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Project 761 Part III

Effect of Yarn Count and Stitch Length on the Physical and Dimensional Properties of 28G Plain Single-Jersey Fabric

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Contents

Introduction

Part III of Project 761 looks at the effect of yarn count and stitch length on 28G single jersey fabrics, (for Parts I and II see *RR 64 and 85*), and completes the individual analysis of the results of the single jersey investigation. Part IV, which will follow shortly, will deal with the detailed comparisons between the different counts and gauges.

Knitting on 28G Camber Zoomnit

The knitting of the 28G fabrics was carried out by Treffor Davies, a student at Leeds University. The machine used was a 28G Camber Zoomnit, having a 26" diameter, 82 feeds and 2280 needles. Five stitch lengths for each of five yarn counts were used to produce a total of 25 fabrics.

The full experimental procedure can be found in the thesis, *The Relationship between Count and Gauge on Single-Jersey Machinery*, which is on file in the knitting department. However, tables 1 and 2 show the yarn testing results and fabric specifications on machine.

All the yarns were purchased from Carrington Viyella and tested at Leeds University. The yarn test data are in *Table 1*; *Table 2* shows the on-machine measurements that were made during knitting.

Test Methods

The following tests were carried out on all the 28G fabrics greige (as received) and after relaxation by five wash and tumble dry cycles. In all cases, the measurements taken after relaxation were distributed evenly over the five replications to ensure a good representation of the sample.

The test methods used were those detailed in *IIC Methods of Test for Cotton Weft Knitted Fabrics*, May 1978.

Dimensional Stability	IIC Method KT1A	May 1978
Spirality	IIC Method KT2	May 1978
Stitch Length	IIC Method KT3	May 1978
Weight	IIC Method KT4B	May 1978
Burst Strength	IIC Method KT5	May 1978
Courses and Wales	IIC Method KT6	May 1978

Results

The results of all the tests carried out on the 28G fabrics are detailed in *Table 3*. Additional *Tables* either act as comparison charts or show the results of calculations made using the original test data and copies of the original TRD Test Sheets are given in the Appendix. For easier visual assessment the majority of the results have been translated onto graphs as *Figures 1-9*.

As discussed in Part II (*RR 85*) certain discrepancies between the results obtained by calculating shrinkage from before- and after-wash course/wale measurements, and shrinkage measured by the shrinkage test, have illustrated the effect that changes in spirality can have on these measurements. However, in keeping with Parts I and II (*RR 64 and 85*) the results are once again presented as tested. No corrections have been made to account for spirality and the course/wale measurements are allowed to stand as representing the "true" dimensions of the fabrics.

Graphs showing spirality and changes in courses and wales are however included and any discrepancies noted.

The discussion of the results is again limited to the gauge of machine under consideration with only brief references to the findings of the previous trials. A full and detailed comparison of the results from all three gauges of machine will be carried out in the concluding Part IV of this investigation.

Discussion

Shrinkage

Figure 1 shows length and width shrinkage plotted against stitch length for each yarn count. As stitch length is increased, length shrinkage increases and width shrinkage decreases. Conversely, as stitch length is decreased length shrinkage decreases and width shrinkage increases. This trend is again similar to previous findings, although it is interesting to note that for every yarn count on 28G, unlike the 18G and 24G results, the cross-over point, i.e. the point at which length and width shrinkage are equal, is very close to the smallest stitch length that could be easily knitted, and falls between stitch lengths of 0.27 and 0.23 cm.

Spirality

Figure 2 show the angle of spirality before and after relaxation plotted against stitch length for each yarn count.

As stitch length is increased, the angle of spirality increases, as does the change in the angle brought about by relaxation. The changes in spirality angles due to relaxation are shown in *Table 4*.

Figure 2 shows the effect of yarn count on the angle of spirality. At the same stitch length, yarns of a coarser count develop a lower angle of spirality after relaxation than yarns of a finer count. In other words, as tightness factor increases, spirality decreases. *Figure 3* shows relaxed spirality angles against tightness factor. The relationship has a linear correlation coefficient of -0.9927 ($R^2 = 0.985$).

Courses and Wales

Figure 4 shows measured relaxed courses and wales plotted against stitch length and *Table 5* gives both the grey and the relaxed stitch densities. As stitch length is increased, the change in wales (i.e. width shrinkage) decreases and the change in courses (i.e. length shrinkage) increases.

This confirms the general trends illustrated by the shrinkage results in *Figure 1* but, as in Part II, there are discrepancies. For example, at the longest loop length, the change in wales indicates a shrinkage (since there are more wales after wash than before), but the results obtained from the shrinkage test indicate a considerable amount of extension (negative

shrinkage in these data). *Figure 5* also shows the shrinkage calculated from the changes in courses and wales (*Table 5*), using the formula

$$Shrinkage\ \% \ = \ 100(1 - G/W)$$

where G = greige measurements and W = after-wash measurements.

If these are compared with the measured shrinkage values in *Figure 1* and *Table 5*, the differences are clear. In the width direction shrinkage calculated from wales is always greater than that measured in the shrinkage test and the discrepancies increase as stitch length is increased.

In the length direction, generally the shrinkage calculated from the change in courses is less than predicted from the shrinkage test, although discrepancies are small and vary in degree depending on the yarn count.

The high degree of spirality in these fabrics almost certainly accounts for the differences in width shrinkage but, at this stage, it is not clear whether spirality accounts for the discrepancies in length shrinkage or whether they are due entirely to random variation in the fabrics.

Weight

Table 6 gives the measurements of weight per unit area before and after relaxation, together with the percentage change brought about by the relaxation process. *Figure 6* shows the fabric weight, before and after relaxation, plotted against stitch length for each yarn count.

At the longest stitch lengths the fabric is lighter and at the smallest stitch lengths it is heavier. Similarly to the 18G results the percentage increase in fabric weight over the range of stitch lengths for a given count is reasonably constant although there is a tendency for the increase to be slightly higher at longer loop lengths. This is more noticeable with the finer yarns. *Figure 6* illustrates the possible combinations of yarn count and stitch length that may be used to arrive at a given relaxed weight.

