DOE/CE/40738--T12
(DE96003784)

Energy
CONSERVATION

HIGH-INTENSITY DRYING PROCESS - IMPULSE DRYING

PROGRESS REPORT ON FURNISH EVALUATIONS FOR IMPULSE DRYING COMMERCIALIZATION DEMONSTRATION

Topical Report

By
D. Orloff
P. Phelan
I. Rudman

February 1995

Work Performed Under Contract DE-FG02-85CE40738

For
U.S. Department of Energy
Office of Industrial Technologies
Washington, D.C.

By
The Institute of Paper Science and Technology
Atlanta, GA

This report has been reproduced directly from the best available copy.

Available to DOE and DOE contractors from the Office of Scientific and Technical Information, P.O. Box 62, Oak Ridge, TN 37831; prices available from (423) 576-8401.

Available to the public from the U.S. Department of Commerce, Technology Administration, National Technical Information Services, Springfield, VA 22161, (703) 487-4650.

DOE/CE/40738--T12
(DE96003784)
Distribution Category UC-1400

HIGH-INTENSITY DRYING PROCESS - IMPULSE DRYING

PROGRESS REPORT ON FURNISH EVALUATIONS FOR IMPULSE DRYING COMMERCIALIZATION DEMONSTRATION

Topical Report

By
David I. Orloff
Paul M. Phelan
Isaak Rudman

February 1995

Work Performed Under Contract No. DE-FG02-85CE40738

For
U.S. Department of Energy
Office of the Assistant Secretary
for Energy Efficiency and Renewable Energy
Office of Industrial Technologies
Washington, D.C.

By
The Institute of Paper Science and Technology
Atlanta, GA

TABLE OF CONTENTS

SUMMARY

Laboratory- and pilot-scale experiments were performed in cooperation with Beloit Corporation and Union Camp Corporation to identify potential furnishes and operating parameters for upcoming high-speed pilot-scale trials and commercial demonstration of impulse drying. These initial experiments focused on determining the relationship between water permeability, refining, and prepressing for specific pulps. Also, mill refined pulp and machine paper were compared to laboratory samples in regards to water permeability and impulse drying performance.

Results indicate that hydrodynamic specific surface is highly dependent on sheet formation and prehandling. Without extreme care in sheet preparation, the permeability test results are highly variable. However, the trends indicate that minimum refining and prepressing as much as possible are necessary to lower the specific surface to the range (1-2 m^2/g) necessary for maximum impulse drying efficiency.

Mill refined pulp and machine paper were comparable to laboratory prepared samples in regards to permeability and impulse drying. Impulse drying results in an outgoing solids improvement of up to eight percentage points compared to double-felted pressing. STFI index values showed an increase of up to 3.5% over double-felted pressing. These results were achieved with ingoing solids of 40-42%. At ingoing solids of 35%, impulse drying showed less improvement compared to double-felted pressing, indicating that an impulse dryer should be in the third or fourth press position for maximum efficiency. Ring crush improved 15% over double-felted pressing for the more open furnish, but double-felted pressing produced higher ring crush results for the closed furnish. For all cases impulse drying significantly decreased (up to 56%) Bendtsen roughness compared to double-felted pressing. Comparisons between Beloit and IPST results indicate consistent trends with IPST results being the most conservative.

Other process variables such as platen surface coating, felt type, felt moisture, and presteaming temperature profiles were investigated. In the laboratory simulations, high felt moisture (>32%) with the R felt resulted in excessive rewet and significant reduction in water removal. The laboratory equipment was not able to obtain presteaming temperature profiles comparable to machine conditions. Observations indicate that platen surface and felt type have an effect on water removal, sheet physical properties, rewet, and sheet sticking. Because of tradeoffs between these properties and others, the data obtained in these experiments were not sufficient to specify optimum process parameters.

These experiments used furnishes that simulated present commercial furnishes and a conservative nip load. Therefore, the water removal and strength improvements are less than what can potentially be achieved, yet substantial improvement in sheet smoothness was achieved. Maximum commercial nip loads are limited by present engineering constraints, but the top ply hydrodynamic specific surface could be substantially lowered to further improve impulse drying performance.

INTRODUCTION

Ongoing laboratory- and pilot-scale research at the Institute of Paper Science and Technology (IPST) has demonstrated that heavy weight grades of paper, such as linerboard, can be successfully impulse dried [1-21]. That research has shown that deleterious sheet delamination can be avoided by a combination of processing strategies. These strategies include steps to make the prepressed sheets highly permeable to water flow and steps to reduce excess heat transfer to the sheet that results in excessive internal flash evaporation at the exit of the impulse dryer.

Research at IPST suggests that high sheet Darcian permeability (low hydrodynamic specific surface) can be obtained by limiting refining to the minimum required for product aesthetics and by prepressing the sheet to as high a solids as possible. In addition, IPST research suggests that excessive pressure-dependent heat transfer can be eliminated by using press roll surfaces composed of materials having low thermal conductivity, low heat capacity, and low density.

Laboratory-scale experiments have been conducted with virgin Southern Pine, Douglas Fir, and OCC [1,2,4,6]. Two-ply sheets made from combinations of the above furnishes, at different levels of specific surface, have also been used. Both virgin furnishes have been successfully impulse dried in the laboratory. OCC performed best in regards to moisture removal and strength development when blended with a virgin kraft at concentrations of 50% or less by weight.

Pilot-scale experiments using a sheet-fed shoe press confirmed the laboratory-scale results [3,7]. The impulse drying critical temperature depends on the thermal properties of the roll coating and the specific surface of the heated ply of the sheet. Impulse drying was shown to be superior to single- and double-felted pressing in water removal and important physical properties. Both single-ply and two-ply sheets were successfully impulse dried.

RESEARCH OBJECTIVES

The overall objective of the work reported was to identify potential furnish types and operating windows to be used during the upcoming pilot-scale trials and commercial demonstration of impulse drying. To meet this objective, initial work was performed to meet the following specific objectives.

- Compare mill-refined pulp and machine paper to laboratory-refined pulp and handsheets in regards to water permeability and impulse drying performance.
- Determine the relationship between permeability, prepressing, and refining for specific pulps.
- Refine laboratory-scale operating parameters to better simulate commercial machine conditions.

EXPERIMENTAL PLANS AND PROCEDURES

This experimental program was a cooperative effort between Union Camp Corporation, Beloit Corporation, and IPST. Union Camp provided the pulp and prepared the handsheets for testing. Beloit prepressed the handsheets and performed some of the physical testing. IPST performed the permeability tests, impulse dried selected furnishes on the MTS laboratory press, and performed the ultrasonic testing. Beloit also performed MTS and pilot-scale impulse drying tests.

For machine linerboard samples, couch trim was grabbed from commercial Union Camp linerboard machines and sealed in plastic bags for transport. The couch trim samples were prepressed to 35% solids prior to testing.

The first set of furnishes evaluated was chosen to simulate present mill furnishes and is described in Table 1. All of these furnishes were made into handsheets for testing. Furnishes W1 and W5 were impulse dried. The remaining furnishes were used for permeability testing.

Table 1. Handsheet furnishes received for impulse drying evaluation.

IPST ID No.	U. C. ID No.	Top Sheet	Bottom Sheet	Nominal Basis Weight[a] (g/m^2)	Nominal Sheet Solids (%)	No. of Sheets Recv'd
W1	2P1	15% mill refined 4705-35-D, 260 ml CSF	85% mill refined 4705-35-E, 660 ml CSF	190	35 42	25 28
W2	1P1	none	100% mill refined 4705-35-E, 660 ml CSF	190	35 42	4 4
W3	1P2	100% mill refined 4705-35-D, 260 ml CSF	none	190	35 40	4 4
W4	2P2	15% valley beaten 4705-35-B, 650 ml CSF	85% mill refined 4705-35-E, 660 ml CSF	190		none
W5	2P3	15% valley beaten 4705-35-B, 650 ml CSF	85% valley beaten 4705-35-C, 640 ml CSF	190	35 42	25 25
W6	1P3	none	100% valley beaten 4705-35-C, 640 ml CSF	190	35 42	4 4
W7	1P4	100% valley beaten 4705-35-B, 650 ml CSF	none	190	35 42	4 4
W8	1P5	100% valley beaten Hard Wood, 650 ml CSF	none	190	35 42	8 8

a) Basis Weight is nominal oven-dried value based on 42# sheets at 7.5% moisture.
b) Cases W1 through W7 are a mixture of hardwood and pine.

For each furnish to be impulse dried, the following matrix of conditions was used.

Table 2. Impulse drying experimental matrix.

Case	D1	D2	D3	D4	A1	A2	C1	C2	A3	A4	C3	C4
Config.	DF	DF	DF	DF	ID	ID	ID	ID	ID	ID	ID	ID
Felt Type	B	B	R	R	B	B	B	B	R	R	R	R
Pivot Position	0	0	0	0	0	0	0	0	0	0	0	0
Platen Surface	n/a	n/a	n/a	n/a	A	A	C	C	A	A	C	C
Press Impulse (MPa·s)	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
no. of temps	n/a	n/a	n/a	n/a	a.n.	a.n.	a.n.	a.n.	a.n.	a.n.	a.n.	a.n.
Sin, %	35	42	35	42	35	42	35	42	35	42	35	42
repeats	10	10	10	10	a.n.	a.n.	a.n.	a.n.	a.n.	a.n.	a.n.	a.n.

a) Ingoing Sheet Temperature Impulse Drying = ~65°C (150°F)
Double-felted Pressing = Ambient

b) Ingoing Felt Moisture = 16% (0.2 mr)

c) a.n. = as needed.

A second set of experiments was performed to characterize the relationship of hydrodynamic specific surface to refining level and prepressing. The furnishes used are listed in Table 3.

Table 3. Furnishes used for permeability study.

IPST ID No.	U. C. ID No.	Pulp Type	Freeness (ml)
W9	1P10	100% Hardwood	691
W10	1P11	100% Pine, 93.0 Kappa	754
W11	1P12	50% Hardwood 50% Pine	707 761
W12	1P13	100% Pine	665
W15	1P14	100% Hardwood	670
W16	1P15	100% Hardwood	650
W17	1P16	100% Hardwood	630
W18	1P17	100% Pine	700
W19	1P18	100% Pine	620
W20	1P19	50% Hardwood 50% Pine	670 700
W21	1P20	50% Hardwood 50% Pine	650 660
W22	1P21	50% Hardwood 50% Pine	630 620

Each furnish was prepressed by Beloit as shown in Table 4, except as noted below. For case P1, furnishes W15-W17 and W22 were crushed resulting in questionable or lost samples. For case P2, furnishes W16, W17, and W22 were again crushed; furnish W15 was pressed at 300 and 800 pli. For cases P3-P5 and furnishes W15-W17 and W22, the first pressing was reduced to 300 pli. A few sheets were still crushed, and the data obtained from them were scrutinized.

Table 4. Pressing conditions.

Pressing Case	Roll Nip Pressures (pli)	DF ENP Pressures (pli)	Total Impulse (psi·s)
P1	800	n/a	2.42
P2	500+800	n/a	3.94
P3	500+800+1200	n/a	7.58
P4	500+800	6000	22.12
P5	800	6000+6000	38.78

a) Machine speed = 1650 fpm.

The water permeability tests were performed using procedures previously documented [24]. Compressive loads used were in the range of 200 to 650 lb.-force. Water pressure in the range of 2 to 15 psi was used to ensure flow rates in the range of 0.5 to 30 g/min.

The question was raised about whether the sheet temperature profile was constant in the z-direction during steaming. We embedded thermocouples in a sheet by pressing multiple thin layers (65 g/m^2) together with thermocouples between the layers. Top and bottom thermocouples were added to give a total of four measurements through the sheet. Table 5 lists the furnishes prepared with thermocouples.

Table 5. Multilayer sheets with thermocouples between the layers.

IPST ID No.	Ply	U. C. ID No.	Pulp Type	Freeness (ml)
W13	Top	1P6	100% Hardwood	691
	Middle & Bottom	1P7 & 1P9	100% Pine, 93.0 Kappa	659
W14	Top	1P8	100% Hardwood	297
	Middle & Bottom	1P7 & 1P9	100% Pine	659

RESULTS

FIBER ANALYSIS

For each furnish used for the refining study, samples from the prepared sheets were sent to John D. Hankey & Associates for fiber analysis. The results of the fiber identification are shown in Table 6. Table 7 summarizes the average fiber dimensions.

Table 6. Fiber identification for various pulp samples.

Furnish ID IPST	U. C.	USWK (%)	UHWK (%)	Softwood Species	Hardwood Species
W9	1P10	2	98	Mixed species of southern yellow pine (Hard Cook)	Oak, Gum, Yellow Poplar, Maple, and trace amounts of other mixed species
W10	1P11	97	3	Mixed species of southern yellow pine (Hard Cook)	Mixed, incl. Oak, Gum, Yellow Poplar, and Maple

Table 7. Fiber dimensions.

Case	Pulp	Kappa No.	Freeness (ml CSF)	Length (mm) Arith	LW	WW	Width (µm)	Perimeter (µm)	Cell Wall Thickness (µm)	Coarseness (mg/100 m)
W10	Pine	93.0	754	2.36	3.28	3.86	34.3	82.6	3.5	41.0
W18	Pine	93.0	700	2.44	3.21	3.78	34.6	85.2	4.0	35.8
W12	Pine	93.0	665	2.55	3.29	3.87	35.9	85.0	3.3	35.4
W19	Pine	93.0	620	2.19	2.92	3.46	36.2	85.2	3.2	35.2
W9	Hard	-	691	1.20	1.41	1.57	16.8	45.6	3.0	17.4
W15	Hard	-	670	1.47	1.33	1.47	16.9	46.2	3.1	15.8
W16	Hard	-	650	1.22	1.41	1.58	16.4	45.2	3.1	16.4
W17	Hard	-	630	1.17	1.32	1.43	16.0	44.4	3.1	16.2
W11	Mix	-	734	1.52	2.13	2.97	21.1	58.6	3.6	25.2
W20	Mix	-	685	1.55	2.19	3.01	23.8	60.0	3.1	21.6
W21	Mix	-	655	1.36	1.81	2.37	21.9	57.0	3.3	21.0
W22	Mix	-	625	1.44	2.15	3.11	22.8	58.0	3.1	21.2

PERMEABILITY

All of the raw permeability data are summarized in Appendix D as permeability versus porosity plots.

Couch Trim Sample Set

The permeability data collected for the couch trim samples are summarized in Table 8. Some of the sheets were manually separated at the ply bond and each ply tested.

Table 8. Permeability results for the couch trim samples.

Furnish	Sheet Solids (%)	95% Conf. Interval	OD Basis Weight (g/m^2)	95% Conf. Interval	Specific Surface (m^2/g)	95% Conf. Interval	Specific Volume (cm^3/g)	95% Conf. Interval
Mill #1	36.7	1.6	180	3	5.0	1.2	1.7	0.3
Mill #1 Top Ply	-	-	-	-	15.8	6.0	3.1	0.4
Mill #1 Bottom Ply	-	-	-	-	16.3	8.2	2.95	0.2
Mill #2	25.0	0.3	141	4	5.3	1.6	2.0	0.5
Mill #2 Top Ply	-	-	-	-	4.8	4.2	7.2	3.2
Mill #2 Bottom Ply	-	-	-	-	2.5	1.6	4.3	0.4

It was determined that the permeability test equipment was not working properly (note the large values for specific volume). Therefore, all of the above results are probably in error to some extent. Before continuing with additional tests, the equipment was repaired and checked. All of the data reported in subsequent sections of this report were collected after the repairs.

Impulse Drying Sample Set

Handsheets made from mill-refined and laboratory-refined pulps were evaluated for impulse drying. In addition to the two-ply sheets, one-ply sheets of each component pulp were tested for permeability. The results are shown in Table 9.

Table 9. Permeability results for the impulse drying samples.

IPST ID No.	U. C. ID No.	Sheet Solids (%)	95% Conf. Interval	OD Basis Weight (g/m^2)	95% Conf. Interval	Specific Surface (m^2/g)	95% Conf. Interval	Specific Volume (cm^3/g)	95% Conf. Interval
W1	2P1	36.8	1.1	174	5	7.3	1.0	2.0	0.1
W1	2P1	47.0	2.3	184	8	5.2	0.6	1.8	0.1
W2	1P1	35.7	1.2	171	9	4.9	1.6	2.0	0.1
W2	1P1	43.5	1.6	169	6	4.9	2.0	1.8	0.1
W3	1P2	32.3	1.8	178	7	60.9	4.9	1.2	0.1
W3	1P2	39.6	1.8	175	6	45.7	6.9	1.6	0.2
W5	2P3	37.1	1.3	183	6	6.0	1.9	1.9	0.1
W5	2P3	42.4	1.3	176	7	5.2	0.8	1.8	0.1
W6	1P3	30.7	2.4	182	4	6.4	2.2	2.0	0.04
W6	1P3	36.6	0.9	181	3	4.0	0.8	2.0	0.02
W7	1P4	31.1	0.2	174	2	11.8	1.2	1.8	0.04
W7	1P4	43.5	1.7	176	5	4.7	0.5	1.7	0.05
W8	1P5	35[a]	-	170	4	6.9	0.3	2.5	0.1
W8	1P5	42[a]	-	174	3	6.7	2.1	2.5	0.1

a) Nominal sheet solids.

Refining Study Set

All the sheets fabricated from furnishes W9 to W12 and W15 to W22 were prepressed to five pressing conditions as described above. Figures 1 to 6 show sheet solids after each prepressing as a function of press condition and total impulse for pine, hardwood, and 50/50 blends. For the pine cases, solids ranged from 30 to 48%, while for the hardwood cases, solids ranged from 36 to 51%. For all cases, solids were directly proportional to total press impulse. The same press impulse results in higher solids for samples of higher freeness. The freeness values used for the mixed cases were averages of the component freenesses.

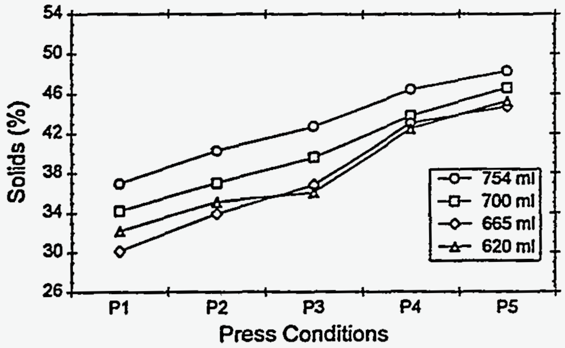

Figure 1. Average sheet solids for pine furnish.

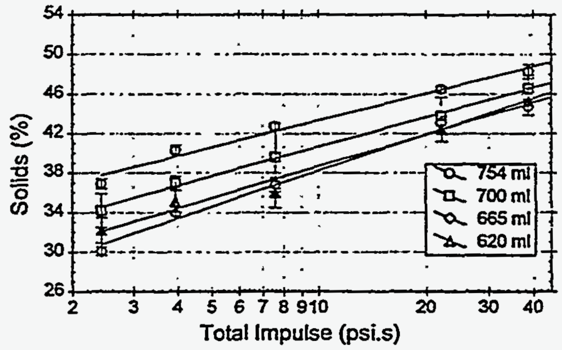

Figure 2. Average sheet solids for pine furnish.

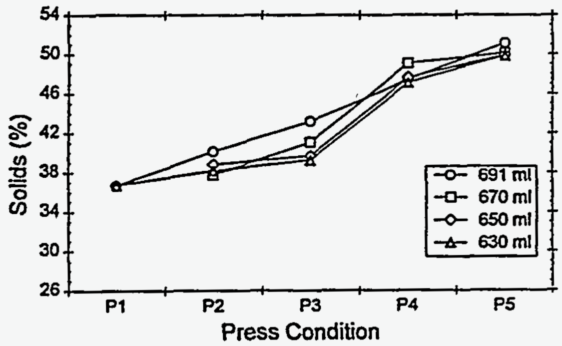

Figure 3. Average sheet solids for hardwood furnish.

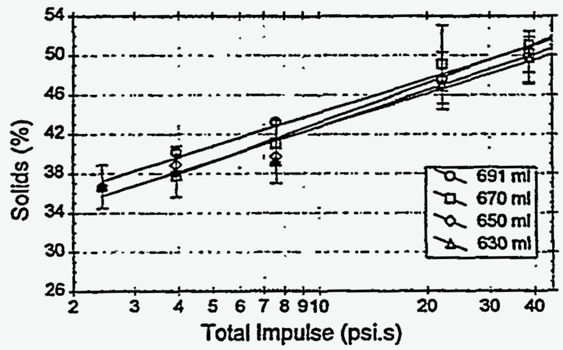

Figure 4. Average sheet solids for hardwood furnish.

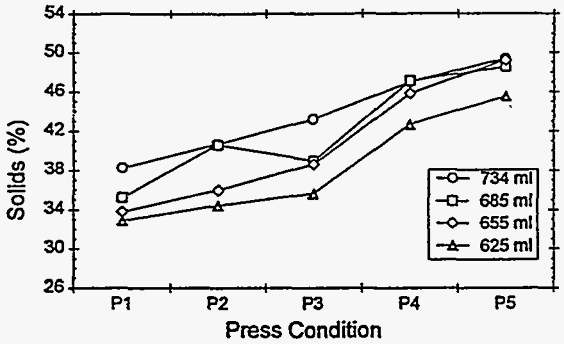

Figure 5. Average sheet solids for mixed furnish.

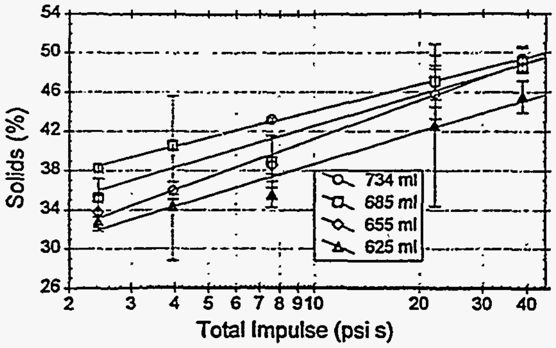

Figure 6. Average sheet solids for mixed furnish.

The sheets were formed and pressed in two batches. The first batch (W9-W12) was received and tested in early September. The second batch (W15-W22) was received about 1.5 months later. Between four and six samples were tested for each case (furnish and prepressing condition). All of the samples were stored in the refrigerator until tested. Since previous work [24] observed that fiber aging affects permeability results, the tests were performed in random order.

Figures 7 through 18 show the dependence of specific surface on storage time measured from pressing date. In general, for the least pressed cases (P1), specific surface increased with storage time. For the pine furnish, there is a general decrease in specific surface with time except for the highest freeness case (W10). For the case W10 (754 ml CSF), there was no aging effect observed.

For the hardwood sheets, the aging effect was more significant and resulted in increased specific surface with time except for the least refined case, W9 (691 ml CSF). For case W9, specific surface increases with time except for the least pressed sheets (P1). There was no observed time correlation for the mixed cases.

In general, the variability of the permeability test results was too great to accurately compensate for aging effects; therefore, for further analysis, all results were time averaged. For some of the cases plotted below, there were data points that were outside of the range plotted. These data points are shown in a box in the plot.

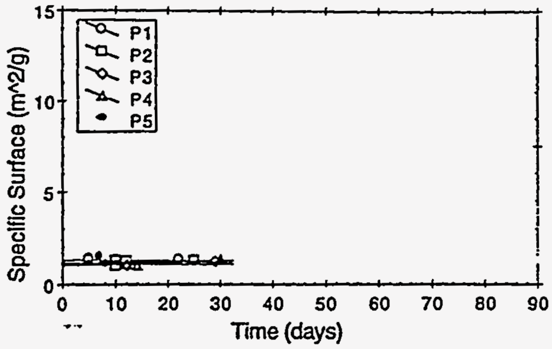

Figure 7. Case W10, pine, 754 ml CSF.

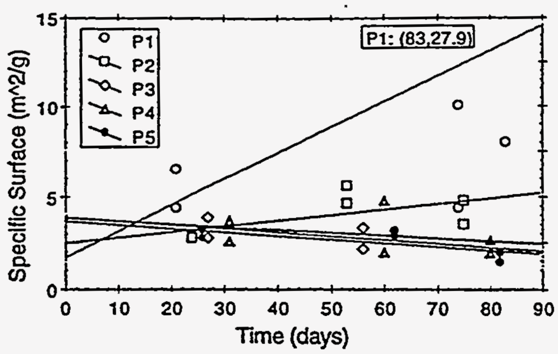

Figure 8. Case W18, pine, 700 ml CSF.

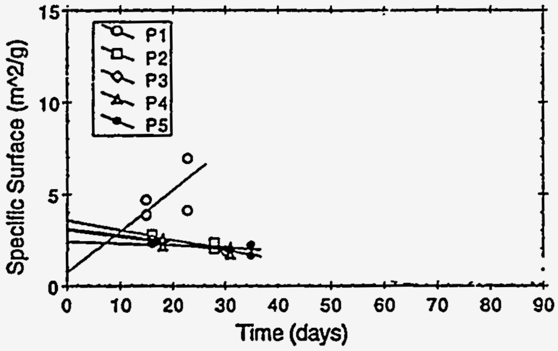

Figure 9. Case W12, pine, 665 ml CSF.

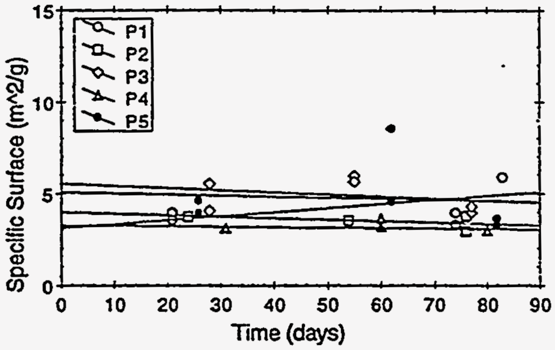

Figure 10. Case W19, pine, 620 ml CSF.

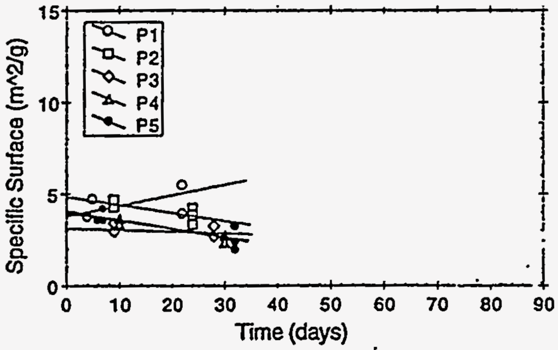

Figure 11. Case W9, hardwood, 691 ml CSF.

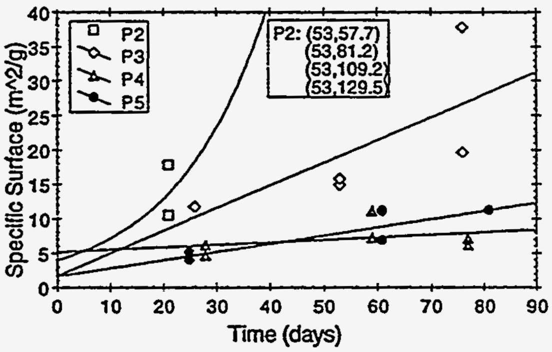

Figure 12. Case W15, hardwood, 670 ml CSF.

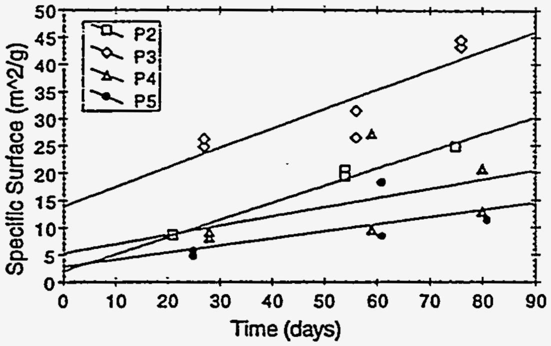

Figure 13. Case W16, hardwood, 650 ml CSF.

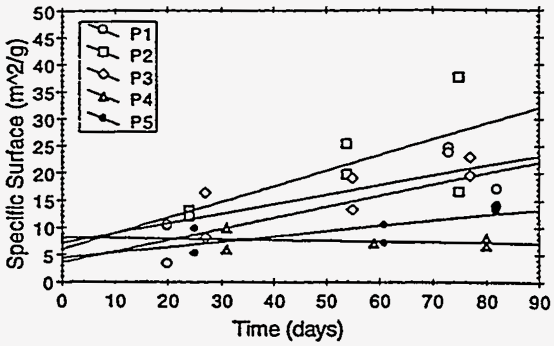

Figure 14. Case W17, hardwood, 630 ml CSF.

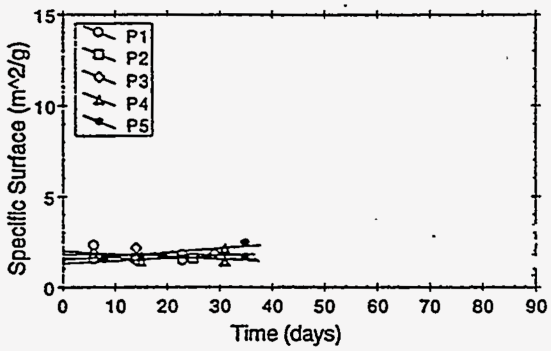

Figure 15. Case W11, mixture, 734 ml CSF.

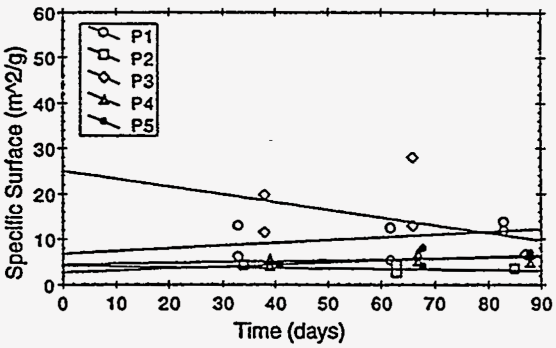

Figure 16. Case W20, mixture, 685 ml CSF.

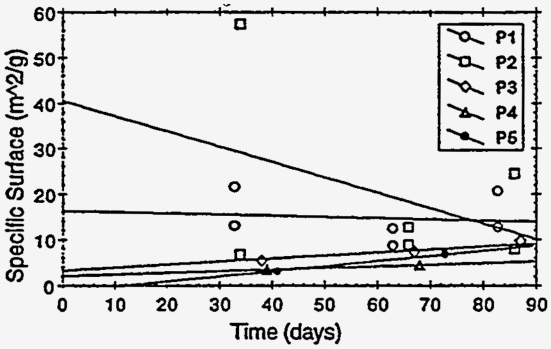

Figure 17. Case W21, mixture, 658 ml CSF.

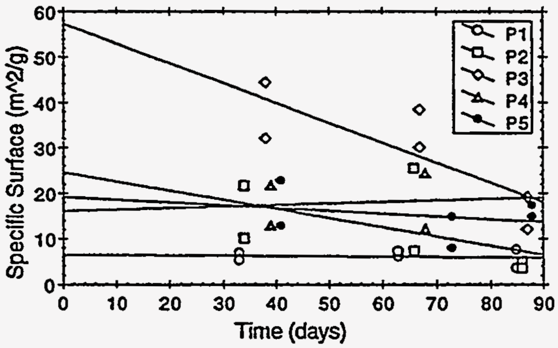

Figure 18. Case W22, mixture, 625 ml CSF.

It was observed that the variability of water permeability measurements for the first batch (furnishes W9-W12) was less than that for the second batch (W15-W22). During prepressing of the sheets from the second batch, sheet crushing was observed for some cases as noted in the procedures section. In general, for the crushed sheets, the specific surface was lower than what was expected.

The dependencies of specific surface and specific volume of swollen fibers on freeness are plotted in Figures 19 through 24. In general, specific surface (Figures 19, 21, and 23) tended to decrease with increased ingoing solids and freeness for both pine and hardwood furnishes. For a given freeness, the specific surface for pine was lower than that for hardwood. These results correspond with previously observed trends [3,6,7].

Figures 20, 22, and 24 show the dependence of specific volume on freeness for different prepressing conditions. Specific volume typically varies in the interval of 1.0 to 1.5 cc/g. Higher values were observed for pine compared to hardwood. Lower solids cases had higher values of specific volume. For pine, there was no observed correlation with freeness (Figure 20), while for hardwood, the specific volume tends to increase with increased freeness.

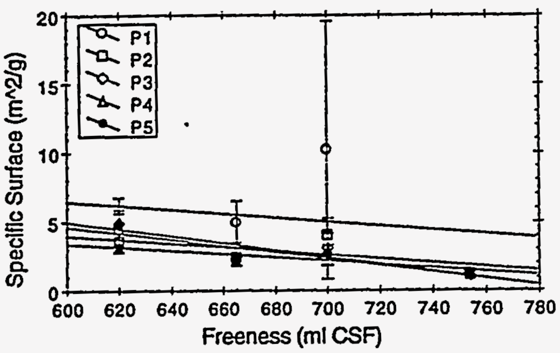

Figure 19. Average specific surface for pine furnish.

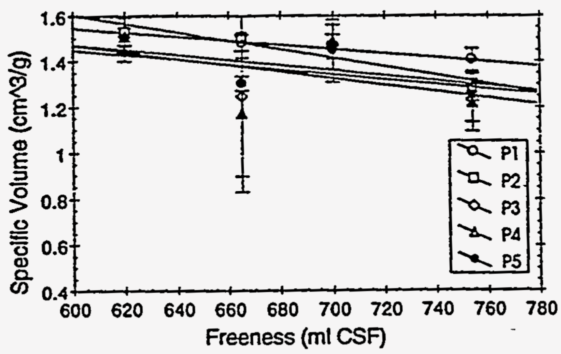

Figure 20. Average specific volume for pine furnish.

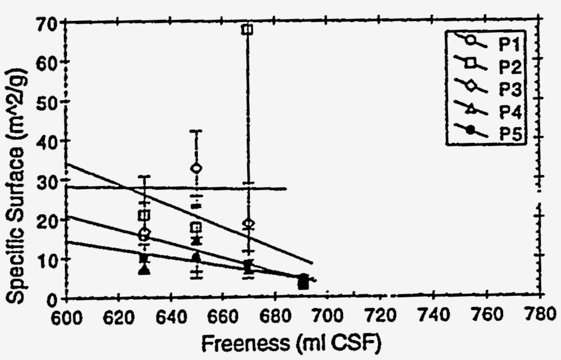

Figure 21. Average specific surface for hardwood furnish.

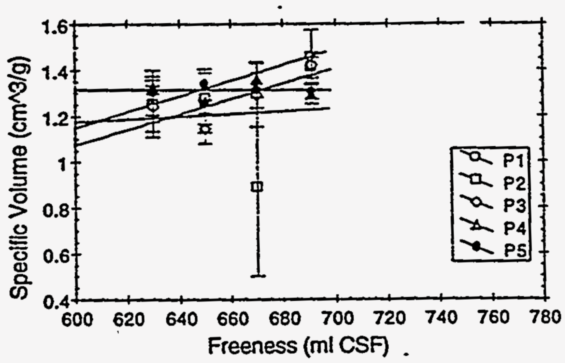

Figure 22. Average specific volume for hardwood furnish.

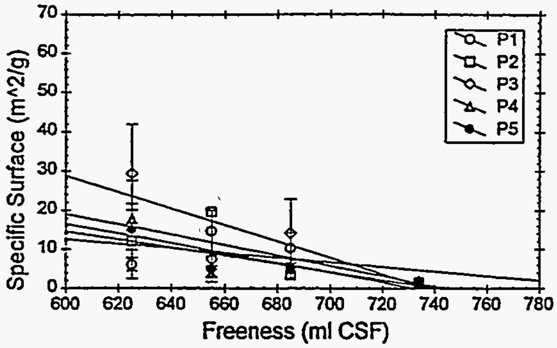

Figure 23. Average specific surface for mixed furnish.

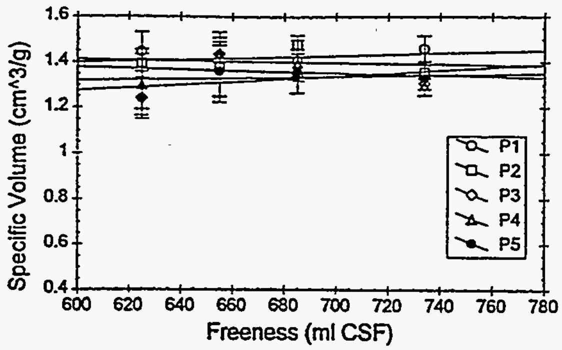

Figure 24. Average specific volume for mixed furnish.

The effect of pine fiber content, in a hardwood mixture, on specific surface for different pressing conditions is shown in Figures 25 through 29. In general, the addition of 50% pine fibers to the hardwood results in virtually the same specific surface as for 100% pine. Some deviations are primarily caused by high variability of specific surface for low freeness furnishes.

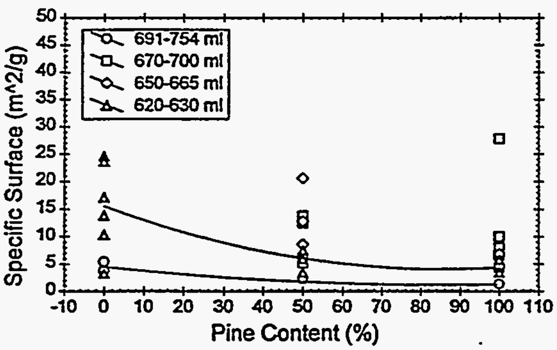

Figure 25. Pressing condition P1.

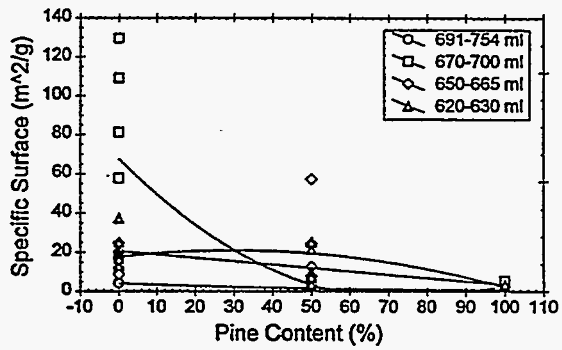

Figure 26. Pressing condition P2.

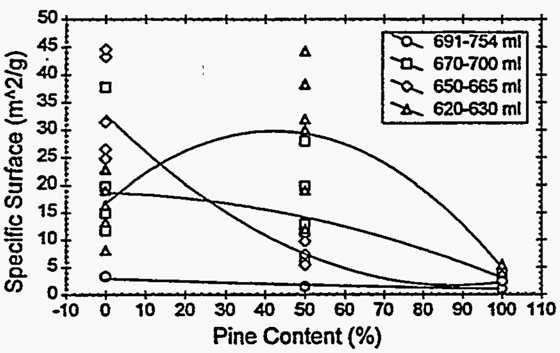

Figure 27. Pressing condition P3.

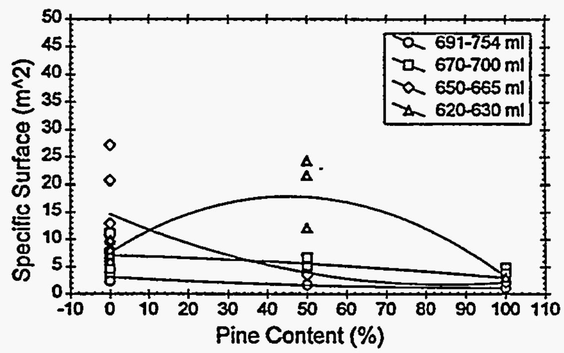

Figure 28. Pressing condition P4.

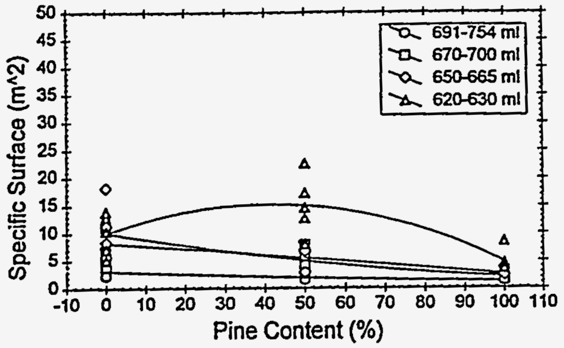

Figure 29. Pressing condition P5.

IMPULSE DRYING

All impulse drying was done with a presteaming temperature of 65°C. To determine the steaming time, two wire thermocouples were placed between the sheet and the felt, and the temperature was recorded while steaming with the platen surface temperature set at 200°C and the heat shield in place. The steaming time was set to the time at which the slowest temperature profile crosses 55°C. At this time, the sheet temperature should be between 55 and 75°C. The results of these calibrations are shown in Table 10, and the temperature profiles are in Appendix E.

Table 10. Presteam times and temperature ranges obtained.

Furnish	Case	Time (s)	Temp Range (°C)
W1	A1	21	55-75
	A2	18	55-70
	A3	15	55-69
	A4	15	55-66
	C1	11	56-71
	C2	14	55-74
	D1	30	55-76
	D2	34	55-83
W5	A1	19	55-72
	A2	15	55-73
	A3	14	55-64
	A4	16	55-69
	C1	14	55-68
	C2	14	55-71
	D1	32	55-82
	D2	31	55-82

A second calibration procedure measures moisture change during steaming. A sheet and felt were weighed and then steamed as if for impulse drying. However, the sheet and felt were removed from the MTS and weighed again right after steaming. Five repeats were done at five platen surface temperatures, and a best fit to the data was used to determine the moisture change during steaming. Before impulse drying, the sheet moisture level was adjusted such that the sheet solids were at the target level after the steaming step, i.e., just before pressing.

Couch Trim Samples

The effect of ingoing felt moisture was tested using the Mill #1 couch trim. The A platen, R felt, and 35% ingoing solids were used (case A3). The steaming time used was 15s at a temperature of 61-71°C. Results are listed in Table 11, and the raw data are in Appendix A. Felt moisture was observed to make a difference, and it was decided to use 16% for the remainder of the experiments.

Table 11. Results of felt moisture variation impulse drying trials.

Case	Platen Temperature (°C)	Ingoing Felt Moisture (%)	95% Conf. Interval	Ingoing Sheet Solids (%)	95% Conf. Interval	Outgoing Sheet Solids (%)	95% Conf. Interval
A3-PR1	200	16.1	0.2	37.5	3.3	42.9	3.6
A3-PR1	200	34.3	15.9[a]	37.2	2.8	36.1	9.4
A3-PR1	250	16.6	3.4	36.3	2.4	44.9	1.0
A3-PR1	250	32.7	2.5	33.9	2.1	38.6	3.6

a) The high variation for this case was the result of moisture migration within a stack of wet felts while waiting to perform the experiment.

Critical temperatures were determined from the specific elastic modulus, %CV of SEM, and from visual observations. All of this data are shown in Appendix C. An explanation of the delamination codes is at the beginning of Appendix A. The following procedure was used to determine the critical temperatures.

1) Determine the temperature at which the %CV of SEM exceeds a value of 15-20%. In most cases, there was a sharp increase in %CV when delamination first occurred.
2) Determine the temperature at which the SEM values peak.
3) Determine the highest temperature at which there were no visible delaminations observed.
4) If two or more of the above determined temperatures agree, then that was the critical temperature.
5) If none of the above temperatures agree, then determine if the density data peak at one of the possible temperatures. For these cases, the critical temperature was the temperature that agrees with the majority of data.
6) If all else fails, the critical temperature was determined from the visual observations.

7) Round off the temperature to the nearest 5°C.
8) Identify any anomalies.

Previous experiments have shown that above the critical temperature, the SEM (and other strength properties) drops. Conversely, the %CV of the SEM rises just above the critical temperature. Therefore, the above procedure will determine a lower limit for the critical temperature for most cases. To determine the upper and lower uncertainties for the critical temperature, the following procedure was used.

1) The upper limit was the next higher temperature for which there were data if there was no visible delamination. If there were any visible delaminations, then the upper limit was zero.
2) If there was a large jump in the %CV of SEM value at the upper limit (~10 to 40+), then the lower limit was 10°C less than the critical temperature; otherwise, the lower limit was next lower temperature for which there were data.
3) If the SEM data do not show a peak at the critical temperature, then the lower limit was the next lower temperature for which there were data.
4) The lower limit cannot be less than 100°C (otherwise, it would not be impulse drying).
5) Uncertainties are the difference between the critical temperatures and the limits rounded to the nearest 5°C.

Additional Mill #1 couch trim sheets were impulse dried to determine the critical temperature and water removal. Figures 30 through 33 show the data used to determine the critical temperature. For temperatures of 150°C and below, severe sticking affected the results, and these data were ignored when determining the critical temperature. The critical temperature was 255°C, plus zero, minus 55°C. In Figure 32, the observed delamination value of six at 200°C may have been an anomaly.

Figures 34 and 35 show the outgoing solids and felt water gain results. The higher sheet outgoing solids and lower felt water gain at temperatures of 150° and below are a result of sheet sticking. Because sticking was also a problem at high temperatures, the felt water gain was lower than the typical values of 70-90%.

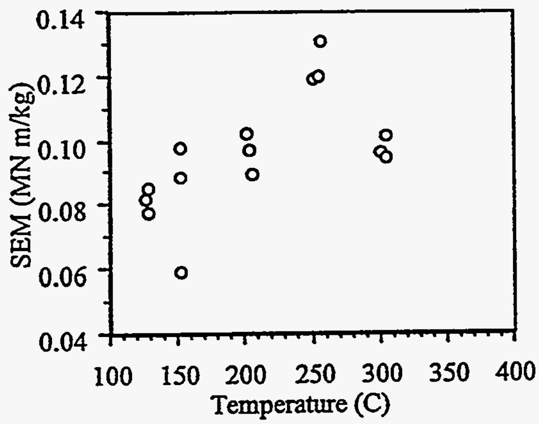

Figure 30. Specific elastic modulus.

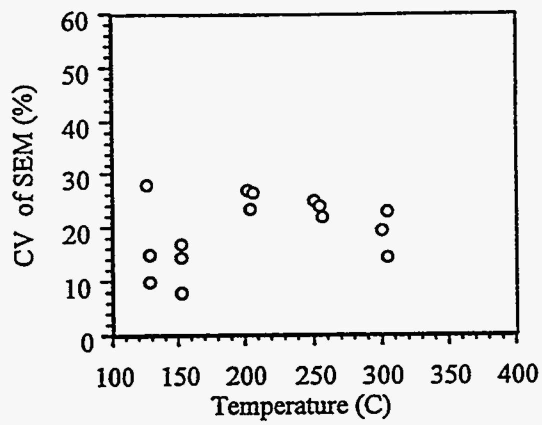

Figure 31. Coefficient of variation of SEM.

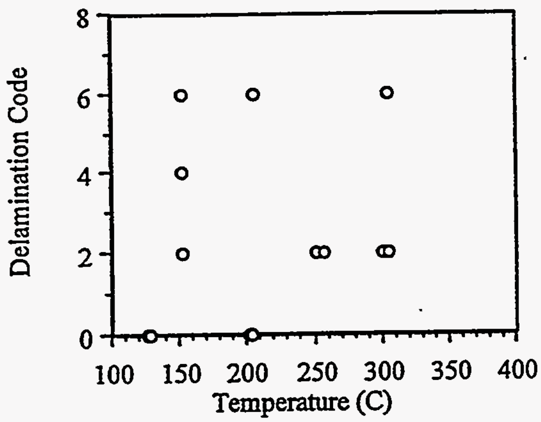

Figure 32. Visual delamination observations. See Appendix A for codes.

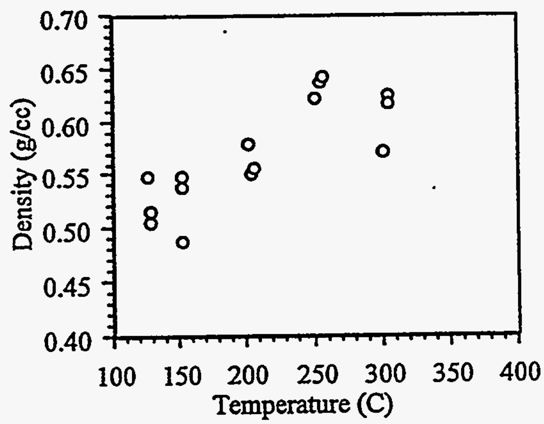

Figure 33. Ultrasonic sheet density.

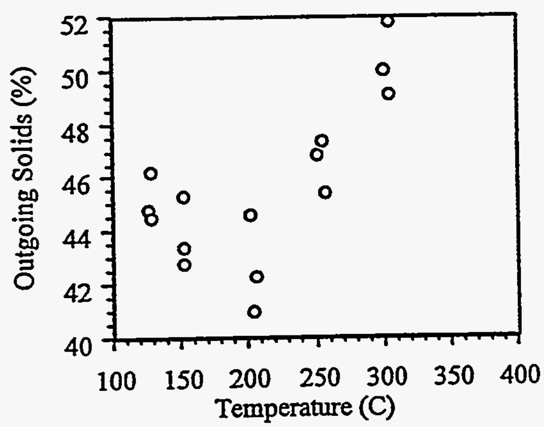

Figure 34. Outgoing sheet solids.

