17.	1.18	96P	O	L623
L663	202.	-31.	-1.09	13.	.81	178.	-24.	-.80	11.	.76	96P	O	L663
L676	260.	26.	.91	24.	1.53	225.	22.	.73	23.	1.59	96P	O	L676

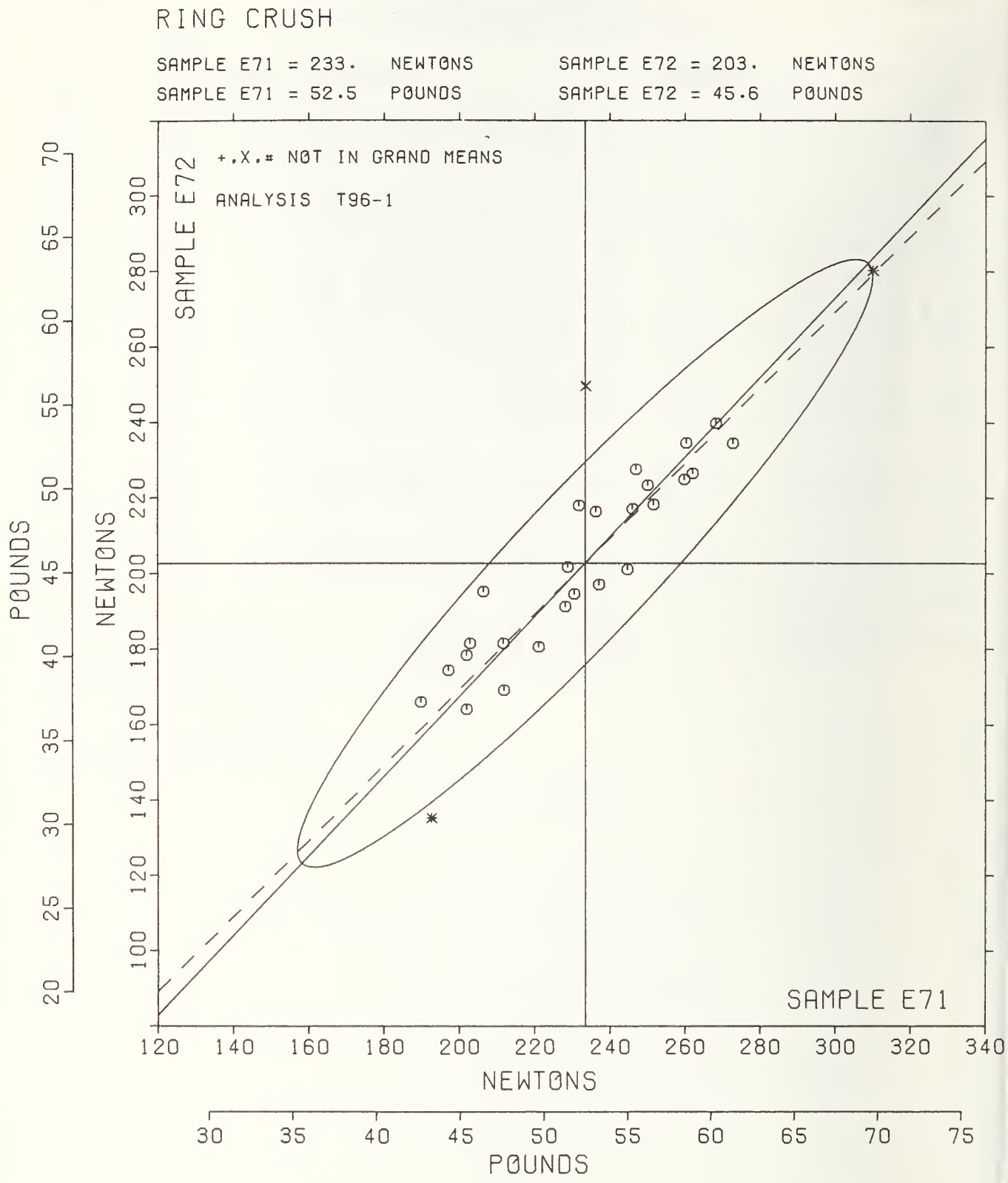
GR. MEAN = 233. NEWTONS — GRAND MEAN = 203. NEWTONS — TEST DETERMINATIONS = 10
SD MEANS = 29. NEWTONS — SD OF MEANS = 30. NEWTONS — 27 LABS IN GRAND MEANS
AVERAGE SDR = 16. NEWTONS — AVERAGE SDR = 14. NEWTONS
GR. MEAN = 52.47 POUNDS — GRAND MEAN = 45.56 POUNDS
TOTAL NUMBER OF LABORATORIES REPORTING = 29