Burst Strength

Figure 7 shows relaxed fabric burst strength plotted against stitch length for all yarn counts. As stitch length is increased fabric burst strength is reduced for a given yarn count, but coarser counts at the same stitch length give a higher burst strength. *Table 7* gives fabric burst strength results before and after relaxation. Generally speaking, there is no conclusive evidence to suggest that fabric strength either increases or decreases after relaxation. In the main, the spread of the results round the mean (see *Appendix* for 95% confidence limits) could account for the differences.

Figure 8 illustrates the relationship between fabric weight and burst strength after relaxation, and indicates that as the fabric becomes heavier it also becomes stronger. This agrees with the findings of the 18G investigation.

Fabric Width

Table 8 shows fabric width (fully opened) calculated from measured wales/cm before and after wash. *Figure 9* shows relaxed fabric width plotted against tightness factor (*sqrt(tex) / St.Len*) and illustrates once again the available combinations of count and stitch length to arrive at a given relaxed width. It also emphasises the possible dangers if fabric construction is not taken into account during finishing. As tightness factor is increased, fabric width decreases for each yarn count but, at the same tightness factor, the coarser yarns give a wider fabric.

Conclusions

The main trends illustrated by the results of the 28G fabric testing confirm those already documented in Parts I and II. It now only remains for the detailed comparisons to be carried out to determine whether or not there is a count/gauge relationship for cotton yarns on single-jersey machinery.

This comparison will be reported in Part IV of this series.

Table 1: Yarn Test Results

Yarn Count		Twist Factor	Single-end Strength		Ext. at Break, %	Friction against steel
Ne	tex		g	g/tex		
1/28	21.7	3.5	264	12.2	7.7	0.11
1/30	19.7	3.3	238	12.1	7.5	0.11
1/34	17.4	3.5	206	11.8	7.0	0.11
1/38	15.5	3.5	172	11.1	6.3	0.11
1/40	14.8	3.3	158	10.7	6.8	0.12

All yarns were tested at Leeds University

Table 2: Fabric Specifications On-machine

Sample	Stitch Length, cm	Tightness Factor	CPI
SJ28/430	0.43	10.8	18
SJ28/390	0.39	11.9	18
SJ28/350	0.35	13.3	22
SJ28/310	0.31	15.0	28
SJ28/270	0.27	17.2	41
SJ30/450	0.45	9.9	18
SJ30/400	0.40	11.1	18
SJ30/350	0.35	12.7	23
SJ30/300	0.30	14.8	28
SJ30/260	0.26	17.1	42
SJ34/470	0.47	8.9	17
SJ34/420	0.42	9.9	18
SJ34/370	0.37	11.3	22
SJ34/310	0.31	13.4	27
SJ34/260	0.26	16.0	42
SJ38/470	0.47	8.4	17
SJ38/420	0.42	9.4	18
SJ38/370	0.37	10.6	22
SJ38/310	0.31	12.7	28
SJ38/260	0.26	15.1	42
SJ40/470	0.47	8.2	17
SJ40/420	0.42	9.1	17
SJ40/370	0.37	10.3	22
SJ40/310	0.31	12.3	28
SJ40/260	0.26	14.8	42

Table 3: Fabric Test Data

Sample	Shrinkage %		Weight, gsm		Courses /3cm		Wales /3cm		Stitch length, mm		Burst Str, KN/sqm		Spirality angle, deg	
	Length	Width	BW	AW	BW	AW	BW	AW	BW	AW	BW	AW	BW	AW
SJ28/430	40.30	-26.76	93.20	132.80	24.60	39.53	35.60	38.50	4.36	4.25	434.60	390.52	13.26	46.08
SJ28/390	36.04	-12.48	108.60	153.00	28.50	44.49	36.10	39.13	3.98	3.79	431.20	447.75	14.04	42.34
SJ28/350	30.10	0.25	118.80	165.00	33.90	46.69	37.30	41.50	3.50	3.49	498.10	482.91	11.22	33.90
SJ28/310	23.33	8.66	126.20	181.40	43.50	54.09	38.30	43.46	3.12	3.10	549.80	497.40	9.38	25.40
SJ28/270	13.58	16.24	142.40	204.00	56.70	63.15	38.50	47.17	2.76	2.72	617.40	614.61	7.12	17.08
SJ30/450	38.55	-29.37	78.10	121.80	24.60	37.72	33.70	35.35	4.50	4.53	316.00	329.85	13.87	49.06
SJ30/400	36.31	-16.35	91.60	128.60	27.40	40.87	35.70	38.03	4.07	4.09	356.70	363.40	13.27	43.76
SJ30/350	29.65	-2.24	101.40	143.60	32.70	47.40	36.90	41.57	3.67	3.58	431.20	446.14	11.11	39.66
SJ30/300	24.90	9.95	117.00	163.60	42.80	54.96	37.30	44.02	3.13	3.10	469.80	464.99	8.14	27.04
SJ30/260	12.42	19.98	135.20	184.40	61.00	66.06	38.60	48.43	2.64	2.62	570.50	585.00	6.97	17.18
SJ34/470	34.44	-30.58	75.40	104.40	25.40	38.98	31.90	34.88	4.72	4.78	254.00	281.58	14.73	55.06
SJ34/420	35.01	-21.00	81.40	114.00	25.60	39.92	36.10	39.69	4.16	4.19	291.20	336.10	12.79	47.84
SJ34/370	33.23	-6.72	101.00	129.20	31.30	45.35	37.20	41.57	3.64	3.59	326.40	370.53	11.40	42.16
SJ34/310	24.49	9.16	103.00	143.60	40.70	53.39	37.40	44.33	3.14	3.10	360.90	407.53	10.01	32.24
SJ34/260	14.46	19.13	118.20	164.80	57.90	63.39	38.70	48.82	2.64	2.59	453.30	473.95	7.62	21.50
SJ38/470	38.46	-32.83	66.70	100.80	24.70	35.59	32.40	35.43	4.78	4.66	211.20	246.19	15.13	54.02
SJ38/420	40.68	-30.32	69.00	110.40	25.70	38.35	36.60	41.73	4.23	4.22	251.90	272.39	13.76	52.66
SJ38/370	34.18	-7.88	82.80	119.00	30.20	44.49	37.60	45.67	3.63	3.55	305.00	312.38	13.89	43.46
SJ38/310	25.58	8.18	87.40	134.60	42.10	52.28	38.00	47.32	3.13	3.03	342.90	357.43	11.88	37.26
SJ38/260	14.67	19.97	107.20	153.00	56.10	64.65	33.80	51.10	2.64	2.58	405.00	390.05	9.74	26.94
SJ40/470	40.03	-45.65	60.60	98.50	25.10	37.95	33.30	35.04	4.69	4.84	225.00	232.40	17.65	56.00
SJ40/420	39.52	-27.56	65.80	105.40	26.50	42.60	36.10	42.52	4.18	4.29	208.50	238.83	15.81	52.52
SJ40/370	33.62	-8.96	76.20	118.80	31.90	46.77	38.20	44.80	3.56	3.64	263.00	288.94	13.81	46.32
SJ40/310	24.61	8.35	91.80	129.00	42.10	53.78	37.80	49.29	3.10	3.20	305.70	322.95	11.37	37.82
SJ40/260	16.62	20.06	101.40	149.80	55.80	63.23	39.20	51.50	2.65	2.65	366.40	375.81	9.57	27.66