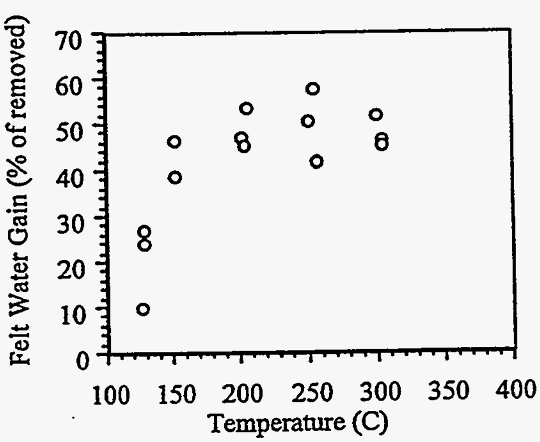

Figure 35. Felt gain of water removed.

Beloit also performed some tests using the Mill #1 and Mill #2 couch trim sheets. Ingoing solids were 36%; the "A" roll coating, "R" felt, and presteaming were used. The results at the critical temperature are tabulated in Table 12 for comparison.

Table 12. Results of Beloit impulse drying tests of couch trim.

Test	Simulator	Mill #1	Mill #2
Critical Temperature (°C)	MTS[a]	177	149
	HRP[b]	204	177
Outgoing Solids (%)	MTS	46.5	50.5
	HRP	51.9	52.9
	DF ENP[c]	47.7	47.8
TAPPI Density (g/cm^3)	MTS	-	-
	HRP	0.620	0.626
	DF ENP	0.605	0.574
GM STFI Index (Nm/g)	MTS	-	-
	HRP	27.2	27.5
	DF ENP	25.3	25.8
Top Side Bendtsen Rough. (ml/min)	MTS	-	-
	HRP	1650	790
	DF ENP	2330	1840

a) MTS = Beloit MTS.
b) HRP = Beloit impulse drying pilot roll press.
c) DF ENP = Beloit double-felted pilot extended-nip press.

Prepared Handsheets

Extensive IPST impulse drying trials were conducted for furnishes W1 and W5. A presteam temperature of ~65°C, and an ingoing felt moisture of 16% were used. Before analysis, the impulse drying data were filtered for a basis weight of 177 ±10 g/m^2 (OD), an ingoing solids of 32,35,40 or 42 ±1.0%, and an impulse of 0.1379 ±0.0034 MPa·s. Data used for further analysis are listed in Appendix A. Rejected data are listed in Appendix B.

Table 13 lists the experimental conditions used for impulse drying and the critical temperatures obtained. SEM, %CV of SEM, visible delamination codes, and some of the density data that were used to determine the critical temperatures are listed in Appendix C.

Table 13. Impulse drying critical temperatures.

Furnish ID IPST	Furnish ID U. C.	Case	Felt	Specific Sur. (m^2/g)	95% C.I.	Critical Temp. (°C)	Uncertainty	
W1	2P1	A1	B	7.35	0.98	170	+15	-10
W1	2P1	A2	B	5.24	0.58	160	+10	-10
W1	2P1	A3	R	7.35	0.98	155	+10	-10
W1	2P1	A4	R	5.24	0.58	160	+10	-15
W1	2P1	C1	B	7.35	0.98	205	+∞	-10
W1	2P1	C2	B	5.24	0.58	190	+∞	-10
W5	2P3	A1	B	6.00	1.94	175	+10	-10
W5	2P3	A2	B	5.24	0.77	205	+10	-10
W5	2P3	A3	R	6.00	1.94	160	+10	-15
W5	2P3	A4	R	5.24	0.77	170	+15	-25
W5	2P3	C1	B	6.00	1.94	230	+10	-20
W5	2P3	C2	B	5.24	0.77	230	+20	-20

Other physical properties at the critical temperature are listed in Tables 14 and 15, and are shown in Figures 36 through 39.

Table 14. Impulse drying water removal data at the critical temperature.

Furnish	Case	Ingoing Solids (%)	Outgoing Solids (%)	95% Conf. Interval	Moisture Ratio Change	95% Conf. Interval
W1	A1	32	46.6	1.4	0.97	0.25
W1	A2	40	50.0	1.0	0.54	0.09
W1	A3	32	43.4	1.5	0.85	0.03
W1	A4	40	47.6	2.2	0.44	0.05
W1	C1	35	46.5	1.4	0.70	1.02
W1	C2	42	50.3	0.2	0.37	0.37
W1	D1	35	41.6	0.5	0.48	0.06
W1	D2/40	40	44.7	1.4	0.22	0.10
W1	D2/42	42	44.9	3.6	0.17	0.12
W5	A1	32	46.6	0.7	0.96	0.05
W5	A2	40	51.6	0.5	0.58	0.07
W5	A3	32	45.6	1.3	0.92	0.16
W5	A4	40	47.6	11.3	0.42	0.07
W5	C1	35	46.7	1.7	0.69	0.09
W5	C2	42	51.5	1.4	0.45	0.09
W5	D1	35	41.3	0.14	0.43	0.04
W5	D2/40	40	43.6	∞	0.19	∞
W5	D2/42	42	44.3	∞	0.13	∞

Table 15. Impulse drying physical property data at the critical temperature.

Furnish	Case	Density (g/cm^3)	95% Conf. Interval	STFI Index (N·m/g)	95% Conf. Interval	SEM (MN·m/kg)	95% Conf. Interval
W1	A1	0.683	0.029	30.19	0.06	0.186	0.005
W1	A2	0.722	0.072	-	-	0.172	0.020
W1	A3	0.665	0.076	30.06	2.80	0.154	0.028
W1	A4	0.678	0.066	29.47	∞	0.148	0.044
W1	C1	0.670	0.070	29.21	13.59	0.165	0.038
W1	C2	0.699	0.006	29.12	1.67	0.166	0.013
W1	D1	0.614	0.020	29.15	0.80	0.133	0.015
W1	D2/40	0.660	0.047	29.19	3.16	0.143	0.013
W1	D2/42	0.653	0.241	29.74	6.68	0.144	0.019
W5	A1	0.710	0.016	31.03	1.46	0.168	0.009
W5	A2	0.734	0.008	29.44	∞	0.176	0.012
W5	A3	0.699	0.029	31.61	3.46	0.158	0.018
W5	A4	0.722	0.051	31.96	∞	0.151	0.057
W5	C1	0.711	0.007	30.70	1.41	0.165	0.017
W5	C2	0.728	0.014	29.77	2.03	0.160	0.013
W5	D1	0.640	0.028	30.95	0.62	0.142	0.010
W5	D2/40	0.670	∞	32.98	∞	0.140	∞
W5	D2/42	0.643	∞	32.50	∞	0.149	∞

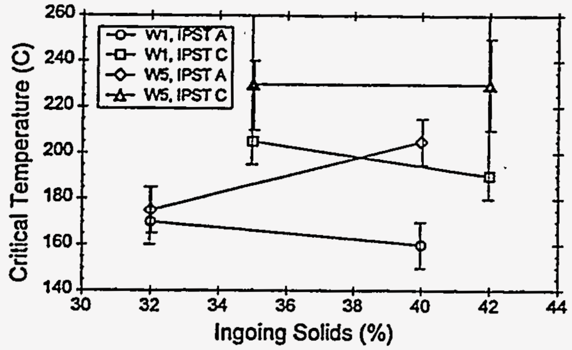

Figure 36. Critical temperatures for B felt.

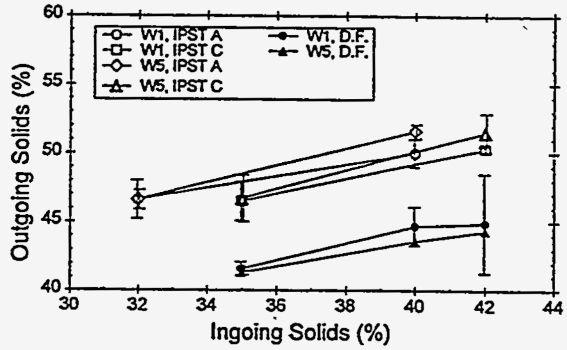

Figure 37. Outgoing solids for B felt.

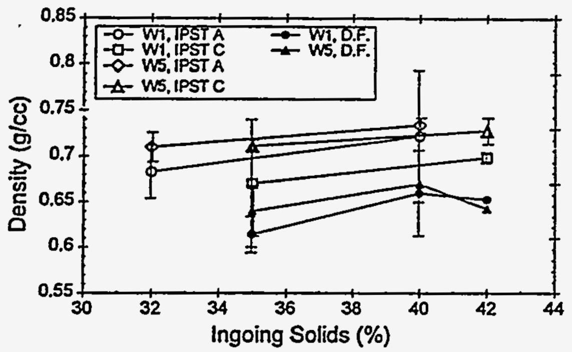

Figure 38. Density for B felt.

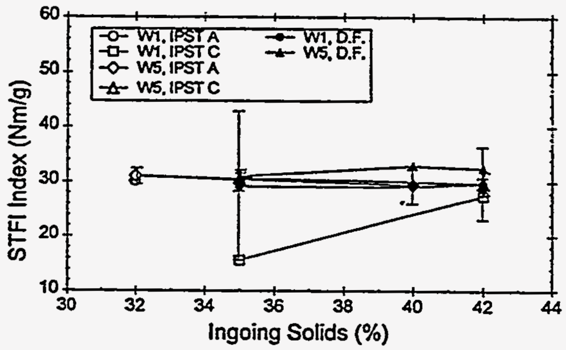

Figure 39. STFI index for B felt.

The following data, obtained by Beloit, are shown in Table 16 for comparison. The roll surface was "A" and the R felt used. The Beloit MTS impulse was 0.16 MPa·s; presteaming was used; and the felts were air dried. Presteaming was also used for the HRP and HTP impulse drying cases. The control case was prepressed and finish dried. The commercial case was prepressed and then run through a three-nip single-felted roll press at 500, 800, and 1200 pli. All physical property data reported were at the critical temperatures.

Table 16. Comparison of IPST and Beloit impulse drying results at the critical temperature.

Test	Furnish	Nominal Ingoing Solids (%)	Cont[d]	Com[e]	IPST MTS	Beloit MTS	Beloit HRP	Beloit ENP HTP	Beloit ENP DF
Critical Temp. (°C)	W1 (2P1)	36	-	-	155	177	<177	177	-
	W1 (2P1)	42	-	-	160	177	<177	177	-
	W5 (2P3)	36	-	-	160	204	177	204	-
	W5 (2P3)	42	-	-	170	204	177	204	-
Outgoing Solids (%)	W1 (2P1)	36	-	38.0	43.4	48.8	49.7	48.0	46.3
	W1 (2P1)	42	-	-	47.6	51.7	51.3	49.2	48.3
	W5 (2P3)	36	-	37.4	45.6	49.4	48.8	46.9	45.6
	W5 (2P3)	42	-	-	47.6	50.8	51.2	50.6	48.2
IPC Density[b] (g/cc)	W1 (2P1)	36	0.615	0.686	0.665	0.775	0.825	0.815	0.800
	W1 (2P1)	42	0.705	-	0.678	0.805	0.845	0.825	0.815
	W5 (2P3)	36	0.617	0.708	0.699	0.825	0.820	0.870	0.860
	W5 (2P3)	42	0.785	-	0.722	0.840	0.835	0.835	0.815
GM STFI Index[a] (Nm/g)	W1 (2P1)	36	26.1	26.4	30.1	27.8	28.0	25.4	29.3
	W1 (2P1)	42	-	-	29.5	27.2	30.0	26.9	29.3
	W5 (2P3)	36	25.7	28.7	31.6	30.9	29.8	30.0	32.5
	W5 (2P3)	42	28.6	-	32.0	30.2	30.3	30.8	31.0
MD Ring Crush Index (Nm/g)	W1 (2P1)	36	13.7	14.3	-	-	13.4	13.4	15.6
	W1 (2P1)	42	-	-	-	-	15.0	12.9	16.4
	W5 (2P3)	36	12.1	14.4	-	-	14.0	13.8	-
	W5 (2P3)	42	13.6	-	-	-	11.8	15.2	12.9
CD Ring Crush Index (Nm/g)	W1 (2P1)	36	7.4	8.4	-	-	10.7	9.6	11.2
	W1 (2P1)	42	-	-	-	-	10.6	8.6	11.2
	W5 (2P3)	36	7.2	9.2	-	-	11.5	11.0	-
	W5 (2P3)	42	8.3	-	-	-	9.9	11.5	9.8
Top Side Bendtsen Rough. (ml/min)	W1 (2P1)	36	1120	1580	-	1780	960	1080	1680
	W1 (2P1)	42	2460	-	-	1570	920	1180	1750
	W5 (2P3)	36	1450	1550	-	1460	880	1000	2020
	W5 (2P3)	42	1730	-	-	1410	910	1120	1830

a) The IPST STFI results are not a geometric mean (the sheets were hand-formed).
b) The IPST densities are from the ultrasonic tests.
c) Beloit pilot ENP press operated as an impulse dryer.
d) Cont = Control case, ingoing conditions.
e) Com = Commercial case, three-nip roll press.

STEAMING TEMPERATURE PROFILES

The objective of this part of the experiments was to try to induce a temperature gradient within the sheet during presteaming. This would enable the MTS to better simulate actual commercial machine conditions.

After preparing the sheets with thermocouples, the sheets were steamed in the MTS nip. The B felt and heat shield were used, and the platen temperature was set at 200°C. Data collection was started, and then the steam was turned on. The first set of results is shown in Figures 40 through 44. One of the thermocouples failed during the embedding process; therefore, some of the temperatures show a flat line.

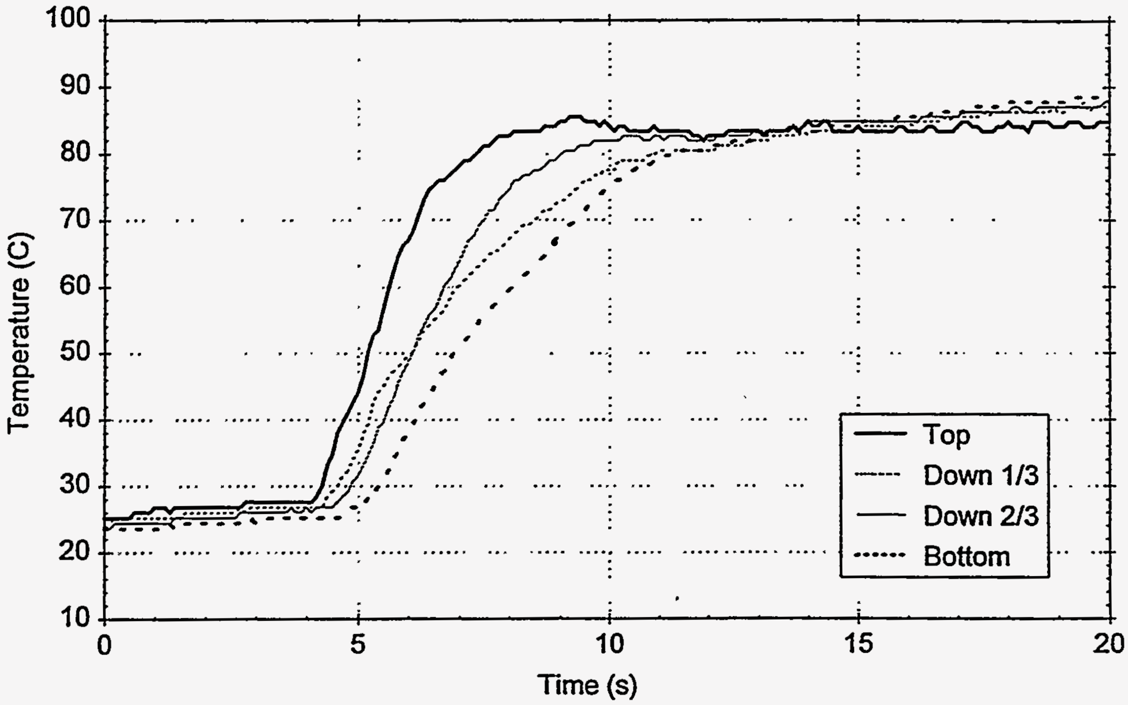

Figure 40. Furnish W13, 35% solids, repeat 1.

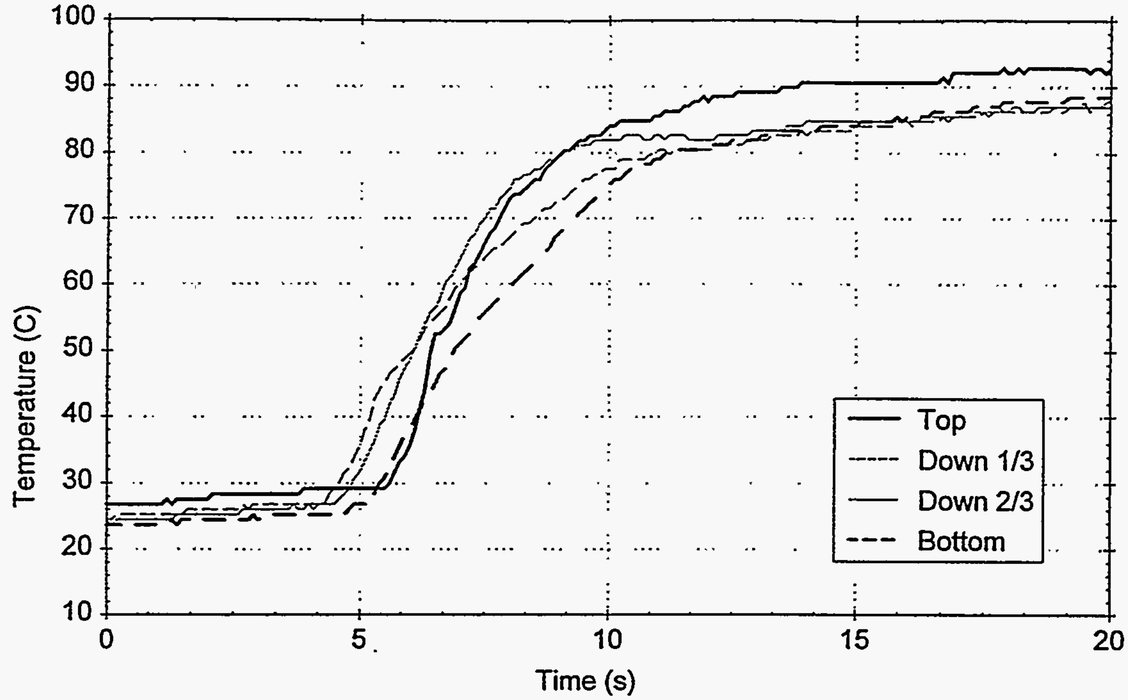

Figure 41. Furnish W13, 35% solids, repeat 2.

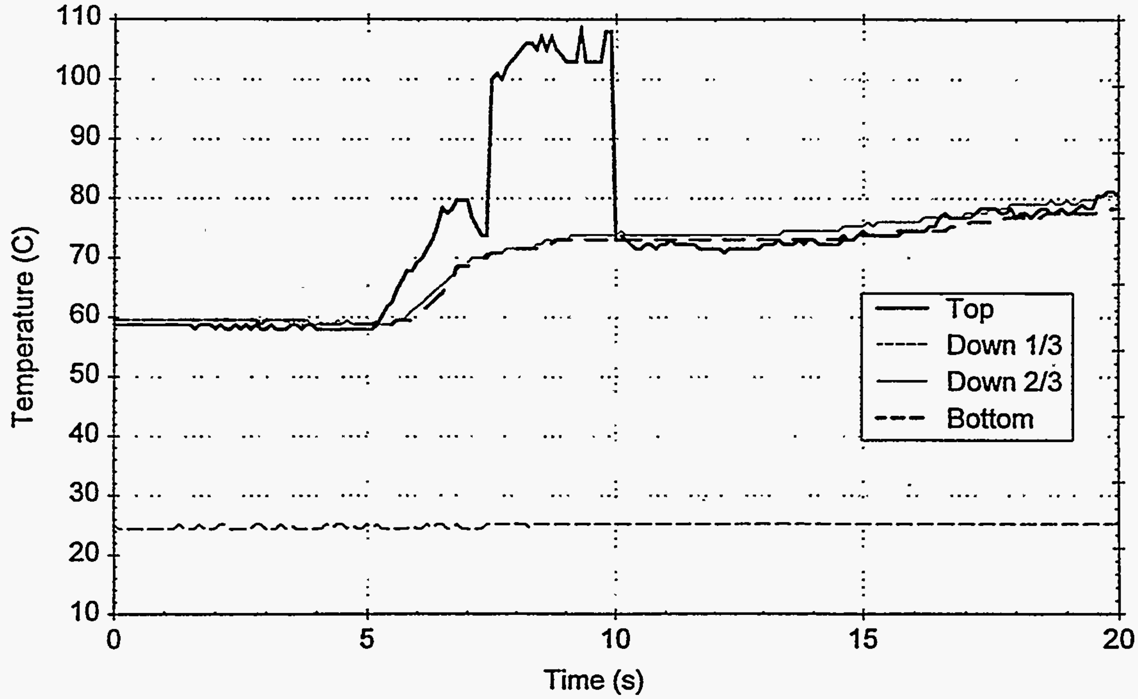

Figure 42. Furnish W14, 35% solids, repeat 1.

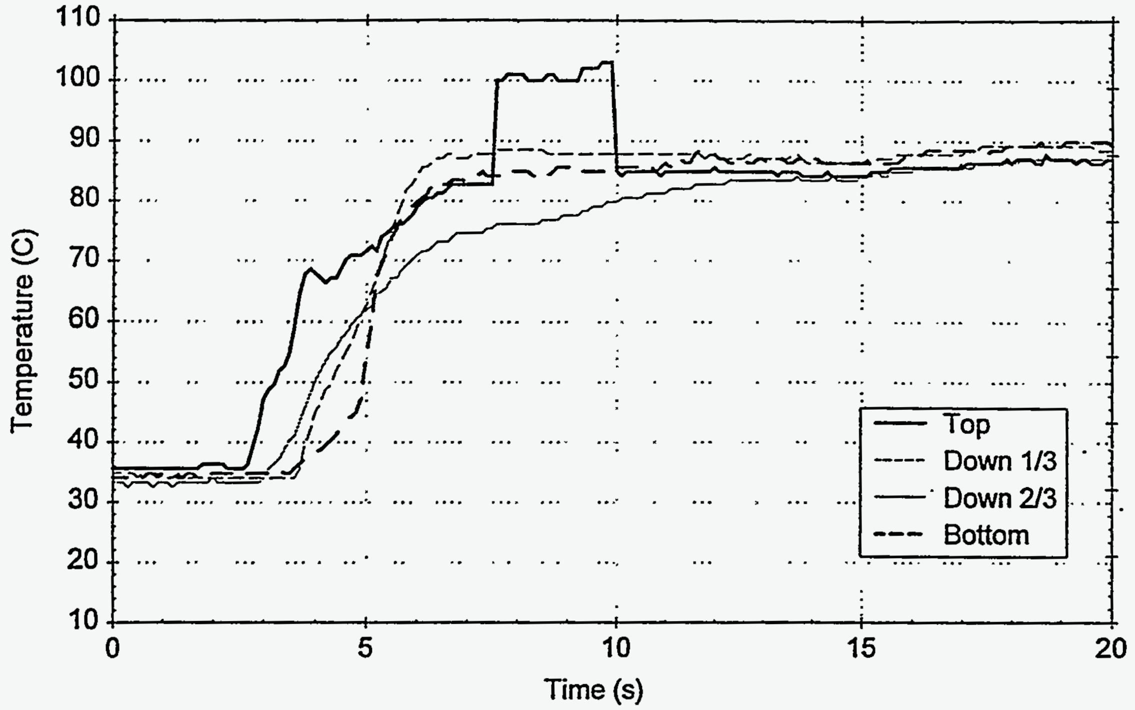

Figure 43. Furnish W14, 35% solids, repeat 2.

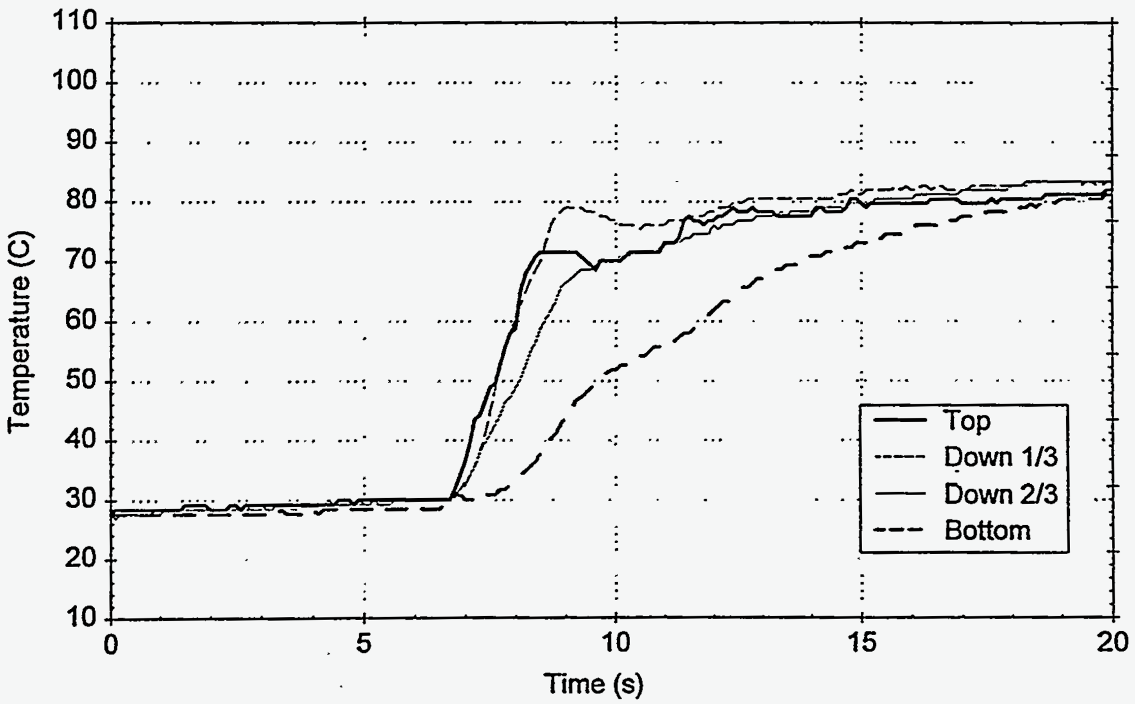

Figure 44. Furnish W14, 35% solids, repeat 3.

From the above results, it was observed that the top thermocouple was lifting from the sheet resulting in inaccurate temperature measurements. Because the felts have a curl, it is possible that enough steam was hitting the bottom of the sheet, reducing the possible temperature gradient. For the next set of tests, the sheet was taped to the felt to prevent steaming from the bottom. Also, the top thermocouple was taped to the sheet with porous tape.

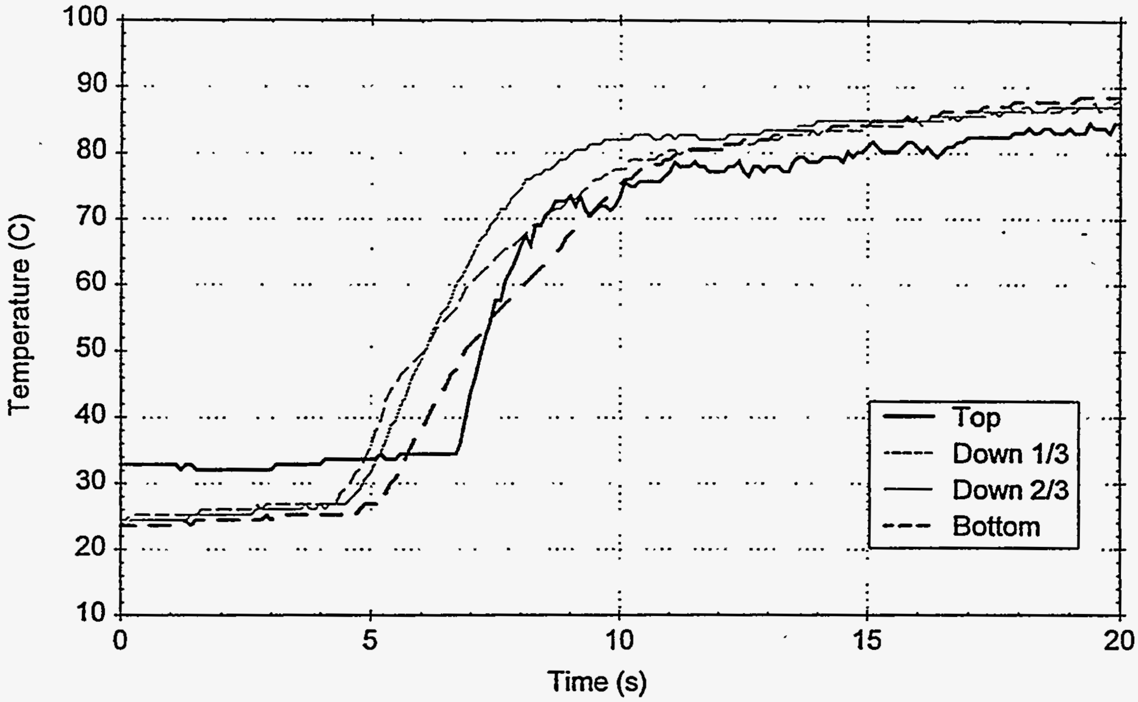

Figure 45. Furnish W13, 35% solids, sheet taped to felt, repeat 1.

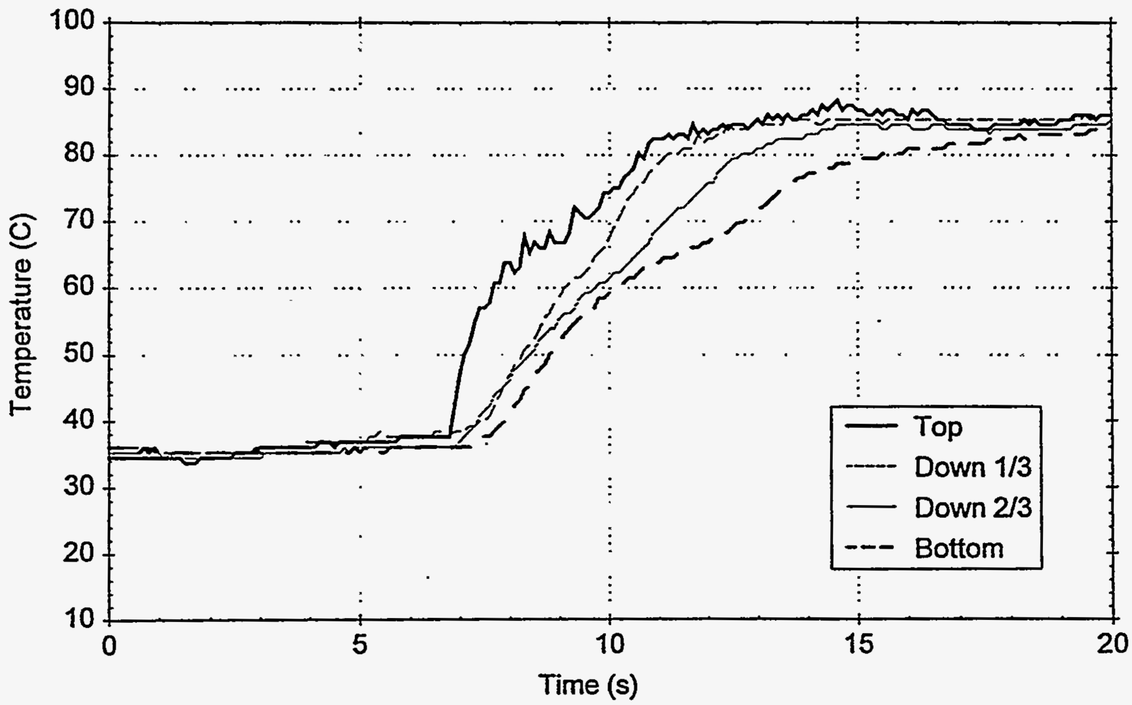

Figure 46. Furnish W13, 35% solids, sheet taped to felt, repeat 2.

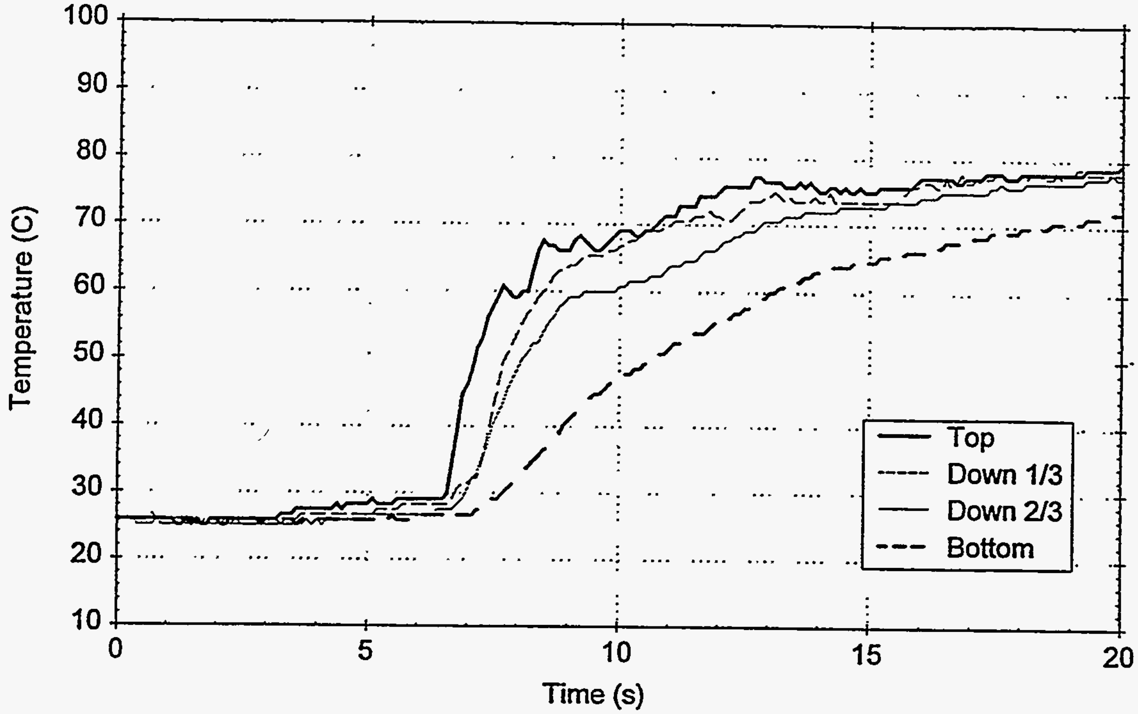

Figure 47. Furnish W14, 35% solids, sheet taped to felt, repeat 1.

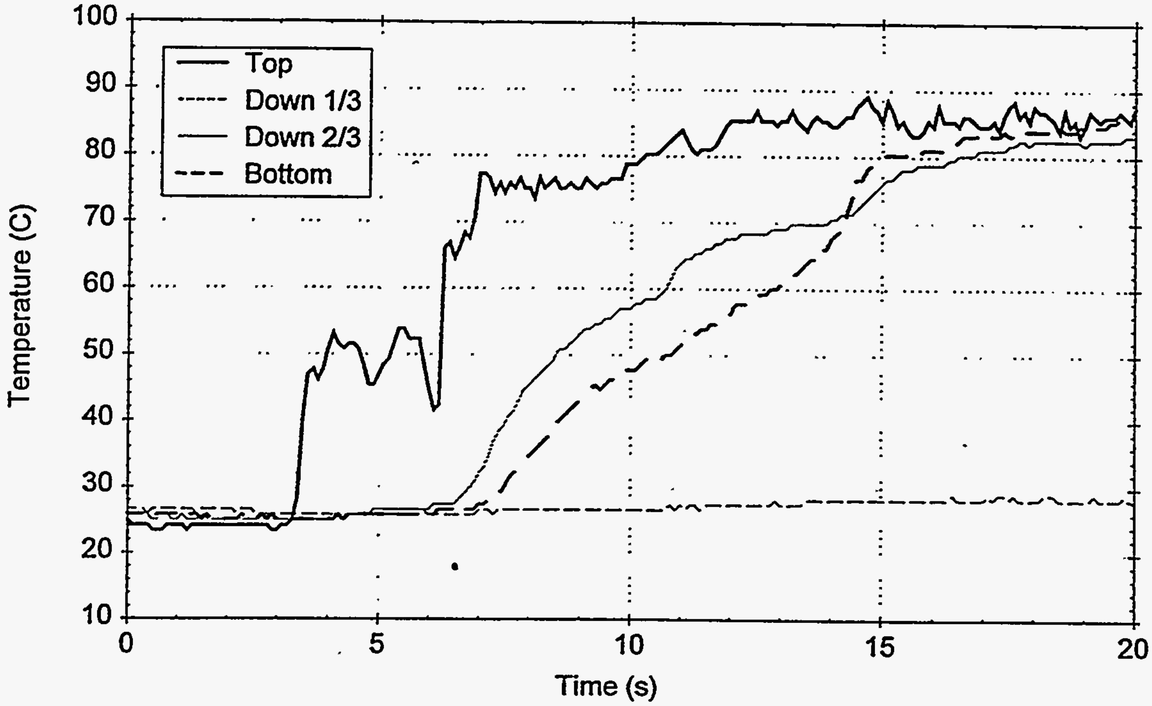

Figure 48. Furnish W14, 35% solids, sheet taped to felt, repeat 2.

For the last trial, a maximum gradient was formed by steaming only until the top surface reached 75°C. The result is shown in Figure 49.

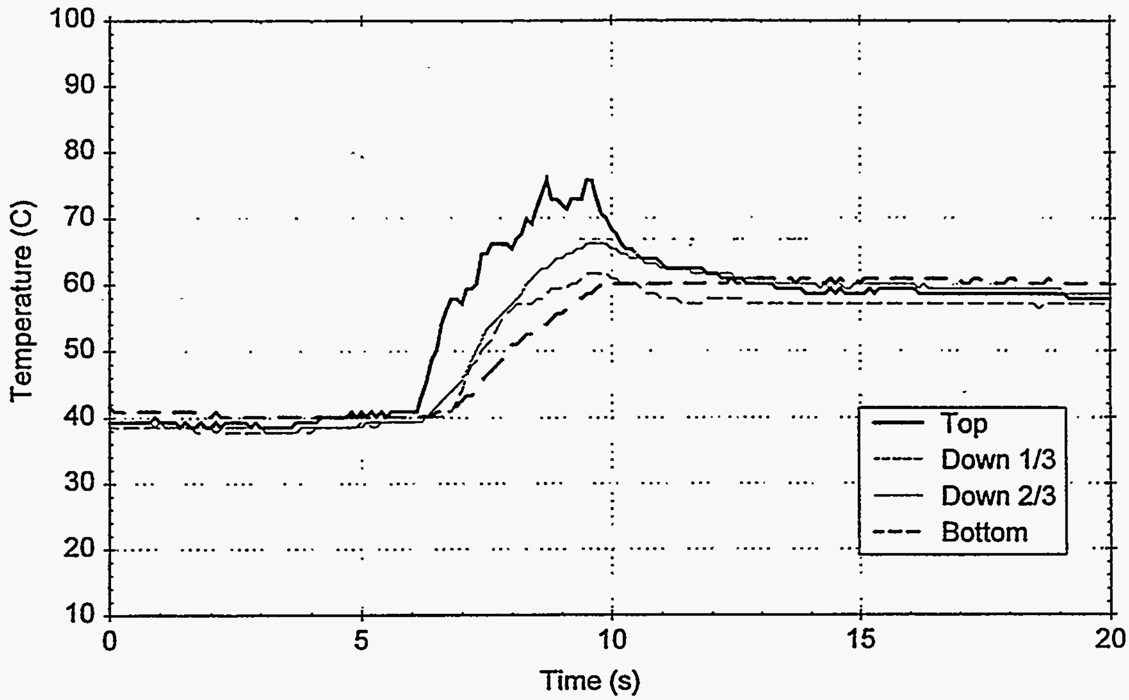

Figure 49. Furnish W14, 35% solids, sheet taped to felt, repeat 3.

Although a temperature gradient does exist during MTS steaming, the sheets reach equilibrium within two to three seconds after turning off the steam. Since it takes nine seconds for the MTS head to close during a hit, any temperature gradient will disappear before a hit can be made. It may be possible to reduce the closure time to about two seconds, but this is still too slow to test a significant temperature gradient.

CONCLUSIONS

The following conclusions can be drawn from this work.

1) There is no observable difference between mill-refined pulp and machine-formed paper, and laboratory-prepared pulp and laboratory-formed handsheets in regards to water permeability and impulse drying. Observed differences can be attributed to process variables such as refining level and prepressing.

2) As reported in previous experiments, specific surface can be minimized by minimally refining the pulp and prepressing the sheet as much as possible. Under the same processing conditions, pine has a lower specific surface than hardwood.

3) Permeability results are highly dependent on sheet preparation and preprocessing. For consistent results, it is important that preparation techniques be standardized and followed rigorously. An aging effect was observed that increases as the furnish becomes more closed.

4) IPST impulse drying results were consistent with previous experiments showing an increase in outgoing solids of 2-8 percentage points for the A platen and 5-7 percentage points for the C platen compared to double-felted pressing for 40-42% ingoing solids. STFI index values showed an increase of up to 3.5%. However, for 35% ingoing solids, impulse drying was no better than double-felted pressing.

5) Beloit impulse drying results had a less dramatic improvement in water removal (up to 3.8 percentage points) compared to double-felted pressing. They also had up to 15% improvement in ring crush and up to 56% decrease in Bendtsen roughness compared to double-felted pressing.

6) Although there was a bias in the results between IPST and Beloit, the trends were consistent, with the IPST results being the most conservative. Some of the differences may be a result of different testing conditions between laboratories.

7) Felt type and moisture levels have an observable effect on water removal, rewet, and sheet sticking. The best combination was the B felt at 16% moisture or less.

8) Present laboratory equipment cannot recreate expected machine presteaming temperature profiles in the sheet. Additional experiments are needed to determine the effect of different presteaming temperatures on impulse drying efficiency.

RECOMMENDATIONS FOR FUTURE WORK

This work was based on furnishes that simulated presently utilized commercial furnishes and a conservative nip loading. Therefore, the results indicate what could be achieved in a worst case scenario. The next phase of impulse drying work should use a less refined top ply to improve the sheet permeability. Also, recycled fiber should be evaluated.

It is not possible to directly test the effect of sheet temperature gradients on impulse drying with the MTS. The next set of experiments should look at the effect of different levels of presteam sheet temperature on impulse drying.

ACKNOWLEDGMENTS

The work reported was supported by the U.S. Department of Energy, Office of Industrial Programs, through Grant No. DE-FGO2-85CE40738. Its support is gratefully acknowledged.

David White of Union Camp Corporation and Jere Crouse of Beloit Corporation were instrumental in the planning and execution of the experiments. Without their support, the experiments would not have been possible, and the authors are most grateful. The authors would also like to thank Andy Krause, Thomas Bales, Tim Patterson, and Barry Hojjatie of IPST for their assistance in performing the data acquisition and testing.

REFERENCES

1. Orloff, D.I., "Impulse Drying of Recycled Multi-ply Linerboard: Laboratory-scale Studies," TAPPI Journal, 77(2):169 (1994).

2. Kerschner, Craig M., "The Effects of Platen Material and Pressure on Impulse Drying," IPST A190 Project, (May 1994).

3. Orloff, D.I., and Phelan, P.M., "Impulse Drying of Multi-Ply Linerboard - Pilot Scale Shoe Press Experiments," U.S. Department of Energy Report No. DOE/CE/40738-T8, (January 1994).

4. Orloff, D.I., "Impulse Drying of Recycled Multi-ply Linerboard: Laboratory-scale Studies," Proceedings of the 1993 TAPPI Engineering Conference, pp.1021-1030, TAPPI Press, (September 1993).

5. Orloff, D.I., and Phelan, P.M., "Heat Transfer During Impulse Drying: The Influence of Press Impulse and Pressure Profile," HTD-Vol. 238, Heat and Mass Transfer in Pulp and Paper Processing, pp.17-23, ASME, (August 1993).

6. Orloff, D.I., "Impulse Drying Performance Database for Heavy Weight Grades of Paper," Technical Division of the CKPG of the American Paper Institute Report No. 1, (December 1992).

7. Orloff, D.I., "A Comparison of Impulse Drying to Double Felted Pressing on Pilot-Scale Shoe Presses and Roll Presses," U.S. Department of Energy Report No. DOE/CE/40738-T7, (August 1992).

8. Orloff, D.I., Jones, G.L., and Phelan, P.M., "Effects of Heating Mode on Roll Durability and Efficiency of Impulse Drying," HTD-Vol. 193, Fundamentals of Heat Transfer in Porous Media, pp.141-150, ASME, (August 1992).

9. Lenling, W.J., Smith, M.F., and Orloff, D.I., "Thermal Coating Development for Impulse Drying," International Thermal Spray Conference, Orlando, FL, (June 1992). (Given Best Paper of Conference Award).

10. Orloff, D.I., and Sobczynski, S.F., "Impulse Drying Pilot Press Demonstration: Ceramic Surfaces Inhibit Delamination," Proceedings of the Fourth International Conference on New Available Techniques and Current Trends, pp.180-198, SPCI'92 ATICELCA, Bologna, Italy, (May 1992).

11. Orloff, D.I., and Lindsay, J.D., "Advances in Wet Pressing," IPST Executives' Conference, Atlanta, GA, (May 1992).

12. Orloff, D.I., and Lindsay, J.D, "The Influence of Yield, Refining and Ingoing Solids on the Impulse Drying Performance of a Ceramic Coated Press Roll," Proceedings of the 1992 TAPPI Papermakers Conference, pp.85-94, Nashville, TN, (April 1992).

13. Orloff, D.I., "Impulse Drying of Paper: A Review of Recent Research," Proceedings of the 14th National Industrial Energy Technology Conference, pp.110-116, Houston, TX, (April 1992).

14. Orloff, D.I., et al., "Method and Apparatus for Drying Web," U.S. Patent Number 5101574, Issued April 7, 1992.

15. Orloff, D.I., "High-Intensity Drying Processes - Impulse Drying Report Six," U.S. Department of Energy Report No. DOE/CE/40738-T6, (July 1991).

16. Orloff, D.I., "Impulse Drying: Controlling Delamination in Heavy Weight Grades," IPST Executives' Conference, Atlanta, GA, (May 1991).

17. Orloff, D.I., "Impulse Drying: Heterogeneous Press Surfaces Offer New Product Opportunities," TAPPI Journal, 75(5): pp.172-176 (May 1992). Also presented at the TAPPI Non-Wovens Conference (May 1991).

18. Orloff, D.I., "Impulse Drying of Linerboard: Control of Delamination," Journal of Pulp and Paper Science, 18(1), J23-J32 (January 1992). Also presented at the 77th Annual Meeting of the Technical Section of the Canadian Pulp and Paper Association, (January 1991).

19. Orloff, D.I., "High-Intensity Drying Processes - Impulse Drying Report Five," U.S. Department of Energy Report No. DOE/CE/40738-T5, (September 1990).

20. Orloff, D.I., "Impulse Drying of Paper - Fundamentals of Delamination and Its Control," Presented at the Annual Meeting of the American Society of Chemical Engineers, (November 1989).

21. Orloff, D.I., "High-Intensity Drying Processes - Impulse Drying Report Four," U.S. Department of Energy Report No. DOE/CE/40738-T4, (May 1989).

22. Walpole, R.E., and Myers, R.H., "Probability and Statistics for Engineers and Scientists," Fourth Edition, Macmillan Publishing Company, New York, N.Y., ISBN 0-02424210-1, (1989).

23. Carslaw, H.S., and Jaeger, J.C., "Conduction of Heat in Solids," Clarendon Press, Oxford, England, (1947).

24. Lindsay, J.D., and Wallin, J.R., "Characterization of In-Plane Fluid Flow in Paper," Proceedings of the AIChE Forest Products Symposium, pp.121-129, (1989 and 1990).

David I. Orloff
Professor of Engineering

Paul M. Phelan
Assistant Scientist

Isaak Rudman
Assistant Scientist

APPENDIX A

The following tables contain the data that were used for analysis. The coded comments are explained below.