Best values: E71 230 ± 40 newtons
E72 210 ± 40 newtons

The following laboratories were omitted from the grand means because of extreme test results: 336

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T96-1 TABLE 2
RING CRUSH (COMPRESSION RESISTANCE OF PAPERBOARD)
TAPPI STANDARD T818 OS-76

LAB CODE	F	MEANS E71	E72	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L307	O	190.	166.	-57.	6.	.75	96P	RING CRUSH, TMI/HINDE & DAUCH
L122	*	193.	135.	-77.	-17.	1.48	96P	RING CRUSH, TMI/HINDE & DAUCH
L553	O	197.	174.	-46.	7.	1.14	96P	RING CRUSH, TMI/HINDE & DAUCH
L663	O	202.	178.	-39.	6.	.79	96P	RING CRUSH, TMI/HINDE & DAUCH
L176	O	202.	164.	-50.	-4.	1.09	96P	RING CRUSH, TMI/HINDE & DAUCH
L191	O	203.	181.	-36.	8.	1.55	96P	RING CRUSH, TMI/HINDE & DAUCH
L114	O	206.	195.	-24.	15.	.86	96P	RING CRUSH, TMI/HINDE & DAUCH
L124	O	212.	181.	-30.	1.	1.44	96P	RING CRUSH, TMI/HINDE & DAUCH
L484	O	212.	169.	-39.	-7.	1.50	96R	RING CRUSH, REGMED
L107	O	221.	181.	-25.	-6.	1.20	96P	RING CRUSH, TMI/HINDE & DAUCH
L157	O	228.	191.	-12.	-4.	.84	96P	RING CRUSH, TMI/HINDE & DAUCH
L171	O	229.	202.	-4.	3.	1.07	96N	RING CRUSH, TMI/HINDE & DAUCH
L141	O	231.	195.	-8.	-3.	1.28	96P	RING CRUSH, TMI/HINDE & DAUCH
L127	O	232.	218.	10.	12.	.91	96P	RING CRUSH, TMI/HINDE & DAUCH
L350	X	234.	250.	34.	32.	.83	96P	RING CRUSH, TMI/HINDE & DAUCH
L126	O	236.	216.	12.	7.	.71	96P	RING CRUSH, TMI/HINDE & DAUCH
L562	O	237.	197.	-2.	-7.	1.65	96P	RING CRUSH, TMI/HINDE & DAUCH
L570	O	245.	201.	7.	-9.	.57	96P	RING CRUSH, TMI/HINDE & DAUCH
L393	O	246.	217.	19.	1.	.72	96P	RING CRUSH, TMI/HINDE & DAUCH
L182	O	247.	227.	27.	7.	.79	96N	RING CRUSH, TMI/HINDE & DAUCH
L610	O	250.	223.	26.	2.	.62	96P	RING CRUSH, TMI/HINDE & DAUCH
L303	O	252.	218.	24.	-3.	.94	96N	RING CRUSH, TMI/HINDE & DAUCH
L676	O	260.	225.	34.	-4.	1.56	96P	RING CRUSH, TMI/HINDE & DAUCH
L575	O	260.	234.	42.	2.	.64	96N	RING CRUSH, TMI/HINDE & DAUCH
L305	O	262.	226.	37.	-4.	.65	96P	RING CRUSH, TMI/HINDE & DAUCH
L329	O	268.	240.	51.	0.	.71	96P	RING CRUSH, TMI/HINDE & DAUCH
L623	O	273.	234.	50.	-7.	1.02	96P	RING CRUSH, TMI/HINDE & DAUCH
L603	*	310.	280.	109.	-2.	.79	96P	RING CRUSH, TMI/HINDE & DAUCH
L336	#	346.	248.	110.	-50.	1.13	96P	RING CRUSH, TMI/HINDE & DAUCH
GMEANS:		233.	203.			1.00		
		95% ELLIPSE:		109.	19.	WITH GAMMA = 46 DEGREES		


RING CRUSH
SAMPLE E71 = 233. NEWTONS
SAMPLE E71 = 52.5 POUNDS
SAMPLE E72 = 203. NEWTONS
SAMPLE E72 = 45.6 POUNDS
+,X,# NOT IN GRAND MEANS
ANALYSIS T96-1
SAMPLE E72
NEWTONS
100 120 140 160 180 200 220 240 260 280 300
POUNDS
20 25 30 35 40 45 50 55 60 65 70
SAMPLE E71
120 140 160 180 200 220 240 260 280 300 320 340
NEWTONS
30 35 40 45 50 55 60 65 70 75
POUNDS