NB: Negative shrinkage indicates an extension

Table 4: Tightness factor and Spirality

Sample	Yarn	Stitch length mm		Spirality angle deg		Tightness Factor	
	tex	BW	AW	BW	AW	BW	AW
SJ28/430	21.7	4.36	4.25	13.26	46.08	10.68	10.96
SJ28/390	21.7	3.98	3.79	14.04	42.34	11.70	12.29
SJ28/350	21.7	3.50	3.49	11.22	33.90	13.31	13.35
SJ28/310	21.7	3.12	3.10	9.38	25.40	14.93	15.03
SJ28/270	21.7	2.76	2.72	7.12	17.08	16.88	17.13
SJ30/450	19.7	4.50	4.53	13.87	49.06	9.86	9.80
SJ30/400	19.7	4.07	4.09	13.27	43.76	10.91	10.85
SJ30/350	19.7	3.67	3.58	11.11	39.66	12.09	12.40
SJ30/300	19.7	3.13	3.10	8.14	27.04	14.18	14.32
SJ30/260	19.7	2.64	2.62	6.97	17.18	16.81	16.94
SJ34/470	17.4	4.72	4.78	14.73	55.06	8.84	8.73
SJ34/420	17.4	4.16	4.19	12.79	47.84	10.03	9.96
SJ34/370	17.4	3.64	3.59	11.40	42.16	11.46	11.62
SJ34/310	17.4	3.14	3.10	10.01	32.24	13.28	13.46
SJ34/260	17.4	2.64	2.59	7.62	21.50	15.80	16.11
SJ38/470	15.5	4.78	4.66	15.13	54.02	8.24	8.45
SJ38/420	15.5	4.23	4.22	13.76	52.66	9.31	9.33
SJ38/370	15.5	3.63	3.55	13.89	43.46	10.85	11.09
SJ38/310	15.5	3.13	3.03	11.88	37.26	12.58	12.99
SJ38/260	15.5	2.64	2.58	9.74	26.94	14.91	15.26
SJ40/470	14.8	4.69	4.84	17.65	56.00	8.20	7.95
SJ34/420	14.8	4.18	4.29	15.81	52.52	9.20	8.97
SJ40/370	14.8	3.56	3.64	13.81	46.32	10.81	10.57
SJ40/310	14.8	3.10	3.20	11.37	37.82	12.41	12.02
SJ40/260	14.8	2.65	2.65	9.57	27.66	14.52	14.52

Table 5: Shrinkage Calculated from Courses & Wales

Shrinkage = 100 (1 - BW/AW)

Sample	Meas. Shrinkage %		Courses /3cm		Wales /3cm		Calc. Shrinkage %	
	Length	Width	BW	AW	BW	AW	Length	Width
SJ28/430	40.30	**-26.76**	24.60	39.53	35.60	38.50	37.77	7.53
SJ28/390	36.04	**-12.48**	28.50	44.49	36.10	39.13	35.94	7.74
SJ28/350	30.10	0.25	33.90	46.69	37.30	41.50	27.39	10.12
SJ28/310	23.33	8.66	43.50	54.09	38.30	43.46	19.58	11.87
SJ28/270	13.58	16.24	56.70	63.15	38.50	47.17	10.21	18.38
SJ30/450	38.55	**-29.37**	24.60	37.72	33.70	35.35	34.78	4.67
SJ30/400	36.31	**-16.35**	27.40	40.87	35.70	38.03	32.96	6.13
SJ30/350	29.65	**-2.24**	32.70	47.40	36.90	41.57	31.01	11.23
SJ30/300	24.90	9.95	42.80	54.96	37.30	44.02	22.13	15.27
SJ30/260	12.42	19.98	61.00	66.06	38.60	48.43	7.66	20.30
SJ34/470	34.44	**-30.58**	25.40	38.98	31.90	34.88	34.84	8.54
SJ34/420	35.01	**-21.00**	25.60	39.92	36.10	39.69	35.87	9.05
SJ34/370	33.23	**-6.72**	31.30	45.35	37.20	41.57	30.98	10.51
SJ34/310	24.49	9.16	40.70	53.39	37.40	44.33	23.77	15.63
SJ34/260	14.46	19.13	57.90	63.39	38.70	48.82	8.66	20.73
SJ38/470	38.46	**-32.83**	24.70	35.59	32.40	35.43	30.60	8.55
SJ38/420	40.68	**-30.32**	25.70	38.35	36.60	41.73	32.99	12.29
SJ38/370	34.18	**-7.88**	30.20	44.49	37.60	45.67	32.12	17.67
SJ38/310	25.58	8.18	42.10	52.28	38.00	47.32	19.47	19.70
SJ38/260	14.67	19.97	56.10	64.65	33.80	51.10	13.23	33.86
SJ40/470	40.03	**-45.65**	25.10	37.95	33.30	35.04	33.86	4.97
SJ40/420	39.52	**-27.56**	26.50	42.60	36.10	42.52	37.79	15.10
SJ40/370	33.62	**-8.96**	31.90	46.77	38.20	44.80	31.79	14.73
SJ40/310	24.61	8.35	42.10	53.78	37.80	49.29	21.72	23.31
SJ40/260	16.62	20.06	55.80	63.23	39.20	51.50	11.75	23.88