Delamination Codes

0: None
1: Small Blisters (≤ 1mm) < half the sheet
2: Medium Blisters (1mm to 1cm) < half the sheet
3: Small Blisters ≥ half the sheet
4: Large Blisters (> 1cm) < half the sheet
5: Medium Blisters ≥ half the sheet
6: Large Blisters ≥ half the sheet
7: Split Sheet
9: Other (explain in Comments)

Rewet Codes

10: None
11: Slight Edge Rewet, < half the edge
12: Moderate Edge Rewet, ≥ half the edge
13: Slight Rewet, < 1/3 of sheet
14: Moderate Rewet, 1/3 to 2/3 of sheet
15: Severe Rewet, > 2/3 of sheet
19: Other (explain in Comments)

Stick Codes

20: None
21: Slight Picking (surface disturbed)
22: Moderate Picking (a few fibers stuck to platen)
23: Severe Picking (many fibers stuck to platen)
25: Slight Sticking (sheet lifted, but released immediately, no picking)
26: Moderate Sticking (sheet stuck, but released on its own, may have picking)
27: Severe Sticking (sheet stuck, but could be easily peeled off, may have picking)
28: Extreme Sticking (sheet stuck, difficult to peel off)
29: Other (explain in Comments)

Table A1. Data with the IPST A platen and the Mill #1 couch trim.

SAMPLE ID	PLATEN SURFACE TEMP (C)	SEM (MN m/kg)	SEM %CV	IMPULSE (MPa.s)	OD BASIS WEIGHT (g/m^2)	SHEET SOLIDS IN (%)	SHEET SOLIDS OUT (%)	SHEET MOISTURE RATIO CHANGE	FELT MOISTURE IN (%)	FELT MOISTURE OUT (%)	FELT GAIN/ SHEET LOSS (%)	WATER REMOVED (Kg/m^2)	US DENSITY (g/cm^3)	AVERAGE STFI INDEX (Nm/g)	95% C.I.	DELAM CODE	REWET CODE	STICK/ PICK CODE	COMMENTS
A3PR1T1	127	0.078	10.26	0.145	179.8	34.9	46.3	0.702	16.9	19.1	27.0	0.126	0.507			0	10	28	
A3PR1T2	127	0.085	15.29	0.142	186.4	36.5	44.5	0.488	16.4	17.8	24.2	0.091	0.517			0	10	27	
A3PR1T3	126	0.082	28.05	0.141	174.0	36.7	44.8	0.490	17.5	18.0	10.2	0.085	0.548			0	10	28	
A3PR1T4	152	0.059	16.95	0.136	175.5	34.3	45.3	0.708	11.0	15.1	46.3	0.124	0.489			6	10	28	
A3PR1T5	152	0.098	8.16	0.140	177.7	34.8	42.8	0.537	16.0	18.4	38.6	0.096	0.539			2	10	27	
A3PR1T6	151	0.089	14.61	0.144	177.9	35.2	43.4	0.539	17.2	20.0	46.4	0.098	0.549			4	10	27	
A3PR1T7	206	0.090	26.67	0.137	183.5	34.6	42.3	0.524	16.6	19.9	53.3	0.096	0.556			6	13	20	
A3PR1T8	202	0.102	27.45	0.136	184.6	36.2	44.6	0.520	16.9	19.8	46.9	0.096	0.578			0	13	20	
A3PR1T9	203	0.097	23.71	0.138	173.0	34.1	41.0	0.406	19.7	22.1	45.4	0.086	0.550			0	14	20	
A3PR1T10	301	0.096	19.79	0.134	180.6	35.5	50.0	0.813	17.1	21.7	51.5	0.147	0.572			2	10	26	
A3PR1T11	304	0.101	14.85	0.131	183.7	36.3	49.1	0.724	16.6	20.6	46.5	0.133	0.625			2	13	26	
A3PR1T12	304	0.095	23.16	0.131	183.1	37.1	51.8	0.767	17.2	21.2	45.1	0.140	0.616			6	12	20	
A3PR1T13	256	0.131	22.14	0.133	188.7	35.8	45.4	0.590	17.3	20.2	41.6	0.111	0.643			2	13	27	
A3PR1T14	254	0.120	24.17	0.142	185.8	36.5	47.4	0.629	17.7	21.9	57.5	0.117	0.636			9	13	20	LARGE BLISTERS ON TH
A3PR1T15	251	0.119	25.21	0.138	183.5	36.0	46.9	0.644	13.2	17.3	50.4	0.118	0.622			2	13	20	

Table A2. Data with the IPST A platen.

SAMPLE ID	PLATEN SURFACE TEMP (C)	SEM (MN m/kg)	SEM %CV	IMPULSE (MPa.s)	OD BASIS WEIGHT (g/m^2)	SHEET SOLIDS IN (%)	SHEET SOLIDS OUT (%)	SHEET MOISTURE RATIO CHANGE	FELT MOISTURE IN (%)	FELT MOISTURE OUT (%)	FELT GAIN/ SHEET LOSS (%)	WATER REMOVED (Kg/m^2)	US DENSITY (g/cm^3)	AVERAGE STFI INDEX (Nm/g)	95% C.I.	DELAM CODE	REWET CODE	STICK/ PICK CODE	COMMENTS
At Critical Temperature																			
W1A1T16	170.5	0.186	11.29	0.1357	179.6	33.0	46.0	0.855	17.7	21.8	67.2	0.154	0.684			0	10	20	
W1A1T17	169.7	0.184	11.41	0.1367	174.0	31.6	46.8	1.024	17.5	22.8	72.9	0.178	0.671	30.185	1.769	0	10	20	
W1A1T19	185.8	0.188	10.64	0.1394	173.8	31.7	47.0	1.029	17.5	23.0	72.1	0.179	0.694	30.194	1.411	0	10	20	
Not At Critical Temperature																			
W1A1T20	188.3	0.184	9.78	0.1367	176.9	32.3	47.9	1.011	16.8	21.8	65.4	0.179	0.696			0	10	20	
W1A1T21	212.1	0.207	11.11	0.1384	173.4	31.8	49.4	1.120	16.8	22.7	71.6	0.194	0.723			0	10	20	NO TRANSERA DATA
W1A1T24	212.1	0.184	4.89	0.1395	175.3	32.0	49.2	1.095	17.3	22.6	64.8	0.192	0.699			0	10	20	
W1A1T38	359.8	0.195	4.10	0.1353	176.9	32.3	52.9	1.203	17.1	20.5	36.5	0.213	0.691			0	10	20	
W1A1T39	358.9	0.199	3.02	0.1394	176.1	31.9	54.6	1.299	16.7	20.8	43.3	0.229	0.692			0	10	20	
W1A1T40	357.2	0.208	3.85	0.1406	180.8	32.8	53.5	1.181	16.6	20.7	45.4	0.214	0.699			0	10	20	
W1A1T44	207.0	0.186	4.84	0.1350	170.3	31.1	47.4	1.108	17.2	22.7	68.9	0.189	0.656			0	10	29	STUCK ON CORNER
W1A1T50	186.6	0.182	6.59	0.1385	173.0	31.5	47.7	1.080	16.8	22.7	74.8	0.187	0.703			0	10	20	
Delaminated																			
W1A1T06	189.2	0.109	22.94	0.1411	170.3	31.1	47.5	1.108	16.7	22.6	72.3	0.189	0.645			6	10	29	STUCK ON EDGE
W1A1T08	188.3	0.162	9.88	0.1351	172.8	31.5	47.5	1.071	17.3	23.1	76.6	0.185	0.623			4	10	20	
W1A1T15	162.0	0.170	10.00	0.1405	172.8	31.6	46.0	0.988	16.5	21.4	68.7	0.171	0.668			1	10	20	
W1A1T25	212.9	0.194	9.28	0.1380	175.7	31.9	49.3	1.108	16.6	22.5	72.5	0.195	0.683			2	10	20	
W1A1T28	230.8	0.181	2.76	0.1383	171.9	31.1	50.2	1.219	16.8	23.1	70.9	0.210	0.712			1	10	20	
W1A1T29	232.5	0.183	15.85	0.1397	177.7	32.2	50.4	1.124	16.7	22.7	72.8	0.200	0.701			2	10	20	
W1A1T33	249.4	0.176	3.98	0.1381	171.7	31.2	50.5	1.222	16.2	22.3	69.0	0.210	0.686			1	10	20	
W1A1T42	212.1	0.129	27.91	0.1410	179.6	32.7	49.0	1.020	17.2	22.8	74.1	0.183	0.648			6	10	29	STUCK ON CORNER
W1A1T47	189.2	0.180	11.67	0.1374	173.4	31.8	48.3	1.080	17.3	23.0	75.7	0.187	0.703			2	10	29	STUCK ON CORNER
W1A1T48	188.3	0.172	8.72	0.1381	171.3	31.2	48.2	1.131	17.0	22.9	74.3	0.194	0.693			2	10	20	
W1A1T58	145.0	0.134	11.94	0.1379	177.5	32.3	46.7	0.950	17.0	22.7	79.5	0.169	0.678	27.256	0.844	2	10	20	
W1A1T65	169.7	0.118	31.36	0.1355	179.4	32.6	47.1	0.946	16.9	22.3	74.3	0.170	0.656	27.308	3.498	7	10	20	
W1A1T66	171.4	0.131	24.43	0.1386	171.9	31.3	46.7	1.051	17.2	23.1	76.0	0.181	0.662	25.182	0.978	6	10	20	
W1A1T67	170.5	0.112	32.14	0.1388	176.1	32.2	47.6	1.006	17.1	22.9	76.4	0.177	0.670	28.203	1.765	7	10	20	
At Critical Temperature																			
W1A2T14	162.0	0.170	7.06	0.1380	177.1	39.0	50.4	0.576	16.7	19.3	59.2	0.102	0.690			0	10	20	STEAMED 21 SEC
W1A2T16	170.5	0.181	10.60	0.1371	181.0	39.6	49.6	0.508	17.4	19.7	58.6	0.092	0.729			0	10	20	
W1A2T20	170.5	0.165	4.85	0.1374	181.5	39.7	50.2	0.525	17.3	19.5	53.1	0.095	0.747			0	10	20	
Not At Critical Temperature																			
W1A2T25	212.9	0.178	8.43	0.1376	186.0	40.9	52.3	0.530	17.2	19.4	52.8	0.099	0.731			0	10	20	RETEST
W1A2T26	228.2	0.184	8.15	0.1380	185.0	40.4	53.1	0.593	17.4	20.3	59.9	0.110	0.751			0	10	20	
W1A2T28	230.8	0.181	4.97	0.1368	184.1	40.1	53.0	0.606	17.1	19.9	59.7	0.112	0.717			0	10	20	
W1A2T33	264.5	0.190	3.68	0.1381	183.3	39.5	54.0	0.676	17.2	20.0	52.3	0.124	0.739			0	10	20	
W1A2T43	357.2	0.180	4.44	0.1372	180.0	39.2	57.4	0.807	16.9	20.1	51.4	0.145	0.745			0	10	20	
W1A2T48	144.2	0.155	7.10	0.1393	184.1	40.3	48.8	0.433	16.8	18.6	50.6	0.080	0.693	31.042	1.490	0	10	26	
W1A2T50	144.2	0.150	14.67	0.1375	181.5	39.8	48.6	0.456	17.5	19.5	56.1	0.083	0.699	30.054	1.347	0	10	29	STUCK ON EDGE
W1A2T56	173.1	0.167	8.38	0.1367	179.6	39.8	50.0	0.514	16.9	19.2	58.0	0.092	0.707			0	10	20	
Delaminated																			
W1A2T07	188.3	0.135	28.89	0.1383	183.3	40.1	50.6	0.521	17.0	19.6	61.8	0.095	0.667			4	10	20	
W1A2T08	188.3	0.102	50.00	0.1398	180.8	39.6	50.3	0.538	17.1	19.7	61.9	0.097	0.648			6	10	20	
W1A2T10	187.5	0.117	33.33	0.1369	183.5	40.3	52.3	0.571	17.5	20.1	57.6	0.105	0.669			6	10	20	
W1A2T23	214.6	0.187	13.37	0.1402	180.2	39.3	52.6	0.641	17.3	20.4	63.0	0.116	0.744			2	10	20	
W1A2T29	230.8	0.174	13.22	0.1375	182.7	40.0	52.4	0.591	16.7	19.5	59.5	0.108	0.726			4	10	20	
W1A2T32	257.9	0.180	14.44	0.1382	184.1	40.1	53.7	0.634	17.1	19.9	54.9	0.117	0.724			2	10	20	
W1A2T38	292.7	0.204	2.94	0.1384	180.6	39.1	54.8	0.733	16.7	20.1	59.8	0.132	0.751			1	10	20	
W1A2T39	291.9	0.189	11.11	0.1390	183.9	39.8	55.1	0.694	16.8	19.9	54.0	0.128	0.749			1	10	20	
W1A2T44	355.5	0.186	5.91	0.1389	179.6	39.0	56.6	0.802	16.6	19.9	53.0	0.144	0.741			1	10	20	
W1A2T45	358.1	0.177	7.91	0.1389	179.0	39.5	58.5	0.823	16.8	19.9	48.6	0.147	0.727			1	10	20	
W1A2T52	187.5	0.162	12.35	0.1391	180.4	40.1	52.1	0.576	17.0	20.0	64.0	0.104	0.730			4	10	20	
W1A2T53	186.6	0.145	18.62	0.1394	180.2	39.8	51.1	0.556	16.7	19.3	59.2	0.100	0.716			4	10	20	
W1A2T54	179.8	0.163	11.04	0.1360	177.3	39.0	50.5	0.587	16.5	19.3	59.6	0.104	0.730			4	10	20	
W1A2T55	175.6	0.157	21.02	0.1377	181.7	40.4	51.0	0.515	16.9	19.3	59.4	0.094	0.706			6	10	20	
W1A2T57	173.1	0.171	7.02	0.1383	184.3	40.6	50.1	0.466	17.4	19.7	63.5	0.086	0.710			1	10	20	
W1A2T58	171.4	0.175	6.29	0.1372	179.4	39.5	50.0	0.532	17.1	19.7	61.5	0.095	0.703			1	10	20	
W1A2T59	169.7	0.174	9.20	0.1381	185.2	40.8	50.3	0.463	17.0	19.3	61.1	0.086	0.719			1	10	20	
W1A2T60	168.8	0.168	11.90	0.1374	182.7	40.2	50.0	0.490	17.4	19.6	56.7	0.089	0.698			2	10	20	

Table A2 Continued. Data with the IPST A platen.

SAMPLE ID	PLATEN SURFACE TEMP (C)	SEM (MN m/kg)	SEM %CV	IMPULSE (MPa.s)	OD BASIS WEIGHT (g/m^2)	SHEET SOLIDS IN (%)	SHEET SOLIDS OUT (%)	SHEET MOISTURE RATIO CHANGE	FELT MOISTURE IN (%)	FELT MOISTURE OUT (%)	FELT GAIN/ SHEET LOSS (%)	WATER REMOVED (Kg/m^2)	US DENSITY (g/cm^3)	AVERAGE STFI INDEX (Nm/g)	95% C.I.	DELAM CODE	REWET CODE	STICK/ PICK CODE	COMMENTS
W1A2T61	200.2	0.147	10.88	0.1379	180.0	39.8	52.0	0.587	17.2	20.0	60.9	0.106	0.724			6	10	29	STUCK ON CORNER
W1A2T62	200.2	0.179	8.38	0.1387	179.0	39.3	52.0	0.618	17.0	19.7	57.9	0.111	0.719			5	10	20	
W1A2T63	199.4	0.182	6.59	0.1394	180.4	39.6	51.7	0.590	17.4	20.2	59.8	0.107	0.707			2	10	20	
W1A2T64	201.1	0.130	24.62	0.1392	182.7	40.0	52.0	0.576	16.8	19.5	60.0	0.105	0.686			6	10	20	
W1A2T65	200.2	0.154	27.27	0.1381	179.8	39.6	52.0	0.601	16.7	19.5	60.2	0.108	0.706			4	10	20	
W1A2T66	162.9	0.142	14.79	0.1401	179.4	39.0	50.8	0.597	17.1	19.9	61.6	0.107	0.702	27.549	1.409	4	10	20	
W1A2T68	162.0	0.137	27.74	0.1391	179.4	39.4	49.7	0.528	16.9	20.1	79.0	0.095	0.695	26.055	1.116	7	10	20	
W1A2T69	162.0	0.131	21.37	0.1365	179.2	39.3	51.2	0.589	17.0	20.1	68.4	0.106	0.668	25.810	2.249	4	10	20	
W1A2T72	152.7	0.162	10.49	0.1359	182.7	40.6	49.5	0.442	16.6	19.1	70.3	0.081	0.664	29.842	2.018	2	10	20	
At Critical Temperature																			
A3W1T05	144.2	0.136	8.82	0.1354	171.9	31.2	42.2	0.835	17.1	21.7	79.8	0.144	0.599			0	13	20	
W1A3T38	145.9	0.177	11.30	0.1418	173.6	31.5	43.2	0.857	17.5	21.8	72.4	0.149	0.711	31.175	1.944	0	13	20	WITH RACKET
W1A3T39	144.2	0.155	18.06	0.1382	176.9	31.9	44.3	0.878	16.7	22.4	90.6	0.155	0.686	30.076	1.588	0	13	20	WITH RACKET
W1A3T40	144.2	0.146	11.64	0.1364	173.8	32.2	43.9	0.830	17.2	21.7	76.2	0.144	0.662	28.921	1.576	0	10	20	WITH RACKET
Delaminated																			
A3W1T06	186.6	0.131	23.66	0.1350	171.9	31.2	45.7	1.015	15.2	20.8	77.8	0.175	0.659			4	13	20	
A3W1T08	188.3	0.117	38.46	0.1360	177.1	32.0	44.9	0.896	17.7	22.2	73.3	0.159	0.575			6	13	20	
A3W1T11	205.3	0.111	38.74	0.1393	173.4	31.4	45.7	0.998	17.1	22.8	83.5	0.173	0.627			6	14	20	
A3W1T12	203.6	0.127	26.77	0.1373	176.3	31.8	44.9	0.918	17.4	22.0	71.3	0.162	0.611			6	13	20	
A3W1T14	203.6	0.086	50.00	0.1387	176.9	31.9	46.1	0.963	15.4	20.7	76.0	0.170	0.571			6	13	20	
A3W1T15	202.8	0.093	47.31	0.1392	177.9	32.5	46.4	0.923	16.6	21.4	72.2	0.164	0.572			6	13	20	
A3W1T16	169.7	0.144	21.53	0.1358	171.5	31.0	42.6	0.882	17.3	22.0	79.0	0.151	0.629			4	13	20	SHEET SHIFTED
A3W1T17	169.7	0.140	8.57	0.1357	175.3	31.8	44.8	0.920	16.6	21.6	75.7	0.161	0.640			4	13	20	
A3W1T18	171.4	0.129	27.13	0.1371	181.0	32.7	43.0	0.732	17.3	21.4	75.6	0.133	0.606			4	13	20	
A3W1T20	173.1	0.116	30.17	0.1378	179.0	32.3	43.7	0.811	17.1	21.5	75.1	0.145	0.599			4	13	20	
A3W1T21	162.0	0.174	13.22	0.1357	171.7	31.0	43.8	0.943	16.9	22.1	81.3	0.162	0.691			4	13	20	
A3W1T23	162.0	0.146	19.86	0.1396	172.8	31.2	42.4	0.852	17.5	21.8	74.2	0.147	0.643			4	13	20	
A3W1T24	162.9	0.141	16.31	0.1354	179.8	32.4	43.8	0.802	16.0	20.6	75.9	0.144	0.629			4	13	20	
A3W1T25	164.6	0.150	19.33	0.1391	173.4	31.3	42.3	0.828	17.5	21.9	78.0	0.144	0.661			4	14	20	
A3W1T27	156.1	0.153	16.34	0.1386	172.2	31.2	42.4	0.841	16.6	21.1	77.4	0.145	0.629			1	13	20	
A3W1T29	154.4	0.163	9.20	0.1370	177.1	32.0	43.3	0.817	16.8	21.1	74.6	0.145	0.644			1	13	20	
A3W1T30	155.2	0.145	15.17	0.1375	181.2	32.8	41.5	0.643	17.1	20.5	69.8	0.117	0.619			2	13	20	
At Critical Temperature																			
A4W1T02	145.0	0.128	8.59	0.1372	178.6	39.0	46.6	0.417	17.5	19.5	62.8	0.074	0.647			0	10	20	
A4W1T21	160.3	0.162	9.26	0.1406	178.8	39.5	47.7	0.439	17.5	19.8	73.0	0.078	0.694			0	13	20	
W1A4T34	145.0	0.154	7.14	0.1416	182.1	39.7	48.4	0.456	17.5	20.0	76.8	0.083	0.692	29.468	1.389	0	10	20	WITH RACQUET
Not At Critical Temperature																			
A4W1T15	170.5	0.157	10.83	0.1389	182.3	39.6	47.7	0.429	17.1	19.3	68.6	0.078	0.662			0	10	20	
A4W1T16	173.1	0.145	8.28	0.1392	178.6	39.0	48.0	0.484	17.1	19.6	72.2	0.086	0.647			0	13	20	
W1A4T27	128.9	0.142	7.75	0.1374	180.8	39.4	47.6	0.436	17.2	20.7	111.0	0.079	0.709	28.955	1.213	0	10	20	WITH RACQUET
Delaminated																			
A4W1T05	186.6	0.129	40.31	0.1381	182.5	39.7	49.1	0.481	17.3	19.1	48.4	0.088	0.643			4	13	20	
A4W1T06	186.6	0.094	58.51	0.1387	180.6	39.4	49.6	0.524	18.1	20.7	67.6	0.095	0.598			6	13	20	
A4W1T07	186.6	0.101	55.45	0.1366	182.5	39.5	49.5	0.512	17.0	19.4	63.0	0.093	0.607			6	13	20	
A4W1T13	206.2	0.080	55.00	0.1391	180.0	39.0	50.2	0.574	16.6	19.4	64.1	0.103	0.598			6	13	20	
A4W1T17	173.1	0.161	15.63	0.1385	184.1	40.0	48.2	0.428	17.2	19.5	70.6	0.079	0.658			2	13	20	
A4W1T24	162.0	0.144	7.64	0.1369	181.0	40.0	49.4	0.472	17.2	19.5	66.4	0.085	0.681			1	13	20	
W1A4T37	161.2	0.104	15.38	0.1353	186.6	40.8	50.4	0.467	17.6	20.3	76.0	0.087	0.694	27.378	1.397	7	10	20	WITH RACQUET
W1A4T40	161.2	0.129	17.05	0.1369	180.6	39.5	49.0	0.489	17.3	18.5	33.3	0.088	0.683	30.907	1.253	4	10	20	WITH RACQUET
W1A4T41	161.2	0.096	31.25	0.1372	182.3	39.8	49.1	0.475	16.7	19.3	71.0	0.087	0.653	25.638	0.985	7	10	20	WITH RACQUET
W1A4T42	175.6	0.110	26.36	0.1401	183.9	40.1	50.5	0.513	16.4	19.7	83.3	0.094	0.696	27.126	1.923	7	10	20	WITH RACQUET
W1A4T43	176.5	0.101	34.65	0.1403	179.4	39.0	49.3	0.534	17.2	18.7	36.8	0.096	0.658	24.123	1.981	7	10	20	WITH RACQUET
W1A4T44	175.6	0.090	28.89	0.1344	181.2	39.5	49.3	0.500	17.0	18.8	50.7	0.091	0.657	25.560	1.401	7	10	20	WITH RACQUET
W1A4T45	174.8	0.090	38.89	0.1384	181.7	39.9	49.6	0.489	17.1	19.6	68.5	0.089	0.660	25.351	1.770	7	10	20	WITH RACQUET
At Critical Temperature																			
W5A1T33	174.8	0.162	8.64	0.1360	174.2	31.8	47.9	1.060	17.8	23.2	73.0	0.185	0.732			0	10	20	
W5A1T34	173.9	0.180	7.78	0.1383	176.9	32.4	46.8	0.951	16.9	22.1	70.6	0.168	0.742			0	10	20	
W5A1T36	174.8	0.179	7.82	0.1372	177.7	32.2	45.9	0.924	17.4	22.2	70.8	0.164	0.734			0	10	20	

Table A2 Continued. Data with the IPST A platen.

SAMPLE ID	PLATEN SURFACE TEMP (C)	SEM (MN m/kg)	SEM %CV	IMPULSE (MPa.s)	OD BASIS WEIGHT (g/m^2)	SHEET SOLIDS IN (%)	SHEET SOLIDS OUT (%)	SHEET MOISTURE RATIO CHANGE	FELT MOISTURE IN (%)	FELT MOISTURE OUT (%)	FELT GAIN/ SHEET LOSS (%)	WATER REMOVED (Kg/m^2)	US DENSITY (g/cm^3)	AVERAGE STFI INDEX (Nm/g)	95% C.I.	DELAM CODE	REWET CODE	STICK/ PICK CODE	COMMENTS
W5A1T44	167.1	0.139	12.23	0.1367	174.2	31.6	47.5	1.060	17.5	23.4	79.9	0.185	0.687	29.621	2.603	0	10	20	STUCK ON CORNER
W5A1T45	166.3	0.171	12.28	0.1365	179.4	32.7	45.7	0.867	17.6	22.7	77.0	0.156	0.693	30.775	2.404	0	10	20	
W5A1T46	165.4	0.169	14.79	0.1370	180.0	32.8	46.1	0.881	17.4	22.3	71.9	0.159	0.691	32.728	3.052	0	10	20	
W5A1T47	174.8	0.172	8.72	0.1404	180.2	32.8	47.5	0.947	17.0	22.6	80.6	0.171	0.712	30.997	1.289	0	10	20	
W5A1T49	174.8	0.168	7.14	0.1380	174.4	31.8	45.9	0.967	16.8	21.9	73.0	0.169	0.694	32.564	1.481	0	10	20	
W5A1T50	174.8	0.168	7.14	0.1396	174.8	31.9	45.9	0.961	17.0	22.3	74.0	0.168	0.702	29.497	0.923	0	10	20	
Not At Critical Temperature																			
A1W5T04	229.9	0.178	8.43	0.1388	180.6	32.9	49.4	1.016	16.9	22.1	67.5	0.184	0.705			0	10	20	
W5A1T11	188.3	0.178	7.87	0.1345	170.9	31.2	47.9	1.121	17.3	23.1	73.7	0.192	0.725			0	10	20	
W5A1T14	188.3	0.163	7.98	0.1371	171.7	31.3	47.3	1.081	16.2	21.8	72.5	0.186	0.691			0	10	20	
W5A1T15	187.5	0.164	4.88	0.1370	174.0	31.6	47.1	1.039	17.1	22.4	68.8	0.181	0.686			0	10	20	
W5A1T16	211.3	0.185	8.65	0.1389	175.0	31.8	48.2	1.076	16.1	21.8	72.3	0.188	0.720			0	10	20	
W5A1T17	211.3	0.178	3.93	0.1383	172.8	31.4	48.0	1.101	17.1	22.6	69.3	0.190	0.700			0	10	20	
W5A1T19	211.3	0.182	7.14	0.1384	178.1	32.4	48.2	1.018	17.2	22.3	69.0	0.181	0.711			0	10	20	
W5A1T26	358.1	0.183	2.73	0.1361	177.9	32.5	53.0	1.193	17.3	21.0	40.3	0.212	0.735			0	10	20	
W5A1T30	145.0	0.149	8.05	0.1380	181.7	33.0	46.0	0.853	17.0	21.4	69.4	0.155	0.686	32.097	1.678	0	10	29	STUCK ON EDGE
W5A1T56	188.3	0.174	11.49	0.1377	177.1	32.2	46.8	0.975	17.3	22.8	75.4	0.173	0.706	29.841	0.683	0	10	20	
Delaminated																			
A1W5T03	229.9	0.162	6.17	0.1391	179.4	32.7	49.0	1.017	17.1	22.4	67.3	0.183	0.710			1	10	20	
A1W5T05	229.1	0.157	8.28	0.1389	180.6	32.9	49.0	1.005	16.8	21.9	64.9	0.182	0.694			1	10	20	
W5A1T24	260.5	0.172	3.49	0.1381	172.8	31.6	49.7	1.152	17.1	22.8	68.1	0.199	0.701			2	10	20	
W5A1T25	257.9	0.191	3.14	0.1362	178.1	32.7	50.5	1.081	16.9	22.4	66.5	0.193	0.707			2	10	20	
W5A1T32	174.8	0.166	12.05	0.1369	170.5	31.2	47.0	1.075	17.5	23.0	72.5	0.183	0.734			2	10	20	
W5A1T38	201.9	0.171	19.30	0.1376	177.5	32.2	49.0	1.061	17.6	23.0	71.2	0.188	0.726			4	10	20	
W5A1T39	201.1	0.161	13.04	0.1390	170.5	31.2	47.9	1.114	17.6	23.1	69.9	0.190	0.708			2	10	20	
W5A1T52	187.5	0.168	8.33	0.1382	177.5	32.3	47.2	0.974	16.6	22.4	79.0	0.173	0.721	31.751	2.170	4	10	20	
W5A1T54	187.5	0.161	8.70	0.1393	177.1	32.2	46.5	0.958	17.4	22.9	78.3	0.170	0.706	31.976	0.947	2	10	20	
W5A1T55	186.6	0.148	27.03	0.1383	179.2	32.7	47.8	0.966	17.6	23.2	78.7	0.173	0.694	28.255	4.518	4	10	20	
At Critical Temperature																			
W5A2T54	212.1	0.192	5.21	0.1396	185.8	40.7	51.2	0.505	17.4	19.7	57.3	0.094	0.738			0	10	20	
W5A2T55	213.8	0.177	9.04	0.1378	180.8	39.4	51.7	0.606	17.0	20.2	65.7	0.110	0.729			0	10	20	
W5A2T61	209.6	0.173	8.09	0.1369	185.2	40.1	51.7	0.558	17.3	20.0	60.6	0.103	0.729			0	10	20	
W5A2T62	204.5	0.172	6.98	0.1384	184.3	40.0	51.4	0.557	16.4	19.4	63.5	0.103	0.730			0	10	20	
W5A2T78	196.0	0.166	6.63	0.1391	178.4	39.0	52.2	0.651	16.7	19.9	64.3	0.116	0.743	29.436	2.692	0	10	20	
Not At Critical Temperature																			
A2W5T01	231.6	0.175	10.86	0.1365	186.0	40.8	52.2	0.535	17.3	19.9	60.4	0.100	0.750			0	10	20	
A2W5T04	229.1	0.168	4.76	0.1370	182.7	40.1	52.0	0.571	16.4	19.1	57.8	0.104	0.748			0	10	20	
A2W5T05	230.8	0.157	5.73	0.1375	179.0	39.2	51.5	0.611	16.6	19.2	54.4	0.109	0.720			0	10	20	
W5A2T09	162.9	0.138	8.70	0.1378	183.7	40.2	48.7	0.433	17.2	19.2	58.9	0.080	0.678			0	10	20	
W5A2T10	162.0	0.162	5.56	0.1365	186.0	40.6	48.6	0.406	16.9	18.7	53.8	0.075	0.693			0	10	20	
W5A2T12	188.3	0.155	7.74	0.1386	181.9	39.8	50.2	0.519	17.1	19.7	60.6	0.094	0.693			0	10	20	
W5A2T19	254.6	0.201	5.97	0.1372	185.2	40.3	52.9	0.593	16.9	19.9	64.9	0.110	0.739			0	10	20	
W5A2T22	272.4	0.185	3.24	0.1383	177.7	39.0	53.9	0.705	16.9	20.0	56.0	0.125	0.718			0	10	20	
W5A2T25	272.4	0.198	3.03	0.1380	180.0	39.4	53.0	0.654	17.2	20.1	66.5	0.118	0.727			0	10	20	
W5A2T29	299.5	0.184	7.07	0.1406	185.4	40.5	54.1	0.623	16.9	19.2	47.6	0.115	0.755			0	10	20	
W5A2T30	297.0	0.177	3.95	0.1373	180.8	39.5	54.8	0.710	16.6	19.7	55.1	0.128	0.735			0	10	20	
W5A2T32	322.4	0.166	16.27	0.1403	184.8	40.4	54.7	0.645	16.9	19.3	47.9	0.119	0.706			0	10	20	
W5A2T37	355.5	0.185	4.32	0.1389	182.7	39.9	56.3	0.732	16.3	18.9	44.1	0.134	0.737			0	10	20	
W5A2T38	356.4	0.192	5.21	0.1382	179.8	39.8	56.7	0.749	17.0	19.4	42.4	0.135	0.732			0	10	20	
W5A2T39	358.9	0.195	2.66	0.1392	178.6	39.3	55.5	0.743	16.6	19.3	46.2	0.133	0.747			0	10	20	
W5A2T41	145.9	0.174	13.79	0.1392	182.9	39.9	48.5	0.445	17.3	19.3	54.4	0.081	0.744	33.056	2.048	0	10	20	
W5A2T43	144.2	0.169	4.73	0.1359	180.4	39.7	48.4	0.453	17.5	19.6	60.1	0.082	0.720	34.815	2.376	0	10	20	
W5A2T47	175.6	0.170	8.82	0.1378	179.0	39.3	49.6	0.527	17.4	20.1	63.9	0.094	0.718	31.554	1.531	0	10	20	
W5A2T68	145.0	0.142	10.56	0.1378	180.0	39.5	48.2	0.454	16.9	19.4	71.1	0.082	0.692	31.591	1.589	0	10	20	
W5A2T70	145.9	0.160	11.25	0.1385	183.7	40.4	48.5	0.411	17.3	19.2	59.5	0.075	0.685	33.524	0.743	0	10	20	
W5A2T71	171.4	0.197	4.57	0.1366	183.9	40.5	49.0	0.431	17.1	18.9	50.7	0.079	0.732	33.650	1.947	0	10	20	
W5A2T72	169.7	0.186	7.53	0.1370	179.6	39.6	48.7	0.470	17.1	19.2	57.1	0.084	0.721	32.611	2.191	0	10	20	
W5A2T73	170.5	0.176	6.82	0.1376	177.5	39.1	49.1	0.522	17.1	19.8	68.4	0.093	0.699	33.572	2.038	0	10	20	
W5A2T74	171.4	0.163	9.82	0.1402	180.2	39.6	51.1	0.570	16.3	19.5	69.2	0.103	0.701	29.731	2.042	0	10	20	
W5A2T87	188.3	0.152	11.84	0.1385	185.4	40.5	50.9	0.503	17.0	19.6	65.3	0.093	0.719	30.665	1.375	0	10	20	

Table A2 Continued. Data with the IPST A platen.

SAMPLE ID	PLATEN SURFACE TEMP (C)	SEM (MN m/kg)	SEM %CV	IMPULSE (MPa.s)	OD BASIS WEIGHT (g/m^2)	SHEET SOLIDS IN (%)	SHEET SOLIDS OUT (%)	SHEET MOISTURE RATIO CHANGE	FELT MOISTURE IN (%)	FELT MOISTURE OUT (%)	FELT GAIN/ SHEET LOSS (%)	WATER REMOVED (Kg/m^2)	US DENSITY (g/cm^3)	AVERAGE STFI INDEX (Nm/g)	95% C.I.	DELAM CODE	REWET CODE	STICK/ PICK CODE	COMMENTS
W5A2T88	187.5	0.186	12.37	0.1407	186.4	40.7	49.7	0.446	16.9	19.1	61.9	0.083	0.739	32.365	2.552	0	10	20	
Delaminated																			
W5A2T53	212.9	0.170	11.76	0.1404	179.0	39.1	51.1	0.602	17.1	20.1	67.1	0.108	0.735			2	10	20	
W5A2T60	207.9	0.163	14.11	0.1383	183.5	40.0	50.9	0.535	16.9	19.4	58.3	0.098	0.731			4	10	20	
W5A2T63	219.7	0.172	15.12	0.1396	176.9	39.3	52.0	0.617	17.3	19.7	52.3	0.109	0.738			4	10	20	
W5A2T81	205.3	0.174	9.77	0.1381	178.8	39.1	49.9	0.556	17.2	19.7	59.4	0.099	0.744	31.020	2.371	4	10	20	
W5A2T82	205.3	0.175	8.57	0.1378	181.0	39.7	50.7	0.550	16.9	19.7	65.3	0.100	0.719	31.540	1.199	2	10	20	
At Critical Temperature																			
W5A3T31	145.0	0.150	8.67	0.1354	179.0	32.4	45.2	0.871	16.9	23.0	99.8	0.156	0.686	30.571	0.690	0	10	20	WITH RACKET
W5A3T52	161.2	0.162	14.81	0.1358	177.9	32.3	45.4	0.890	17.0	22.6	89.4	0.158	0.705	33.191	0.896	0	10	20	WITH RACKET
W5A3T54	162.9	0.163	11.04	0.1395	174.8	31.7	46.2	0.993	17.1	22.9	83.4	0.174	0.707	31.065	1.742	0	10	20	WITH RACKET
Not At Critical Temperature																			
A3W5T09	171.4	0.154	11.69	0.1366	180.6	32.6	42.6	0.718	17.2	21.3	79.6	0.130	0.665			0	13	20	
A3W5T12	189.2	0.158	11.39	0.1359	177.3	32.2	43.3	0.794	16.7	21.1	78.7	0.141	0.676			0	13	20	
A3W5T15	188.3	0.167	13.77	0.1375	175.0	31.8	44.3	0.893	16.1	21.1	77.5	0.156	0.668			0	13	20	
A3W5T16	205.3	0.173	10.98	0.1390	175.7	32.2	43.4	0.804	17.0	21.9	87.7	0.141	0.686			0	14	20	
A3W5T17	206.2	0.161	9.94	0.1382	177.9	32.4	43.8	0.807	17.0	21.6	78.3	0.144	0.682			0	13	20	
A3W5T19	206.2	0.167	15.57	0.1377	180.4	32.7	44.3	0.798	16.8	21.3	78.7	0.144	0.687			0	13	20	
A3W5T20	207.0	0.156	16.03	0.1378	176.1	31.9	43.5	0.839	16.9	20.8	64.5	0.148	0.672			0	13	20	
A3W5T25	229.9	0.182	11.54	0.1394	177.5	32.4	45.9	0.910	17.6	22.3	72.5	0.161	0.677			0	13	20	
Delaminated																			
A3W5T18	205.3	0.166	13.25	0.1369	178.8	32.6	45.1	0.856	17.1	22.0	81.6	0.153	0.684			2	13	20	
A3W5T22	227.4	0.181	6.08	0.1378	179.8	33.0	47.1	0.909	15.6	20.5	72.6	0.163	0.687			1	13	20	
A3W5T23	229.1	0.163	7.36	0.1359	180.8	32.9	46.4	0.887	14.6	19.7	73.7	0.160	0.671			1	10	29	STUCK AT CORNER
W5A3T36	188.3	0.106	31.13	0.1364	173.4	31.5	47.8	1.089	16.7	22.7	80.4	0.189	0.699	26.391	1.485	7	10	20	WITH RACKET
W5A3T38	187.5	0.093	23.66	0.1411	181.2	32.8	48.4	0.984	17.2	22.7	79.8	0.178	0.677	26.847	1.376	7	10	20	WITH RACKET
W5A3T39	186.6	0.081	24.69	0.1372	174.8	31.6	48.5	1.102	17.1	23.3	82.8	0.193	0.661	26.268	1.305	7	10	20	WITH RACKET
W5A3T40	186.6	0.082	31.71	0.1378	173.4	31.4	48.8	1.138	16.8	23.1	81.1	0.197	0.653	28.033	1.919	7	10	20	WITH RACKET
W5A3T46	162.0	0.116	23.28	0.1408	177.7	32.1	45.9	0.939	17.4	23.4	91.5	0.167	0.684	30.056	0.871	6	10	20	WITH RACKET
W5A3T53	162.0	0.145	17.93	0.1392	172.2	31.2	45.6	1.014	17.2	23.9	97.8	0.175	0.668	31.662	2.633	4	10	20	WITH RACKET
W5A3T58	169.7	0.114	42.11	0.1378	176.9	31.9	45.4	0.929	16.8	22.7	92.7	0.164	0.665	27.487	1.010	7	10	20	WITH RACKET
W5A3T59	170.5	0.142	17.61	0.1400	173.8	31.3	46.3	1.038	16.8	23.5	93.5	0.180	0.662	32.158	1.232	4	10	20	WITH RACKET
At Critical Temperature																			
A4W5T01	145.0	0.146	12.33	0.1395	178.1	39.0	46.7	0.424	17.8	19.8	65.5	0.076	0.718			0	13	20	
W5A4T32	145.9	0.155	18.71	0.1402	187.0	40.4	48.5	0.414	16.8	19.7	88.4	0.077	0.726	31.955	0.906	0	10	20	WITH RACKET
Not At Critical Temperature																			
A4W5T18	205.3	0.165	7.88	0.1369	181.2	39.4	48.6	0.479	16.8	19.3	67.5	0.087	0.691			0	13	20	
A4W5T19	205.3	0.167	8.98	0.1356	180.0	39.2	48.0	0.471	17.1	19.4	65.3	0.085	0.689			0	19	20	VERY SLIGHT REWET
A4W5T24	226.5	0.170	7.06	0.1361	185.6	40.5	50.6	0.493	17.2	19.6	64.6	0.091	0.709			0	10	20	
Delaminated																			
A4W5T15	188.3	0.145	12.41	0.1375	182.3	39.7	47.8	0.425	17.2	19.5	73.7	0.078	0.684			1	13	20	
A4W5T16	204.5	0.165	12.12	0.1391	179.0	39.1	48.8	0.508	17.2	20.1	79.9	0.091	0.707			1	13	20	
W5A4T37	175.6	0.135	23.70	0.1365	185.4	40.3	50.5	0.500	16.9	20.1	85.3	0.093	0.715	27.489	2.303	4	10	20	WITH RACKET
W5A4T40	174.8	0.131	22.90	0.1385	186.8	40.6	49.7	0.452	17.4	20.1	79.9	0.085	0.707	29.789	1.664	6	10	20	WITH RACKET

Table A3. Data with the IPST C platen.

SAMPLE ID	PLATEN SURFACE TEMP (C)	SEM (MN m/kg)	SEM %CV	IMPULSE (MPa.s)	OD BASIS WEIGHT (g/m^2)	SHEET SOLIDS IN (%)	SHEET SOLIDS OUT (%)	SHEET MOISTURE RATIO CHANGE	FELT MOISTURE IN (%)	FELT MOISTURE OUT (%)	FELT GAIN/ SHEET LOSS (%)	WATER REMOVED (Kg/m^2)	US DENSITY (g/cm^3)	AVERAGE STFI INDEX (Nm/g)	95% C.I.	DELAM CODE	REWET CODE	STICK/ PICK CODE	COMMENTS
At Critical Temperature																			
W1C1T08	194.4	0.168	8.33	0.1397	172.2	34.2	46.6	0.781	16.6	20.4	65.3	0.134	0.675	30.279	1.666	0	10	20	
W1C1T12	206.7	0.162	10.49	0.1363	181.7	36.0	46.4	0.620	17.2	20.1	59.3	0.113	0.664	28.140	1.519	0	10	20	
Not At Critical Temperature																			
W1C1T10	192.5	0.175	8.00	0.1360	173.8	34.7	46.3	0.723	16.9	20.1	59.6	0.126	0.677	30.014	0.854	0	10	20	
W1C1T18	183.1	0.155	4.52	0.1360	177.9	35.4	45.5	0.627	17.3	20.3	62.3	0.111	0.665	31.898	1.470	0	10	20	
W1C1T19	184.0	0.170	9.41	0.1393	178.4	35.3	45.4	0.632	17.1	19.7	54.6	0.113	0.659	30.830	1.110	0	10	20	
W1C1T20	184.9	0.162	8.64	0.1385	174.4	34.6	45.1	0.678	16.7	19.8	58.2	0.118	0.652	30.798	1.032	0	10	20	
W1C1T23	169.8	0.155	12.90	0.1362	181.0	35.8	44.8	0.560	16.9	19.5	56.2	0.101	0.629	28.542	0.881	0	10	20	
W1C1T25	168.9	0.160	11.25	0.1393	177.3	35.2	45.7	0.648	17.1	20.3	66.7	0.115	0.633	28.367	0.453	0	10	20	
Delaminated																			
W1C1T15	207.6	0.145	15.86	0.1373	179.8	35.5	47.1	0.694	16.4	19.8	63.6	0.125	0.675	28.153	3.015	6	10	20	
At Critical Temperature																			
W1C2T16	183.1	0.165	8.48	0.1356	176.5	41.9	50.4	0.399	17.2	18.9	57.5	0.070	0.699	29.255	0.694	0	10	20	
W1C2T18	183.1	0.167	10.18	0.1385	180.2	42.9	50.3	0.341	17.5	18.9	51.7	0.061	0.698	28.992	1.355	0	10	20	
Not at Critical Temperature																			
W1C2T02	147.2	0.174	8.05	0.1405	179.2	42.7	48.8	0.295	17.1	18.5	56.8	0.053	0.700	31.425	1.620	0	10	20	
Delaminated																			
W1C2T07	192.5	0.162	18.52	0.1394	177.9	42.6	50.3	0.359	17.2	18.7	50.2	0.064	0.700	30.055	1.543	1	10	20	
W1C2T08	192.5	0.147	16.33	0.1412	174.4	41.4	50.9	0.453	17.6	19.3	52.9	0.079	0.692	28.799	3.260	4	10	20	
At Critical Temperature																			
W5C1T11	212.3	0.175	13.71	0.1372	177.7	35.3	46.3	0.671	16.4	19.6	61.0	0.119	0.716	29.475	1.752	0	10	20	
W5C1T12	213.3	0.168	11.31	0.1382	180.8	36.0	46.2	0.619	16.9	19.9	63.5	0.112	0.706	31.259	0.604	0	10	20	
W5C1T13	211.4	0.165	10.30	0.1378	175.0	34.7	46.1	0.711	17.1	20.4	61.8	0.125	0.710	31.432	1.564	0	10	20	
W5C1T20	230.3	0.150	12.00	0.1406	178.8	35.5	48.3	0.750	16.8	20.9	72.0	0.134	0.710	30.651	1.571	0	10	20	
Not At Critical Temperature																			
W5C1T04	147.2	0.138	12.32	0.1394	180.8	36.0	44.2	0.517	17.0	19.4	58.2	0.093	0.664	29.305	1.237	0	10	20	
W5C1T05	147.2	0.139	9.35	0.1371	172.4	34.4	43.8	0.619	16.9	19.8	66.3	0.107	0.671	32.916	1.355	0	10	20	
W5C1T08	193.4	0.156	9.62	0.1401	177.9	35.3	46.3	0.672	17.4	20.6	62.9	0.120	0.683	31.201	0.767	0	10	20	
W5C1T09	193.4	0.160	10.63	0.1379	178.8	35.9	46.5	0.637	17.4	20.3	58.3	0.114	0.692	31.113	0.960	0	10	20	
W5C1T10	193.4	0.156	12.18	0.1374	180.0	35.6	47.2	0.693	17.3	20.9	66.5	0.125	0.687	30.514	1.109	0	10	20	
Delaminated																			
W5C1T17	230.3	0.139	16.55	0.1373	177.7	35.2	46.9	0.707	17.2	20.6	63.9	0.126	0.706	30.157	2.141	2	10	20	
W5C1T21	239.7	0.134	19.40	0.1408	171.3	34.0	48.1	0.866	18.0	22.5	73.9	0.148	0.726	30.954	0.702	4	10	20	
At Critical Temperature																			
W5C2T11	212.3	0.161	4.97	0.1390	180.4	43.0	51.3	0.376	16.8	18.5	58.0	0.068	0.739	30.558	2.938	0	10	20	
W5C2T12	213.3	0.149	8.72	0.1387	173.2	41.1	50.3	0.447	17.4	19.2	55.3	0.077	0.729	28.563	0.837	0	10	20	
W5C2T18	231.2	0.161	5.59	0.1374	177.3	41.9	52.4	0.476	17.2	19.1	50.8	0.084	0.718	28.803	1.367	0	10	20	
W5C2T21	249.2	0.169	8.88	0.1376	173.6	41.3	52.0	0.499	17.0	19.4	63.7	0.087	0.725	31.144	1.969	0	10	20	
Not At Critical Temperature																			
W5C2T05	147.2	0.140	7.86	0.1379	174.4	41.5	47.9	0.321	17.7	18.8	45.2	0.056	0.698	30.955	1.846	0	10	20	
W5C2T06	194.4	0.157	8.28	0.1357	179.6	42.6	50.1	0.353	17.1	18.4	46.4	0.063	0.728	29.693	1.506	0	10	20	
W5C2T07	194.4	0.176	6.82	0.1372	180.2	42.7	49.5	0.324	17.7	18.8	43.6	0.058	0.737	32.613	1.339	0	10	20	
W5C2T10	192.5	0.150	5.33	0.1405	172.2	41.0	49.3	0.414	17.5	18.9	45.2	0.071	0.725	27.874	3.208	0	10	20	
W5C2T25	250.1	0.145	10.34	0.1379	180.4	43.0	53.5	0.458	17.6	19.6	58.3	0.083	0.703	27.310	1.351	0	10	20	
W5C2T26	269.0	0.202	6.44	0.1389	176.7	42.2	52.1	0.450	16.8	18.8	57.2	0.080	0.767	32.869	0.790	0	10	20	
W5C2T27	269.9	0.218	5.05	0.1400	179.4	42.8	51.7	0.399	16.9	18.5	50.8	0.072	0.774	33.904	0.897	0	10	20	
W5C2T28	288.1	0.172	8.72	0.1380	178.1	42.3	52.0	0.441	17.5	19.3	51.8	0.079	0.729	28.995	0.929	0	10	20	
W5C2T32	286.9	0.165	9.09	0.1402	176.7	41.8	53.6	0.528	17.1	18.7	39.1	0.093	0.728	30.515	1.788	0	10	20	
Delaminated																			
W5C2T16	232.2	0.185	7.03	0.1398	176.1	42.0	50.8	0.411	17.1	19.0	58.1	0.072	0.760	31.686	3.344	1	10	20	

Table A4. Data for the double-felted pressing control cases.