SUMMARY TABLE

TEST METHOD	SAMPLE CODE	GRAND MEAN	SD OF MEAN	AVER SDR	REPL CRP	LABS INCL	LABS PARTIC	REPL TAPPI	REPEAT	REPROD
BURSTING STRENGTH, MODEL C	H06	32.59	1.87	1.63	15	39	48	10	1.43	5.25
T10-1 PSI	H63	16.78	1.54	1.21					1.06	4.30
BURSTING STRENGTH, MODEL C-A	H06	32.29	1.89	1.66	15	36	37	10	1.45	5.30
T10-2 PSI	H63	16.86	1.41	1.15					1.01	3.96
BURSTING STRENGTH, HIGH RANGE	B07	74.3	4.3	6.6	15	34	42	10	5.8	12.5
T11-1 PSI	E74	72.4	3.8	5.0					4.3	10.8
TEARING STRENGTH, DEEP CUTOUT	E49	78.6	3.2	2.3	15	105	122	10	2.0	8.9
T15-1 GRAMS	E75	85.7	3.9	2.8					2.4	10.8
TEARING STRENGTH,NO CUTOUT	E49	80.8	2.5	2.4	15	15	15	10	2.1	7.0
T17-1 GRAMS	J41	65.2	3.2	2.9					2.6	8.9
TENSILE STRENGTH, PACKAGING PAPERS	B10	7.12	.30	.52	20	52	55	12	.42	.88
T19-1 KILONEWTON/M	J15	8.52	.43	.33					.26	1.20
TENSILE STRENGTH, CRE TYPE	B46	8.32	.36	.48	20	43	52	12	.39	1.01
T20-1 KILONEWTON/M	J04	3.64	.22	.19					.16	.61
TENSILE STRENGTH, PENDULUM TYPE	B46	8.32	.60	.47	20	33	38	12	.38	1.68
T20-2 KILONEWTON/M	J04	3.72	.25	.19					.15	.69
T.E.A., PACKAGING PAPERS	B10	195.6	15.2	31.0	20	19	20	12	24.8	44.9
T25-1 JOULES/SQ M	J15	115.3	15.3	12.6					10.1	42.9
T.E.A., PRINTING PAPERS	B46	102.4	8.9	10.7	20	16	17	12	8.6	25.3
T26-1 JOULES/SQ M	J04	36.0	4.1	4.3					3.4	11.5
ELONGATION TO BREAK, PACKAGING PAPER	B10	4.12	.25	.49	20	18	19	12	.39	.74
T28-1 PERCENT	J15	2.14	.22	.16					.13	.60
ELONGATION TO BREAK, PRINTING PAPER	B46	2.00	.21	.15	20	15	18	12	.12	.59
T29-1 PERCENT	J04	1.52	.18	.15					.12	.51
FOLDING ENDURANCE (MIT)	J44	57.6	21.1	28.0	15	40	50	10	24.5	60.1
T30-1 DOUBLE FOLDS	J29	22.6	4.2	7.1					6.2	12.1
FOLDING ENDURANCE (MIT)	J44	1.68	.17	.21	15	40	50	10	.19	.47
T30-2 LOG(10) FOLD	J29	1.32	.08	.13					.11	.22
STIFFNESS, GURLEY	H67	483.	29.	29.	10	28	33	10	25.	81.
T35-1 GURLEY UNITS	H69	450.	29.	21.					19.	79.
STIFFNESS, TABER	E25	7.61	1.09	.44	10	22	26	5	.54	3.05
T36-1 TABER UNITS	J10	16.58	.75	.80					.99	2.18
SURFACE PICK STRENGTH, IGT	B82	63.7	32.4	3.4	4	9	15	4	4.7	89.8
T49-1 KP CM/SEC	H79	54.7	28.3	2.5					3.4	78.3
SURFACE PICK STRENGTH, WAX	H82	11.83	1.24	.46	5	19	20	5	.57	3.44
T50-1 WAX NUMBER	H79	9.71	1.24	.39					.48	3.44
CONCORA (CMT)	E71	327.	47.	16.	10	14	14	10	14.	130.
T91-1 NEWTONS	E72	222.	22.	12.					11.	62.
RING CRUSH	E71	233.	29.	16.	10	27	29	10	14.	80.
T96-1 NEWTONS	E72	203.	30.	14.					12.	84.

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

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