NB: Negative shrinkage indicates an extension

Table 6: Fabric Weight

Sample	Weight, gsm		
	BW	**AW**	**% Increase**
SJ28/430	93.20	132.80	42.49
SJ28/390	108.60	153.00	40.88
SJ28/350	118.80	165.00	38.89
SJ28/310	126.20	181.40	43.74
SJ28/270	142.40	204.00	43.26
SJ30/450	78.10	121.80	55.95
SJ30/400	91.60	128.60	40.39
SJ30/350	101.40	143.60	41.62
SJ30/300	117.00	163.60	39.83
SJ30/260	135.20	184.40	36.39
SJ34/470	75.40	104.40	38.46
SJ34/420	81.40	114.00	40.05
SJ34/370	101.00	129.20	27.92
SJ34/310	103.00	143.60	39.42
SJ34/260	118.20	164.80	39.42
SJ38/470	66.70	100.80	51.12
SJ38/420	69.00	110.40	60.00
SJ38/370	82.80	119.00	43.72
SJ38/310	87.40	134.60	54.00
SJ38/260	107.20	153.00	42.72
SJ40/470	60.60	98.50	62.54
SJ34/420	65.80	105.40	60.18
SJ40/370	76.20	118.80	55.91
SJ40/310	91.80	129.00	40.52
SJ40/260	101.40	149.80	47.73

Table 7: Fabric Bursting Strength

Sample	Burst Strength, KN/sqm		
	BW	AW	% Increase
SJ28/430	434.60	390.52	-10.14
SJ28/390	431.20	447.75	3.84
SJ28/350	498.10	482.91	-3.05
SJ28/310	549.80	497.40	-9.53
SJ28/270	617.40	614.61	-0.45
SJ30/450	316.00	329.85	4.38
SJ30/400	356.70	363.40	1.88
SJ30/350	431.20	446.14	3.46
SJ30/300	469.80	464.99	-1.02
SJ30/260	570.50	585.00	2.54
SJ34/470	254.00	281.58	10.86
SJ34/420	291.20	336.10	15.42
SJ34/370	326.40	370.53	13.52
SJ34/310	360.90	407.53	12.92
SJ34/260	453.30	473.95	4.56
SJ38/470	211.20	246.19	16.57
SJ38/420	251.90	272.39	8.13
SJ38/370	305.00	312.38	2.42
SJ38/310	342.90	357.43	4.24
SJ38/260	405.00	390.05	-3.69
SJ40/470	225.00	232.40	3.29
SJ34/420	208.50	238.83	14.55
SJ40/370	263.00	288.94	9.86
SJ40/310	305.70	322.95	5.64
SJ40/260	366.40	375.81	2.57

Table 8: Fabric Width Calculated from Measured Wales

Open Width, cm = No. Needles / Wales per cm

Sample	Wales /3cm		Calculated Width	
	BW	AW	BW	AW
SJ28/430	35.60	38.50	192.13	177.66
SJ28/390	36.10	39.13	189.47	174.80
SJ28/350	37.30	41.50	183.38	164.82
SJ28/310	38.30	43.46	178.59	157.39
SJ28/270	38.50	47.17	177.66	145.01
SJ30/450	33.70	35.35	202.97	193.49
SJ30/400	35.70	38.03	191.60	179.86
SJ30/350	36.90	41.57	185.37	164.54
SJ30/300	37.30	44.02	183.38	155.38
SJ30/260	38.60	48.43	177.20	141.23
SJ34/470	31.90	34.88	214.42	196.10
SJ34/420	36.10	39.69	189.47	172.34
SJ34/370	37.20	41.57	183.87	164.54
SJ34/310	37.40	44.33	182.89	154.30
SJ34/260	38.70	48.82	176.74	140.11
SJ38/470	32.40	35.43	211.11	193.06
SJ38/420	36.60	41.73	186.89	163.91
SJ38/370	37.60	45.67	181.91	149.77
SJ38/310	38.00	47.32	180.00	144.55
SJ38/260	33.80	51.10	202.37	133.86
SJ40/470	33.30	35.04	205.41	195.21
SJ34/420	36.10	42.52	189.47	160.87
SJ40/370	38.20	44.80	179.06	152.68
SJ40/310	37.80	49.29	180.95	138.77
SJ40/260	39.20	51.50	174.49	132.82