SAMPLE ID	PLATEN SURFACE TEMP (C)	SEM (MN m/kg)	SEM %CV	IMPULSE (MPa.s)	OD BASIS WEIGHT (g/m^2)	SHEET SOLIDS IN (%)	SHEET SOLIDS OUT (%)	SHEET MOISTURE RATIO CHANGE	FELT MOISTURE IN (%)	FELT MOISTURE OUT (%)	FELT GAIN/ SHEET LOSS (%)	WATER REMOVED (Kg/m^2)	US DENSITY (g/cm^3)	AVERAGE STFI INDEX (Nm/g)	95% C.I.	DELAM CODE	REWET CODE	STICK/ PICK CODE	COMMENTS
W1D1T04	99.0	0.141	23.40	0.1349	174.6	34.6	41.2	0.469	17.8	19.7	68.3	0.082	0.611	29.616	1.219	0	10	20	TOP
W1D1T04	99.0								16.8	18.4	44.2								BOTTOM
W1D1T05	98.1	0.119	19.33	0.1415	180.4	35.9	41.9	0.404	17.6	19.4	56.4	0.073	0.604	28.234	0.845	0	10	20	TOP
W1D1T05	98.1								16.4	17.8	42.3								BOTTOM
W1D1T06	99.0	0.149	15.44	0.1370	171.7	34.2	41.1	0.492	16.7	18.3	43.3	0.085	0.636	29.909	0.364	0	10	20	TOP
W1D1T06	99.0								16.3	17.4	26.7								BOTTOM
W1D1T07	99.0	0.132	17.42	0.1396	173.0	34.4	42.1	0.532	17.5	19.9	60.0	0.092	0.625	28.986	0.621	0	10	20	TOP
W1D1T07	99.0								16.7	18.3	39.8								BOTTOM
W1D1T09	99.0	0.123	14.63	0.1382	173.0	34.4	41.7	0.510	17.1	19.1	50.4	0.088	0.596	29.009	0.902	0	10	20	TOP
W1D1T09	99.0								16.7	18.0	34.2								BOTTOM
At 40% Solids																			
W1D2T01	99.0	0.147	17.69	0.1428	168.6	40.4	45.2	0.265	17.6	18.6	48.6	0.045	0.677	29.210	1.537	0	10	20	TOP
W1D2T01	99.0								16.3	17.2	47.0								BOTTOM
W1D2T04	99.0	0.145	11.72	0.1378	173.4	40.8	44.7	0.216	18.1	18.7	36.5	0.037	0.664	30.455	0.988	0	10	20	TOP
W1D2T04	99.0								16.5	17.1	31.8								BOTTOM
W1D2T09	98.1	0.137	18.98	0.1356	170.5	40.7	44.1	0.188	18.3	18.8	36.8	0.032	0.640	27.910	2.274	0	10	20	TOP
W1D2T09	98.1								16.4	16.8	22.9								BOTTOM
At 42% Solids																			
W1D2T05	99.0	0.145	24.14	0.1354	177.1	41.6	44.6	0.161	18.3	18.7	39.9	0.029	0.672	29.217	0.773	0	10	20	TOP
W1D2T05	99.0								16.7	17.0	24.3								BOTTOM
W1D2T10	98.1	0.142	11.97	0.1395	176.5	41.7	45.1	0.180	17.5	19.1	114.9	0.032	0.634	30.267	1.087	0	10	20	TOP
W1D2T10	98.1								16.3	16.7	26.9								BOTTOM
W5D1T01	99.0	0.141	21.99	0.1339	172.2	34.2	41.2	0.495	18.0	20.0	57.2	0.085	0.649	30.926	2.926	0	10	20	TOP
W5D1T01	99.0								16.8	17.9	30.1								BOTTOM
W5D1T03	99.0	0.141	17.73	0.1375	178.8	35.4	41.2	0.401	18.3	20.0	57.9	0.072	0.648	32.004	1.173	0	10	20	TOP
W5D1T03	99.0								16.6	17.6	31.4								BOTTOM
W5D1T04	99.0	0.139	15.11	0.1393	176.5	35.1	41.3	0.429	18.0	19.1	34.4	0.076	0.651	31.030	1.867	0	10	20	TOP
W5D1T04	99.0								17.1	18.7	48.9								BOTTOM
W5D1T05	99.0	0.127	23.62	0.1399	175.3	35.0	41.5	0.443	18.1	20.2	63.5	0.078	0.629	30.565	3.078	0	10	20	TOP
W5D1T05	99.0								16.3	17.3	28.7								BOTTOM
W5D1T09	99.0	0.144	22.92	0.1401	180.2	35.6	41.5	0.398	17.7	19.5	58.7	0.072	0.591	30.275	0.712	0	10	20	TOP
W5D1T09	99.0								16.5	17.5	30.0								BOTTOM
W5D1T10	99.0	0.158	12.66	0.1382	177.5	35.0	41.3	0.434	18.1	20.2	63.0	0.077	0.670	30.910	1.237	0	10	20	TOP
W5D1T10	99.0								16.5	17.5	31.1								BOTTOM
At 40% Solids																			
W5D2T09	99.0	0.140	10.71	0.1377	168.8	40.3	43.6	0.191	18.4	18.7	25.5	0.032	0.670	32.984	2.178	0	13	20	TOP
W5D2T09	99.0								16.8	16.8	0.3								BOTTOM
At 42% Solids																			
W5D2T05	99.0	0.149	13.42	0.1383	174.2	41.9	44.3	0.133	18.3	18.9	60.5	0.023	0.643	32.503	0.457	0	10	20	TOP
W5D2T05	99.0								16.7	17.0	31.7								BOTTOM

APPENDIX B

The following tables contain the data that were not used for analysis. Data were not used if the ingoing solids or basis weight were out of the established range. Also rejected were data where the sheet stuck to the platen (except at the corner) or showed any other anomalous behavior.

Table B1. Data with the IPST A platen.

SAMPLE ID	PLATEN SURFACE TEMP (C)	SEM (MN m/kg)	SEM %CV	IMPULSE (MPa.s)	OD BASIS WEIGHT (g/m^2)	SHEET SOLIDS IN (%)	SHEET SOLIDS OUT (%)	SHEET MOISTURE RATIO CHANGE	FELT MOISTURE IN (%)	FELT MOISTURE OUT (%)	FELT GAIN/ SHEET LOSS (%)	WATER REMOVED (Kg/m^2)	US DENSITY (g/cm^3)	AVERAGE STFI INDEX (Nm/g)	95% C.I.	DELAM CODE	REWET CODE	STICK/ PICK CODE	COMMENTS
W1A1T01	145.9	0.149	10.74	0.1260	179.0	32.6	46.1	0.895	17.2	21.8	70.6	0.160	0.649	0.000	0.000	0	10	27	
W1A1T02	145.0	0.140	6.43	0.1300	178.8	32.6	45.6	0.868	17.3	21.9	70.0	0.155	0.623	0.000	0.000	0	10	27	
W1A1T03	144.2	0.152	7.89	0.1225	177.3	32.4	45.1	0.870	17.4	22.2	75.9	0.154	0.628	29.532	1.516	0	10	26	
W1A1T04	144.2	0.164	8.54	0.1299	171.9	31.3	45.0	0.966	17.2	22.5	75.2	0.166	0.635	0.000	0.000	0	10	29	STUCK ON EDGE ONLY
W1A1T05	145.0	0.138	7.97	0.1352	170.5	31.0	57.6	1.486	17.2	22.0	45.6	0.253	0.633	0.000	0.000	0	10	28	
W1A1T07	189.2	0.093	37.63	0.1367	167.4	30.5	47.1	1.151	16.1	22.3	74.2	0.193	0.612	0.000	0.000	6	10	20	
W1A1T09	187.5	0.088	27.27	0.1383	184.1	33.7	47.4	0.856	16.7	21.5	72.8	0.158	0.595	0.000	0.000	6	10	20	
W1A1T10	187.5	0.098	31.63	0.1382	189.7	34.6	47.7	0.796	16.9	21.4	73.6	0.151	0.599	0.000	0.000	6	10	20	
W1A1T11	162.0	0.168	12.50	0.1120	186.8	34.2	45.3	0.716	17.3	21.1	64.4	0.134	0.659	0.000	0.000	0	10	20	
W1A1T12	162.0	0.160	9.38	0.1256	180.2	33.0	46.2	0.865	17.2	21.5	65.7	0.156	0.652	29.728	1.274	0	10	20	
W1A1T13	162.9	0.179	7.26	0.1357	166.8	30.5	46.5	1.127	17.3	23.1	75.6	0.188	0.676	28.792	2.032	1	10	25	
W1A1T14	163.7	0.177	6.21	0.1415	173.4	31.6	47.0	1.035	17.8	23.1	71.6	0.180	0.675	0.000	0.000	0	10	29	STUCK ON CORNER
W1A1T18	179.0	0.190	9.47	0.1372	181.9	33.1	47.0	0.900	17.4	22.3	69.4	0.164	0.683	30.293	0.957	0	10	20	
W1A1T22	212.9	0.179	10.61		175.9	32.3	50.4	1.112	16.9	22.4	67.7	0.196	0.701	0.000	0.000	0	10	20	NO TRANSERA DATA
W1A1T23	212.9	0.149	20.81	0.1380	181.9	33.2	49.7	1.003	17.3	22.5	69.6	0.182	0.665	0.000	0.000	2	10	20	
W1A1T26	437.9	0.160	9.38	0.1448	169.1	31.1	55.4	1.416	16.3	19.7	31.7	0.239	0.682	0.000	0.000	0	10	20	
W1A1T27	232.5	0.166	4.82	0.1391	169.7	30.8	53.8	1.382	17.2	23.0	59.9	0.234	0.708	0.000	0.000	1	10	28	
W1A1T30	231.6	0.182	9.34	0.1390	169.9	30.8	50.1	1.255	16.8	22.9	68.3	0.213	0.694	0.000	0.000	2	10	20	
W1A1T31	229.9	0.190	4.21	0.1383	169.7	30.8	50.5	1.269	16.9	23.5	71.3	0.215	0.698	0.000	0.000	1	10	20	
W1A1T32	252.0	0.179	9.50	0.1393	175.0	31.9	55.5	1.334	16.2	21.8	57.5	0.233	0.692	0.000	0.000	1	10	27	
W1A1T34	252.0	0.193	4.66	0.1377	174.6	31.9	51.5	1.189	17.0	22.7	66.6	0.208	0.688	0.000	0.000	1	10	25	
W1A1T35	249.4	0.191	6.28	0.1382	170.3	31.1	50.6	1.237	16.8	22.8	66.3	0.211	0.679	0.000	0.000	1	10	25	
W1A1T36	252.0	0.175	13.71	0.1372	181.0	33.2	52.4	1.104	17.2	22.5	63.8	0.200	0.665	0.000	0.000	1	10	20	
W1A1T37	358.1	0.201	4.46	0.1351	166.8	30.4	53.8	1.432	16.9	21.0	39.6	0.239	0.720	0.000	0.000	0	10	20	
W1A1T41	212.1	0.181	12.71	0.1294	184.3	33.6	48.8	0.929	16.9	22.5	76.0	0.171	0.692	0.000	0.000	0	10	20	BELOIT
W1A1T43	214.6	0.142	33.10	0.1377	183.3	33.4	49.0	0.951	17.1	22.5	73.2	0.174	0.647	0.000	0.000	5	10	20	
W1A1T45	204.5	0.180	7.78	0.1352	167.8	30.6	53.0	1.383	17.0	23.5	68.7	0.232	0.651	0.000	0.000	2	10	27	
W1A1T46	189.2	0.183	10.38	0.1380	169.1	30.9	47.0	1.110	17.1	22.7	72.2	0.188	0.676	0.000	0.000	0	10	20	
W1A1T49	186.6	0.163	5.52	0.1372	185.4	33.6	48.7	0.934	17.2	22.4	74.0	0.173	0.684	0.000	0.000	0	10	20	
W1A1T51	179.0	0.178	7.87	0.1379	166.2	30.4	47.3	1.180	17.1	22.6	67.5	0.196	0.677	0.000	0.000	0	10	27	
W1A1T52	145.0	0.154	10.39		182.9	33.7	45.5	0.768	17.2	21.7	76.4	0.141	0.673	32.156	1.297	0	10	20	NO TRANSERA DATA
W1A1T53	145.9	0.145	13.10	0.1315	176.3	32.5	45.4	0.873	17.1	22.0	73.8	0.154	0.647	32.455	1.118	0	10	20	
W1A1T54	145.0	0.148	6.76	0.1363	182.9	33.6	46.2	0.810	17.5	22.2	74.0	0.148	0.663	28.908	0.813	0	10	20	
W1A1T55	145.0	0.144	9.03	0.1387	164.9	30.4	48.4	1.227	17.3	22.9	68.0	0.202	0.661	0.000	0.000	1	10	27	
W1A1T56	178.1	0.173	6.94	0.1399	169.3	31.2	50.3	1.215	16.9	22.3	63.6	0.206	0.699	0.000	0.000	0	10	27	
W1A1T57	178.1	0.167	12.57	0.1422	160.0	29.5	48.0	1.299	16.7	22.7	70.6	0.208	0.674	0.000	0.000	0	10	27	REMOVED WITH SPATUL
W1A1T59	145.0	0.161	7.95	0.1377	174.4	31.6	49.6	1.128	17.1	22.3	63.9	0.197	0.663	30.332	1.532	0	10	27	
W1A1T60	145.0	0.150	13.33	0.1396	173.2	31.5	47.0	1.047	17.4	23.3	80.1	0.181	0.678	30.102	2.137	2	10	25	
W1A1T61	144.2	0.153	6.54	0.1395	177.3	32.3	46.5	0.942	16.9	22.2	77.5	0.167	0.658	29.946	2.399	0	10	25	
W1A1T62	144.2	0.154	8.44	0.1374	175.3	32.0	46.5	0.977	17.4	22.8	77.7	0.171	0.675	28.374	1.716	0	10	25	
W1A1T63	170.5	0.127	33.07	0.1376	183.1	33.4	47.0	0.866	16.7	21.9	77.8	0.159	0.671	27.124	2.202	7	10	20	
W1A1T64	169.7	0.114	28.95	0.1394	170.3	31.1	47.7	1.122	17.0	23.0	75.6	0.191	0.660	26.155	1.477	7	10	25	
W1A1T68	162.0	0.127	22.83	0.1405	171.5	30.9	47.4	1.123	16.7	23.5	86.6	0.193	0.695	26.351	2.238	7	10	20	
W1A1T69	153.5	0.150	14.00	0.1365	172.4	31.2	46.7	1.064	17.2	23.2	81.1	0.183	0.663	29.431	1.774	2	10	25	
W1A1T70	152.7	0.156	12.18	0.1345	183.9	33.4	46.9	0.866	16.9	21.7	73.3	0.159	0.655	28.815	2.100	0	10	26	
W1A1T71	152.7	0.153	23.53	0.1382	173.2	31.4	45.2	0.970	17.5	23.0	76.6	0.168	0.644	30.414	4.247	4	10	25	
W1A1T72	153.5	0.160	12.50	0.1384	174.8	31.8	46.4	0.984	16.8	22.4	77.4	0.172	0.686	29.848	1.627	2	10	25	STUCK ON EDGE
W1A1T73	154.4	0.141	15.60	0.1373	183.1	33.4	47.5	0.892	17.9	22.9	74.3	0.163	0.647	29.382	1.336	2	10	26	
W1A2T01	145.9	0.157	10.19	0.1442	190.3	41.7	49.3	0.374	17.0	18.7	54.8	0.071	0.686			0	10	20	
W1A2T02	145.0	0.172	3.49	0.1459	192.4	42.0	49.4	0.358	16.8	18.4	51.5	0.069	0.681			0	10	20	
W1A2T03	145.0	0.149	7.38	0.1462	173.4	37.8	51.9	0.716	17.1	19.3	41.2	0.124	0.663			0	10	28	
W1A2T04	145.9	0.153	11.11	0.1394	179.0	39.1	49.4	0.535	16.5	18.3	44.8	0.090	0.661			0	10	28	
W1A2T05	145.0	0.164	7.93	0.1542	180.0	39.3	49.5	0.526	17.2	19.6	57.1	0.095	0.664			0	10	26	
W1A2T06	189.2	0.138	32.61	0.1429	182.5	40.0	50.1	0.504	17.3	19.9	64.2	0.092	0.688			6	10	20	
W1A2T09	187.5	0.108	34.26	0.1392	175.5	38.5	50.5	0.620	17.1	20.0	60.3	0.109	0.659			6	10	20	
W1A2T11	162.0	0.183	6.58	0.1412	186.6	41.2	49.5	0.406	16.9	18.4	42.9	0.076	0.701			0	10	20	
W1A2T12	162.9	0.179	7.26	0.1386	175.0	38.2	49.6	0.600	16.9	19.7	60.8	0.105	0.699			0	10	20	
W1A2T13	162.9	0.186	8.06	0.1391	175.0	38.3	49.0	0.569	16.9	19.5	58.6	0.100	0.704			0	10	20	
W1A2T15	162.0	0.171	8.19	0.1377	174.4	38.2	48.9	0.571	16.6	19.0	56.9	0.100	0.703			0	10	20	
W1A2T17	169.7	0.172	13.37	0.1376	176.3	38.8	49.4	0.553	16.9	19.5	64.3	0.098	0.697			0	10	20	

Table B1 Continued. Data with the IPST A platen.

SAMPLE ID	PLATEN SURFACE TEMP (C)	SEM (MN m/kg)	SEM %CV	IMPULSE (MPa.s)	OD BASIS WEIGHT (g/m^2)	SHEET SOLIDS IN (%)	SHEET SOLIDS OUT (%)	SHEET MOISTURE RATIO CHANGE	FELT MOISTURE IN (%)	FELT MOISTURE OUT (%)	FELT GAIN/ SHEET LOSS (%)	WATER REMOVED (Kg/m^2)	US DENSITY (g/cm^3)	AVERAGE STFI INDEX (Nm/g)	95% C.I.	DELAM CODE	REWET CODE	STICK/ PICK CODE	COMMENTS
W1A2T18	169.7	0.169	11.24	0.1376	188.3	41.1	49.1	0.397	16.8	18.4	50.7	0.075	0.697			0	10	20	
W1A2T19	171.4	0.174	11.49	0.1380	193.0	42.3	50.8	0.398	16.8	18.5	48.9	0.077	0.707			0	10	20	
W1A2T21	212.1	0.176	6.82	0.1414	178.8	38.8	52.0	0.659	17.1	20.0	58.4	0.118	0.720			0	10	20	
W1A2T22	213.8	0.190	7.37	0.1382	178.1	38.7	52.8	0.687	16.6	19.9	61.1	0.122	0.735			0	10	20	
W1A2T24	213.8	0.176	11.36	0.1387	188.5	41.1	52.7	0.535	16.8	19.2	54.0	0.101	0.728			0	10	20	
W1A2T27	229.1	0.184	4.89	0.1398	171.5	37.7	52.8	0.754	17.2	20.9	65.2	0.129	0.727			1	10	20	
W1A2T30	229.9	0.186	4.30	0.1357	174.6	38.1	52.0	0.705	16.6	20.2	66.4	0.123	0.740			0	10	20	
W1A2T31	256.2	0.173	15.61	0.1390	198.2	43.3	54.8	0.487	16.4	18.3	44.6	0.097	0.740			0	10	20	
W1A2T34	255.4	0.193	3.11	0.1388	179.6	38.9	54.7	0.745	16.8	20.1	57.6	0.134	0.735			0	10	20	
W1A2T35	257.1	0.186	2.69	0.1388	174.8	38.1	54.2	0.782	16.8	20.4	60.6	0.137	0.739			0	10	20	
W1A2T36	293.6	0.204	2.94	0.1403	174.6	37.8	55.1	0.830	17.0	20.7	60.3	0.145	0.753			1	10	20	
W1A2T37	294.4	0.200	5.00	0.1381	175.9	38.1	54.8	0.799	16.9	20.4	56.8	0.141	0.742			0	10	20	
W1A2T40	295.3	0.206	5.34	0.1402	171.7	37.5	54.9	0.846	16.7	20.4	60.2	0.145	0.758			0	10	20	
W1A2T41	356.4	0.176	4.55	0.1440	180.0	39.9	59.0	0.814	16.3	19.6	51.4	0.147	0.737			1	10	20	
W1A2T42	358.9	0.179	6.15	0.1414	185.0	40.4	57.1	0.723	16.6	19.4	47.5	0.134	0.741			0	10	20	
W1A2T46	145.0	0.159	11.95	0.1350	178.6	39.7	50.6	0.544	16.5	18.0	35.4	0.097	0.685	31.007	0.902	0	10	27	USED SPATULA
W1A2T47	144.2	0.160	15.63	0.1377	197.2	43.6	49.7	0.283	17.0	18.2	47.9	0.056	0.701	28.518	1.147	0	10	29	STUCK ON CORNER
W1A2T49	145.9	0.152	11.18	0.1371	186.0	41.2	49.2	0.398	17.3	19.2	61.1	0.074	0.693	30.190	2.194	0	10	29	STUCK ON EDGE
W1A2T51	188.3	0.143	15.38	0.1391	186.8	41.3	51.7	0.487	17.3	20.0	70.6	0.091	0.737			6	10	20	
W1A2T67	162.9	0.147	21.77	0.1399	188.7	40.9	50.5	0.465	16.9	18.7	44.8	0.088	0.681	27.863	1.498	4	10	20	
W1A2T70	162.0	0.164	12.80	0.1366	176.5	38.5	49.5	0.578	16.2	19.4	71.6	0.102	0.677	28.500	3.684	4	10	20	
W1A2T71	152.7	0.175	7.43	0.1362	177.5	38.9	49.6	0.553	16.8	20.1	79.5	0.098	0.699	30.891	0.753	0	10	20	
W1A2T73	152.7	0.146	9.59	0.1423	174.4	38.3	53.5	0.743	17.0	20.5	64.5	0.130	0.656	28.608	1.538	0	10	27	
W1A2T74	154.4	0.150	8.67	0.1388	170.7	37.3	49.4	0.657	16.5	20.2	74.2	0.112	0.650	28.864	2.761	0	10	20	
W1A2T75	152.7	0.173	7.51	0.1386	196.1	42.8	50.6	0.360	17.3	18.8	50.5	0.071	0.657	27.941	1.795	0	10	20	
A3W1T01	145.0	0.121	22.31	0.1240	167.8	30.4	42.7	0.951	16.6	22.2	84.5	0.160	0.581			0	13	20	
A3W1T02	145.9	0.120	17.50	0.1174	171.3	31.2	42.5	0.849	17.3	21.7	75.9	0.146	0.581			0	10	26	
A3W1T03	145.0	0.116	12.93	0.1191	180.4	32.6	42.1	0.689	17.0	20.9	76.7	0.124	0.591			0	13	20	
A3W1T04	144.2	0.126	8.73	0.1329	180.6	32.7	42.4	0.700	18.2	22.0	77.0	0.126	0.593			0	13	21	
A3W1T07	187.5	0.104	36.54	0.1352	187.7	34.1	45.4	0.732	15.9	19.9	71.7	0.137	0.594			4	13	20	
A3W1T09	188.3	0.117	41.88		171.5	31.1	43.9	0.936	16.3	21.3	76.7	0.161	0.565			6	13	20	
A3W1T10	189.2	0.102	44.12		174.0	31.4	43.4	0.878	17.8	22.2	72.7	0.153	0.578			6	14	20	NO TRANS ERA DATA
A3W1T13	205.3	0.103	33.98	0.1394	170.1	30.6	43.7	0.975	19.0	23.8	73.8	0.166	0.581			6	14	20	
A3W1T19	171.4	0.148	10.14	0.1343	182.1	32.9	43.7	0.754	17.3	21.1	68.3	0.137	0.646			0	13	20	
A3W1T22	164.6	0.147	17.01	0.1366	167.6	30.2	42.1	0.929	17.0	22.1	80.7	0.156	0.636			4	13	20	
A3W1T26	154.4	0.163	13.50	0.1376	160.8	29.3	42.5	1.066	15.9	21.4	79.5	0.171	0.662			2	13	20	
A3W1T28	155.2	0.155	9.68	0.1379	183.7	33.2	42.6	0.666	17.4	20.9	71.9	0.122	0.630			0	13	20	
W1A3T31	128.1	0.162	11.11	0.1323	173.0	31.3	44.1	0.926	15.8	20.7	73.2	0.160	0.634	29.860	0.976	0	13	27	WITH RACKET
W1A3T32	128.1	0.140	27.14	0.1307	188.7	34.2	44.0	0.649	16.9	19.9	60.9	0.123	0.645	28.347	2.634	0	10	27	WITH RACKET
W1A3T33	128.1	0.135	20.74	0.1351	178.6	32.4	43.9	0.811	18.0	23.0	90.9	0.145	0.653	29.241	0.642	0	10	26	WITH RACKET
W1A3T34	128.1	0.155	10.97	0.1382	174.6	31.7	50.1	1.162	17.2	22.6	68.9	0.203	0.678	29.716	2.864	0	10	27	WITH RACKET
W1A3T35	128.1	0.146	11.64	0.1406	175.9	31.8	44.0	0.869	17.2	22.0	79.7	0.153	0.654	30.518	1.208	0	13	27	WITH RACKET
W1A3T36	145.9	0.162	13.58	0.1406	170.1	30.8	44.4	0.992	17.9	23.4	82.8	0.169	0.706	30.020	0.990	0	13	20	WITH RACKET
W1A3T37	145.0	0.166	7.23	0.1386	184.1	33.9	45.4	0.746	15.6	20.7	90.8	0.137	0.698	30.325	1.633	0	13	20	WITH RACKET
W1A3T41	153.5	0.158	12.03	0.0985	176.7	32.1	44.0	0.841	16.9	22.5	93.6	0.149	0.683	30.134	0.668	0	13	20	WITH RACQUET
W1A3T42	154.4	0.146	20.55	0.1109	177.1	32.1	44.5	0.864	17.4	23.0	92.0	0.153	0.650	28.125	1.081	0	10	20	WITH RACQUET
W1A3T43	152.7	0.134	15.67	0.1188	162.0	29.4	45.5	1.201	16.6	23.2	84.5	0.195	0.653	28.275	2.712	4	10	20	WITH RACQUET
W1A3T44	153.5	0.111	33.33	0.1242	163.1	29.6	44.8	1.142	17.9	23.4	76.7	0.186	0.631	25.504	4.028	7	10	20	WITH RACQUET
W1A3T45	153.6	0.131	20.61	0.1286	179.4	32.7	45.7	0.865	16.7	21.7	78.8	0.155	0.658	26.762	1.242	6	10	20	WITH RACQUET
A4W1T01	144.2	0.134	6.72	0.1374	176.1	38.2	46.3	0.456	16.5	18.8	68.2	0.080	0.671			0	13	20	
A4W1T03	144.2	0.137	11.68	0.1368	176.3	38.4	46.9	0.469	16.8	19.1	68.2	0.083	0.653			0	10	20	
A4W1T04	146.4	0.131	6.87	0.1353	176.5	38.5	46.3	0.439	17.0	19.4	73.8	0.078	0.640			0	13	20	
A4W1T08	187.5	0.135	37.78	0.1367	178.8	38.7	49.2	0.549	16.5	19.2	67.2	0.098	0.629			4	13	20	
A4W1T09	186.6	0.116	37.07	0.1378	176.1	38.2	48.9	0.575	18.4	21.3	72.6	0.101	0.607			4	13	20	
A4W1T10	204.5	0.161	8.07	0.1385	180.2	38.9	51.8	0.638	17.2	20.3	66.4	0.115	0.687			4	10	20	
A4W1T11	205.3	0.156	26.92	0.1402	167.4	36.5	49.5	0.721	17.4	20.9	73.3	0.121	0.672			2	13	20	
A4W1T12	203.6	0.107	57.94	0.1386	178.4	38.6	50.2	0.599	17.5	20.4	67.7	0.107	0.629			6	13	20	
A4W1T14	205.3	0.099	47.47	0.1408	175.3	38.0	49.2	0.604	17.0	20.1	71.7	0.106	0.601			6	13	20	
A4W1T18	170.5	0.158	8.23	0.1375	178.8	38.8	47.9	0.488	17.3	20.2	78.5	0.087	0.662			0	13	20	

Table B1 Continued. Data with the IPST A platen.

SAMPLE ID	PLATEN SURFACE TEMP (C)	SEM (MN m/kg)	SEM %CV	IMPULSE (MPa.s)	OD BASIS WEIGHT (g/m^2)	SHEET SOLIDS IN (%)	SHEET SOLIDS OUT (%)	SHEET MOISTURE RATIO CHANGE	FELT MOISTURE IN (%)	FELT MOISTURE OUT (%)	FELT GAIN/ SHEET LOSS (%)	WATER REMOVED (Kg/m^2)	US DENSITY (g/cm^3)	AVERAGE STFI INDEX (Nm/g)	95% C.I.	DELAM CODE	REWET CODE	STICK/ PICK CODE	COMMENTS
A4W1T19	171.4	0.158	11.39	0.1389	172.8	37.4	48.4	0.607	17.2	20.5	77.6	0.105	0.662			0	13	20	
A4W1T20	161.2	0.156	9.62	0.1423	182.3	40.0	47.2	0.385	17.2	19.1	82.8	0.070	0.681			4	13	20	
A4W1T22	161.2	0.164	13.41	0.1407	168.8	36.7	47.6	0.627	17.4	20.3	70.3	0.108	0.692			2	13	20	
A4W1T23	160.3	0.173	8.67	0.1358	162.4	36.5	47.3	0.631	17.1	19.7	63.0	0.102	0.688			0	13	20	
A4W1T25	160.3	0.135	12.59	0.1356	137.8	36.9	48.1	0.628	17.4	19.7	65.5	0.087	0.666			0	13	20	
A4W1T26	161.2	0.146	10.96	0.1405	139.5	37.8	49.1	0.607	17.2	19.4	64.8	0.085	0.693			0	19	20	VERY SLIGHT REWET
W1A4T28	128.9	0.139	11.51	0.1349	177.9	38.7	46.4	0.428	17.3	20.9	113.6	0.076	0.690	28.264	1.790	0	10	20	SHEET OFF CENTER, W/
W1A4T29	128.9	0.139	7.91	0.1384	174.4	37.8	46.9	0.515	17.7	20.9	90.1	0.090	0.690	29.823	1.707	0	10	25	WITH RACQUET
W1A4T30	128.1	0.152	11.18	0.1357	176.9	38.2	48.2	0.544	17.6	20.6	79.2	0.096	0.673	30.393	1.104	0	10	27	WITH RACQUET
W1A4T31	128.1	0.144	9.03	0.1367	174.0	37.9	50.4	0.653	16.9	19.2	49.1	0.114	0.695	29.354	2.583	0	10	28	WITH RACQUET
W1A4T32	145.0	0.155	10.97	0.1393	178.4	38.7	48.0	0.499	16.8	19.6	74.4	0.089	0.701	30.213	2.566	0	13	20	WITH RACQUET
W1A4T33	145.0	0.150	12.67	0.1392	177.7	38.8	48.3	0.507	16.8	19.4	68.5	0.090	0.688	30.724	1.510	0	10	20	WITH RACQUET
W1A4T35	145.0	0.114	9.65	0.1370	194.7	42.6	50.6	0.372	16.9	19.2	74.5	0.072	0.653	26.149	1.164	0	10	20	WITH RACQUET
W1A4T36	144.2	0.138	7.97	0.1389	176.5	38.5	48.2	0.519	17.4	18.8	35.2	0.092	0.672	29.319	1.709	0	10	27	WITH RACQUET
W1A4T38	162.0	0.103	27.18	0.1367	178.8	38.8	48.7	0.522	17.0	19.6	67.9	0.093	0.673	26.515	1.620	6	10	20	WITH RACQUET
W1A4T39	162.0	0.129	22.48	0.1404	179.0	38.9	51.6	0.633	17.0	18.6	32.2	0.113	0.683	27.561	1.742	4	10	20	WITH RACQUET
W1A4T46	174.8	0.102	24.51	0.1388	179.4	38.9	49.1	0.536	17.0	19.6	64.8	0.096	0.655	25.754	0.425	7	10	20	WITH RACQUET
A1W5T01	229.1	0.174	12.07	0.1337	167.2	30.6	48.9	1.226	16.3	22.5	71.8	0.205	0.734			1	10	25	
A1W5T02	229.9	0.155	4.52	0.1384	169.5	30.9	49.6	1.220	17.2	23.1	69.2	0.207	0.710			1	10	20	
A1W5T06	144.2	0.142	18.31	0.1461	176.7	32.1	44.8	0.881	17.1	21.6	86.3	0.156	0.679			1	10	26	
A1W5T07	146.7	0.113	23.89	0.1382	179.0	32.8	48.4	0.978	16.7	20.4	49.0	0.175	0.633			2	10	28	
A1W5T08	145.0	0.111	26.13	0.1373	182.7	33.1	56.7	1.255	17.0	19.7	27.0	0.229	0.609			2	10	28	
A1W5T09	162.9	0.155	14.19	0.1692	180.6	33.1	47.0	0.893	17.3	22.4	76.4	0.161	0.708			1	10	20	
A1W5T10	161.2	0.142	21.13	0.1255	186.4	34.0	45.0	0.720	17.5	21.0	60.8	0.134	0.666			0	10	20	
W5A1T12	188.3	0.170	13.53	0.1373	166.6	30.4	47.5	1.185	17.1	22.9	70.9	0.197	0.698			0	10	20	
W5A1T13	188.3	0.153	8.50	0.1387	169.1	30.8	49.3	1.218	17.3	23.3	72.9	0.206	0.697			0	10	20	
W5A1T18	211.3	0.174	5.17	0.1391	168.2	30.6	48.6	1.213	17.2	23.0	70.0	0.204	0.712			0	10	20	
W5A1T20	211.3	0.179	8.38	0.1372	155.4	28.2	48.4	1.476	17.1	23.7	71.1	0.229	0.708			1	10	20	
W5A1T21	249.4	0.192	2.60	0.1393	186.0	33.9	49.5	0.933	17.0	21.7	61.4	0.174	0.740			0	10	20	
W5A1T22	252.0	0.178	6.18	0.1392	181.7	33.2	49.8	1.001	16.9	22.0	65.6	0.182	0.697			1	10	20	
W5A1T23	252.8	0.185	3.24	0.1401	181.9	33.2	50.6	1.033	17.1	22.3	66.1	0.188	0.708			2	10	20	
W5A1T27	145.9	0.155	13.55	0.1283	173.4	31.5	50.2	1.179	17.3	22.5	62.4	0.204	0.698	30.974	2.384	0	10	27	
W5A1T28	145.9	0.139	15.11	0.1366	179.0	32.4	48.8	1.037	17.5	23.3	74.3	0.188	0.666	28.533	3.068	0	10	27	USED SPATULA
W5A1T29	145.0	0.146	10.27	0.1370	173.0	31.4	46.0	1.011	17.8	22.9	71.2	0.175	0.687	30.705	1.651	0	10	27	USED SPATULA
W5A1T31	144.2	0.149	10.07	0.1369	167.0	30.2	45.5	1.110	17.3	23.0	75.5	0.185	0.691	31.472	3.533	0	10	29	RETEST,STUCK ON EDG
W5A1T35	175.6	0.169	7.10	0.1387	184.3	33.6	46.9	0.840	17.4	22.1	71.5	0.155	0.720			0	10	20	
W5A1T37	204.5	0.167	12.57	0.1385	170.3	30.9	48.2	1.164	17.2	23.5	75.4	0.198	0.739			4	10	20	
W5A1T40	200.2	0.181	12.15	0.1365	183.5	33.6	49.0	0.930	17.2	22.4	71.9	0.171	0.732			1	10	20	
W5A1T41	199.4	0.171	9.94	0.1352	180.4	33.3	48.0	0.919	17.4	22.2	69.8	0.168	0.719			0	10	20	
W5A1T42	167.1	0.179	11.17	0.1375	183.9	33.5	46.6	0.844	18.0	23.0	78.9	0.155	0.726	32.193	2.113	0	10	20	
W5A1T43	166.3	0.163	12.88	0.1365	181.7	33.2	46.2	0.854	17.6	22.6	77.4	0.155	0.709	32.115	1.524	0	10	20	
W5A1T48	175.6	0.165	16.97	0.1374	181.7	33.1	46.8	0.888	17.5	22.7	79.2	0.161	0.698	29.377	3.004	4	10	20	
W5A1T51	175.6	0.165	5.45	0.1385	160.6	29.3	46.6	1.270	17.1	23.6	78.2	0.204	0.741	32.096	1.446	0	10	20	
W5A1T53	188.3	0.161	11.80	0.1390	188.9	34.4	49.9	0.902	17.2	22.6	77.5	0.170	0.701	29.135	0.701	4	10	20	
A2W5T02	229.1	0.166	5.42	0.1379	176.7	38.9	51.8	0.638	16.3	19.1	57.7	0.113	0.724			0	10	20	
A2W5T03	230.8	0.154	4.55	0.1373	176.1	38.7	51.9	0.659	16.8	19.7	59.9	0.116	0.717			0	10	20	
W5A2T06	162.9	0.153	7.19	0.1335	183.1	40.3	49.0	0.438	17.2	19.1	54.6	0.080	0.699			0	10	20	
W5A2T07	162.9	0.141	7.09	0.1349	170.9	37.5	48.7	0.613	17.1	20.0	64.3	0.105	0.691			0	10	20	
W5A2T08	162.9	0.166	6.63	0.1352	198.8	43.6	49.5	0.270	17.0	18.1	47.6	0.054	0.707			0	10	20	
W5A2T11	188.3	0.172	8.14	0.1405	187.4	41.1	50.0	0.433	17.0	18.8	52.7	0.081	0.722			0	10	20	
W5A2T13	188.3	0.163	5.52	0.1396	162.2	35.4	49.6	0.811	17.1	20.9	66.3	0.132	0.688			0	10	20	
W5A2T14	188.3	0.163	5.52	0.1403	167.8	36.8	48.9	0.673	17.0	20.2	66.4	0.113	0.698			0	10	20	
W5A2T15	187.5	0.172	8.14	0.1356	193.4	42.2	49.9	0.363	17.1	18.6	49.3	0.070	0.702			0	10	20	
W5A2T16	254.5	0.193	5.18	0.1502	177.9	39.0	53.5	0.696	16.0	19.8	69.5	0.124	0.751			0	10	20	
W5A2T17	257.1	0.183	7.65	0.1422	185.6	40.5	53.3	0.594	16.9	20.0	63.3	0.110	0.751			0	10	20	
W5A2T18	255.4	0.197	5.08	0.1436	186.2	40.7	53.5	0.591	16.5	19.5	62.8	0.110	0.731			0	10	20	
W5A2T20	257.1	0.205	1.95	0.1370	170.9	37.3	52.7	0.784	16.3	20.1	65.4	0.134	0.737			0	10	20	
W5A2T21	272.4	0.174	7.47	0.1399	188.3	41.4	54.2	0.570	16.7	19.3	54.2	0.107	0.737			0	10	20	
W5A2T23	272.4	0.191	4.71	0.1405	175.3	38.3	53.7	0.750	16.7	19.8	54.7	0.131	0.729			1	10	20	

Table B1 Continued. Data with the IPST A platen.

SAMPLE ID	PLATEN SURFACE TEMP (C)	SEM (MN m/kg)	SEM %CV	IMPULSE (MPa.s)	OD BASIS WEIGHT (g/m^2)	SHEET SOLIDS IN (%)	SHEET SOLIDS OUT (%)	SHEET MOISTURE RATIO CHANGE	FELT MOISTURE IN (%)	FELT MOISTURE OUT (%)	FELT GAIN/ SHEET LOSS (%)	WATER REMOVED (Kg/m^2)	US DENSITY (g/cm^3)	AVERAGE STFI INDEX (Nm/g)	95% C.I.	DELAM CODE	REWET CODE	STICK/ PICK CODE	COMMENTS
W5A2T24	273.2	0.177	6.21	0.1396	187.4	41.0	53.5	0.567	16.3	18.7	52.3	0.106	0.717			0	10	20	
W5A2T26	297.0	0.161	6.21	0.1406	190.8	41.7	54.5	0.563	17.6	19.9	49.8	0.107	0.733			1	10	20	
W5A2T27	298.7	0.181	6.08	0.1425	184.3	40.2	54.0	0.632	16.7	19.4	52.6	0.117	0.724			0	10	20	
W5A2T28	296.1	0.178	4.49	0.1383	176.5	38.5	53.7	0.736	17.1	20.0	54.5	0.130	0.720			0	10	20	
W5A2T31	321.6	0.167	6.59	0.1398	177.5	38.8	57.0	0.822	16.6	19.7	50.9	0.146	0.725			0	10	29	STUCK ON CORNER
W5A2T33	322.4	0.179	7.26	0.1407	187.7	41.2	55.1	0.616	16.8	19.1	43.2	0.116	0.696			0	10	20	
W5A2T34	322.4	0.194	4.12	0.1421	189.9	41.7	54.7	0.573	16.9	18.9	43.3	0.109	0.718			0	10	20	
W5A2T35	321.6	0.191	6.81	0.1417	199.4	43.7	55.8	0.498	16.9	18.5	38.3	0.099	0.707			0	10	20	
W5A2T36	357.2	0.171	2.92	0.1419	181.2	39.7	56.2	0.739	16.3	18.9	42.9	0.134	0.743			0	10	20	
W5A2T40	356.4	0.174	3.45	0.1378	171.5	37.7	56.5	0.881	16.8	19.4	40.3	0.151	0.737			0	10	20	
W5A2T42	145.0	0.162	8.64	0.1432	178.6	38.9	47.8	0.478	17.2	19.1	50.6	0.085	0.714	33.692	1.217	0	10	20	
W5A2T44	144.2	0.160	11.88	0.1371	176.3	38.5	48.0	0.519	16.8	19.3	61.4	0.091	0.707	31.974	1.353	0	11	20	
W5A2T45	145.9	0.157	8.92	0.1384	158.9	36.0	47.5	0.672	17.3	20.6	71.2	0.107	0.752	32.321	4.615	0	10	20	
W5A2T46	174.8	0.179	5.59	0.1413	169.1	37.1	49.6	0.677	17.1	20.3	65.8	0.114	0.750	31.525	1.701	0	10	20	
W5A2T48	174.8	0.171	9.36	0.1375	172.2	37.8	49.3	0.613	17.2	20.2	66.9	0.106	0.723	32.874	1.232	0	10	20	
W5A2T49	175.6	0.170	12.94	0.1384	173.4	38.3	51.7	0.679	17.2	20.4	64.1	0.118	0.706	31.608	1.606	0	10	20	
W5A2T50	174.8	0.166	4.22	0.1374	162.6	36.3	49.6	0.734	17.4	20.8	66.7	0.119	0.757	32.861	2.108	0	10	20	
W5A2T51	212.9	0.167	16.77	0.1399	187.2	41.0	51.6	0.503	16.7	19.0	57.3	0.094	0.757			6	10	20	
W5A2T52	212.9	0.163	9.20	0.1387	179.6	38.9	51.5	0.630	16.7	19.9	60.5	0.113	0.741			0	10	20	
W5A2T56	203.6	0.166	3.61	0.1384	176.3	38.4	51.9	0.682	16.9	20.6	72.9	0.120	0.722	34.221	1.689	0	10	20	
W5A2T57	202.8	0.176	7.95	0.1385	170.7	38.6	52.9	0.703	17.3	20.3	56.7	0.120	0.744	32.164	4.519	0	10	20	
W5A2T58	210.4	0.157	4.46	0.1380	169.7	37.4	53.1	0.792	17.1	21.1	70.7	0.134	0.753	30.773	1.422	0	10	20	
W5A2T59	209.6	0.190	4.74	0.1382	168.4	37.9	51.4	0.694	17.5	20.7	63.2	0.117	0.757	31.292	1.456	0	10	20	
W5A2T64	219.7	0.178	10.11	0.1378	170.7	38.1	51.6	0.686	17.3	20.7	68.2	0.117	0.733			0	10	20	
W5A2T65	220.6	0.170	9.41	0.1383	177.7	38.7	52.2	0.686	17.2	20.3	63.1	0.118	0.719			0	10	20	
W5A2T66	145.0	0.142	9.15	0.1346	177.7	39.1	51.9	0.635	17.4	19.8	48.7	0.113	0.737	30.443	1.387	0	10	27	
W5A2T67	145.0	0.176	15.91	0.1375	189.7	41.2	48.2	0.356	17.6	19.2	58.7	0.068	0.740	31.271	1.349	0	10	20	
W5A2T69	145.0	0.159	9.43	0.1355	187.2	40.8	48.1	0.372	16.4	18.4	62.6	0.070	0.704	31.692	0.995	0	10	20	
W5A2T75	170.5	0.190	8.95	0.1392	189.1	41.5	49.7	0.398	16.8	18.7	58.6	0.075	0.755	31.616	1.238	0	10	20	
W5A2T76	196.0	0.166	16.27	0.1388	163.1	35.9	50.8	0.817	17.0	21.2	76.3	0.133	0.767	30.803	2.309	4	10	20	
W5A2T77	196.8	0.184	6.52	0.1384	172.8	38.2	51.4	0.676	16.7	20.3	71.1	0.117	0.756	31.776	1.745	2	10	20	
W5A2T79	195.1	0.174	8.62	0.1381	168.6	37.2	50.1	0.692	16.6	20.3	70.2	0.117	0.741	29.851	1.069	0	10	20	
W5A2T80	196.8	0.159	25.79	0.1404	175.9	38.6	50.8	0.622	16.7	19.9	68.0	0.109	0.724	28.369	1.918	4	10	20	
W5A2T83	204.5	0.156	5.13	0.1376	159.3	35.0	52.8	0.969	16.8	21.6	73.7	0.154	0.726	31.856	1.529	0	10	20	
W5A2T84	203.6	0.160	16.25	0.1383	169.3	37.2	53.4	0.813	16.7	20.8	69.8	0.138	0.693	27.425	2.759	4	10	20	
W5A2T85	188.3	0.160	8.13	0.1366	174.8	37.7	50.4	0.664	16.5	20.0	68.0	0.116	0.724	32.399	1.456	0	10	20	
W5A2T88	188.3	0.147	8.84	0.1355	175.0	38.1	50.6	0.651	17.2	20.8	74.3	0.114	0.719	29.642	0.744	0	10	20	
W5A2T89	187.5	0.180	9.44	0.1410	176.9	38.6	49.4	0.563	16.5	19.1	58.2	0.100	0.734	33.208	1.353	0	10	20	
A3W5T01	145.9	0.130	10.77	0.1421	168.0	30.5	42.0	0.892	16.1	21.7	92.0	0.150	0.628	0.000	0.000	0	13	20	
A3W5T02	145.9	0.112	7.14	0.1417	174.2	31.7	44.0	0.887	16.7	22.0	86.7	0.154	0.611	0.000	0.000	0	13	29	STUCK AT CORNER
A3W5T03	145.9	0.131	9.92	0.1377	157.1	28.5	40.3	1.030	16.4	22.0	85.9	0.162	0.602	0.000	0.000	0	13	20	
A3W5T04	145.9	0.140	7.86	0.1382	167.8	30.4	41.7	0.895	17.0	21.9	82.3	0.150	0.616	0.000	0.000	0	13	20	
A3W5T05	145.0	0.142	8.45	0.1395	163.3	29.4	41.3	0.983	16.1	21.6	84.2	0.161	0.657	0.000	0.000	0	13	20	
A3W5T06	171.4	0.178	15.73	0.1573	180.0	32.5	42.2	0.707	17.0	21.1	80.6	0.127	0.696	0.000	0.000	0	13	20	STEAMED 16 SEC
A3W5T08	172.2	0.159	13.21	0.1327	181.0	32.8	43.2	0.737	16.7	20.9	79.7	0.133	0.672	0.000	0.000	0	13	20	
A3W5T10	171.4	0.148	10.14	0.1367	167.0	30.1	41.6	0.918	17.2	22.1	81.0	0.153	0.665	0.000	0.000	0	14	20	
A3W5T11	187.5	0.155	15.48	0.1372	169.9	30.8	42.8	0.909	16.7	21.0	68.8	0.154	0.677	0.000	0.000	0	13	20	
A3W5T13	179.0	0.153	17.65	0.1342	178.1	32.4	45.7	0.901	17.0	22.2	80.7	0.160	0.664	0.000	0.000	0	13	20	
A3W5T14	186.6	0.166	9.64	0.1363	169.7	30.7	42.6	0.909	16.6	21.5	79.4	0.154	0.664	0.000	0.000	0	13	20	
A3W5T21	229.1	0.172	11.05	0.1346	172.4	31.5	47.7	1.077	15.1	20.6	70.6	0.186	0.697			1	10	26	
A3W5T24	229.1	0.164	8.54	0.1378	175.9	32.0	47.7	1.035	17.2	22.4	74.3	0.182	0.676			1	10	26	
W5A3T26	128.9	0.126	21.43	0.1053	174.8	31.9	47.0	1.011	16.8	21.8	71.5	0.177	0.638	29.856	0.552	0	10	28	WITH RACKET
W5A3T27	127.2	0.131	19.08	0.1294	184.8	33.4	44.8	0.761	17.2	23.2	108.5	0.141	0.645	31.767	1.368	0	10	28	WITH RACKET
W5A3T28	128.1	0.141	19.15	0.1378	182.5	32.9	43.5	0.742	16.9	22.7	107.9	0.135	0.649	29.569	1.009	0	10	26	WITH RACKET
W5A3T29	128.9	0.136	16.91	0.1375	184.6	33.3	46.2	0.837	17.3	22.3	82.2	0.154	0.635	29.961	2.221	0	10	28	WITH RACKET
W5A3T30	128.1	0.138	15.94	0.1383	187.8	30.4	46.5	1.134	16.8	22.4	78.3	0.190	0.635	29.143	1.114	0	10	28	WITH RACKET
W5A3T32	145.0	0.101	7.92	0.1394	174.6	31.4	45.5	0.982	17.1	23.3	94.7	0.172	0.632	28.368	0.575	0	10	23	WITH RACKET, STUCK O
W5A3T33	145.9	0.126	23.81	0.1356	180.8	32.7	44.8	0.824	17.1	23.2	103.7	0.149	0.653	29.228	1.814	0	10	23	WITH RACKET
W5A3T34	145.9	0.125	20.80	0.1380	179.2	32.7	45.3	0.846	16.7	23.1	105.4	0.152	0.669	30.636	0.865	1	10	21	WITH RACKET
W5A3T35	145.0	0.143	17.48	0.1362	162.0	29.4	43.7	1.117	16.5	24.1	107.0	0.181	0.683	31.789	1.238	0	10	21	WITH RACKET

Table B1 Continued. Data with the IPST A platen.