Figure 1: Shrinkage After 5 cycles Wash & Tumble Dry

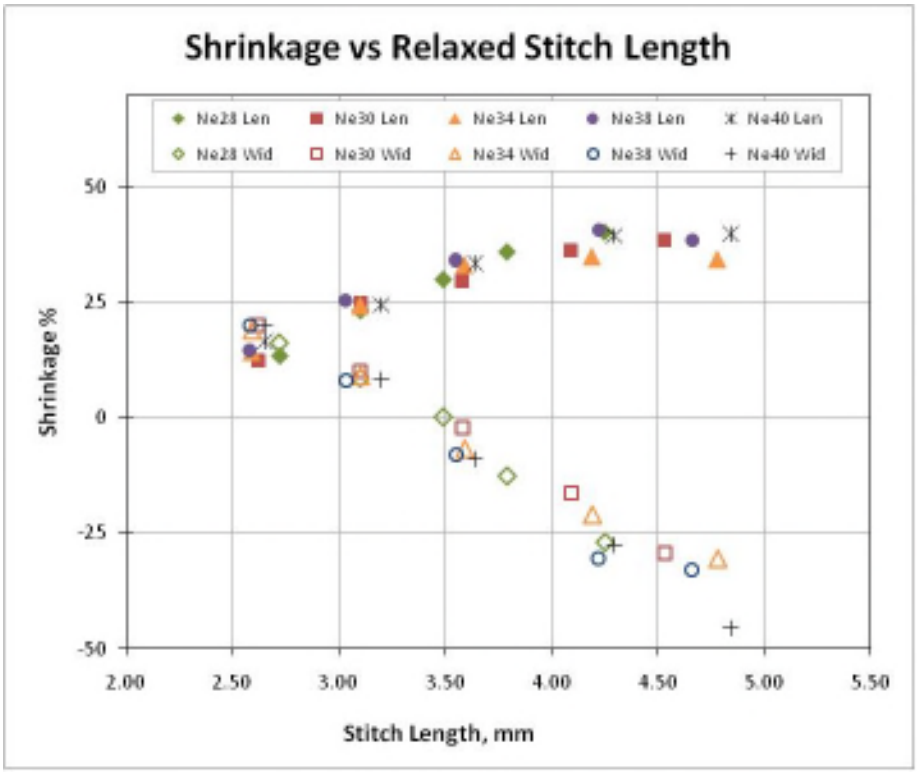


Figure 2: Spirality and Yarn Count

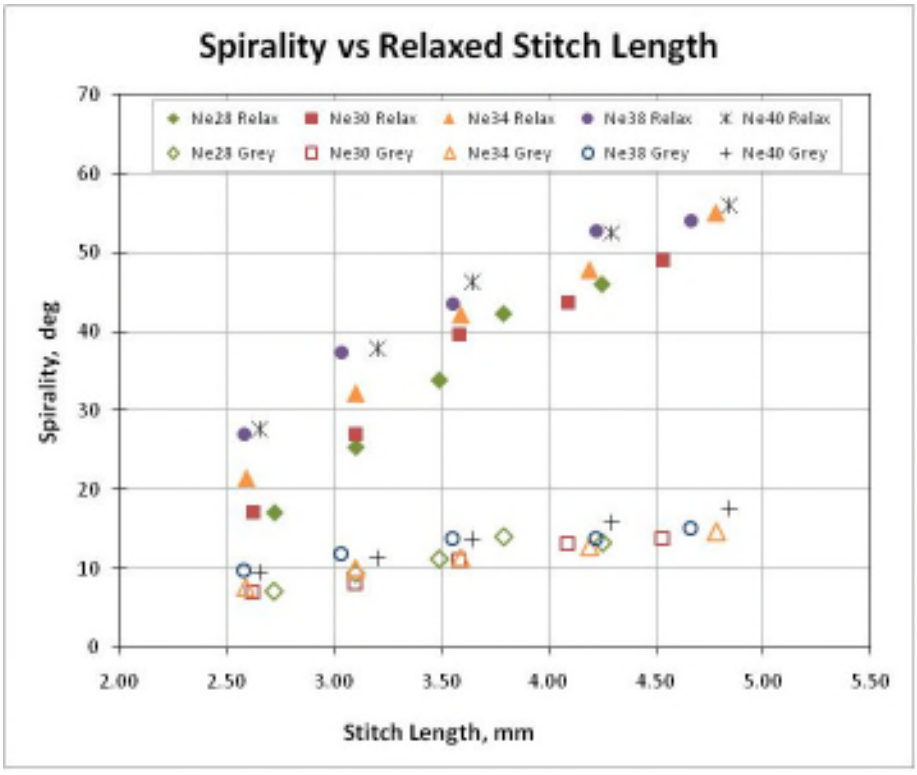


Figure 3: Spirality and Tightness factor

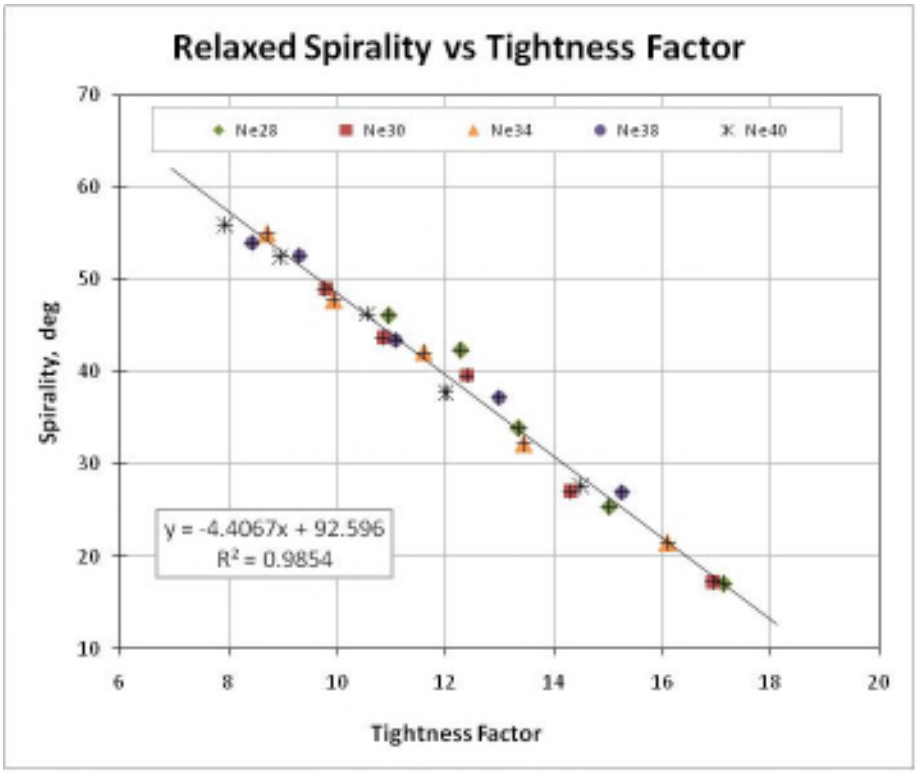


Figure 4: Courses and Wales

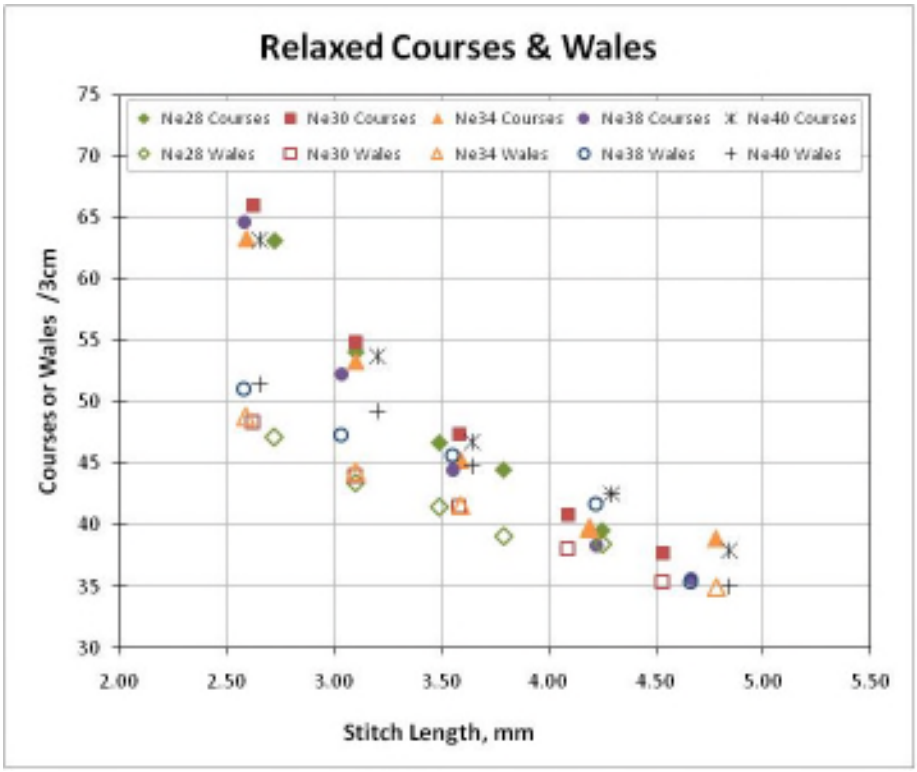


Figure 5: Calculated Shrinkage

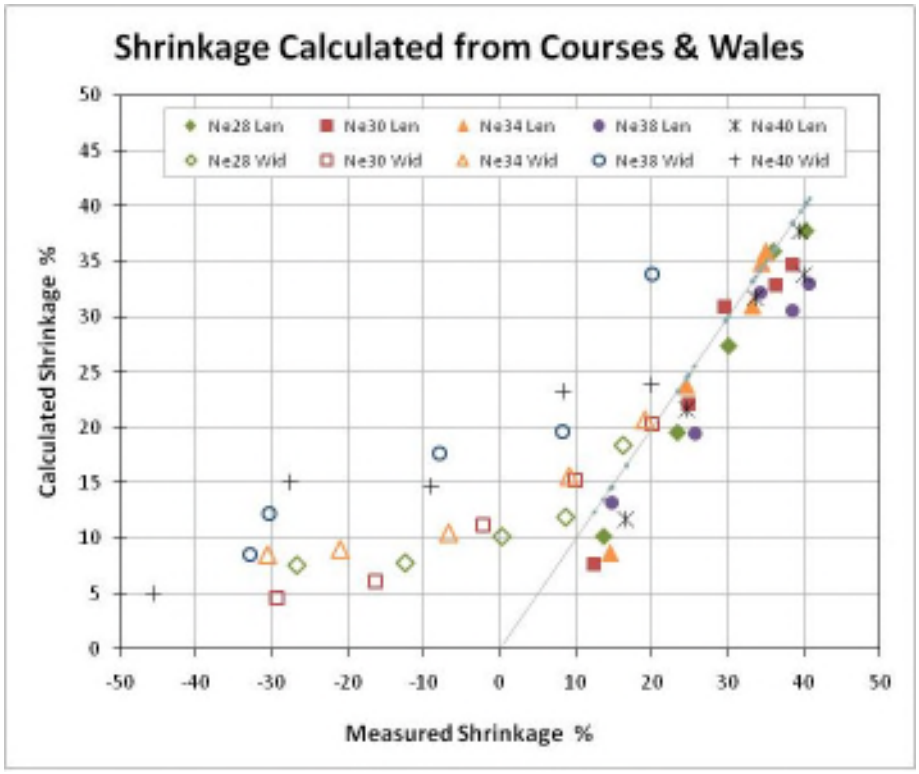


Figure 6: Fabric Weight per Unit Area

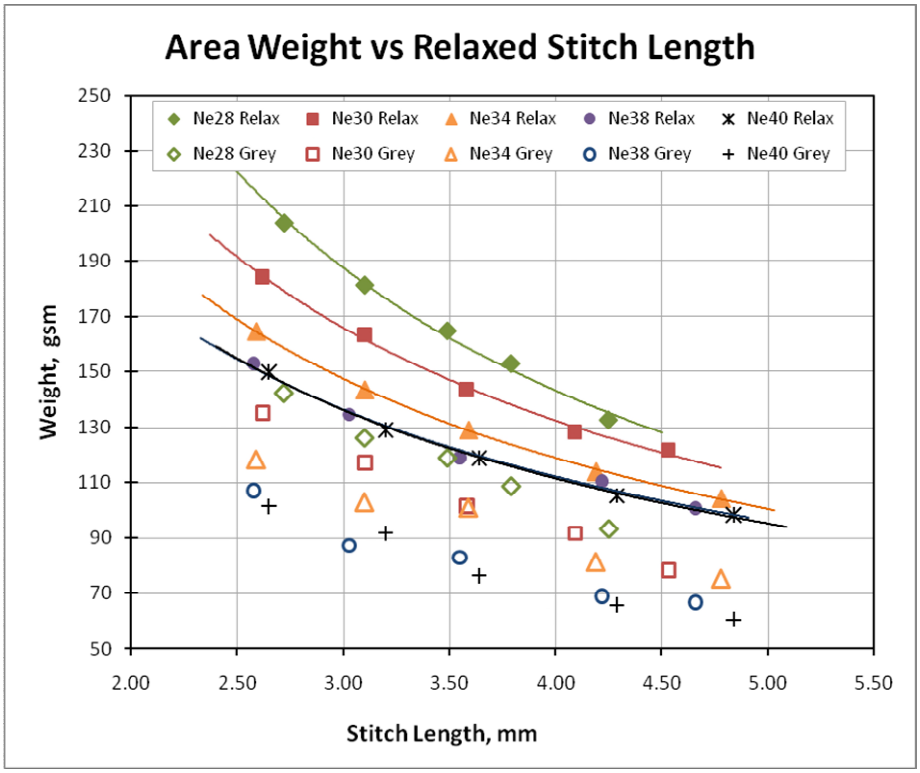


Figure 7: Fabric Bursting Strength

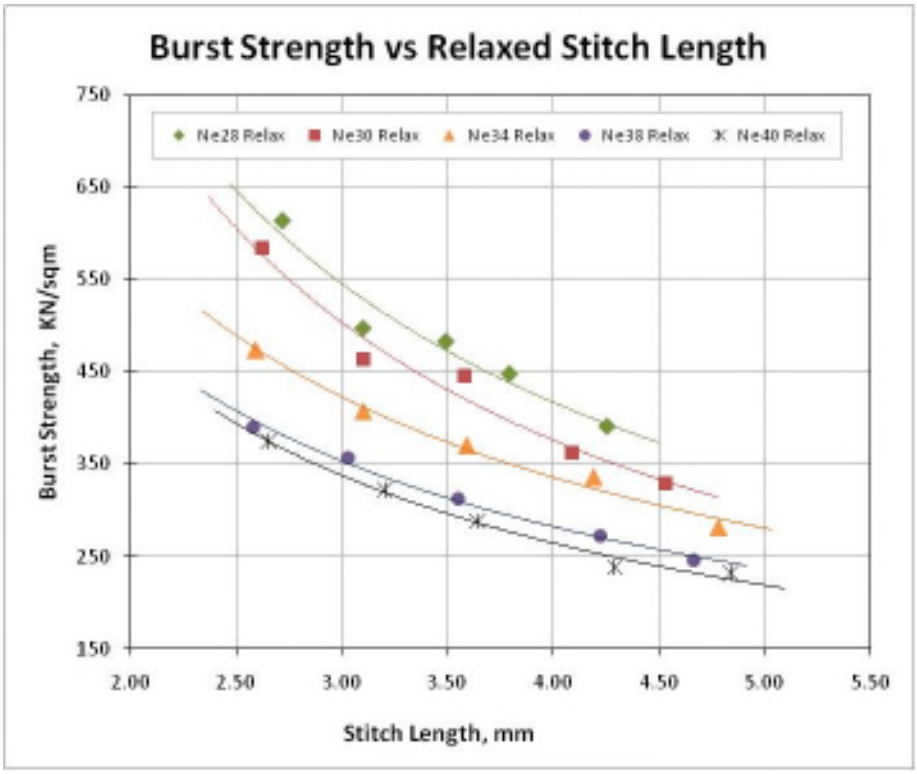


Figure 8: Bursting Strength and Area Weight

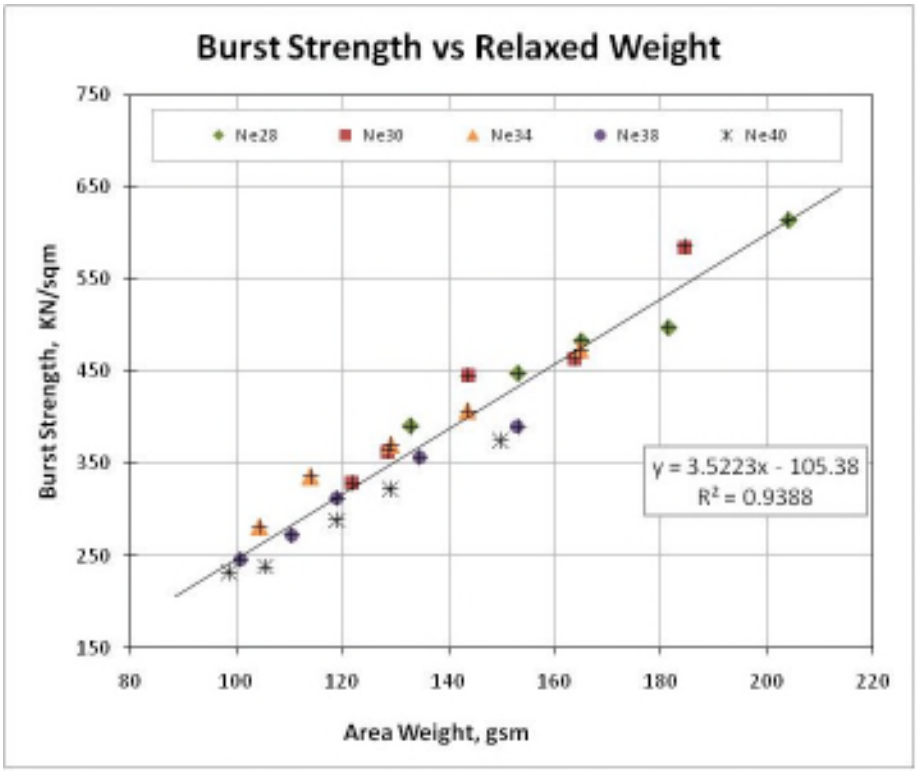
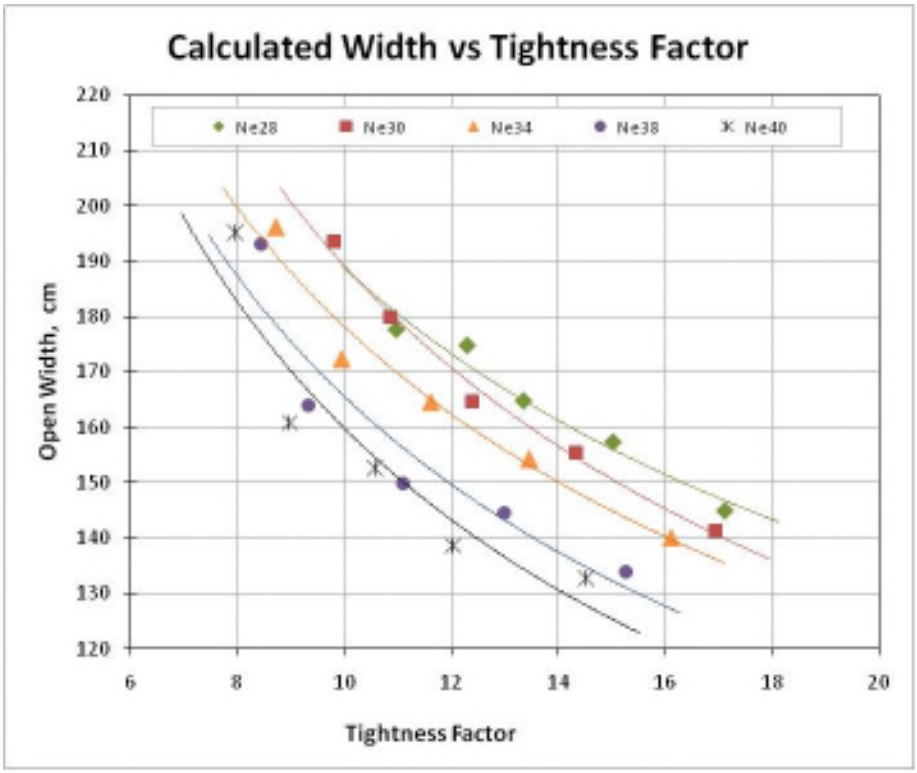


Figure 9: Open Width Calculated from Wale Density



Appendix: Original TRD Test Sheets.

INTERNATIONAL INSTITUTE FOR COTTON. KNITTING REF. LAB. REF. 607 SUBMITTED BY: JCS DATE:

TESTS REQUIRED		✓	1/28 cc SAMPLE 1	95%CL	2	95%CL	3	95%CL	4	95%CL	5	95%CL
% SHRINKAGE	length		40.30	2.83	36.04	1.68	30.10	1.43	23.33	1.19	13.58	1.19
	width		26.76 EXT	3.03	12.43 EXT	1.78	0.25	1.06	8.66	0.55	16.24	2.32
FABRIC WEIGHT gm/m²	BW		93.2	3.97	108.6	5.10	118.8	5.0	126.2	1.62	142.4	2.57
	AW		132.8	3.87	153.0	2.48	165.	1.96	181.4	4.54	204	15.48
C/3 CM	BW		24.6	0.74	28.5	0.74	33.9	1.09	43.5	1.07	56.7	0.34