SAMPLE ID	PLATEN SURFACE TEMP (C)	SEM (MN m/kg)	SEM %CV	IMPULSE (MPa.s)	OD BASIS WEIGHT (g/m^2)	SHEET SOLIDS IN (%)	SHEET SOLIDS OUT (%)	SHEET MOISTURE RATIO CHANGE	FELT MOISTURE IN (%)	FELT MOISTURE OUT (%)	FELT GAIN/ SHEET LOSS (%)	WATER REMOVED (Kg/m^2)	US DENSITY (g/cm^3)	AVERAGE STFI INDEX (Nm/g)	95% C.I.	DELAM CODE	REWET CODE	STICK/ PICK CODE	COMMENTS
W5A3T37	187.5	0.100	18.00	0.1426	184.6	33.6	48.5	0.912	17.1	22.9	86.5	0.168	0.679	27.956	1.603	7	10	20	WITH RACKET
W5A3T41	178.1	0.115	16.52	0.1276	184.3	33.4	47.6	0.895	17.3	21.9	70.2	0.165	0.698	29.224	1.083	7	10	20	WITH RACKET
W5A3T42	178.1	0.087	28.74	0.1412	185.2	33.3	47.9	0.912	17.8	23.9	94.8	0.169	0.667	27.700	1.780	7	10	20	WITH RACKET
W5A3T43	171.4	0.085	20.00	0.1381	177.3	32.0	50.4	1.135	16.2	22.0	71.4	0.201	0.680	27.464	1.148	7	10	27	WITH RACKET
W5A3T44	171.4	0.102	26.47	0.1413	179.0	32.2	46.2	0.936	16.7	22.9	90.6	0.168	0.675	27.259	1.901	7	10	25	WITH RACKET
W5A3T45	162.0	0.133	21.05	0.1345	185.8	33.4	45.9	0.821	17.0	23.1	101.0	0.152	0.702	31.339	2.636	6	10	20	WITH RACKET
W5A3T47	153.5	0.153	5.88	0.1214	173.8	31.5	46.6	1.023	16.7	23.5	97.3	0.178	0.705	31.809	1.356	0	10	26	WITH RACKET
W5A3T48	154.4	0.146	13.70	0.1277	178.1	32.4	45.7	0.900	16.6	22.8	98.6	0.160	0.679	32.127	1.508	0	10	25	WITH RACKET
W5A3T49	153.5	0.149	18.79	0.1354	185.6	33.4	46.1	0.822	16.5	22.8	104.2	0.152	0.687	31.461	1.047	0	10	20	WITH RACKET
W5A3T50	152.7	0.155	14.19	0.1375	182.7	33.1	45.4	0.822	16.5	22.5	98.8	0.150	0.681	31.222	0.577	0	10	20	WITH RACKET
W5A3T51	154.4	0.155	17.42	0.1340	178.8	32.2	44.9	0.883	16.9	23.0	99.9	0.158	0.667	30.684	2.655	0	10	20	WITH RACKET
W5A3T55	162.9	0.157	20.38	0.1389	184.3	33.3	45.8	0.818	16.9	22.6	96.9	0.151	0.681	31.669	2.577	1	10	20	WITH RACKET
W5A3T56	162.9	0.149	15.44	0.1394	188.7	34.0	46.1	0.769	16.9	22.6	99.5	0.145	0.676	31.414	0.825	0	10	20	WITH RACKET
W5A3T57	169.7	0.148	24.32	0.1387	169.7	30.6	46.3	1.114	16.9	23.9	94.0	0.189	0.697	28.604	1.913	4	10	20	WITH RACKET
W5A3T60	170.5	0.130	27.69	0.1334	178.6	32.3	45.4	0.890	16.9	23.1	98.0	0.159	0.679	28.144	2.796	7	10	20	WITH RACKET
W5A3T61	171.4	0.152	19.74	0.1385	183.3	33.3	47.3	0.893	16.8	23.2	98.6	0.164	0.686	30.418	0.795	4	10	20	WITH RACKET
A4W5T02	147.6	0.139	5.76	0.1411	157.7	34.8	46.2	0.713	17.3	20.7	75.3	0.112	0.733			0	13	20	
A4W5T03	144.2	0.143	7.69	0.1375	172.8	37.8	45.0	0.421	17.1	19.2	70.5	0.073	0.714			0	13	20	
A4W5T04	144.2	0.149	6.04	0.1382	167.8	36.7	46.2	0.559	17.8	20.6	71.6	0.094	0.725			0	13	20	
A4W5T05	145.9	0.165	6.67	0.1388	170.1	37.0	45.6	0.506	17.0	19.3	63.2	0.088	0.701			0	13	20	
A4W5T06	169.7	0.151	9.27	0.1394	188.7	41.1	47.4	0.324	17.1	18.7	62.8	0.061	0.732			1	13	20	
A4W5T07	169.7	0.166	7.83	0.1390	167.4	36.5	45.9	0.561	16.8	19.3	66.5	0.094	0.713			0	13	20	
A4W5T08	171.4	0.172	11.05	0.1386	174.2	37.4	46.8	0.532	17.1	20.0	76.8	0.093	0.704			0	19	20	VERY SLIGHT REWET
A4W5T09	171.4	0.153	7.19	0.1394	178.1	38.7	46.7	0.441	17.2	19.6	72.8	0.078	0.696			2	13	20	
A4W5T10	171.4	0.149	10.74	0.1400	188.7	41.3	47.6	0.318	16.6	18.2	60.4	0.060	0.691			0	19	20	VERY SLIGHT REWET
A4W5T11	188.3	0.177	9.04	0.1391	173.6	38.1	47.7	0.532	16.5	19.1	68.5	0.092	0.714			2	10	20	
A4W5T12	189.2	0.145	10.34	0.1373	170.7	37.2	46.9	0.559	17.2	20.0	72.6	0.095	0.673			1	13	20	
A4W5T13	188.3	0.173	8.09	0.1377	164.7	35.9	46.5	0.634	17.1	20.3	74.1	0.104	0.680			1	13	20	
A4W5T14	188.3	0.171	7.60	0.1385	157.5	34.5	46.9	0.765	16.4	20.1	75.5	0.120	0.705			1	13	20	
A4W5T17	207.0	0.167	10.18	0.1402	173.8	37.8	48.1	0.564	16.8	19.4	65.7	0.098	0.698			1	13	20	
A4W5T20	205.3	0.189	9.52	0.1385	180.4	38.9	48.8	0.519	16.0	18.8	71.7	0.094	0.692			1	19	20	VERY SLIGHT REWET
A4W5T21	229.1	0.164	7.32	0.1305	179.4	39.5	51.4	0.587	16.7	19.8	72.1	0.105	0.709			0	13	20	
A4W5T22	228.2	0.170	4.71	0.1310	178.6	39.4	52.1	0.619	15.8	18.7	61.8	0.111	0.720			0	10	20	
A4W5T23	229.9	0.191	5.76	0.1343	187.2	41.1	50.6	0.457	16.7	19.1	67.1	0.086	0.733			0	10	20	
A4W5T25	225.7	0.163	9.20	0.1377	194.5	42.4	51.8	0.428	17.3	19.5	65.7	0.083	0.718			0	13	20	
W5A4T26	128.1	0.146	13.70	0.1393	173.4	37.7	47.0	0.527	16.9	20.9	106.9	0.091	0.713	32.293	4.934	0	10	29	WITH RACKET, STUCK O
W5A4T27	128.1	0.129	16.28	0.1429	179.8	39.0	48.1	0.483	17.4	21.2	111.1	0.087	0.680	28.509	1.958	0	10	20	WITH RACKET
W5A4T28	128.9	0.126	13.49	0.1367	162.9	35.2	47.9	0.754	17.4	21.8	89.0	0.123	0.677	28.349	3.661	0	10	27	WITH RACKET
W5A4T29	128.9	0.153	9.80	0.1390	156.2	34.0	45.9	0.766	18.0	22.8	103.4	0.120	0.693	32.194	3.918	0	10	29	WITH RACKET, STUCK O
W5A4T30	128.1	0.138	15.94	0.1394	183.9	40.0	47.2	0.386	16.8	19.7	96.7	0.071	0.691	31.718	1.838	0	10	26	WITH RACKET
W5A4T31	145.9	0.157	11.46	0.1366	179.0	38.9	47.9	0.486	17.3	20.5	92.5	0.087	0.730	31.707	1.884	0	10	20	WITH RACKET
W5A4T33	145.0	0.146	9.59	0.1367	170.5	37.3	49.2	0.648	17.0	20.0	67.2	0.111	0.718	30.569	1.765	0	10	20	WITH RACKET
W5A4T34	145.0	0.159	10.69	0.1405	187.7	40.6	48.5	0.403	16.7	18.8	66.3	0.076	0.714	31.107	1.035	0	10	20	WITH RACKET
W5A4T35	144.2	0.147	12.24	0.1403	160.4.	34.9	47.7	0.765	17.0	21.2	83.9	0.123	0.692	31.668	1.127	0	10	20	WITH RACKET
W5A4T36	175.6	0.160	8.75	0.1368	171.3	37.2	49.0	0.647	16.6	20.6	87.5	0.111	0.743	30.635	1.422	2	10	20	WITH RACKET
W5A4T38	175.6	0.145	8.28	0.1368	173.8	37.9	49.0	0.594	16.6	20.1	81.8	0.103	0.732	29.362	2.285	1	10	20	WITH RACKET
W5A4T39	173.9	0.125	24.80	0.1424	180.6	39.2	49.0	0.513	17.3	20.7	91.4	0.093	0.710	27.807	2.768	7	10	20	WITH RACKET
W5A4T41	187.5	0.120	17.50	0.1362	173.2	37.8	49.7	0.630	16.9	20.4	79.7	0.109	0.720	28.663	1.074	7	10	20	WITH RACKET
W5A4T42	188.3	0.103	28.16	0.1408	172.2	37.6	49.3	0.628	16.8	20.5	85.0	0.108	0.703	27.723	1.485	7	10	20	WITH RACKET
W5A4T43	187.5	0.116	25.00	0.1374	187.7	40.9	50.1	0.448	17.2	20.1	87.2	0.084	0.720	27.434	1.368	7	10	20	WITH RACKET

Table B2. Data with the IPST C platen.

SAMPLE ID	PLATEN SURFACE TEMP (C)	SEM (MN m/kg)	SEM %CV	IMPULSE (MPa.s)	OD BASIS WEIGHT (g/m^2)	SHEET SOLIDS IN (%)	SHEET SOLIDS OUT (%)	SHEET MOISTURE RATIO CHANGE	FELT MOISTURE IN (%)	FELT MOISTURE OUT (%)	FELT GAIN/ SHEET LOSS (%)	WATER REMOVED (Kg/m^2)	US DENSITY (g/cm^3)	AVERAGE STFI INDEX (Nm/g)	95% C.I.	DELAM CODE	REWET CODE	STICK/ PICK CODE	COMMENTS
W1C1T01	147.2	0.159	11.32	0.1404	166.0	33.0	44.8	0.797	17.1	21.0	68.4	0.132	0.691	29.281	2.706	0	10	20	
W1C1T02	147.2	0.157	10.19	0.1434	174.6	34.9	45.1	0.651	17.1	20.2	66.1	0.114	0.667	30.074	1.295	0	10	20	
W1C1T03	147.2	0.158	12.66	0.1422	158.7	31.5	44.7	0.938	17.0	21.6	70.6	0.149	0.685	26.638	2.853	0	10	20	
W1C1T04	148.1	0.155	9.03	0.1418	163.7	32.6	44.8	0.837	17.4	21.5	71.7	0.137	0.668	28.148	1.989	0	10	20	
W1C1T05	149.1	0.151	17.88	0.1376	189.7	37.6	45.4	0.459	17.3	19.7	60.7	0.087	0.649	29.566	1.366	0	10	20	
W1C1T06	193.4	0.168	11.90	0.1404	168.6	33.6	46.7	0.834	17.1	21.3	69.5	0.141	0.693			1	10	20	
W1C1T07	192.5	0.157	9.55	0.1386	184.6	37.1	47.4	0.588	17.4	20.3	63.1	0.108	0.674	26.962	1.517	2	10	20	
W1C1T09	192.5	0.166	11.45	0.1414	163.1	32.4	46.7	0.946	17.5	21.8	68.8	0.154	0.646	31.534	3.036	2	10	20	
W1C1T11	208.6	0.172	13.37	0.1393	188.2	36.9	47.4	0.599	16.8	19.7	61.5	0.112	0.701	29.684	0.910	1	10	20	
W1C1T13	207.6	0.149	8.05	0.1395	162.6	32.2	48.5	1.043	17.4	22.5	73.0	0.170	0.664	26.179	1.520	2	10	20	
W1C1T14	206.7	0.135	23.70	0.1391	182.3	36.2	47.3	0.650	17.3	20.2	58.1	0.118	0.661	27.185	1.990	6	10	20	
W1C1T16	183.1	0.173	9.83	0.1343	176.1	35.0	45.3	0.652	17.2	20.5	67.0	0.115	0.689	29.630	1.064	0	10	20	
W1C1T17	183.1	0.165	4.24	0.1362	168.8	33.5	45.1	0.774	17.3	21.0	67.7	0.131	0.670	30.762	1.286	0	10	20	
W1C1T21	169.8	0.159	11.32	0.1349	186.4	36.8	45.9	0.541	17.1	19.5	55.7	0.101	0.660	30.252	1.337	0	10	20	
W1C1T22	168.9	0.156	19.87	0.1391	194.3	38.6	45.4	0.388	17.2	18.7	46.8	0.075	0.633	29.506	2.221	0	10	20	
W1C1T24	169.8	0.151	7.28	0.1380	182.5	36.4	45.3	0.540	16.8	19.3	57.9	0.099	0.625	29.953	1.346	0	10	20	
W1C2T01	146.2	0.141	13.48	0.1394	186.2	44.3	49.3	0.226	17.3	17.9	34.9	0.042	0.678	28.398	1.076	0	10	20	
W1C2T03	147.2	0.173	9.25	0.1390	187.2	44.6	49.2	0.207	17.0	17.7	38.5	0.039	0.716	29.734	2.189	0	10	20	
W1C2T04	147.2	0.175	8.00	0.1414	175.3	41.7	48.4	0.331	16.9	18.1	49.6	0.058	0.706	30.249	1.236	0	10	20	
W1C2T05	147.2	0.168	7.14	0.1362	180.4	43.6	48.6	0.237	17.3	18.4	54.8	0.043	0.708	30.071	1.162	0	10	20	
W1C2T06	192.5	0.160	20.00	0.1430	184.3	43.7	50.9	0.320	17.2	18.5	48.4	0.059	0.715	28.305	3.834	4	10	20	
W1C2T09	192.5	0.162	12.35	0.1385	181.7	43.2	50.8	0.342	17.4	18.8	49.2	0.062	0.690	30.331	1.162	1	10	20	
W1C2T10	194.4	0.157	8.28	0.1406	180.6	42.9	50.3	0.343	16.9	18.2	47.8	0.062	0.692	29.767	1.081	1	10	25	
W1C2T11	208.6	0.138	13.04	0.1372	186.4	44.3	51.4	0.313	17.1	17.9	33.2	0.058	0.701	28.231	1.438	4	10	20	
W1C2T12	207.6	0.138	20.29	0.1407	192.2	45.9	51.9	0.253	17.2	18.2	47.5	0.049	0.693	29.851	2.482	4	10	20	
W1C2T13	208.6	0.167	5.39	0.1391	186.8	44.7	51.1	0.281	17.4	18.3	41.3	0.052	0.726	29.082	1.353	4	10	20	
W1C2T14	208.6	0.149	19.46	0.1385	189.9	45.7	51.5	0.247	17.5	18.2	35.2	0.047	0.711	29.025	1.533	2	10	20	
W1C2T15	206.7	0.152	11.84	0.1385	186.4	44.6	51.2	0.288	17.6	18.3	31.0	0.054	0.714	28.403	1.318	4	10	20	
W1C2T17	183.1	0.152	16.45	0.1368	183.5	43.6	50.5	0.311	17.0	18.3	51.6	0.057	0.689	27.427	0.913	0	10	20	
W1C2T19	184.9	0.153	9.15	0.1377	190.5	45.4	51.1	0.244	17.1	17.8	33.2	0.046	0.677	29.620	1.627	0	10	20	
W1C2T20	184.0	0.172	6.98	0.1389	188.7	45.1	50.9	0.253	17.5	18.4	40.9	0.048	0.672	31.106	1.146	0	10	20	
W1C2T21	168.9	0.171	11.11	0.1391	183.3	43.7	49.9	0.284	17.1	17.8	31.0	0.052	0.728	30.458	1.228	0	10	20	
W1C2T22	170.8	0.156	10.26	0.1387	184.6	44.0	49.9	0.267	17.3	18.2	41.2	0.049	0.695	30.791	1.490	0	10	20	
W1C2T23	169.8	0.180	12.22	0.1370	189.7	45.1	50.4	0.233	17.7	18.1	24.4	0.044	0.723	32.131	1.032	0	10	20	
W1C2T24	168.9	0.161	16.77	0.1379	202.9	48.0	52.1	0.162	17.3	17.4	5.1	0.033	0.701	28.562	2.354	0	10	20	
W1C2T25	169.8	0.160	8.13	0.1387	187.4	45.1	50.2	0.227	17.3	18.0	40.4	0.043	0.736	30.697	1.547	0	10	20	
W5C1T01	147.2	0.139	23.02	0.1303	180.2	35.6	45.3	0.600	17.1	20.1	64.8	0.108	0.692	30.057	1.931	0	10	20	
W5C1T02	147.2	0.138	20.29	0.1297	176.9	35.0	43.8	0.575	15.5	18.1	55.1	0.102	0.662	30.562	1.534	0	10	20	
W5C1T03	147.2	0.145	13.79	0.133	167.6	33.4	43.4	0.688	17.1	20.3	65.4	0.115	0.660	30.496	2.936	0	10	20	
W5C1T06	192.5	0.163	7.98	0.138	182.1	36.3	45.8	0.568	16.6	19.5	64.0	0.103	0.718	32.716	1.714	0	10	20	
W5C1T07	193.4	0.154	9.09	0.141	162.6	32.3	46.4	0.943	16.9	21.2	68.4	0.153	0.696	30.504	1.816	0	10	20	
W5C1T14	213.3	0.162	7.41	0.138	183.5	36.4	46.8	0.615	17.5	20.5	62.7	0.113	0.699	31.259	0.732	0	10	20	
W5C1T15	211.4	0.166	10.24	0.137	156.2	31.1	45.6	1.023	17.2	21.9	68.2	0.160	0.726	28.908	2.009	0	10	20	WET SHEET
W5C1T16	232.2	0.150	14.00	0.131	169.5	33.6	46.7	0.834	16.9	21.6	75.8	0.141	0.749	31.290	0.825	0	10	20	
W5C1T18	232.2	0.141	15.60	0.1418	175.7	34.8	47.8	0.785	17.1	21.4	75.1	0.138	0.722	29.214	1.810	4	10	20	
W5C1T19	232.2	0.137	8.76	0.138	182.5	36.1	47.3	0.655	17.0	20.2	59.7	0.119	0.707	28.630	1.115	1	10	20	
W5C1T22	239.7	0.135	16.30	0.138	163.9	32.4	47.1	0.962	16.8	21.9	74.4	0.158	0.703	26.026	2.973	4	10	20	
W5C1T23	239.7	0.130	20.00	0.139	163.9	32.6	47.1	0.948	17.3	22.0	72.3	0.155	0.703	27.088	2.631	4	10	20	
W5C1T24	241.6	0.151	11.92	0.138	183.3	36.5	48.1	0.661	17.3	21.0	72.6	0.121	0.702	30.712	1.303	4	10	20	
W5C1T25	239.7	0.154	9.09	0.137	181.7	36.1	48.2	0.696	17.1	20.8	68.0	0.126	0.707	30.368	1.987	4	10	20	
W5C2T01	146.2	0.163	7.55	0.1297	175.5	41.7	47.6	0.297	16.7	17.8	45.4	0.052	0.709	32.429	1.607	0	10	20	
W5C2T02	147.2	0.138	9.42	0.132	182.9	43.7	48.0	0.203	17.2	17.5	20.3	0.037	0.695	31.208	0.397	0	10	20	
W5C2T03	146.2	0.146	10.96	0.135	182.5	43.7	48.3	0.219	17.1	17.4	21.4	0.040	0.693	31.290	1.009	0	10	20	
W5C2T04	146.2	0.162	11.73	0.135	166.4	39.7	46.8	0.382	17.2	18.5	45.4	0.063	0.704	29.501	2.918	0	10	20	
W5C2T08	194.4	0.168	8.33	0.1426	174.4	41.3	49.9	0.418	17.2	18.5	38.0	0.073	0.752	32.010	1.775	0	10	20	
W5C2T09	192.5	0.177	6.21	0.1337	177.1	41.9	49.1	0.353	17.6	18.8	40.4	0.062	0.738	32.183	0.933	0	10	20	
W5C2T13	212.3	0.176	9.09	0.139	184.6	44.1	50.9	0.306	17.2	18.3	44.1	0.056	0.741	31.250	1.454	0	10	20	
W5C2T14	212.3	0.180	6.11	0.138	183.7	44.0	50.5	0.296	17.4	18.2	35.5	0.054	0.740	31.467	1.457	0	10	20	

Table B2 Continued. Data with the IPST C platen.

SAMPLE ID	PLATEN SURFACE TEMP (C)	SEM (MN m/kg)	SEM %CV	IMPULSE (MPa.s)	OD BASIS WEIGHT (g/m^2)	SHEET SOLIDS IN (%)	SHEET SOLIDS OUT (%)	SHEET MOISTURE RATIO CHANGE	FELT MOISTURE IN (%)	FELT MOISTURE OUT (%)	FELT GAIN/ SHEET LOSS (%)	WATER REMOVED (Kg/m^2)	US DENSITY (g/cm^3)	AVERAGE STFI INDEX (Nm/g)	95% C.I.	DELAM CODE	REWET CODE	STICK/ PICK CODE	COMMENTS
W5C2T15	213.3	0.146	6.16	0.141	185.6	44.6	51.3	0.294	17.7	18.8	46.0	0.055	0.726	28.712	2.095	0	10	20	
W5C2T17	232.2	0.145	6.21	0.137	185.4	44.0	53.0	0.387	17.5	19.1	52.3	0.072	0.724	29.165	2.171	0	10	20	
W5C2T19	231.2	0.201	8.46	0.135	166.4	39.6	50.0	0.525	17.5	19.6	53.8	0.087	0.725	32.575	1.984	0	10	20	
W5C2T20	232.2	0.169	10.65	0.138	185.2	44.1	51.2	0.316	17.2	18.2	40.5	0.059	0.726	30.008	1.560	0	10	20	
W5C2T22	249.2	0.184	4.89	0.139	180.6	43.4	52.3	0.389	17.1	18.6	45.5	0.070	0.724	30.354	1.896	0	10	20	
W5C2T23	249.2	0.184	5.43	0.139	171.3	40.7	51.1	0.502	17.8	19.7	52.6	0.086	0.738	32.550	0.567	0	10	20	
W5C2T24	251.1	0.183	7.65	0.138	162.2	38.7	51.2	0.630	17.5	20.0	57.8	0.102	0.730	33.076	3.122	0	10	20	
W5C2T29	269.9	0.200	5.00	0.136	180.2	43.1	51.9	0.391	16.6	18.1	47.6	0.070	0.740	31.052	2.005	0	10	20	
W5C2T30	267.1	0.190	6.32	0.139	189.1	45.2	52.9	0.320	17.0	17.7	24.2	0.060	0.751	31.528	2.049	0	10	20	
W5C2T31	288.8	0.166	7.83	0.138	195.3	46.4	55.5	0.355	17.5	18.6	36.5	0.069	0.731	28.654	1.112	0	10	20	
W5C2T33	278.4	0.183	4.92	0.139	188.5	44.5	54.5	0.415	17.2	19.0	60.9	0.078	0.787	32.895	1.720	0	10	20	
W5C2T34	258.6	0.180	16.67	0.144	171.1	40.2	51.7	0.549	16.7	18.8	51.3	0.094	0.755	30.965	2.461	4	10	20	
W5C2T35	259.6	0.166	10.24	0.141	167.8	40.0	53.4	0.628	17.3	20.1	64.6	0.105	0.736	29.882	2.642	1	10	20	
W5C2T36	260.5	0.167	16.17	0.139	161.0	38.3	51.6	0.674	17.2	20.1	63.1	0.108	0.759	32.436	1.768	4	10	20	
W5C2T37	259.6	0.153	11.11	0.138	184.8	43.9	53.8	0.416	17.5	19.2	46.8	0.077	0.747	29.855	1.182	0	10	20	
W5C2T38	258.6	0.165	15.76	0.138	169.9	40.5	52.2	0.552	17.5	19.8	59.2	0.094	0.745	29.173	1.357	2	10	20	

Table B3. Data for the double-felted pressing control cases.

SAMPLE ID	PLATEN SURFACE TEMP (C)	SEM (MN m/kg)	SEM %CV	IMPULSE (MPa.s)	OD BASIS WEIGHT (g/m^2)	SHEET SOLIDS IN (%)	SHEET SOLIDS OUT (%)	SHEET MOISTURE RATIO CHANGE	FELT MOISTURE IN (%)	FELT MOISTURE OUT (%)	FELT GAIN/ SHEET LOSS (%)	WATER REMOVED (Kg/m^2)	US DENSITY (g/cm^3)	AVERAGE STFI INDEX (Nm/g)	95% C.I.	DELAM CODE	REWET CODE	STICK/ PICK CODE	COMMENTS
W1D1T01	99.0	0.136	19.85	0.116	189.7	37.6	41.8	0.268	17.8	18.9	45.2	0.051	0.639	28.923	1.127	0	10	20	TOP
W1D1T01	99.0								16.5	17.5	44.8								BOTTOM
W1D1T02	99.0	0.123	21.14	0.1236	181.5	36.1	41.6	0.366	18.0	19.7	60.2	0.066	0.616	28.577	1.062	0	10	20	TOP
W1D1T02	99.0								16.6	17.9	43.4								BOTTOM
W1D1T03	99.0	0.130	16.15	0.1324	175.7	35.0	41.2	0.434	18.2	20.0	59.7	0.076	0.606	30.247	1.499	0	10	20	TOP
W1D1T03	99.0								17.2	18.9	52.6								BOTTOM
W1D1T08	99.0	0.135	16.30	0.1398	170.7	33.9	41.7	0.551	17.7	20.0	55.9	0.094	0.621	28.927	0.881	0	10	20	TOP
W1D1T08	99.0								16.5	18.1	36.7								BOTTOM
W1D1T10	99.0	0.137	17.52	0.139	166.6	33.1	41.2	0.593	17.6	19.5	45.6	0.099	0.617	29.100	1.787	0	10	20	TOP
W1D1T10	99.0								16.9	18.5	37.3								BOTTOM
W1D2T02	98.1	0.150	13.33	0.1520	176.1	41.7	45.3	0.189	18.2	18.3	5.0	0.033	0.678	30.728	1.504	0	10	20	TOP
W1D2T02	98.1								16.3	16.4	7.1								BOTTOM
W1D2T03	99.0	0.138	17.39	0.1439	177.3	42.0	45.7	0.193	17.8	18.5	44.0	0.034	0.659	29.040	1.220	0	10	20	TOP
W1D2T03	99.0								16.1	16.5	27.4								BOTTOM
W1D2T06	98.1	0.151	12.58	0.1290	164.9	39.3	43.8	0.257	17.9	18.6	41.5	0.042	0.679	28.426	2.077	0	10	20	TOP
W1D2T06	98.1								16.6	17.7	56.8								BOTTOM
W1D2T07	98.1	0.158	12.03	0.1318	178.8	42.4	45.2	0.149	17.9	18.6	57.4	0.027	0.662	32.978	0.450	0	10	20	TOP
W1D2T07	98.1								16.5	17.0	44.6								BOTTOM
W1D2T08	98.1	0.133	18.05	0.1338	181.5	43.2	46.1	0.146	17.6	18.1	39.8	0.026	0.634	29.216	0.890	0	10	20	TOP
W1D2T08	98.1								16.9	17.1	12.1								BOTTOM
W5D1T02	99.0	0.127	24.41	0.1381	187.7	37.3	42.2	0.314	18.3	19.7	60.0	0.059	0.642	28.894	1.165	0	10	20	TOP
W5D1T02	99.0								16.8	17.5	26.3								BOTTOM
W5D1T06	98.1	0.150	20.67	0.1388	157.9	31.5	40.3	0.695	18.0	20.4	51.8	0.110	0.666	30.143	6.476	0	10	20	TOP
W5D1T06	98.1								16.5	17.7	24.5								BOTTOM
W5D1T07	99.0	0.126	13.49	0.1366	165.1	32.9	40.5	0.576	17.8	20.3	58.2	0.095	0.614	30.130	1 727	0	10	20	TOP
W5D1T07	99.0								16.8	18.3	33.7								BOTTOM
W5D1T08	99.0	0.142	16.20	0.1364	158.1	31.4	40.4	0.707	17.7	20.7	62.8	0.112	0.630	28.699	2.667	0	10	20	TOP
W5D1T08	99.0								16.2	17.9	36.4								BOTTOM
W5D2T01	99.0	0.142	8.45	0.1358	181.7	44.0	45.8	0.092	17.8	18.1	46.6	0.017	0.702	31.994	1.263	0	10	20	TOP
W5D2T01	99.0								16.7	15.9	-98.3								BOTTOM
W5D2T02	99.0	0.140	7.14	0.1389	183.3	43.8	45.5	0.083	18.1	18.3	28.0	0.015	0.684	32.040	1.988	0	10	20	TOP
W5D2T02	99.0								16.6	16.5	-21.0								BOTTOM
W5D2T03	99.0	0.133	17.29	0.1371	183.9	43.8	45.4	0.080	18.0	18.0	-8.1	0.015	0.640	30.094	1.539	0	10	20	TOP
W5D2T03	99.0								16.0	15.8	-28.9								BOTTOM
W5D2T04	99.0	0.145	6.90	0.1387	182.1	43.7	45.2	0.078	18.4	18.7	46.0	0.014	0.642	30.782	1.710	0	10	20	TOP
W5D2T04	99.0								16.2	15.9	-38.5								BOTTOM
W5D2T06	98.1	0.172	11.05	0.1376	183.9	43.8	45.4	0.084	18.2	18.6	65.0	0.015	0.720	33.824	0.909	0	10	20	TOP
W5D2T06	98.1								16.6	16.5	-23.4								BOTTOM
W5D2T07	98.1	0.152	13.16	0.1385	183.1	43.7	45.6	0.094	18.2	18.3	21.4	0.017	0.689	33.063	1.636	0	10	20	TOP
W5D2T07	98.1								16.7	16.5	-34.4								BOTTOM
W5D2T08	98.1	0.140	10.00	0.1366	183.9	44.0	45.2	0.063	18.4	18.6	40.6	0.012	0.682	31.153	1.164	0	10	20	TOP
W5D2T08	98.1								16.7	16.4	-52.8								BOTTOM
W5D2T10	99.0	0.153	13.73	0.1385	181.7	43.3	44.9	0.080	17.9	18.6	99.7	0.014	0.693	31.058	2.348	0	10	20	TOP
W5D2T10	99.0								16.8	16.8	-2.1								BOTTOM

APPENDIX C

The following figures show the specific elastic modulus, %CV of SEM, visual delamination code, and selected density plots used to determine the critical temperature.

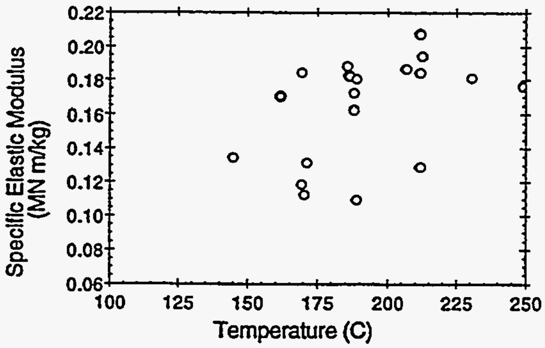

Figure C1. Case W1A1.

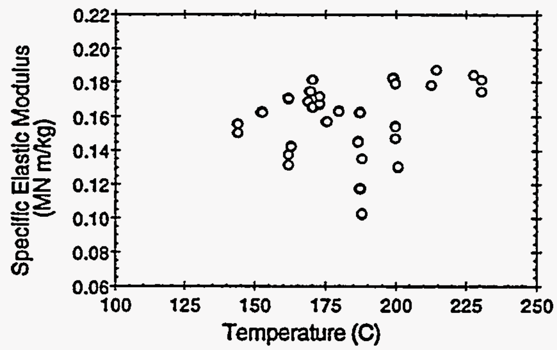

Figure C2. Case W1A2.

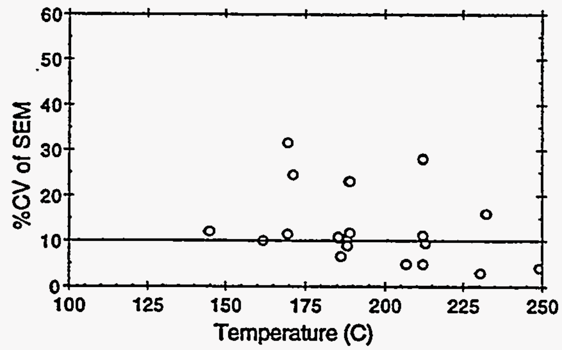

Figure C3. Case W1A1.

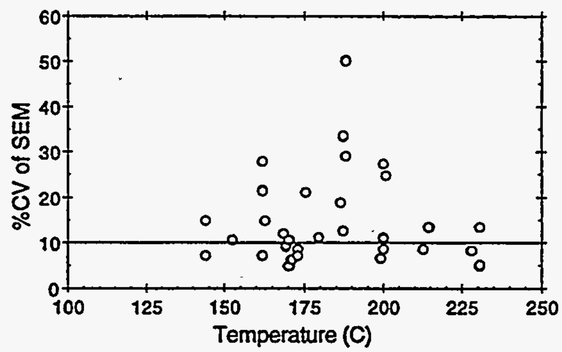

Figure C4. Case W1A2.

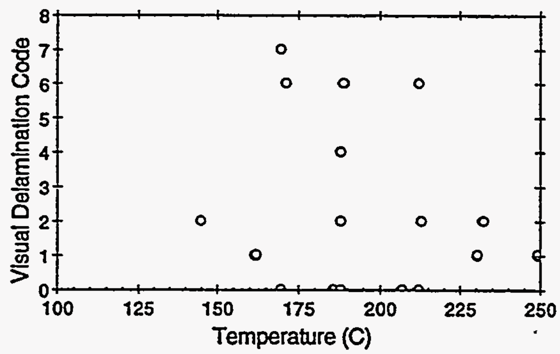

Figure C5. Case W1A1.

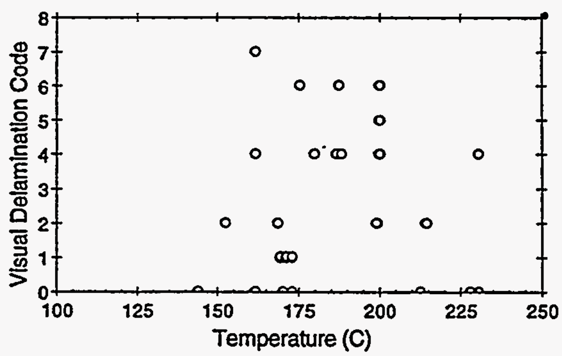

Figure C6. Case W1A2.

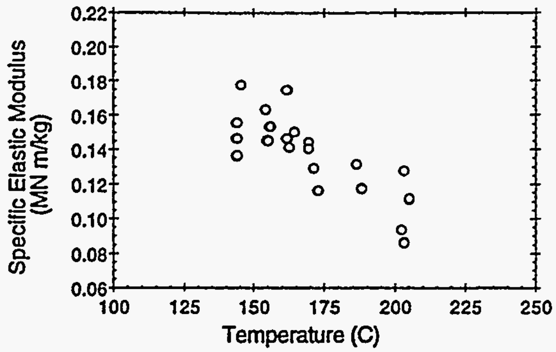

Figure C7. Case W1A3.

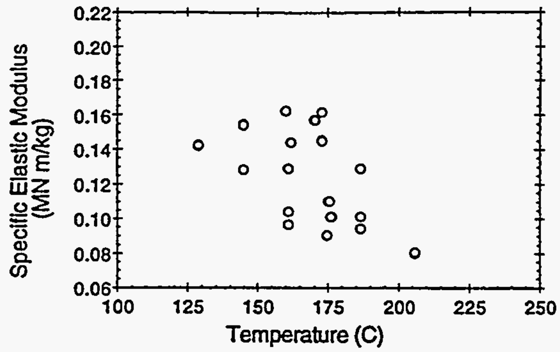

Figure C8. Case W1A4.

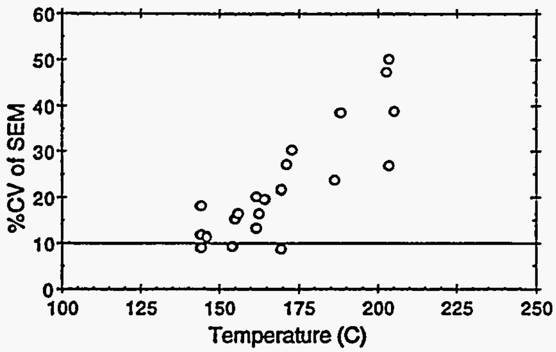

Figure C9. Case W1A3.

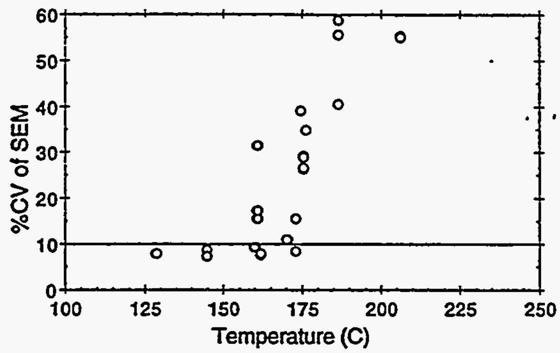

Figure C10. Case W1A4.

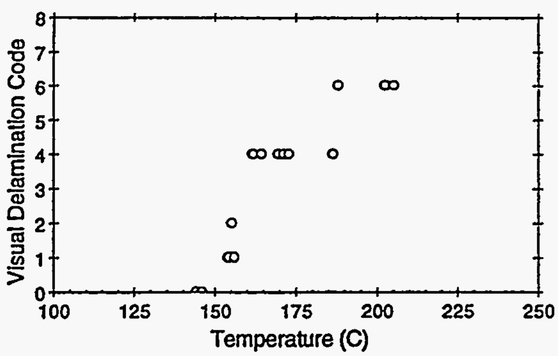

Figure C11. Case W1A3.

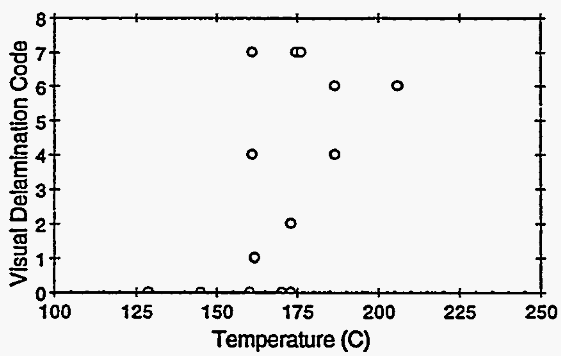

Figure C12. Case W1A4.

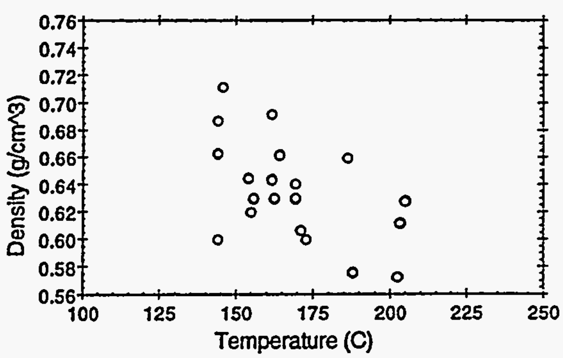

Figure C11A. Case W1A3.

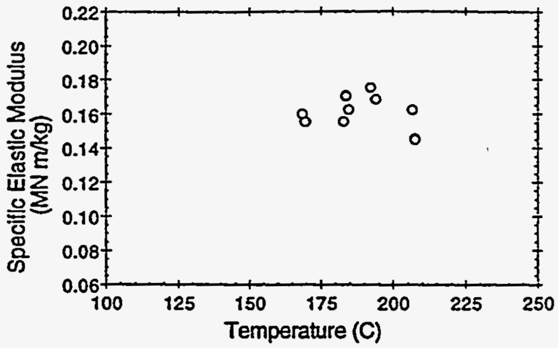

Figure C13. Case W1C1.

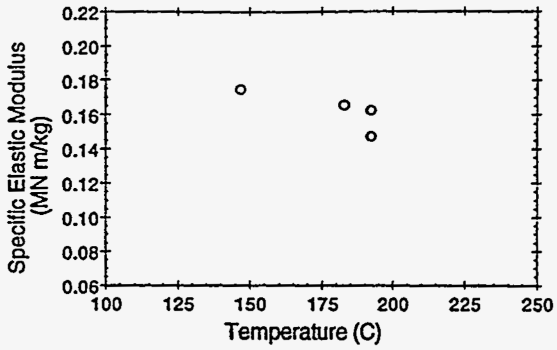

Figure C14. Case W1C2.

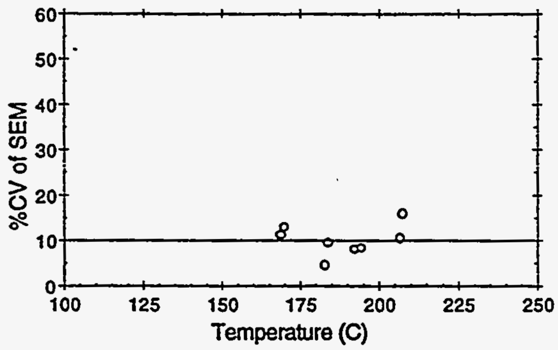

Figure C15. Case W1C1.

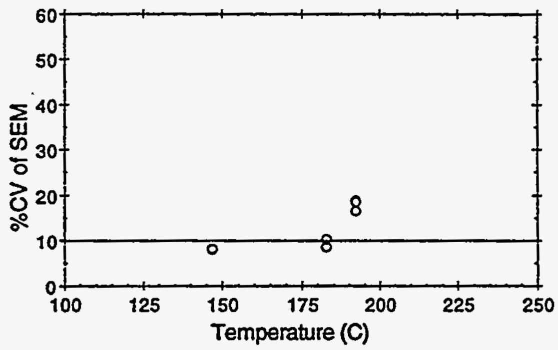

Figure C16. Case W1C2.

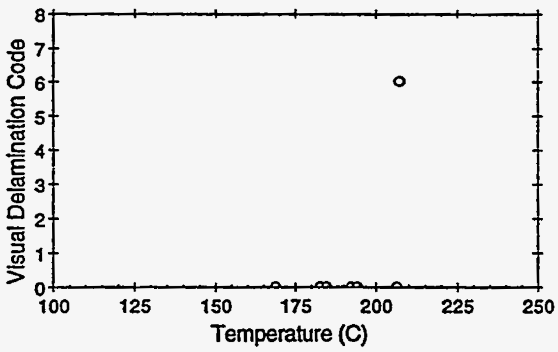

Figure C17. Case W1C1.

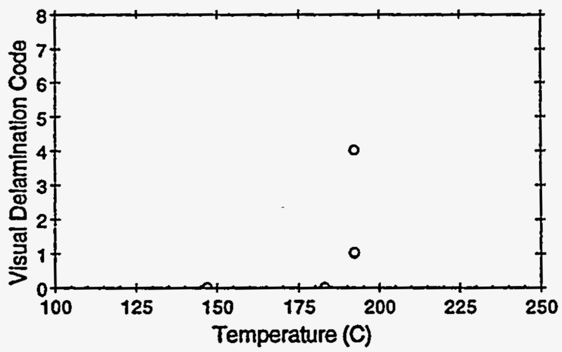

Figure C18. Case W1C2.

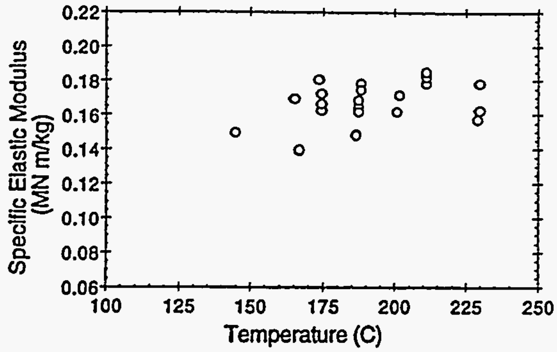

Figure C19. Case W5A1.

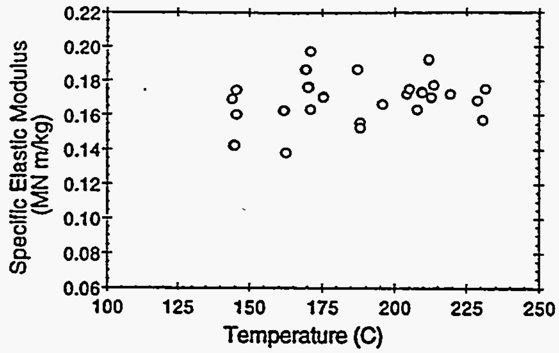

Figure C20. Case W5A2.

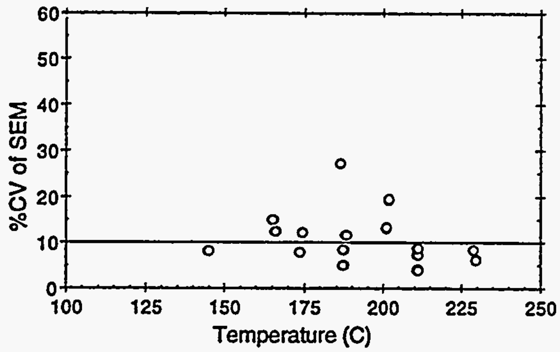

Figure C21. Case W5A1.

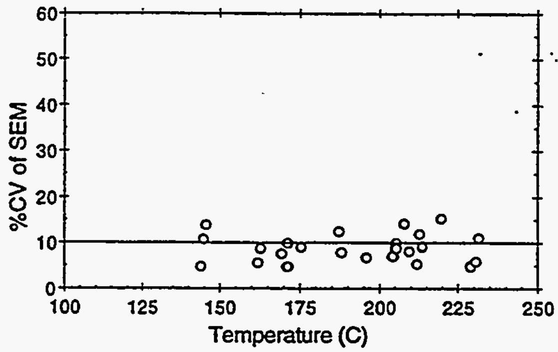

Figure C22. Case W5A2.

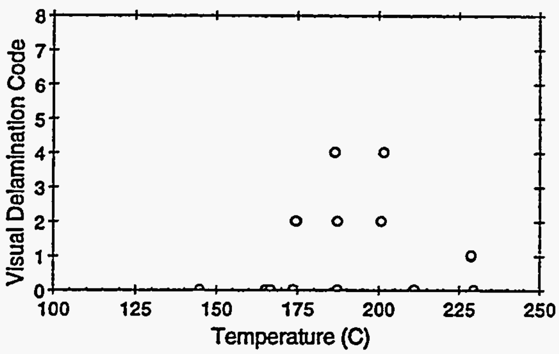

Figure C23. Case W5A1.

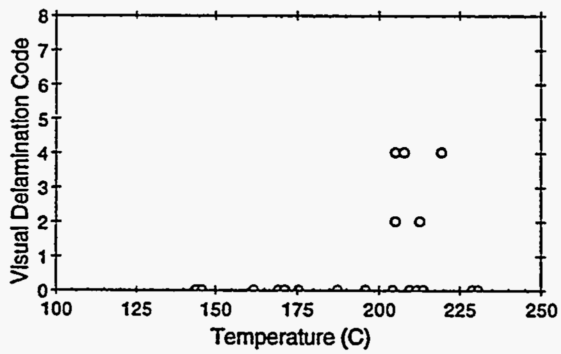

Figure C24. Case W5A2.

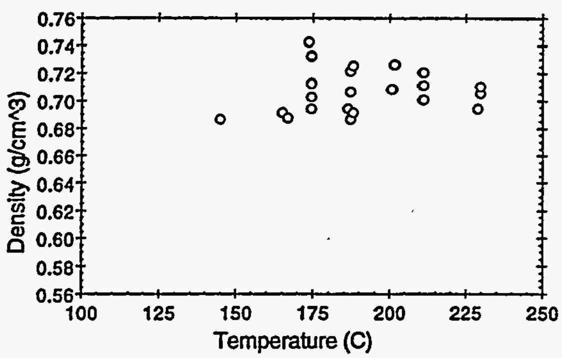

Figure C23A. Case W5A1.

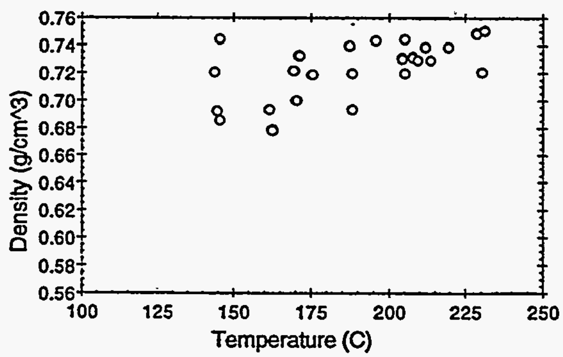

Figure C24A. Case W5A2.

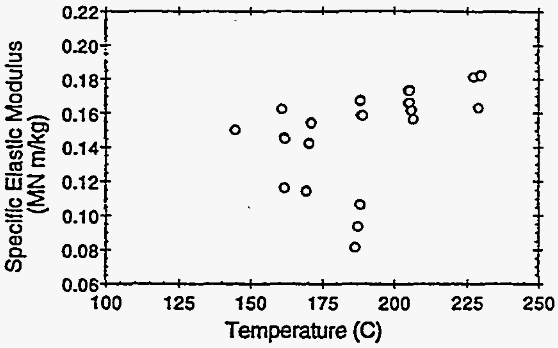

Figure C25. Case W5A3.

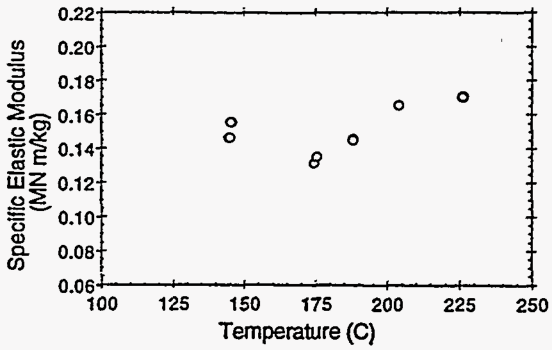

Figure C26. Case W5A4.

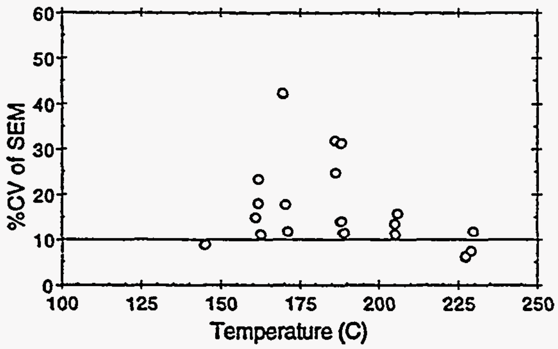

Figure C27. Case W5A3.

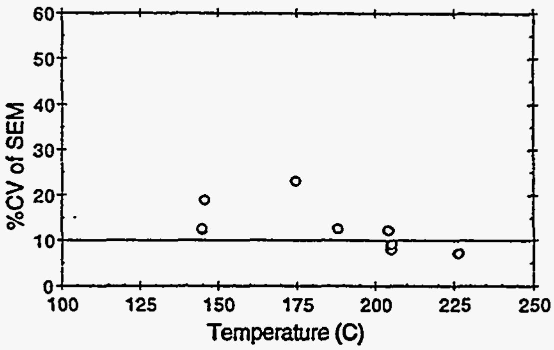

Figure C28. Case W5A4.

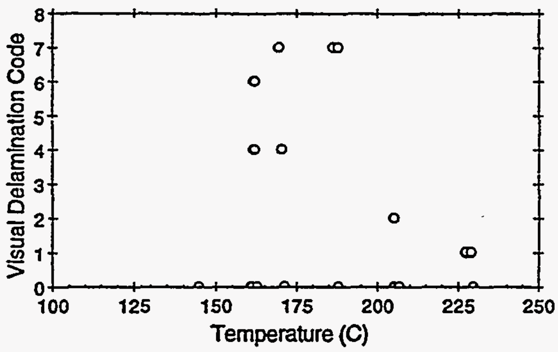

Figure C29. Case W5A3.

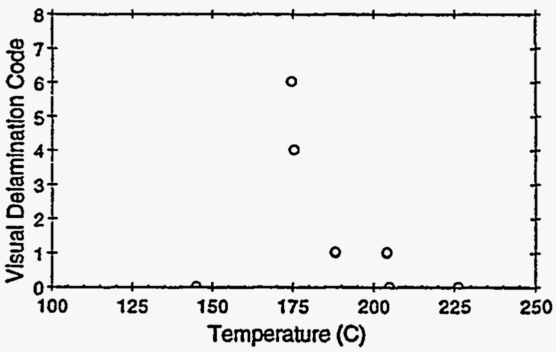

Figure C30. Case W5A4.

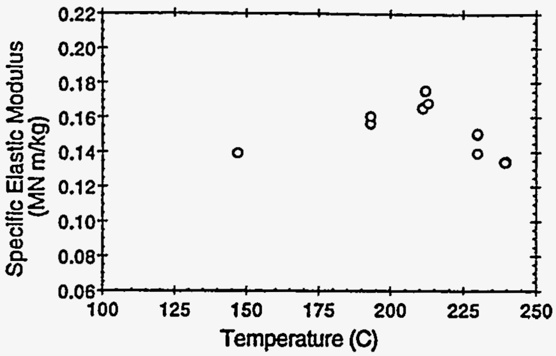

Figure C31. Case W5C1.

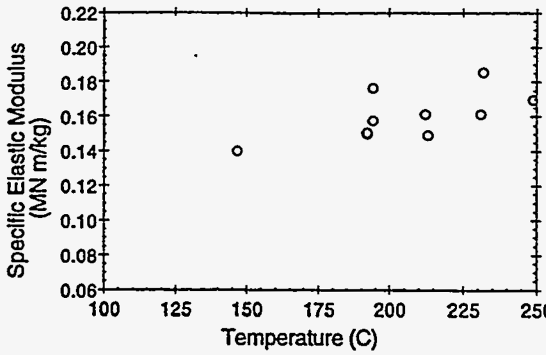

Figure C32. Case W5C2.

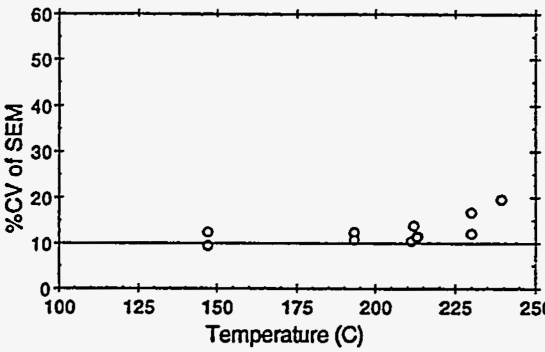

Figure C33. Case W5C1.

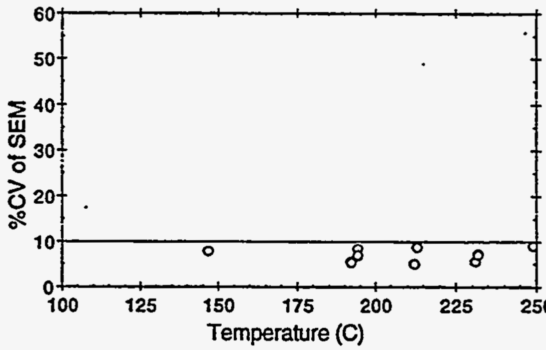

Figure C34. Case W5C2.

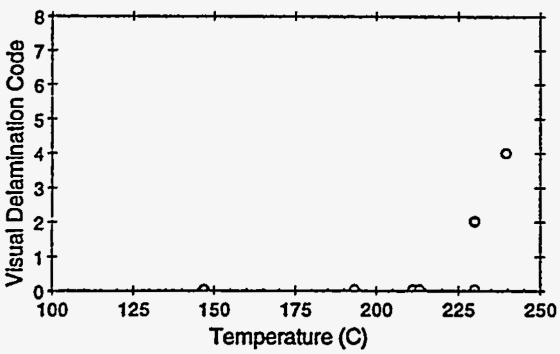

Figure C35. Case W5C1.

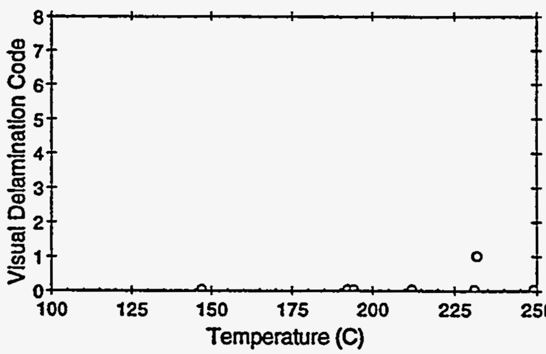

Figure C36. Case W5C2.

APPENDIX D

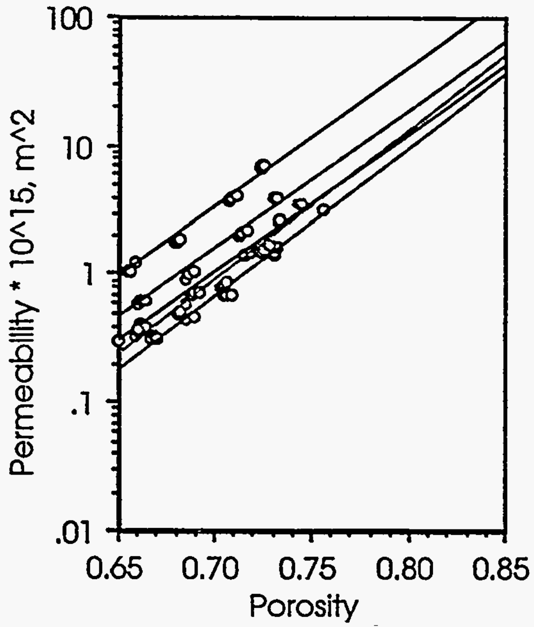

Figure D1. Mill #1 furnish, whole sheet.

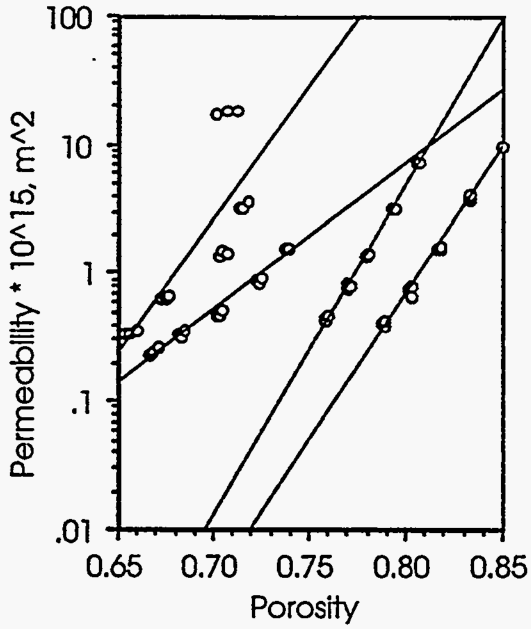

Figure D2. Mill #1 furnish, whole sheet.

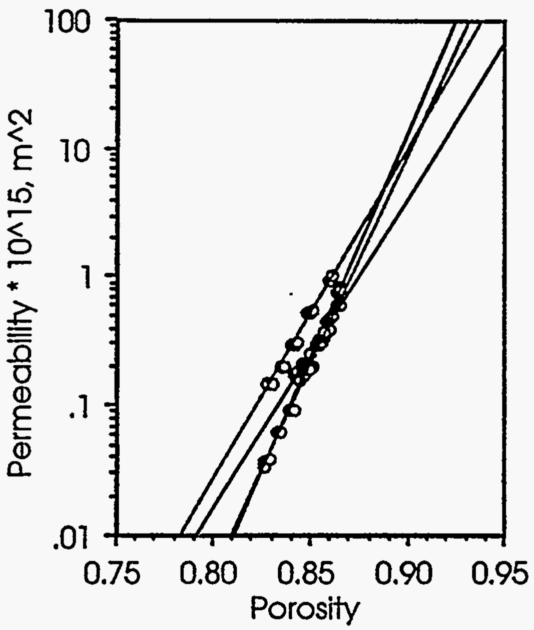

Figure D3. Mill #1 furnish, top ply.

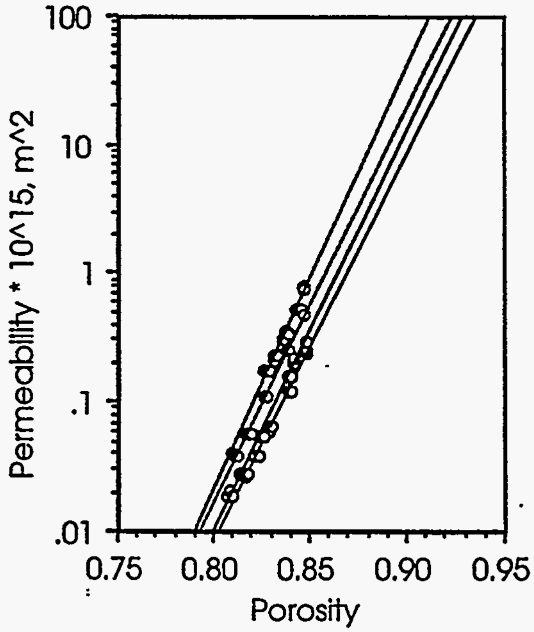

Figure D4. Mill #1 furnish, bottom ply.

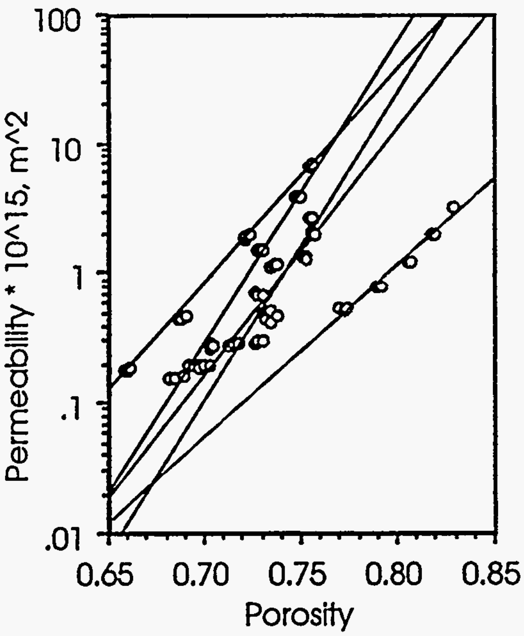

Figure D5. Mill #2 furnish, whole sheet.

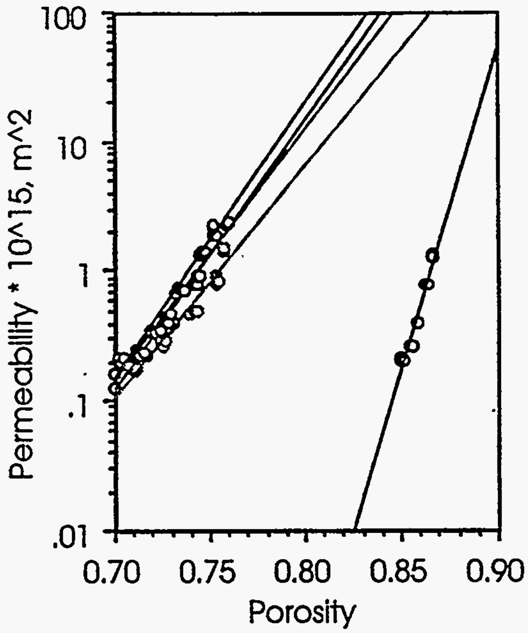

Figure D6. Mill #2 furnish, whole sheet.

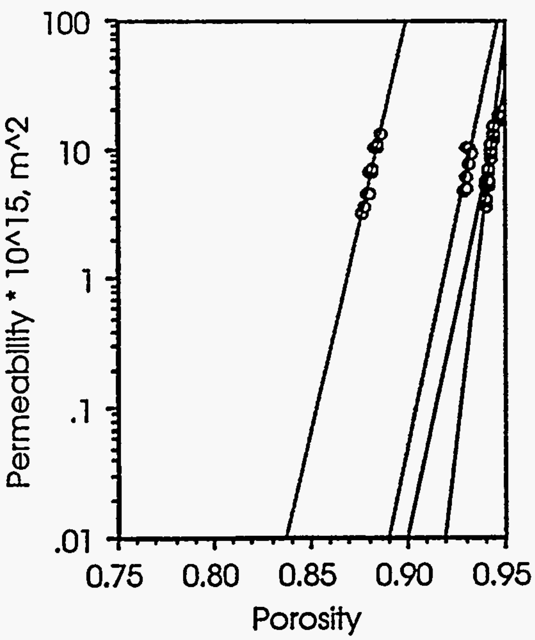

Figure D7. Mill #2 furnish, top ply.

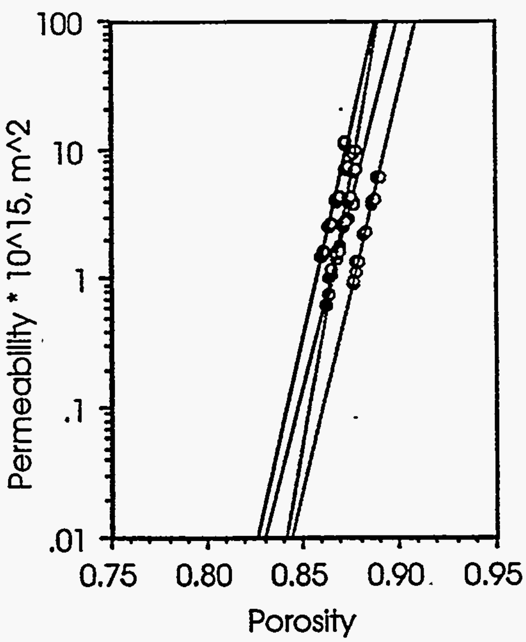

Figure D8. Mill #2 furnish, bottom ply.

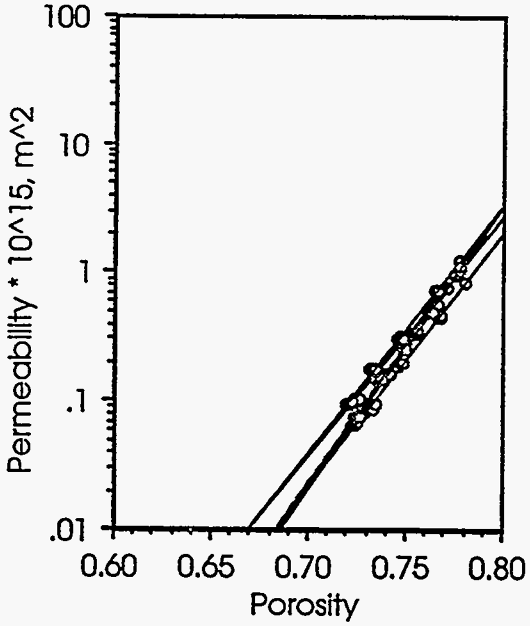

Figure D9. Furnish W1, solids 35%.

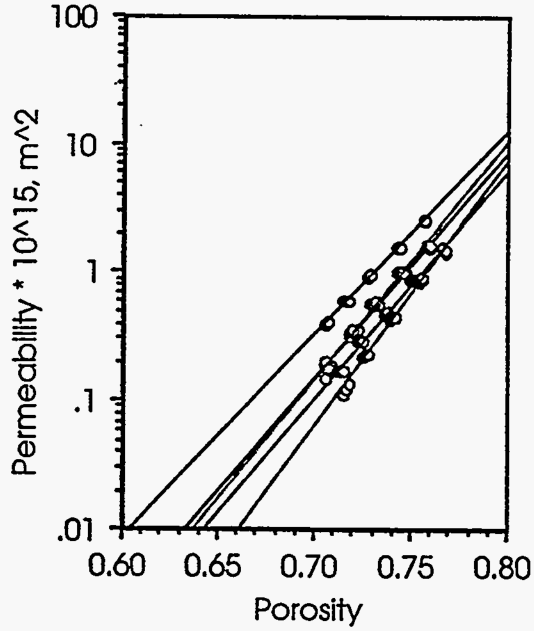

Figure D10. Furnish W1, solids 42%.

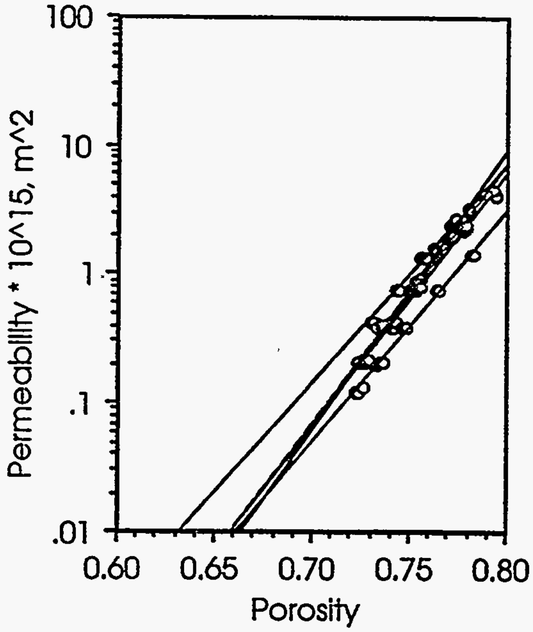

Figure D11. Furnish W2, solids 35%.

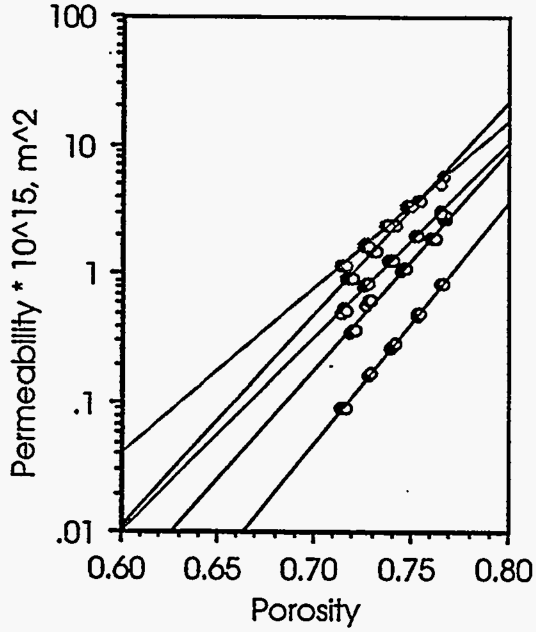

Figure D12. Furnish W2, solids 42%.

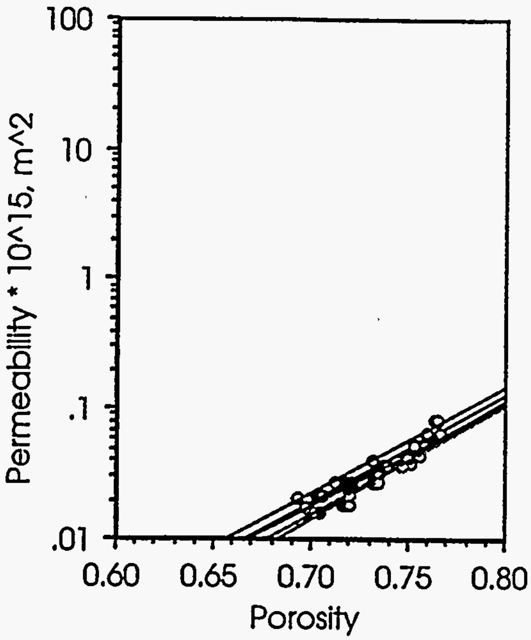

Figure D13. Furnish W3, solids 35%.

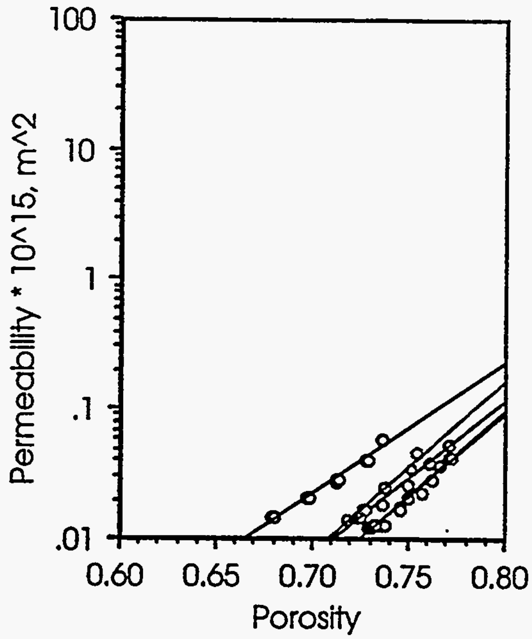

Figure D14. Furnish W3, solids 40%.

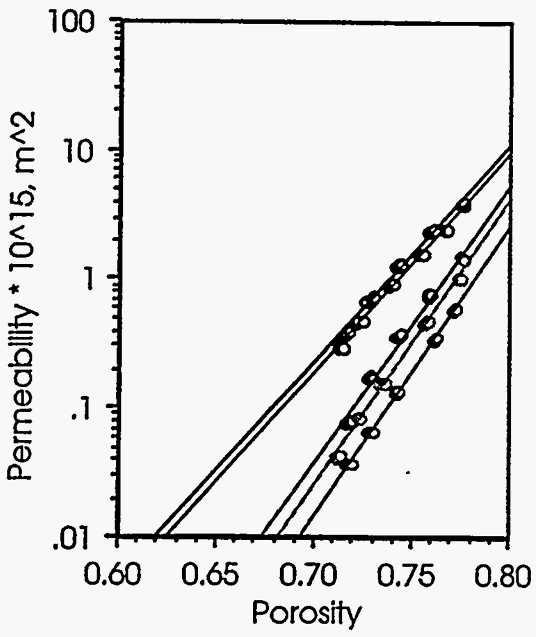

Figure D15. Furnish W5, solids 35%.

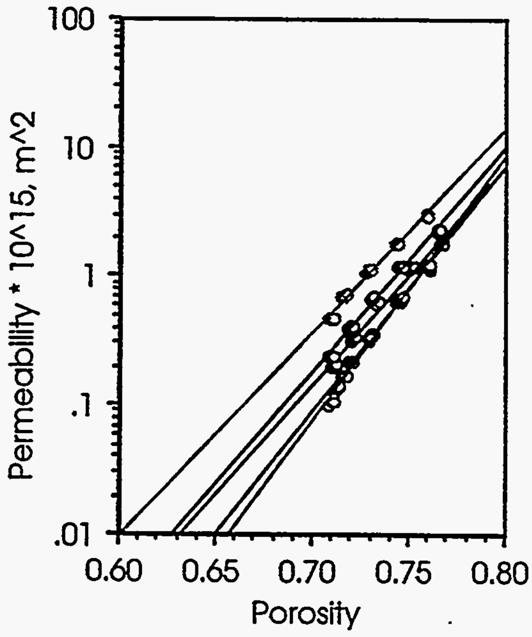

Figure D16. Furnish W5, solids 42%.

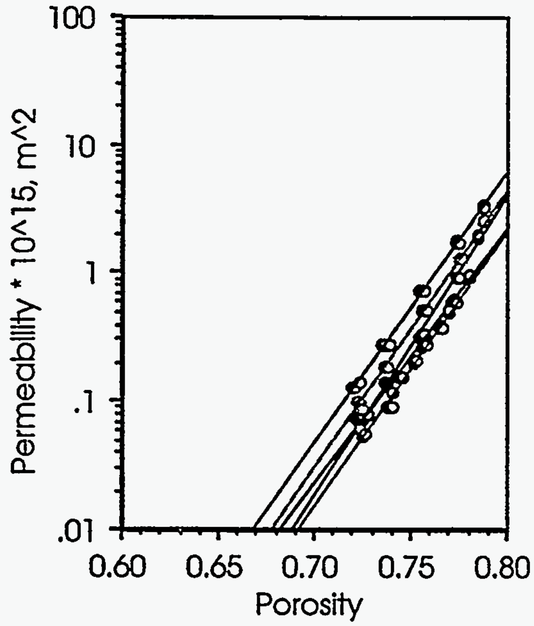

Figure D17. Furnish W6, solids 35%.

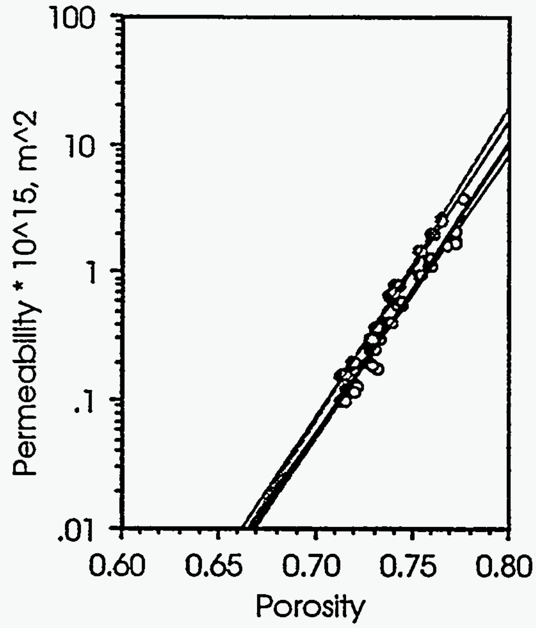

Figure D18. Furnish W6, solids 42%.

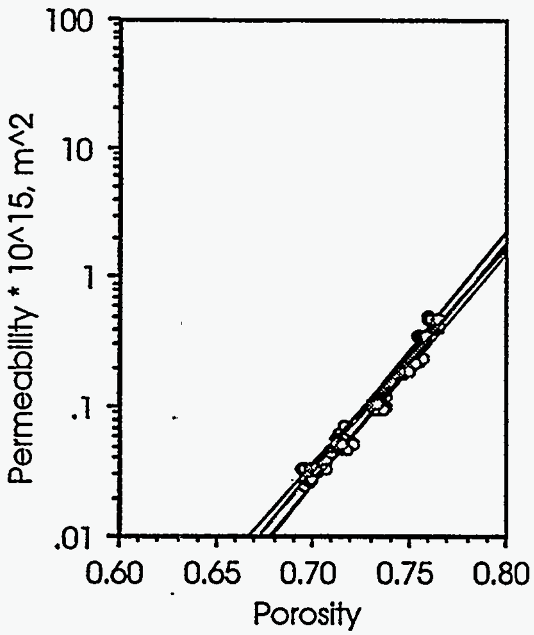

Figure D19. Furnish W7, solids 35%.

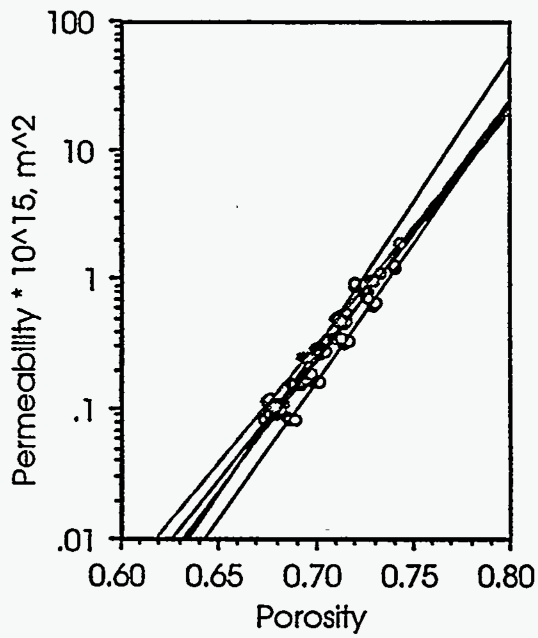

Figure D20. Furnish W7, solids 42%.

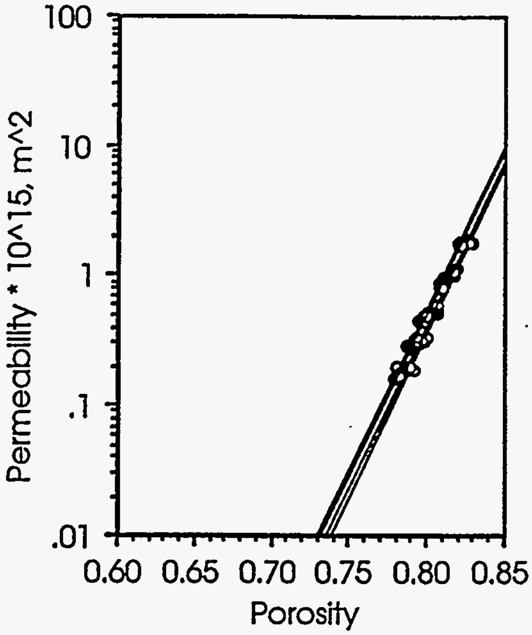

Figure D21. Furnish W8, solids 35%.

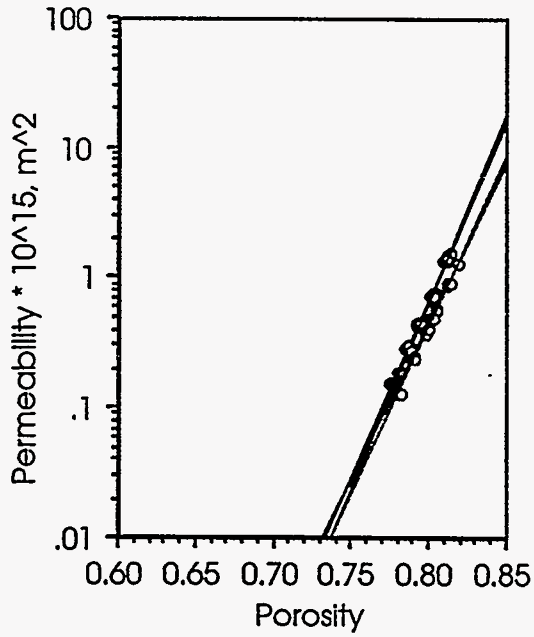

Figure D22. Furnish W8, solids 42%.

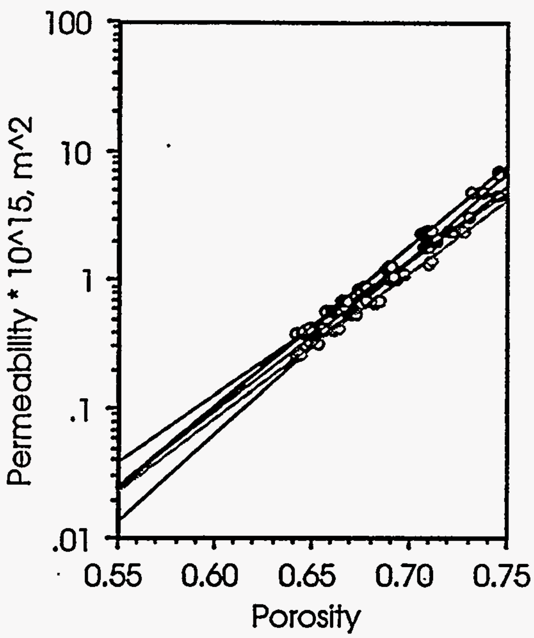

Figure D23. Furnish W9, press condition P1.

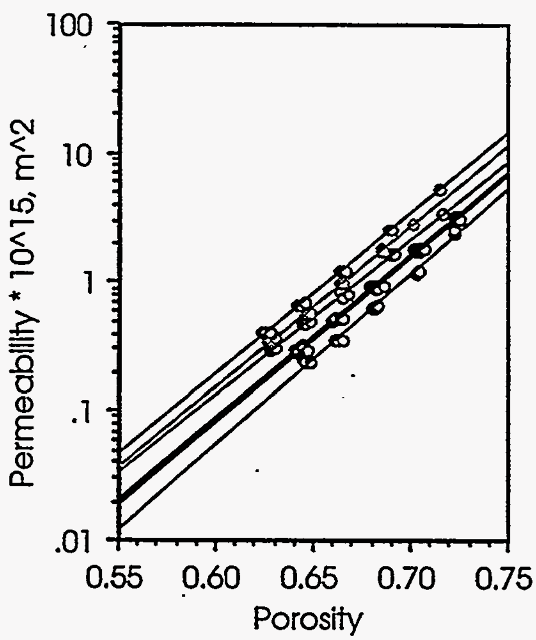

Figure D24. Furnish W9, press condition P2.

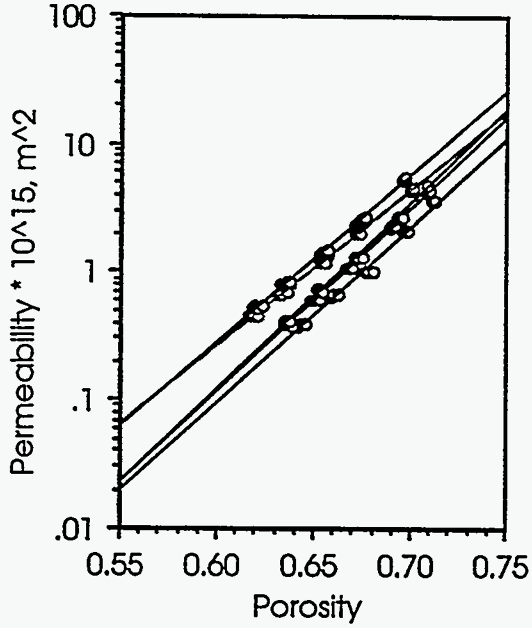

Figure D25. Furnish W9, press condition P3.

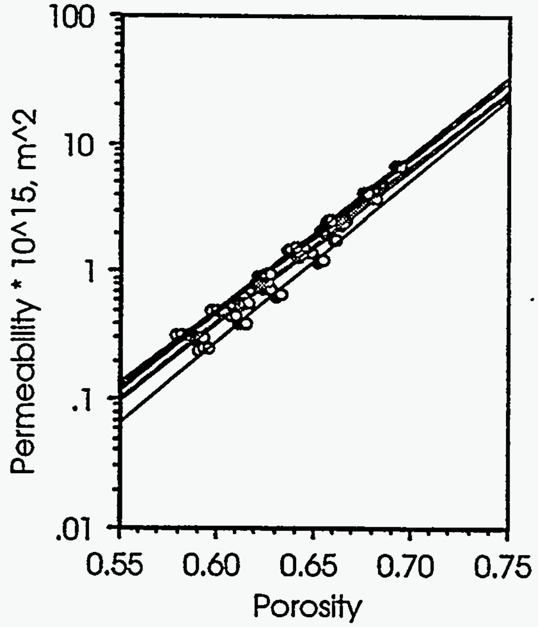

Figure D26. Furnish W9, press condition P4.

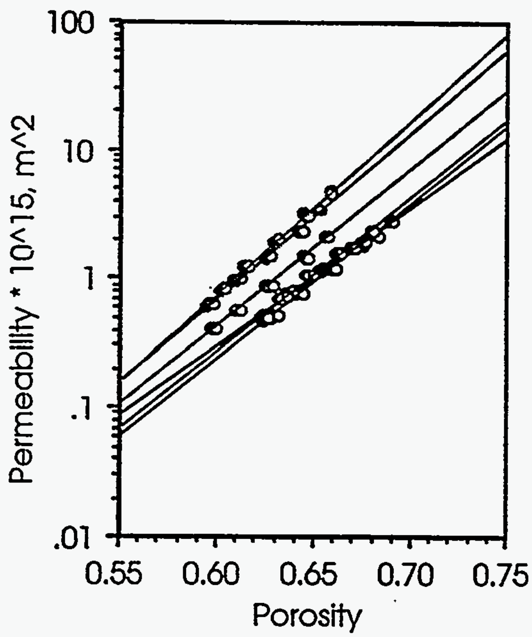

Figure D27. Furnish W9, press condition P5.

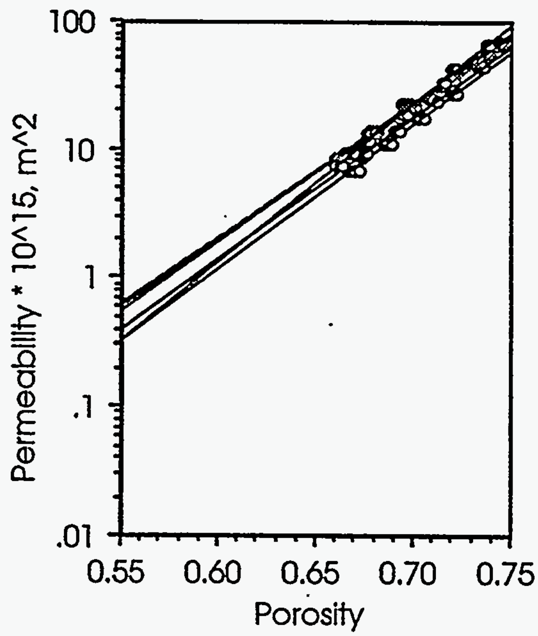

Figure D28. Furnish W10, press condition P1.

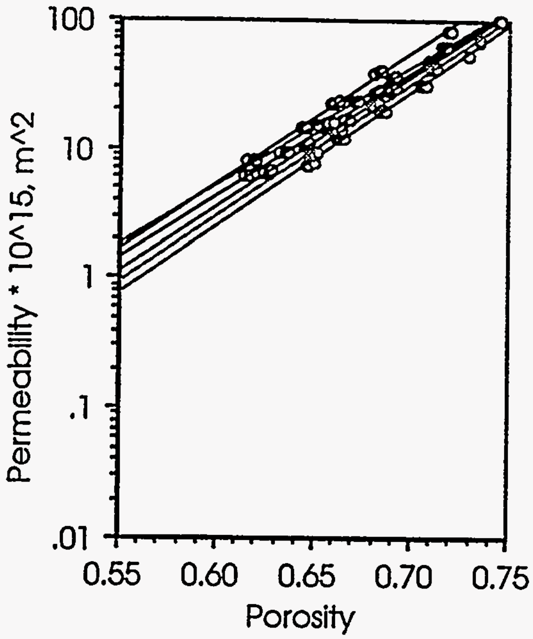

Figure D29. Furnish W10, press condition P2.

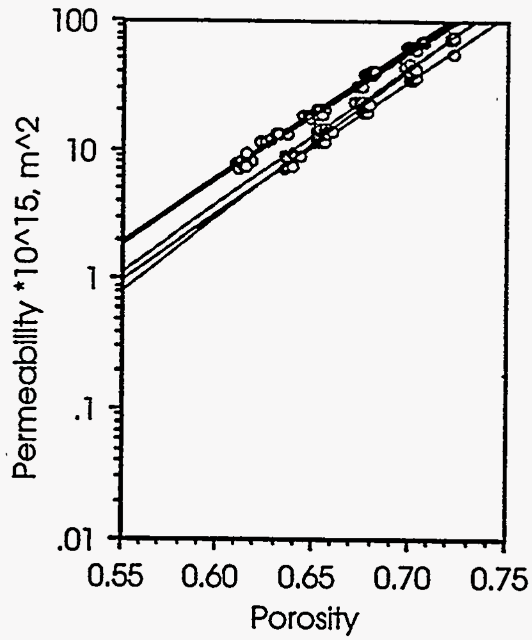

Figure D30. Furnish W10, press condition P3.

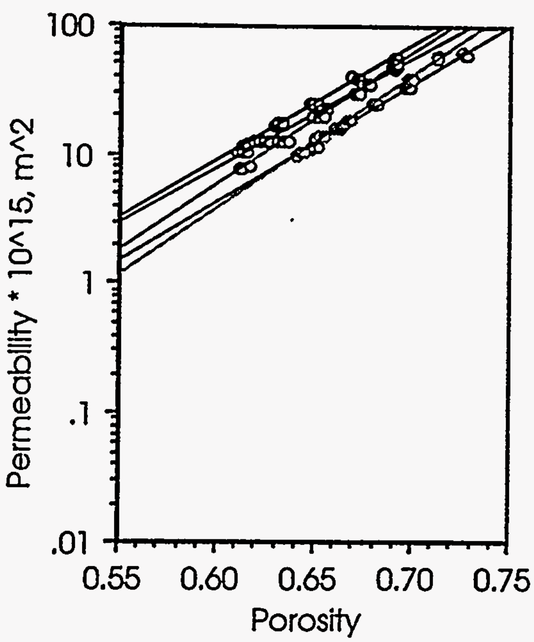

Figure D31. Furnish W10, press condition P4.

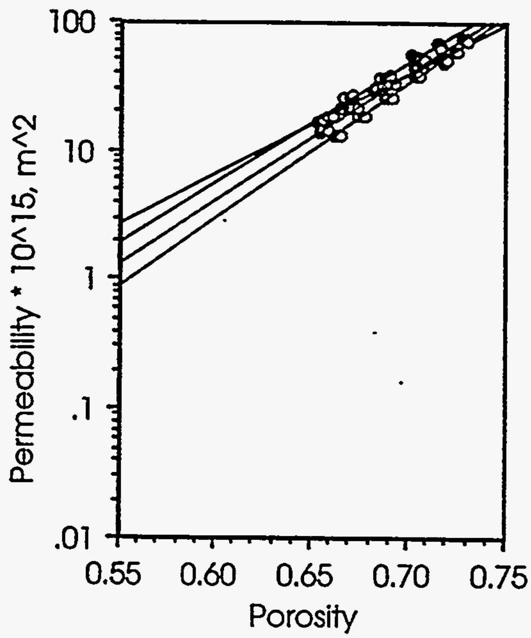

Figure D32. Furnish W10, press condition P5.

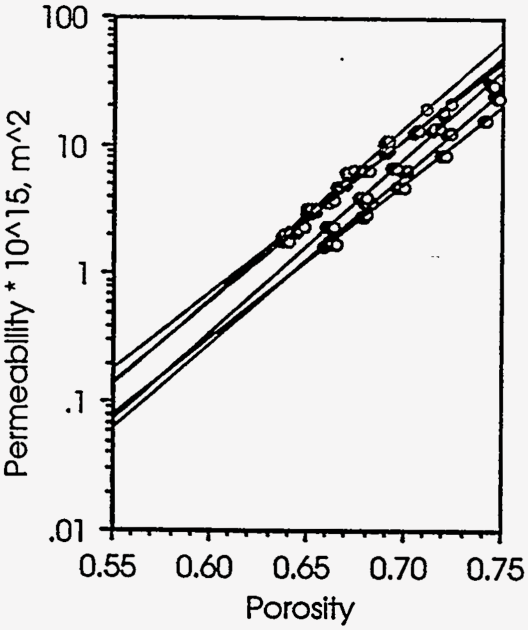

Figure D33. Furnish W11, press condition P1.

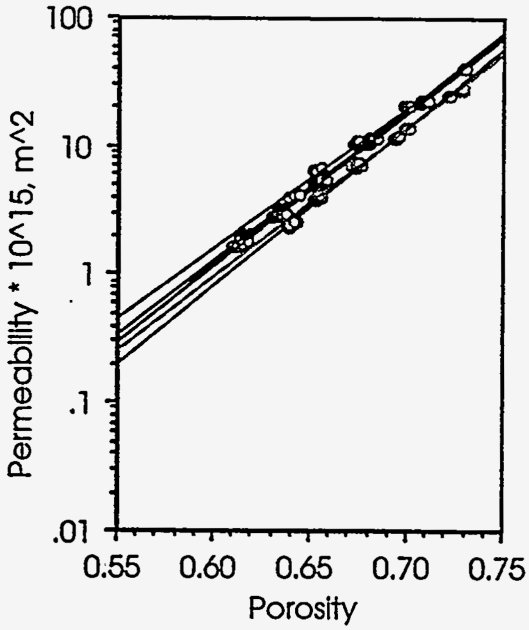

Figure D34. Furnish W11, press condition P2.

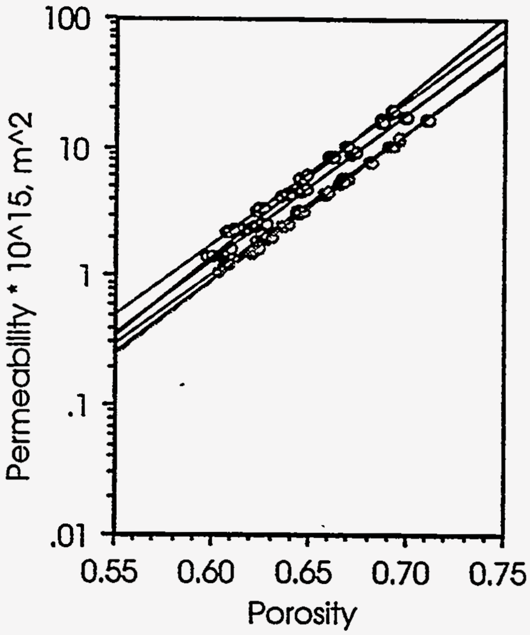

Figure D35. Furnish W11, press condition P3.

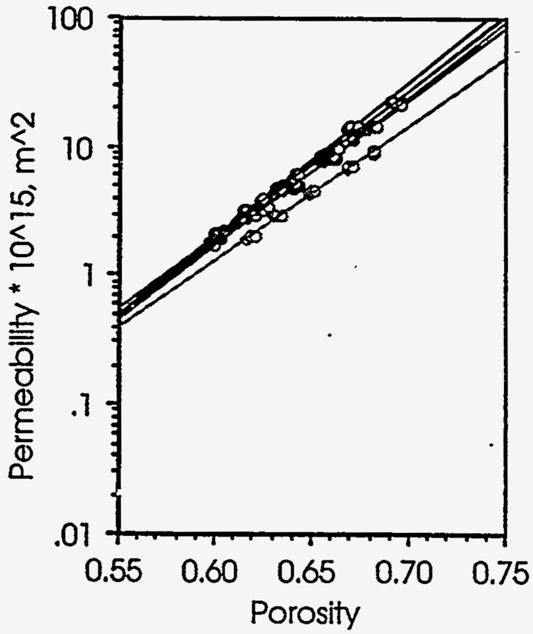

Figure D36. Furnish W11, press condition P4.

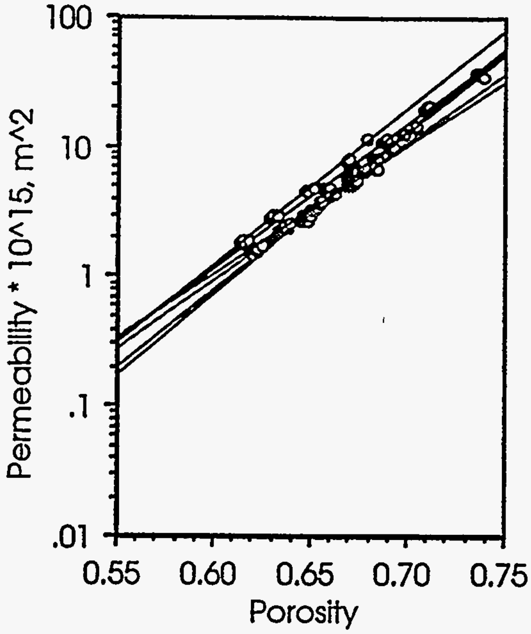

Figure D15. Furnish W37, press condition P5.

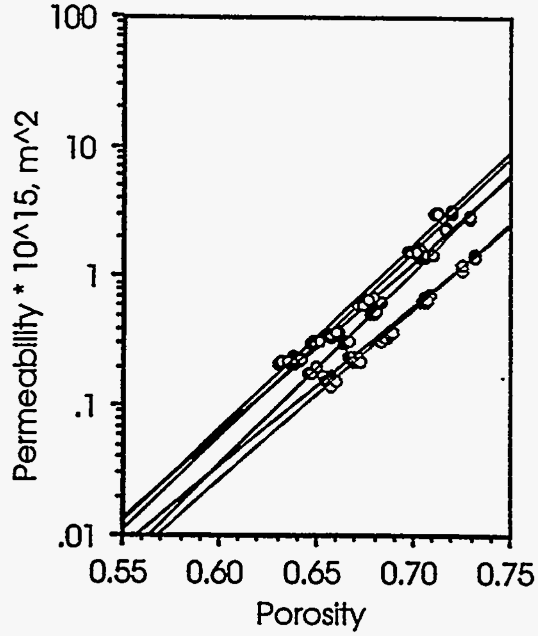

Figure D38. Furnish W12, press condition P1.

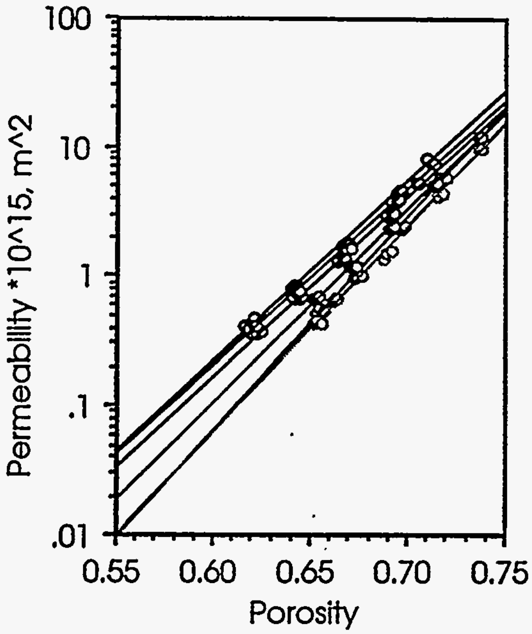

Figure D39. Furnish W12, press condition P2.

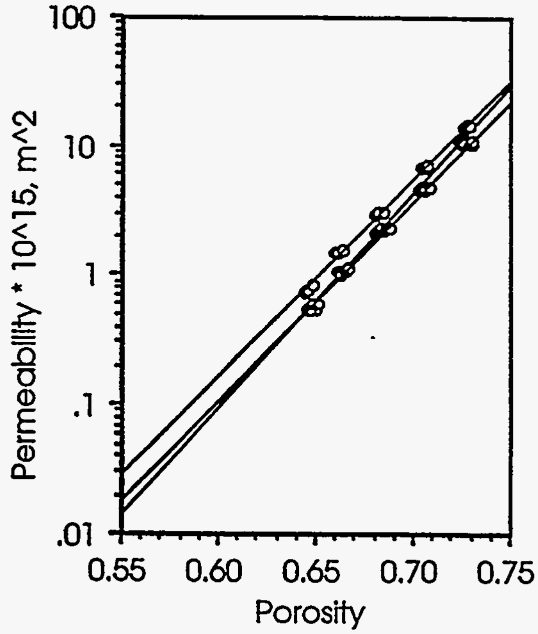

Figure D40. Furnish W12, press condition P3.

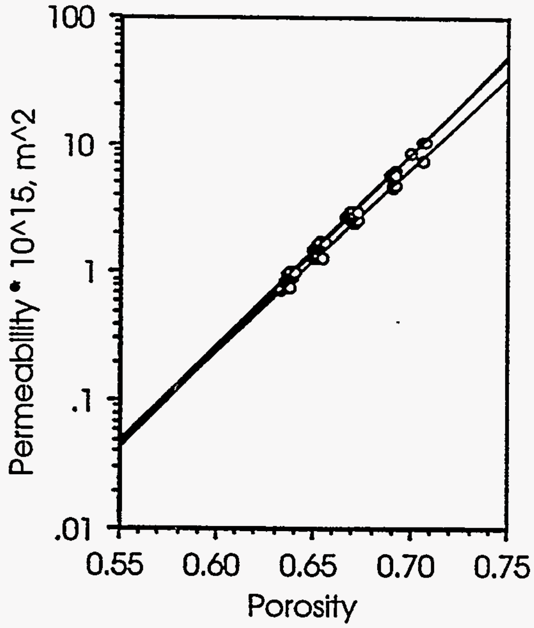

Figure D41. Furnish W12, press condition P4.

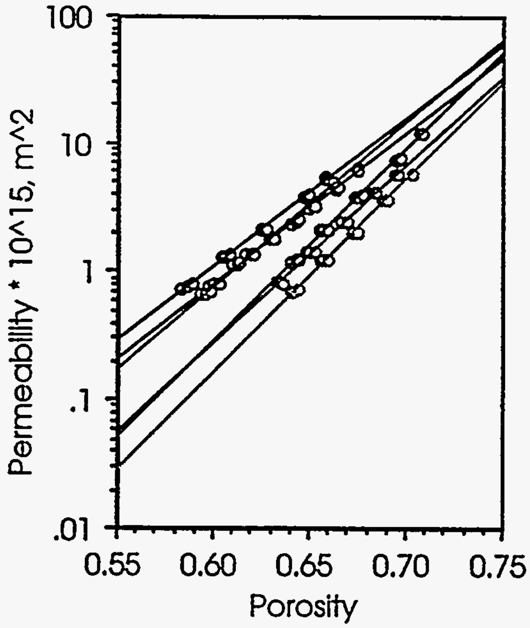

Figure D42. Furnish W12, press condition P5.

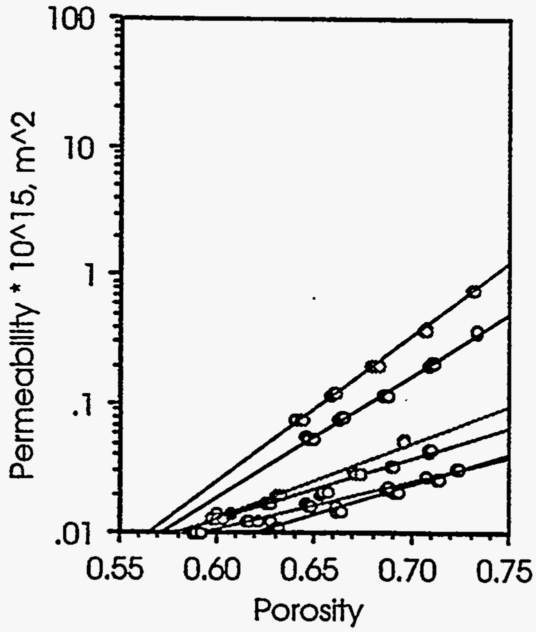

Figure D43. Furnish W15, press condition P2.

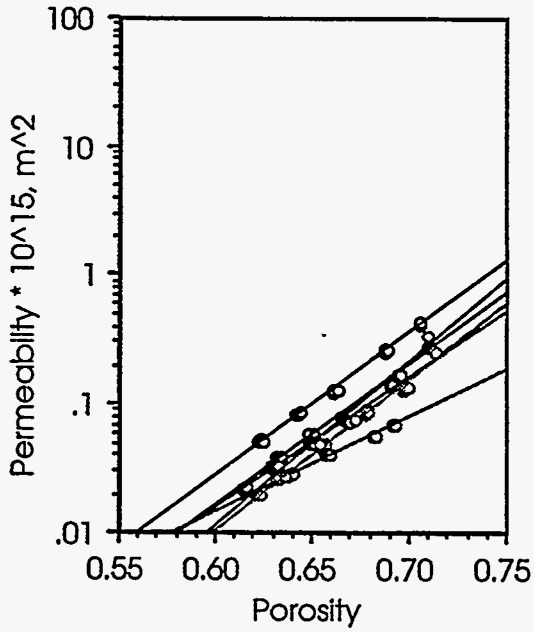

Figure D44. Furnish W15, press condition P3.

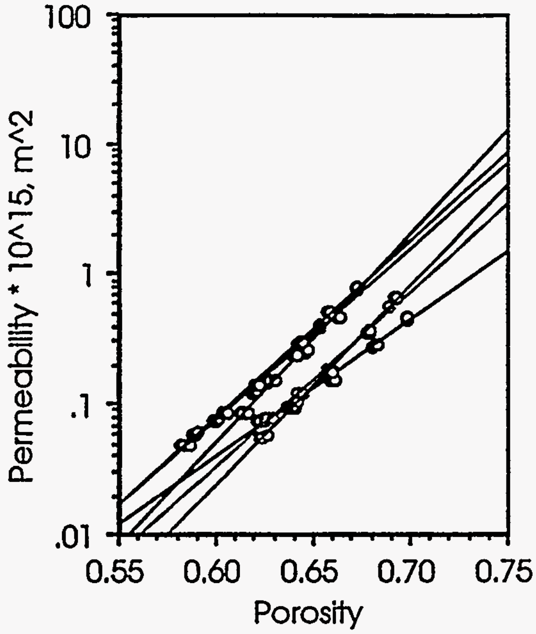

Figure D45. Furnish W15, press condition P4.

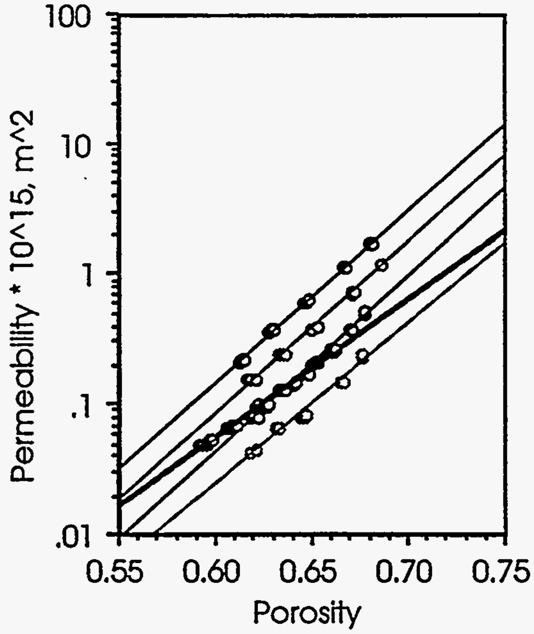

Figure D46. Furnish W15, press condition P5.

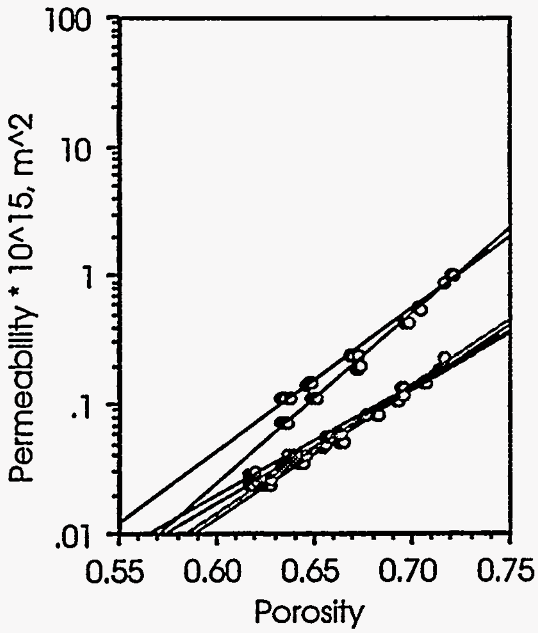

Figure D47. Furnish W16, press condition P2.

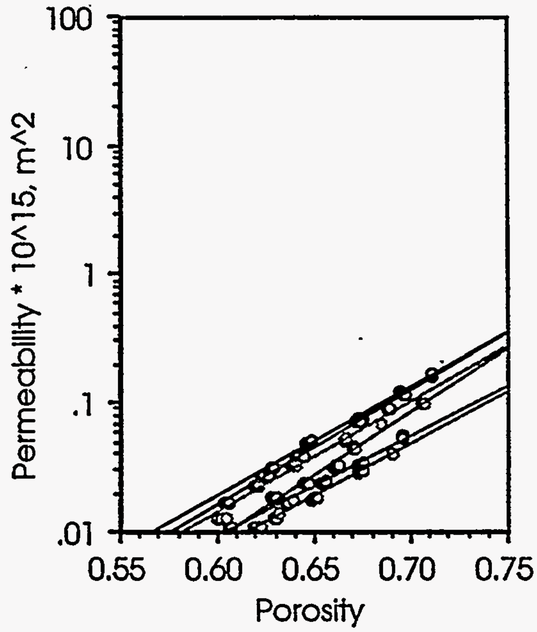

Figure D48. Furnish W16, press condition P3.

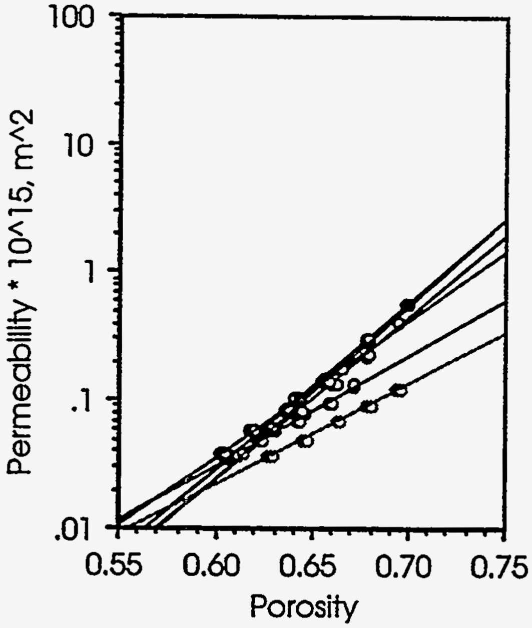

Figure D49. Furnish W16, press condition P4.

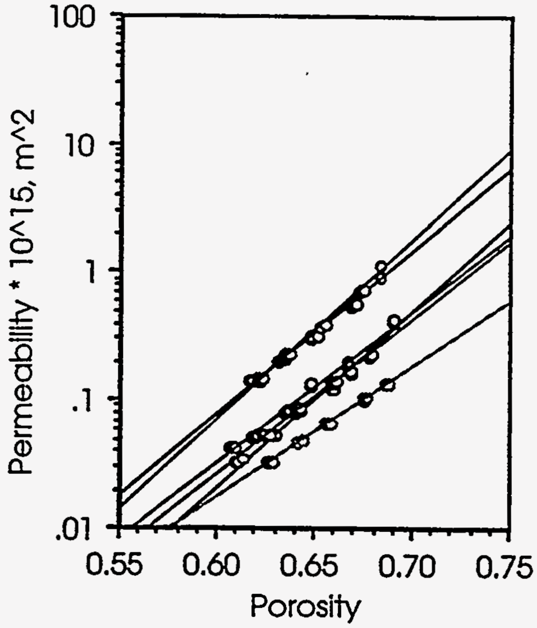

Figure D50. Furnish W16, press condition P5.

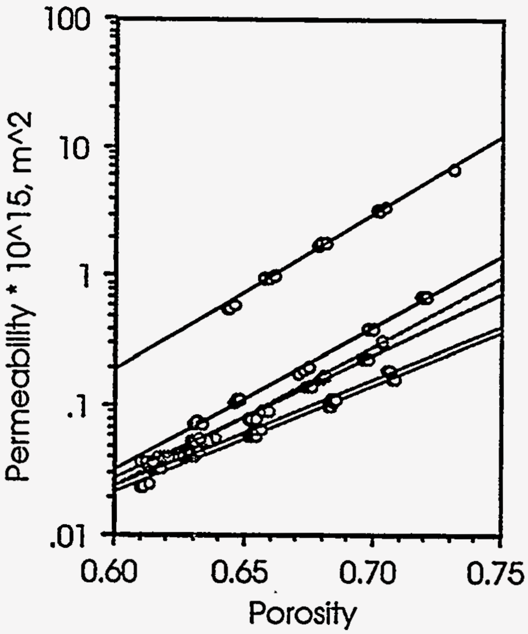

Figure D51. Furnish W17, press condition P1.

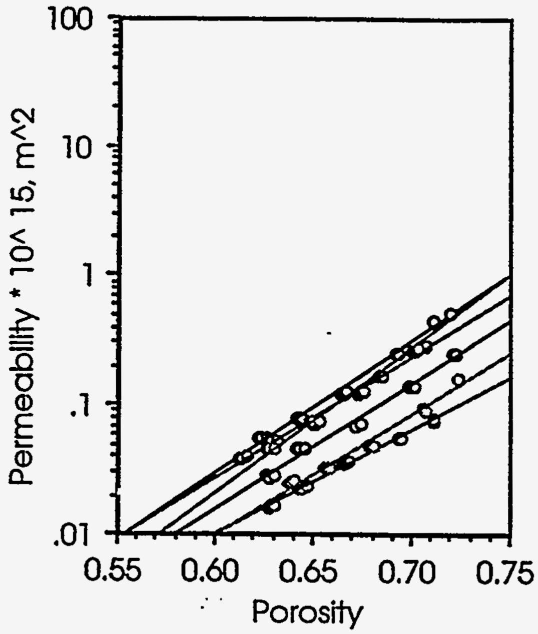

Figure D52. Furnish W17, press condition P2.

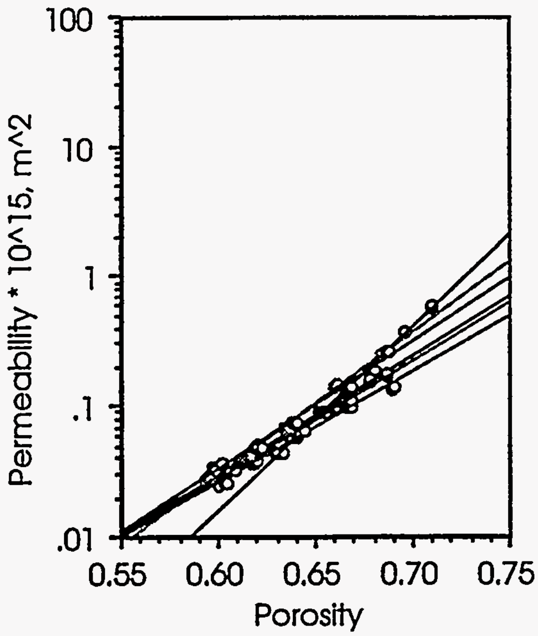

Figure D53. Furnish W17, press condition P3.

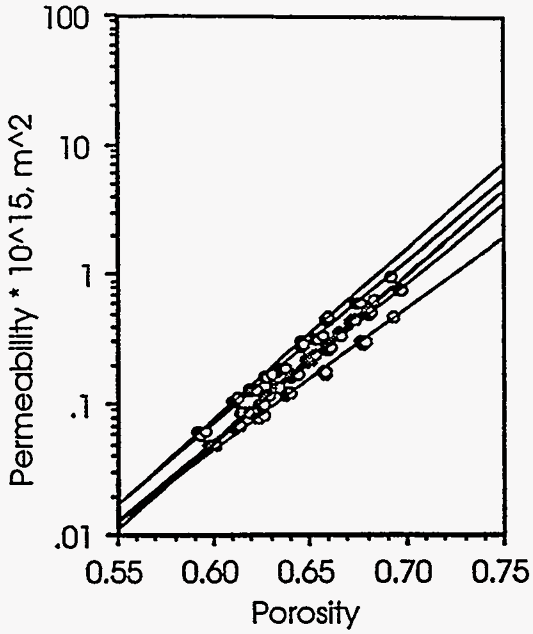

Figure D54. Furnish W17, press condition P4.

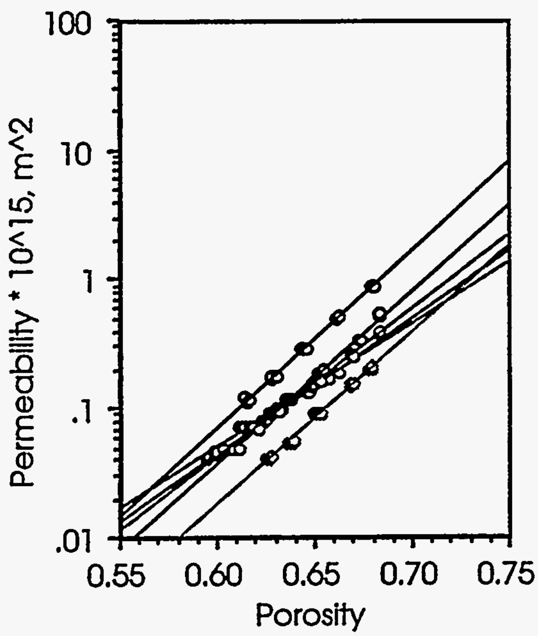

Figure D55. Furnish W17, press condition P5.

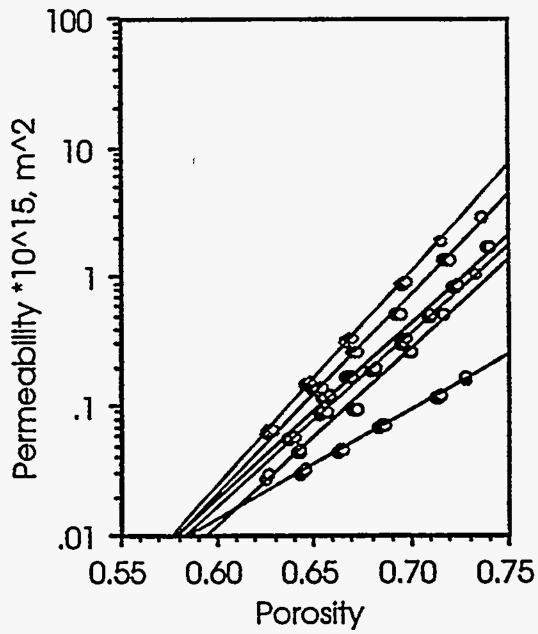

Figure D56. Furnish W18, press condition P1.

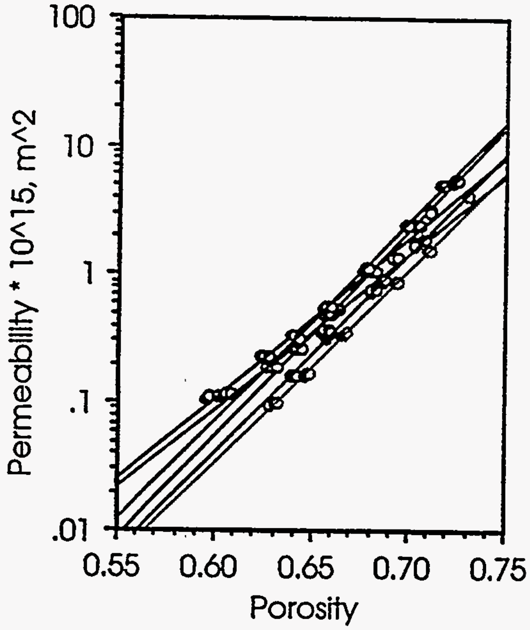

Figure D57. Furnish W18, press condition P2.

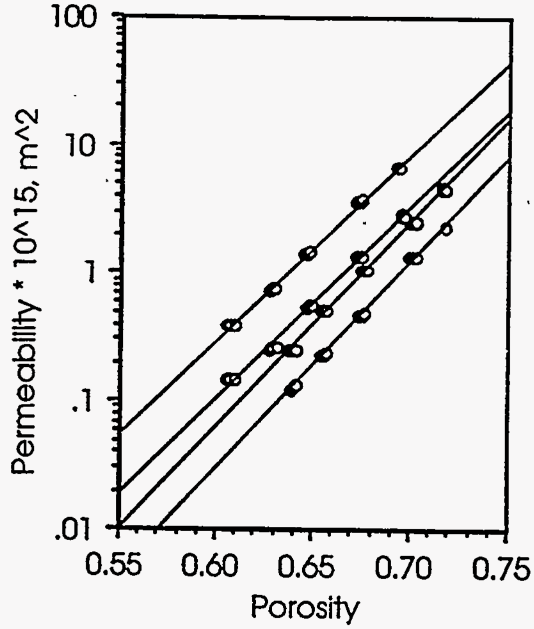

Figure D58. Furnish W18, press condition P3.

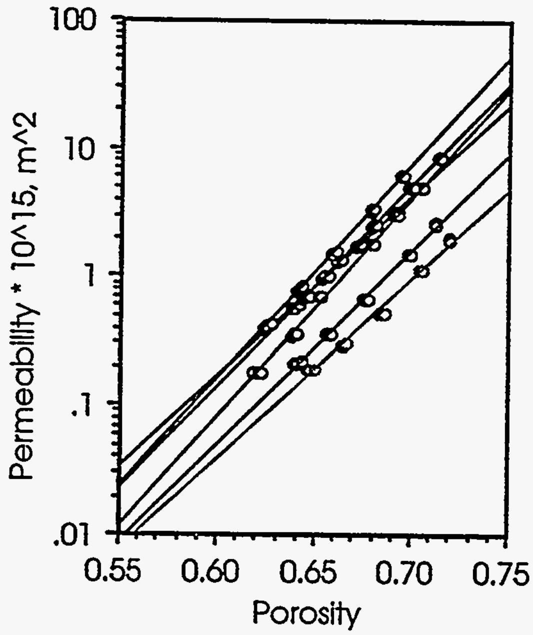

Figure D59. Furnish W18, press condition P4.

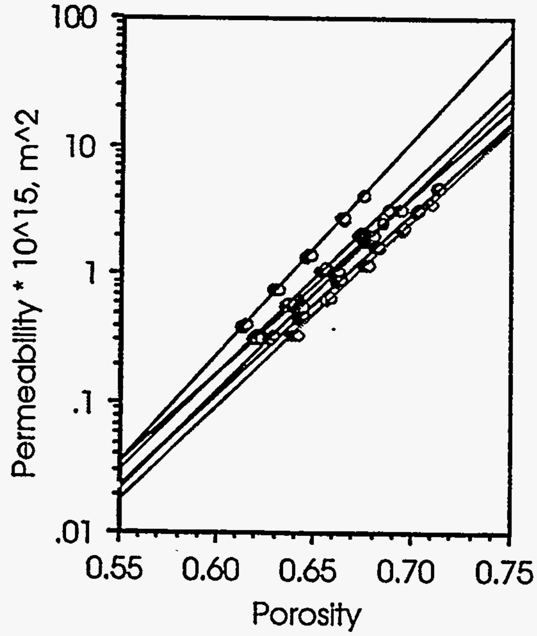

Figure D60. Furnish W18, press condition P5.

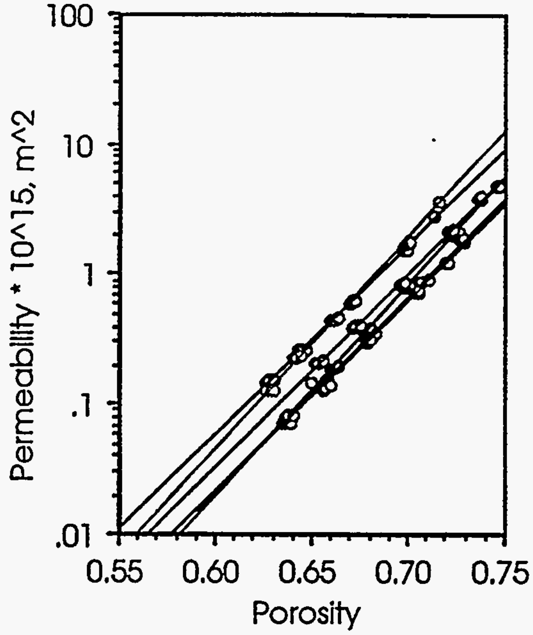

Figure D61. Furnish W19, press condition P1.

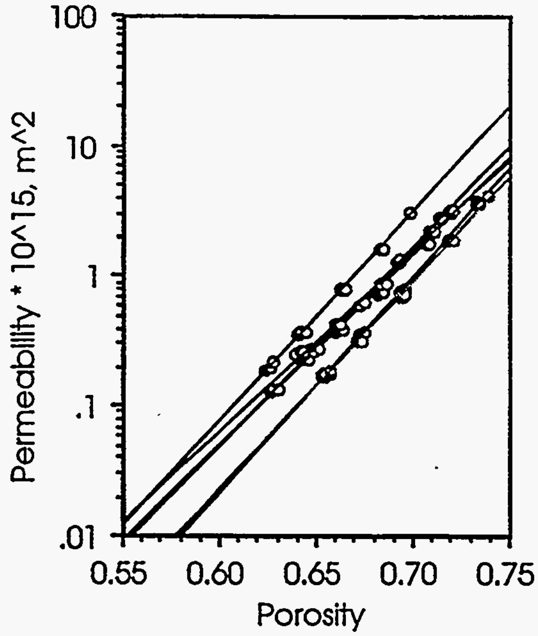

Figure D62. Furnish W19, press condition P2.

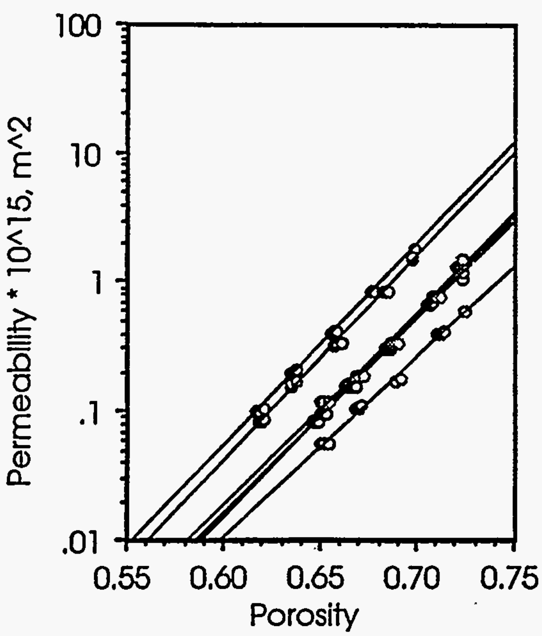

Figure D63. Furnish W19, press condition P3.

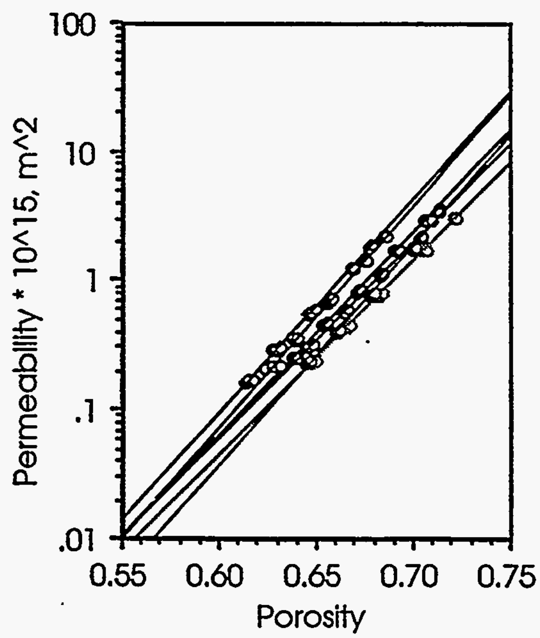

Figure D64. Furnish W19, press condition P4.

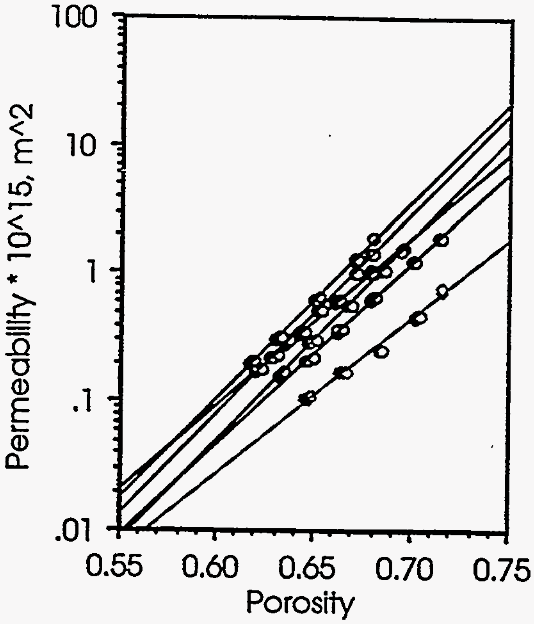

Figure D65. Furnish W19, press condition P5.

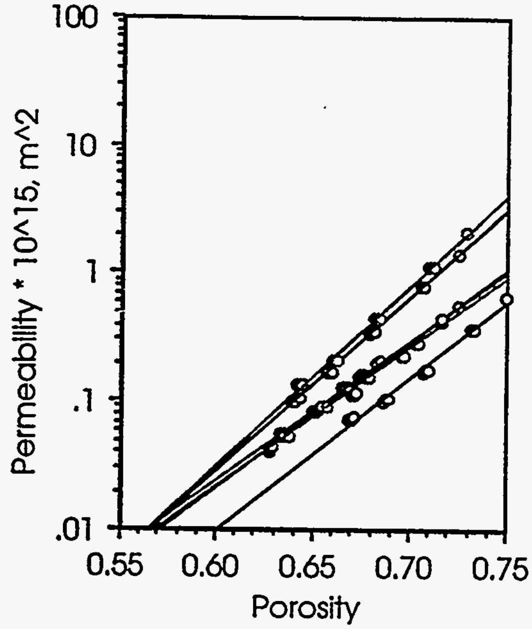

Figure D66. Furnish W20, press condition P1.

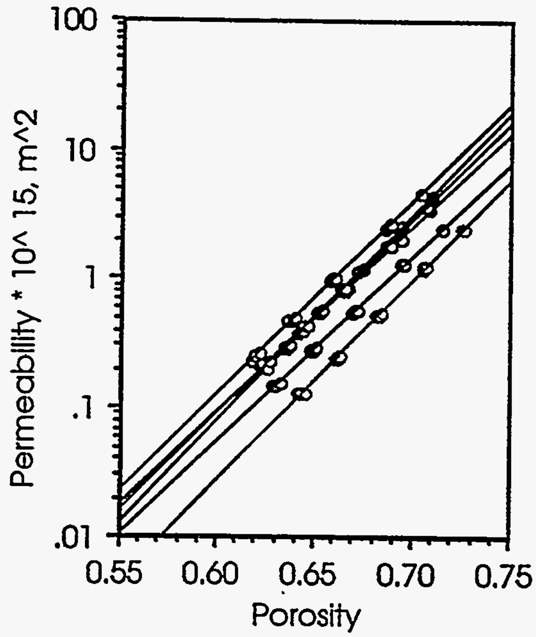

Figure D67. Furnish W20, press condition P2.

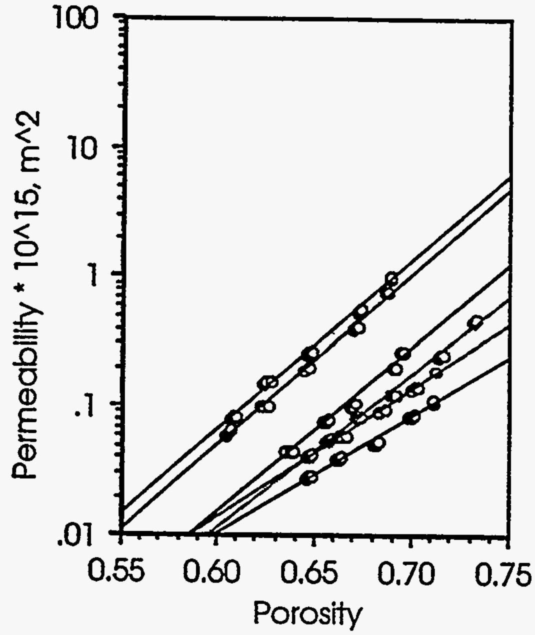

Figure D68. Furnish W20, press condition P3.

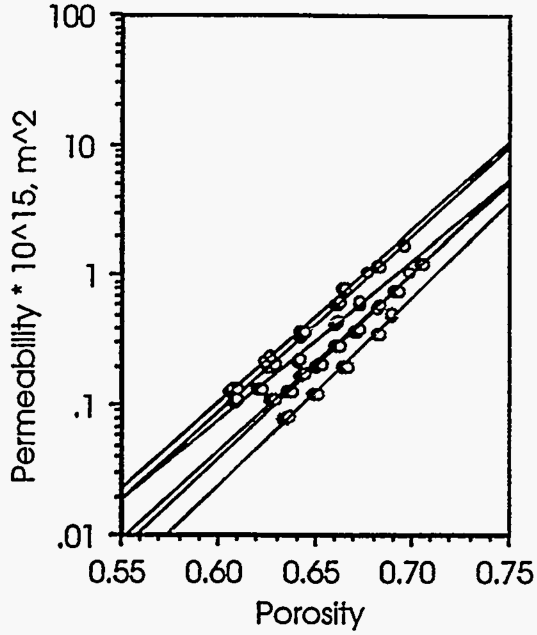

Figure D69. Furnish W20, press condition P4.

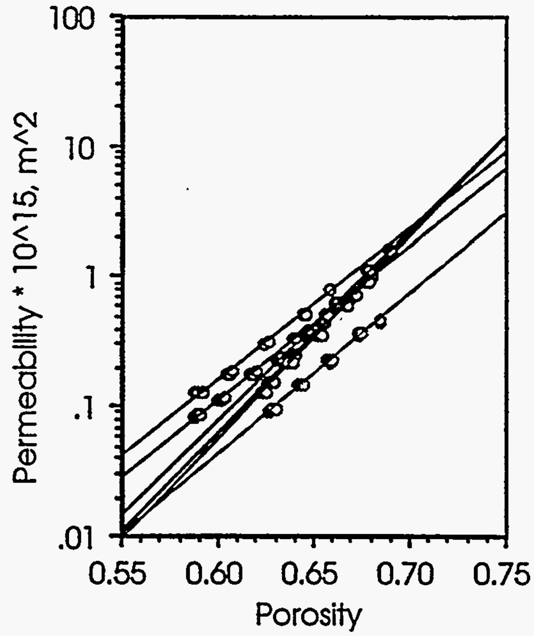

Figure D70. Furnish W20, press condition P5.

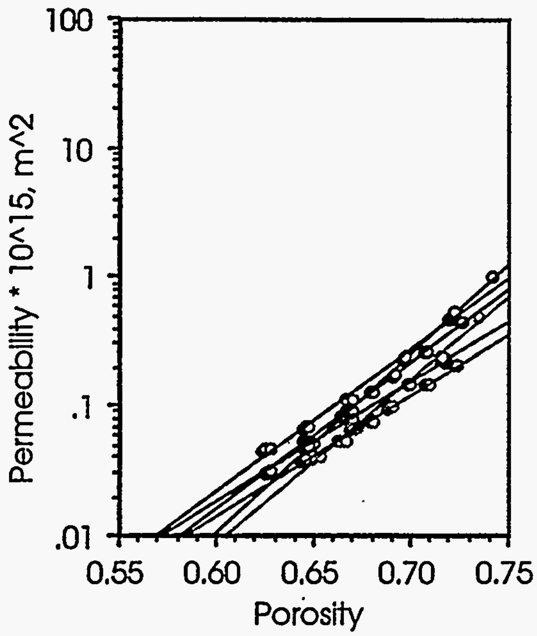

Figure D71. Furnish W21, press condition P1.

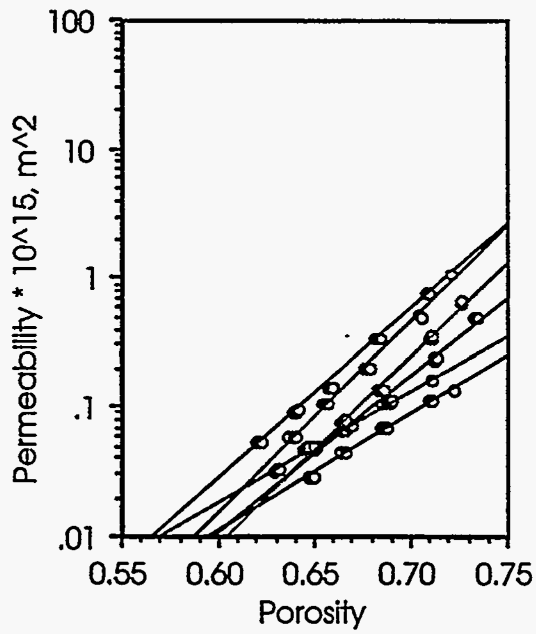

Figure D72. Furnish W21, press condition P2.

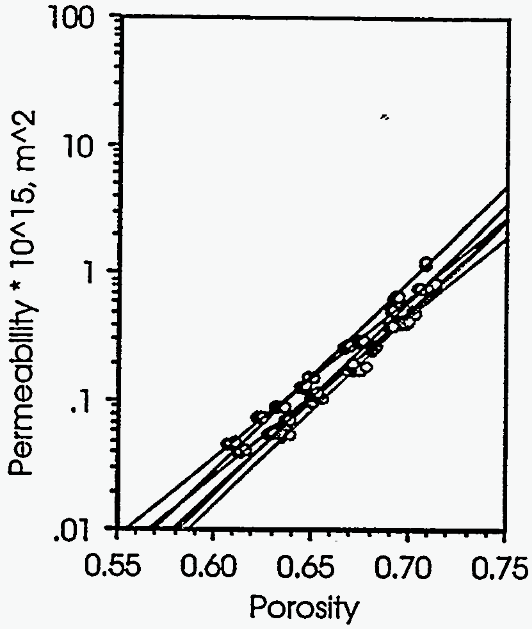

Figure D73. Furnish W21, press condition P3.

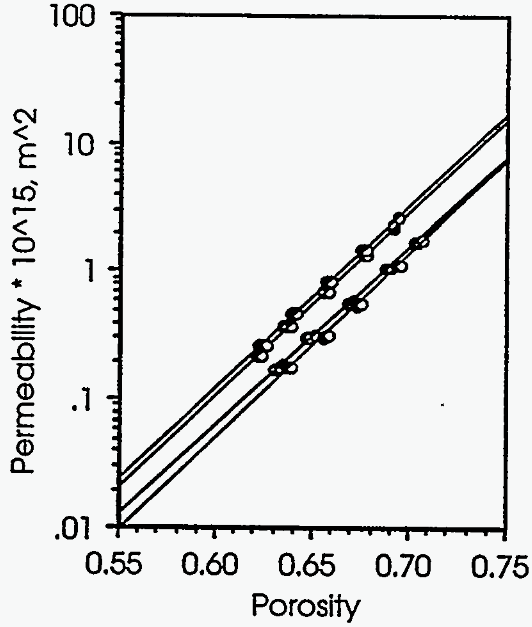

Figure D74. Furnish W21, press condition P4.

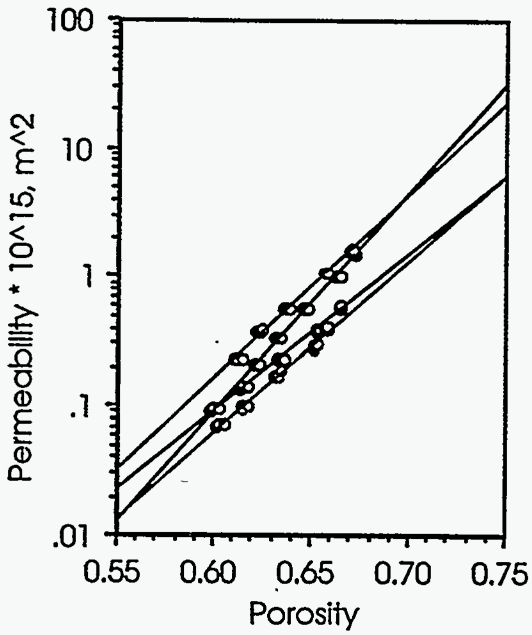

Figure D75. Furnish W21, press condition P5.

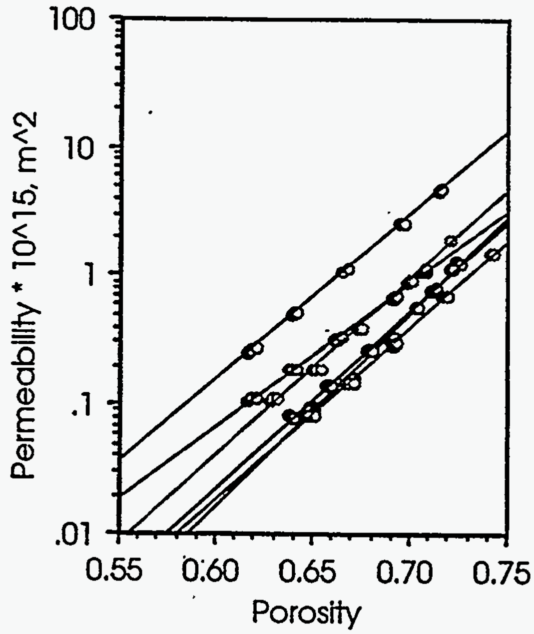

Figure D76. Furnish W22, press condition P1.

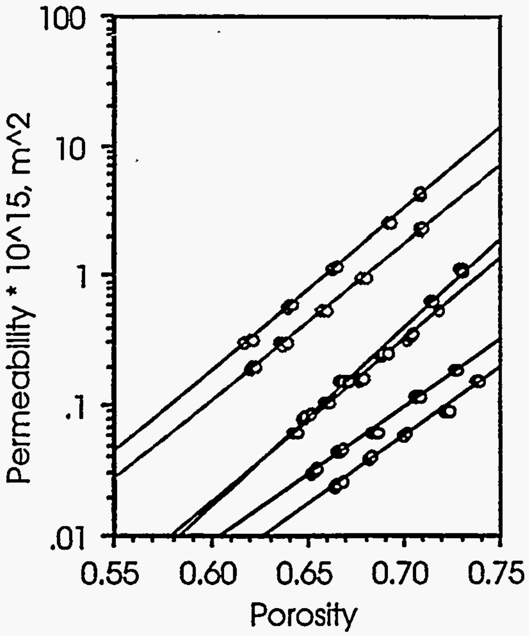

Figure D77. Furnish W22, press condition P2.

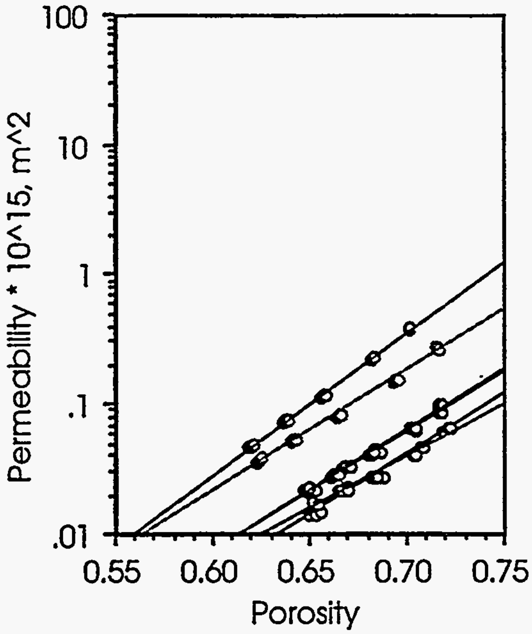

Figure D78. Furnish W22, press condition P3.

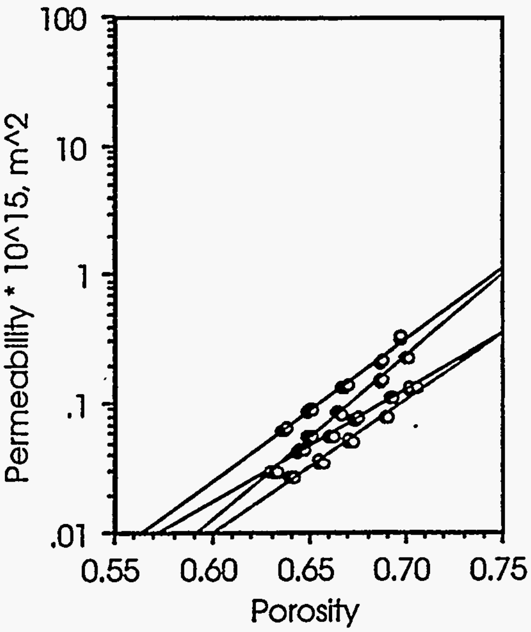

Figure D79. Furnish W22, press condition P4.

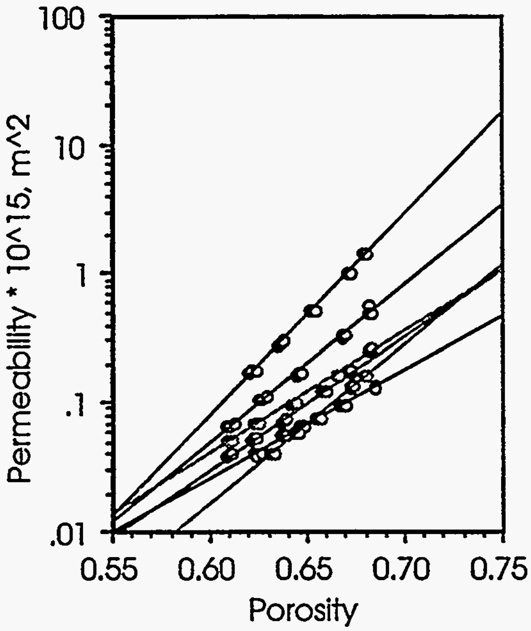

Figure D80. Furnish W22, press condition P5.

APPENDIX E

The following figures show the temperatures recorded during presteaming. Time zero is when the steam is first turned on. The steaming time was set to the time when the lowest temperature exceeded 55°C.

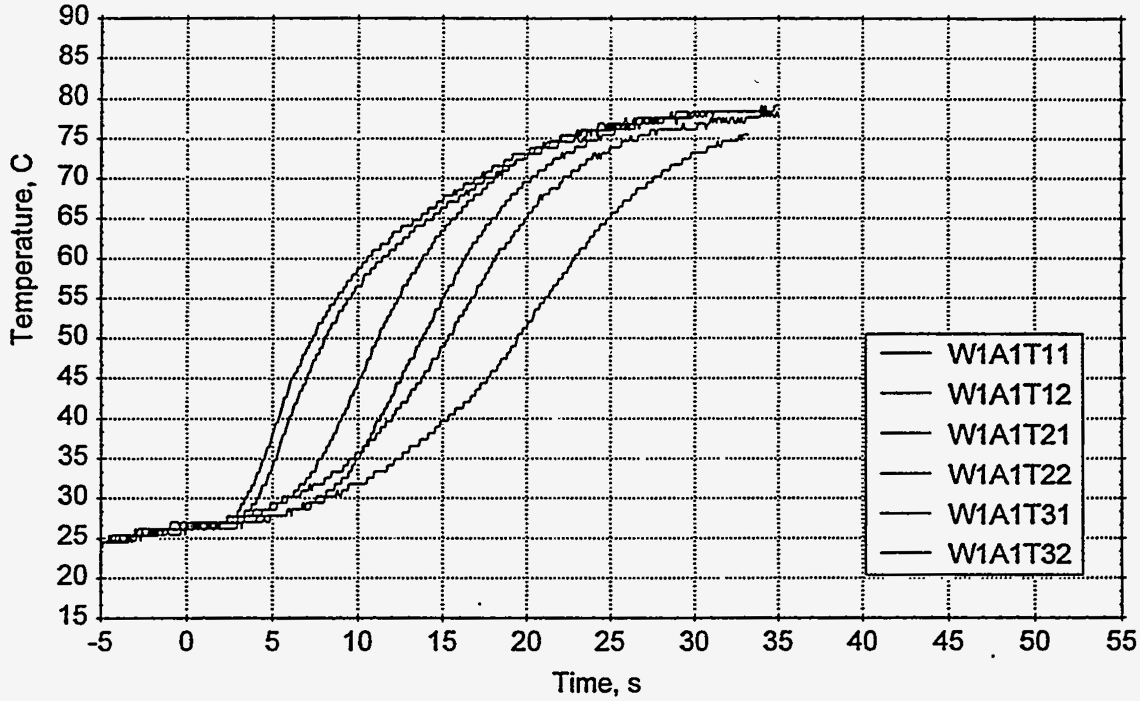

Figure E1. Furnish W1 (2P1), A platen, B felt, 35% sheet solids.

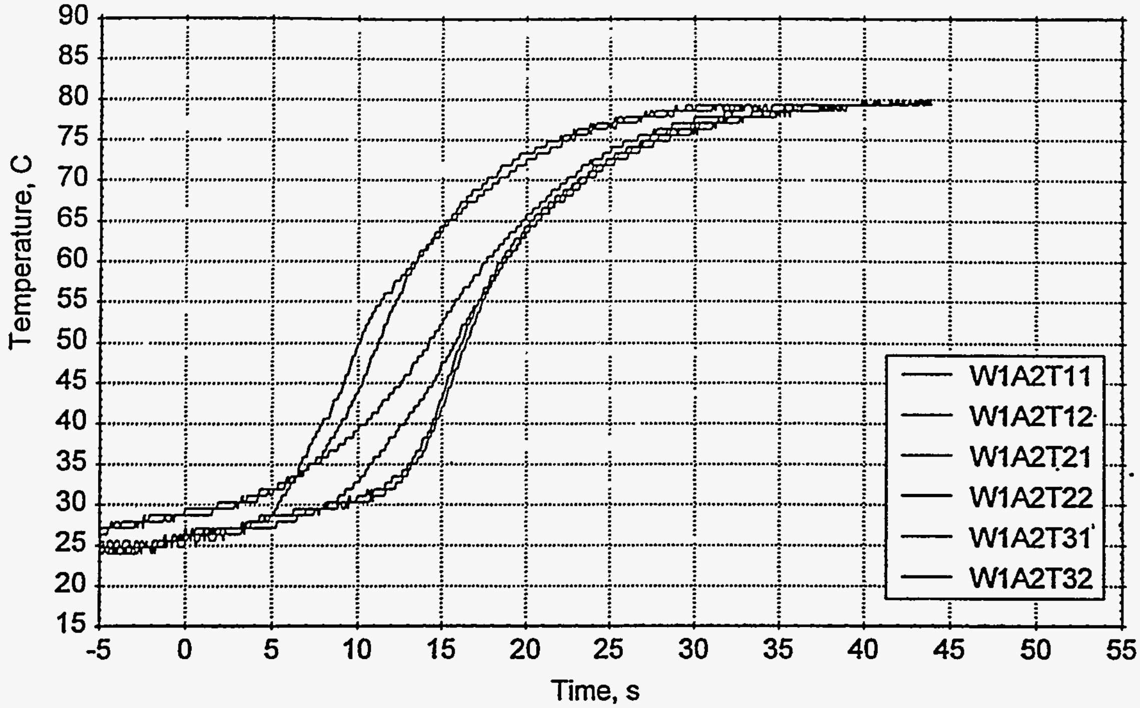

Figure E2. Furnish W1 (2P1), A platen, B felt, 42% sheet solids.

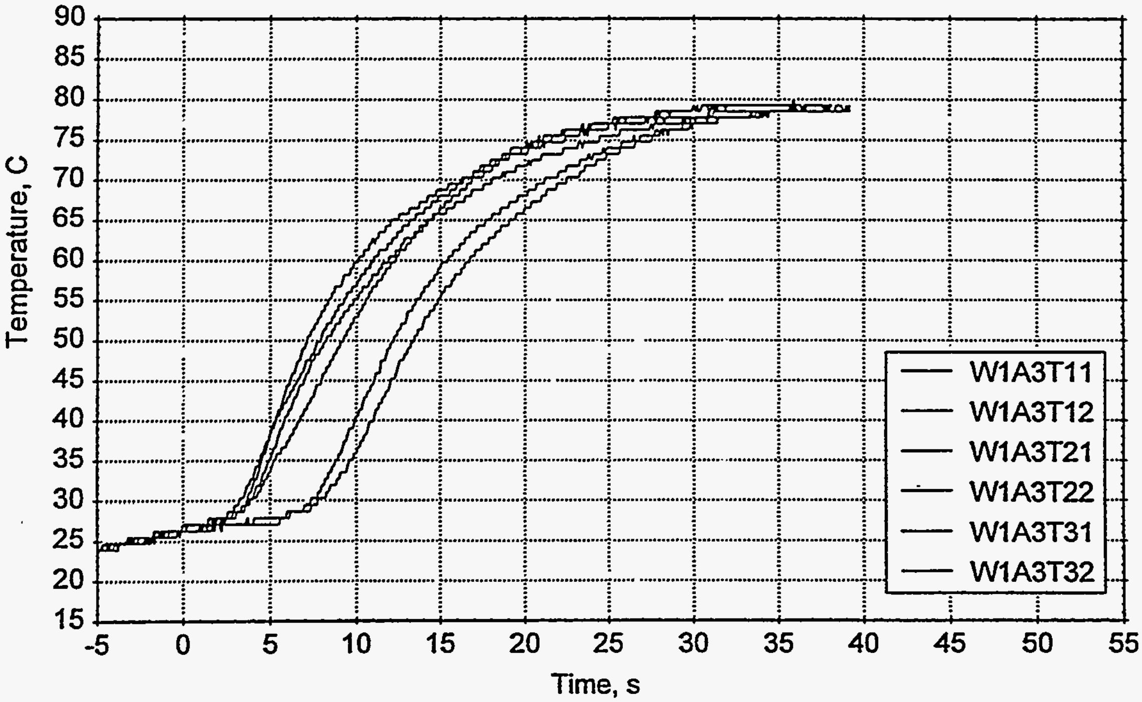

Figure E3. Furnish W1 (2P1), A platen, R felt, 35% sheet solids.

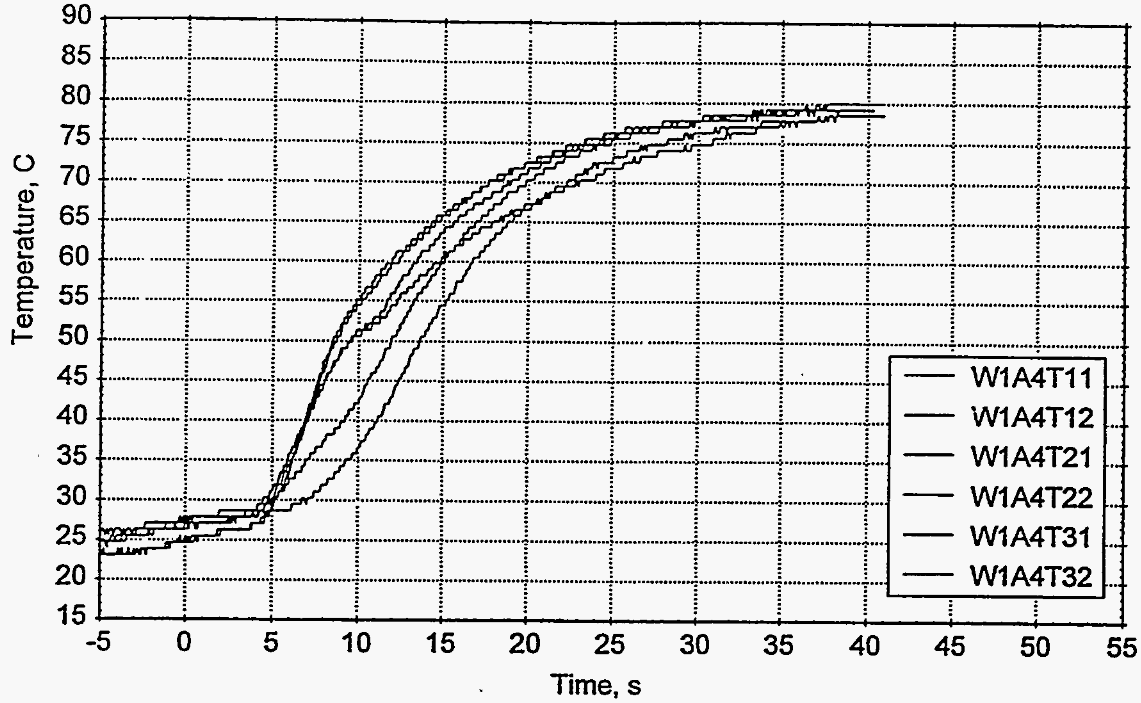

Figure E4. Furnish W1 (2P1), A platen, R felt, 42% sheet solids.

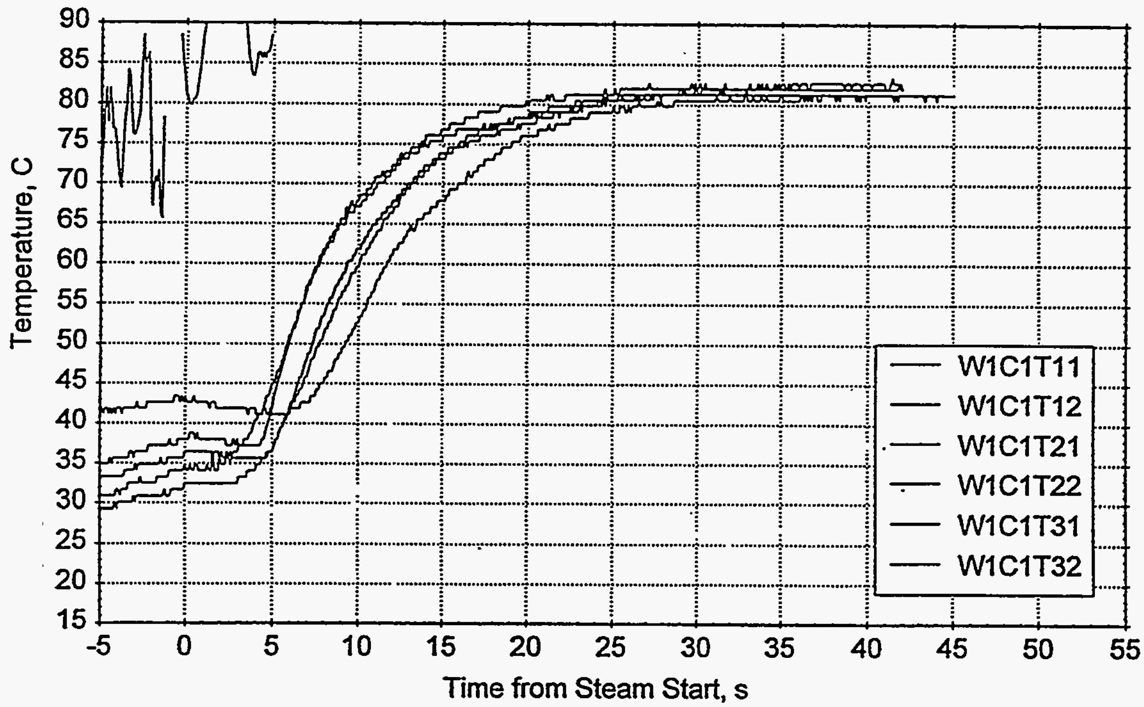

Figure E5. Furnish W1 (2P1), C platen, B felt, 35% sheet solids.

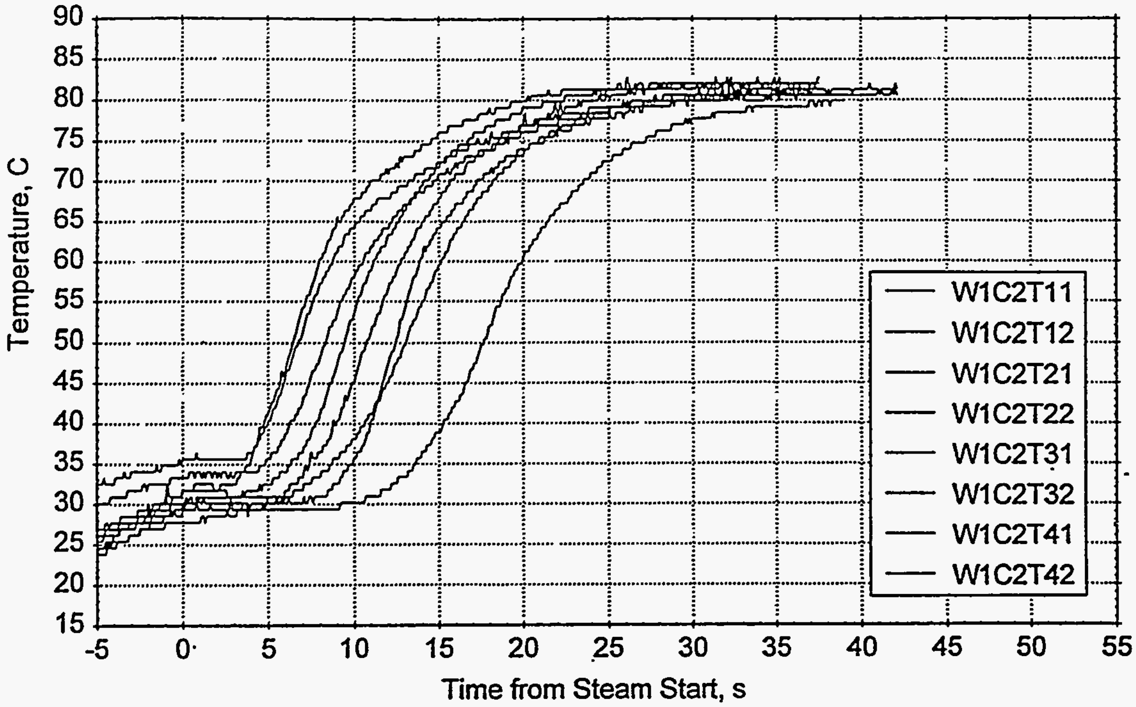

Figure E6. Furnish W1 (2P1), C platen, B felt, 42% sheet solids.

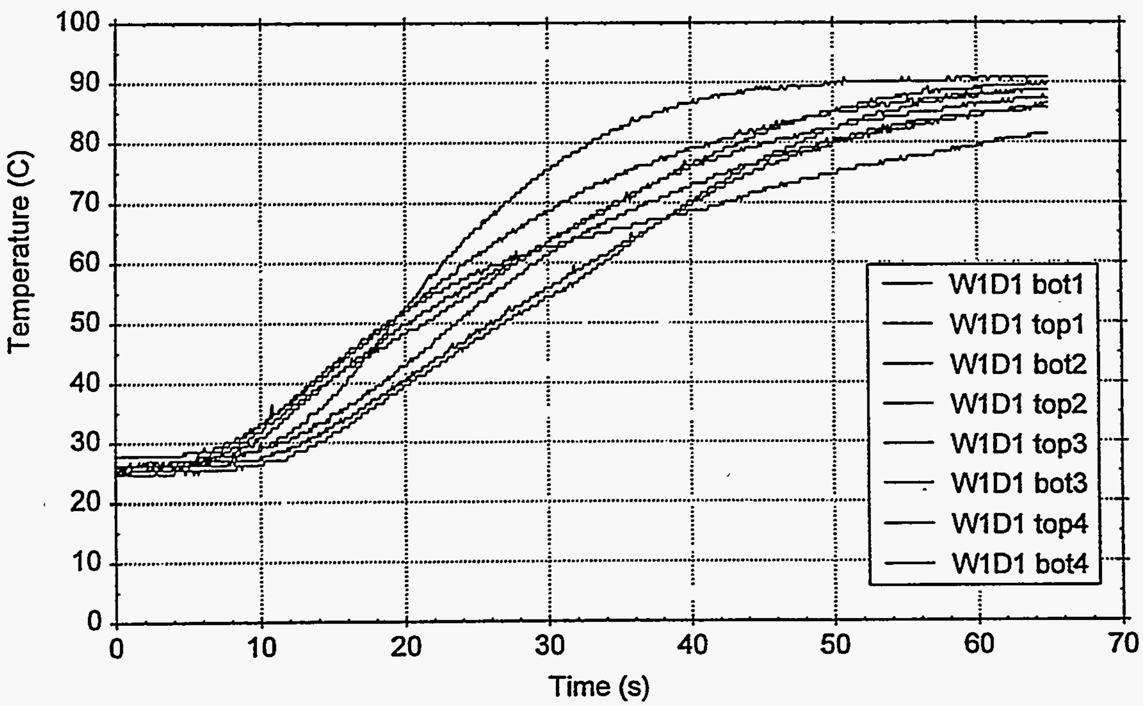

Figure E7. Furnish W1 (2P1), double-felted pressing, B felt, 35% sheet solids.

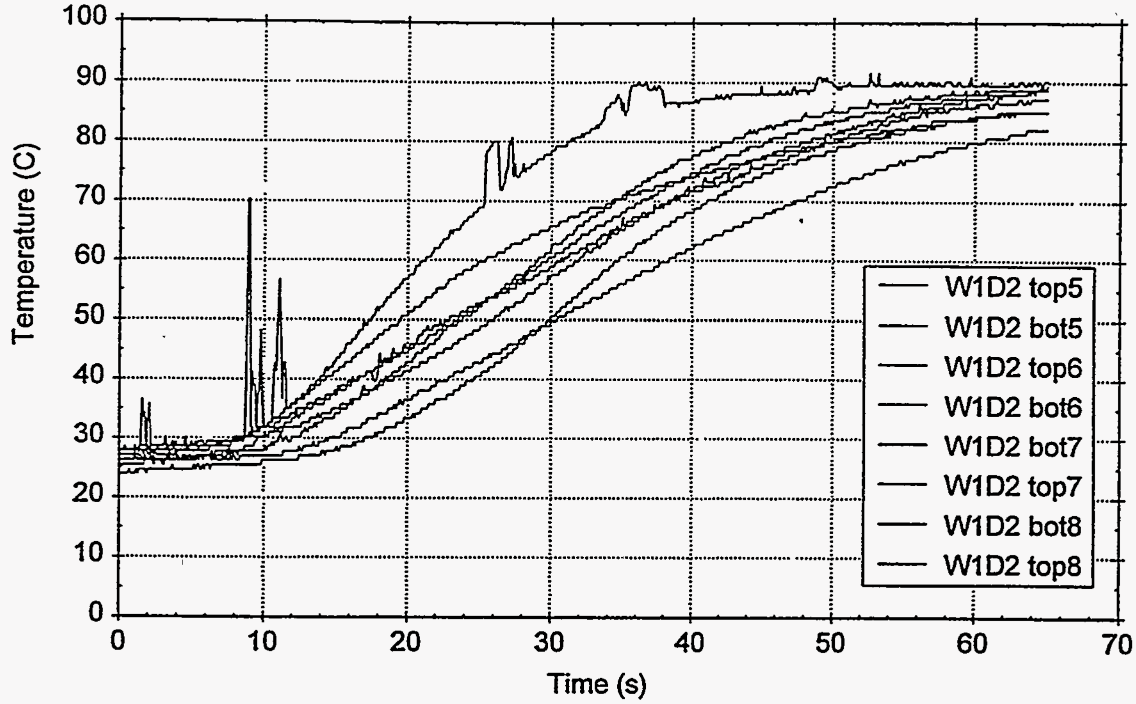

Figure E8. Furnish W1 (2P1), double-felted pressing, B felt, 42% sheet solids.

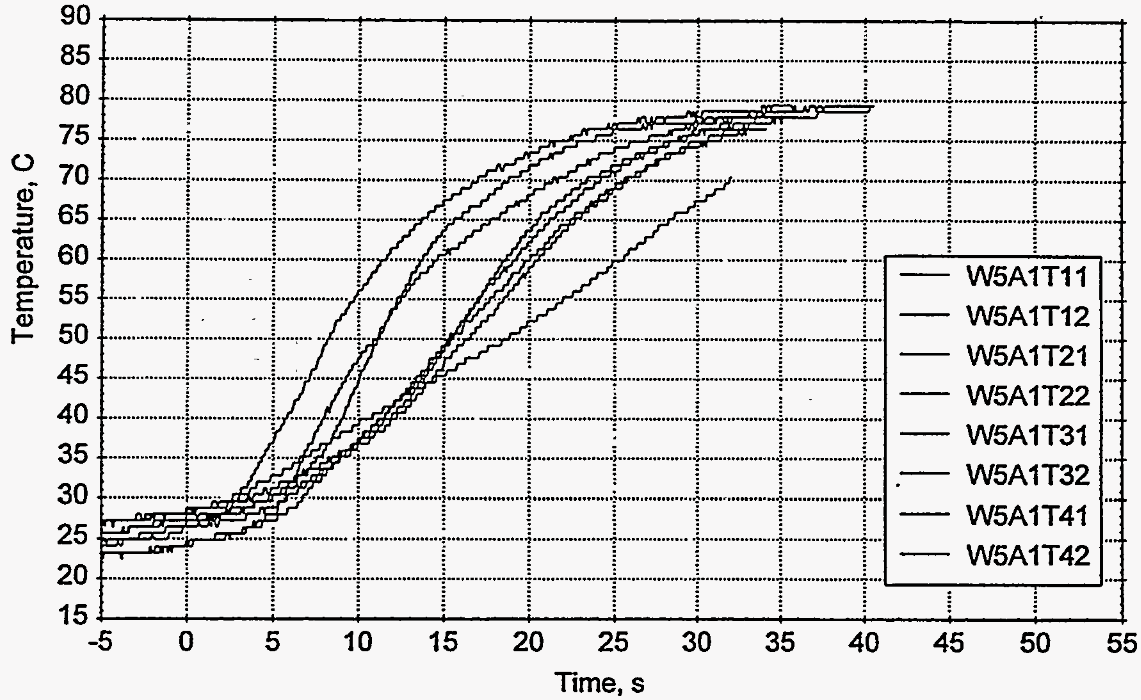

Figure E9. Furnish W5 (2P3), A platen, B felt, 35% sheet solids.

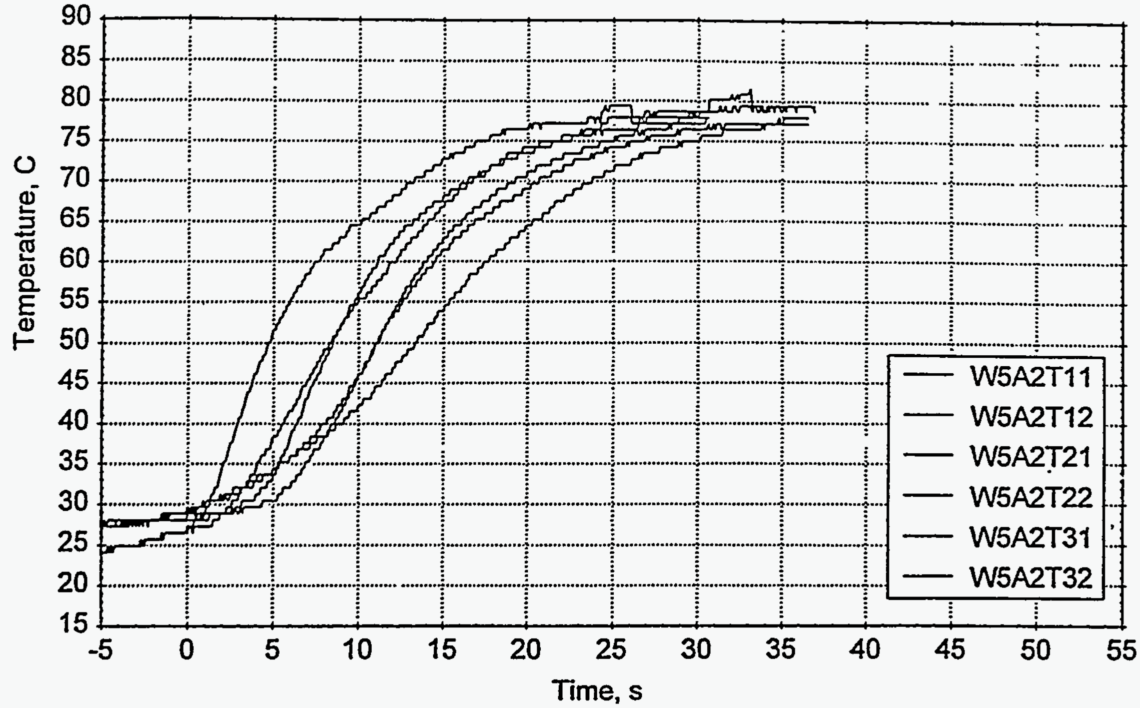

Figure E10. Furnish W5 (2P3), A platen, B felt, 42% sheet solids.

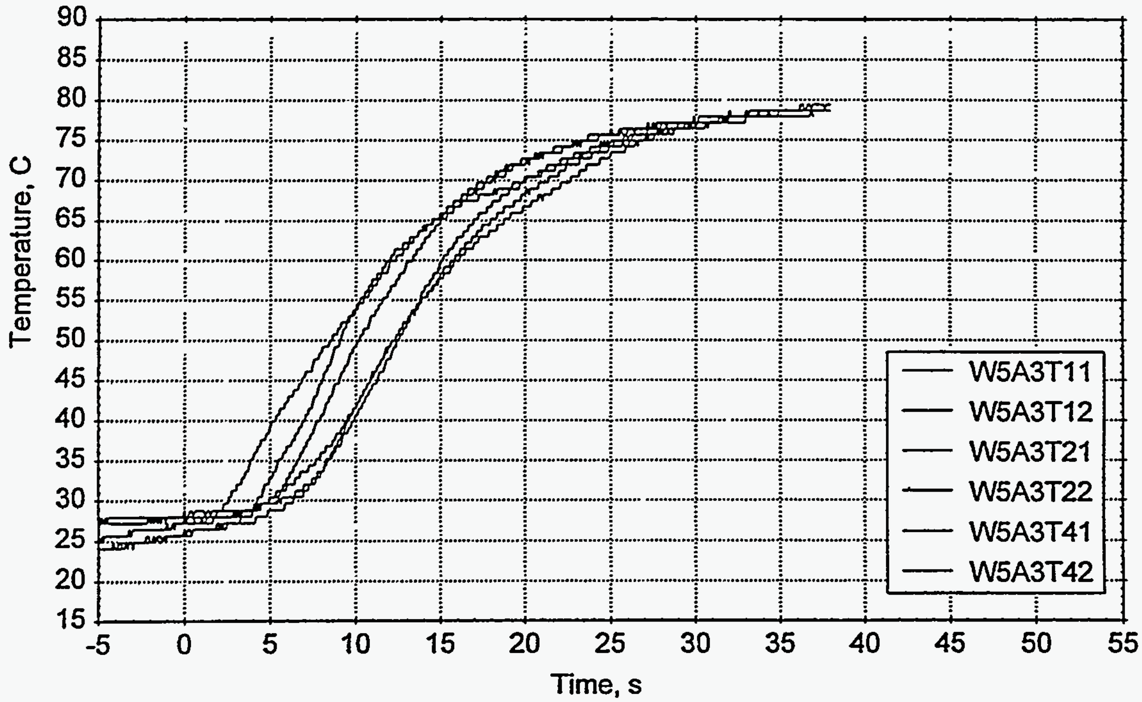

Figure E11. Furnish W5 (2P3), A platen, R felt, 35% sheet solids.

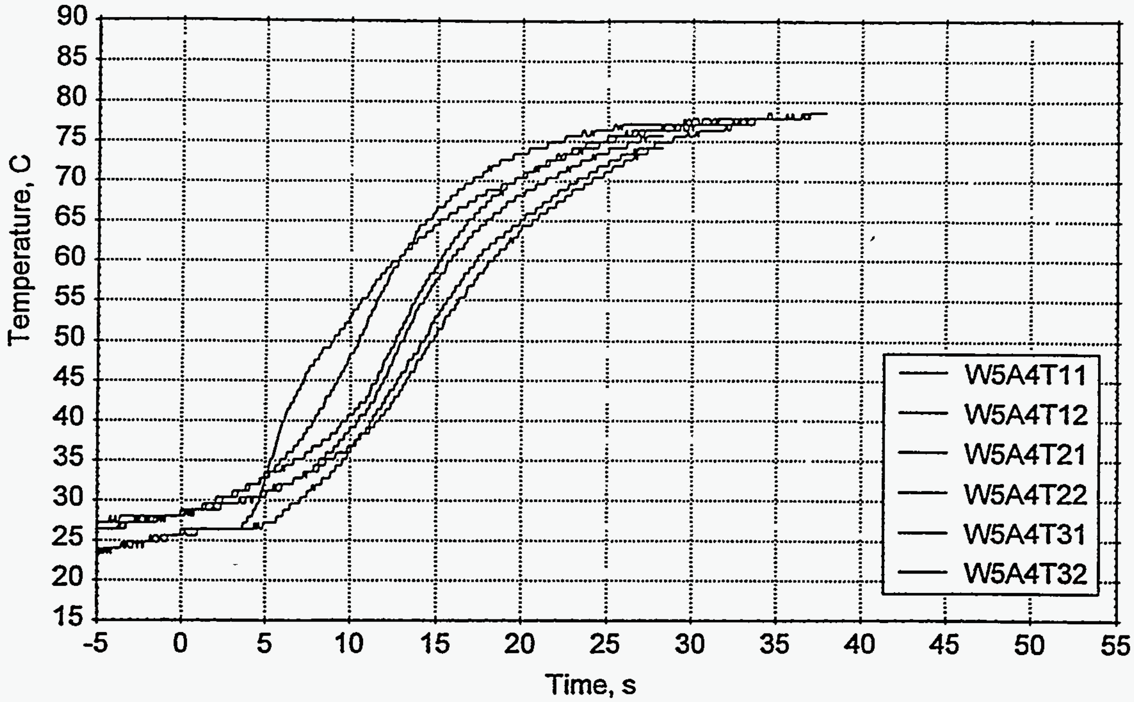

Figure E12. Furnish W5 (2P3), A platen, R felt, 42% sheet solids.

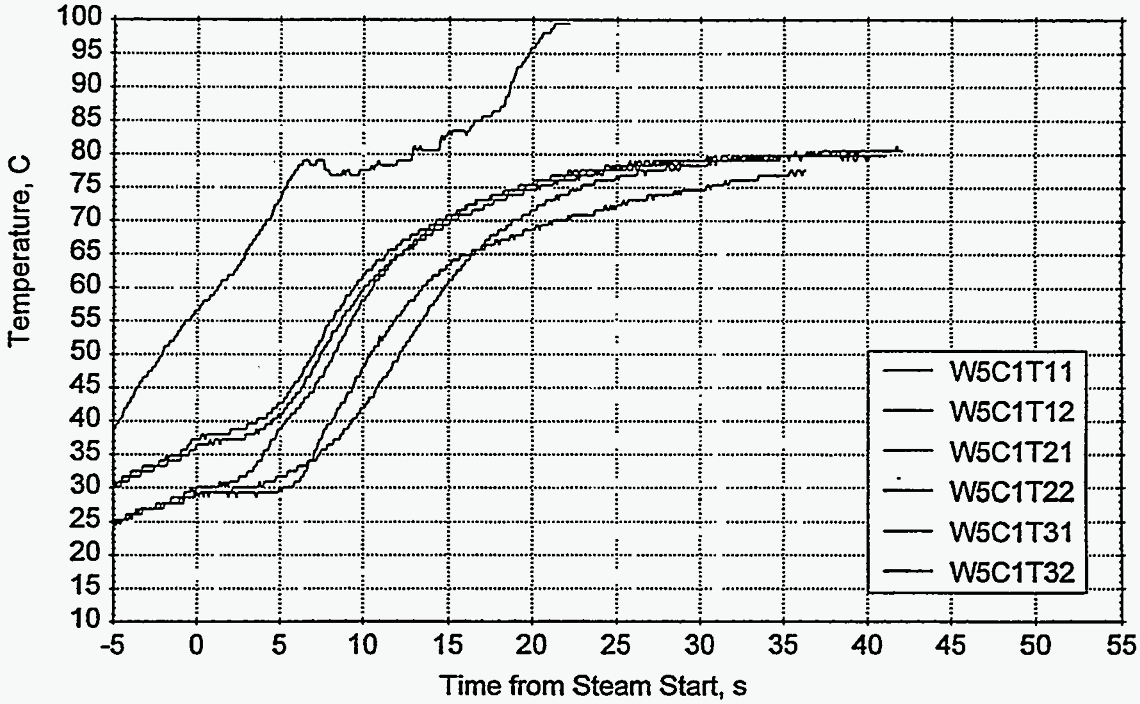

Figure E13. Furnish W5 (2P3), C platen, B felt, 35% sheet solids.

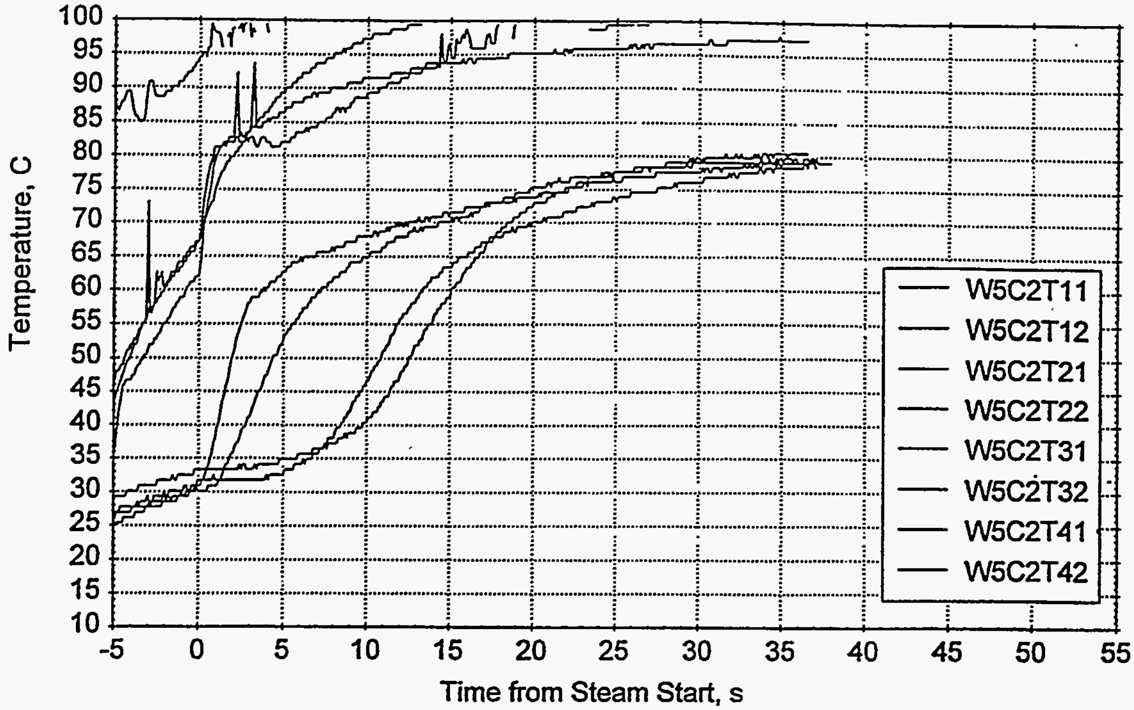

Figure E14. Furnish W5 (2P3), C platen, B felt, 42% sheet solids.

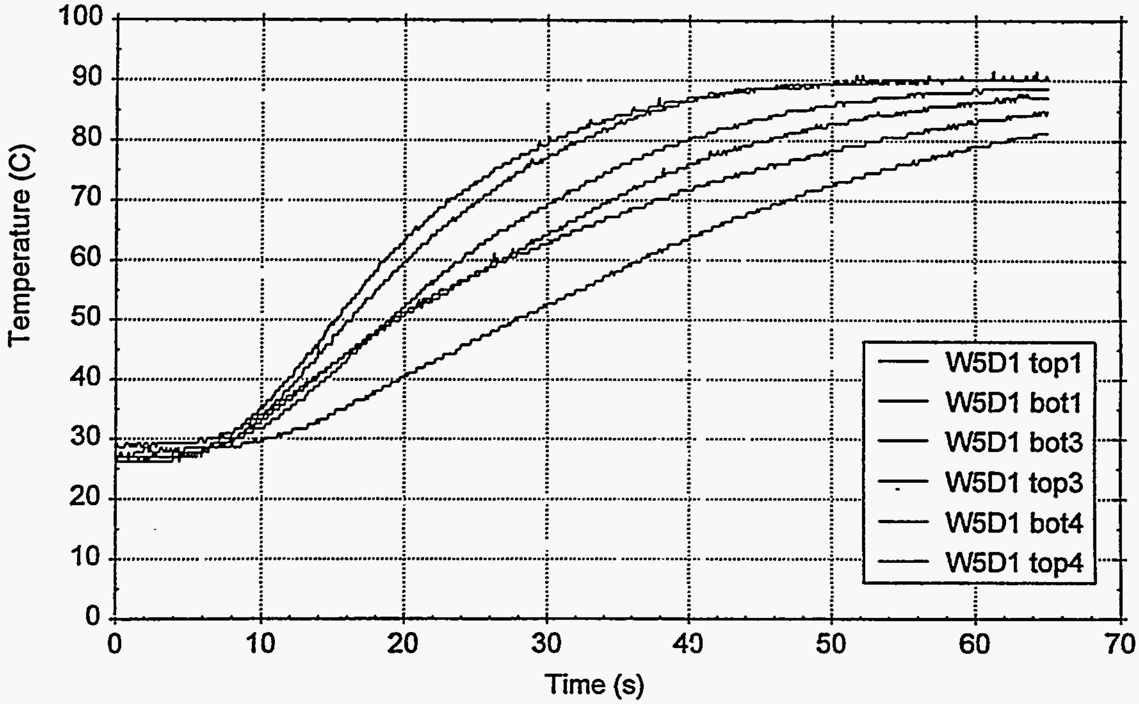

Figure E15. Furnish W5 (2P3), double-felted pressing, B felt, 35% sheet solids.

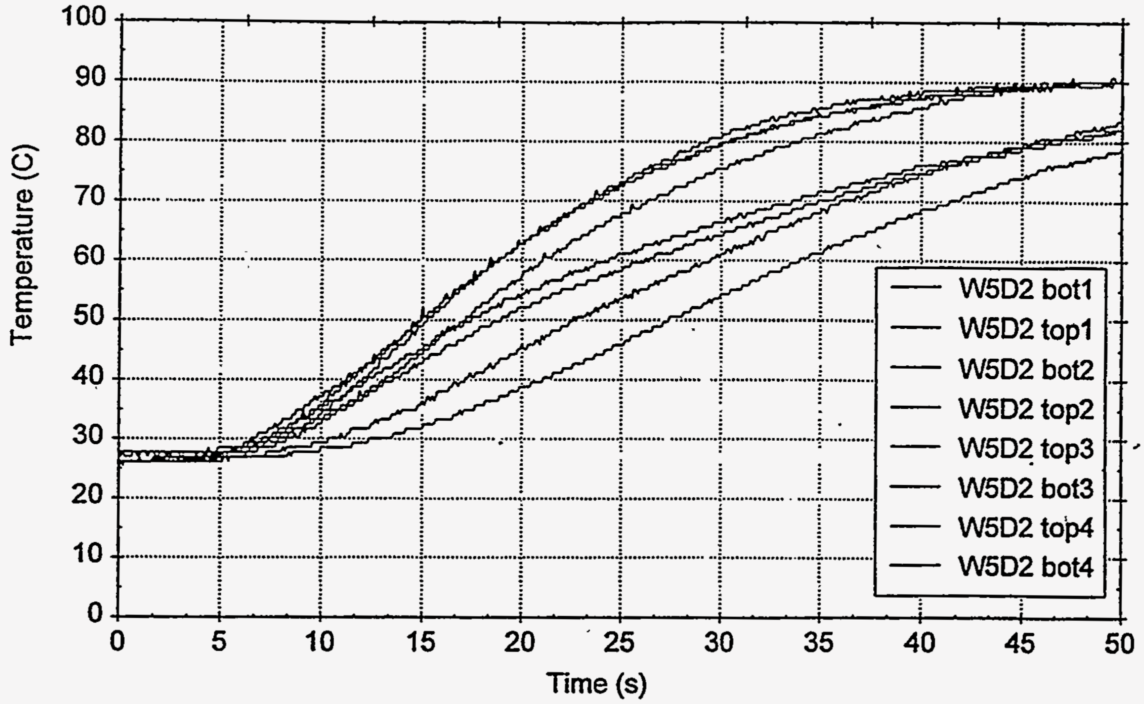

Figure E16. Furnish W5 (2P3), double-felted pressing, B felt, 42% sheet solids.

DOE/CE/40738--T12

USDOE

HIGH-INTENSITY DRYING PROCESS - IMPULSE DRYING

PROGRESS REPORT ON FURNISH EVALUATIONS FOR IMPULSE DRYING COMMERCIALIZATION DEMONSTRATION