	AW		39.53	1.12	44.49	0.69	46.69	0.56	54.09	0.74	63.15	1.17
W/3 CM	BW		35.6	0.29	36.1	0.44	37.3	1.06	38.3	0.42	38.5	0.64
	AW		38.5	2.17	39.13	1.68	41.5	1.23	43.46	0.65	47.17	0.20
STITCH LENGTH mm	BW		4.36	0.012	3.98	0.015	3.5	0.014	3.12	0.012	2.76	0.007
	AW		4.25	0.017	3.79	0.017	3.49	0.023	3.10	0.028	2.72	0.009
BURST STRENGTH kn/m²	BW		434.6	20.47	431.2	20.68	498.1	17.84	549.8	29.33	617.4	20.12
	AW		390.52	26.72	447.75	13.44	482.91	33.11	497.4	26.24	614.61	31.82
SPIRALITY ANGLES	BW		13.26	1.29	14.04	1.16	11.22	1.27	9.38	1.07	7.12	0.95
	AW		46.08	1.12	42.34	1.00	33.9	0.80	25.4	0.78	17.08	0.62

COMMENTS:
Shrinkage TGV IIC KT 1A SWASH + STUMBLE DRY CYCLES

FABRIC DETAILS:
28G Plain Single - Jersey GREIGE

INTERNATIONAL INSTITUTE FOR COTTON. KNITTING REF. LAB. REF. 607 SUBMITTED BY: JCS DATE:

TESTS REQUIRED		1/30cc SAMPLE									
	✓	1	95%CL	2	95%CL	3	95%CL	4	95%CL	5	95%CL
% SHRINKAGE length		38.55	2.74	36.31	2.17	29.65	1.12	24.9	2.70	12.42	1.14
width		29.37 EXT	2.82	16.35 EXT	1.22	2.24 EXT	1.74	9.95	1.35	19.98	0.28
FABRIC WEIGHT BW		78.1	3.31	91.6	2.84	101.4	2.57	117.0	5.34	135.2	2.39
gm/m² AW		121.8	3.33	128.6	4.26	143.6	2.08	163.6	3.58	184.4	3.89
C/3 CM BW		24.6	0.89	27.4	0.74	32.7	0.49	42.8	0.56	61.0	2.71
AW		37.72	1.16	40.87	0.53	47.40	1.49	54.96	1.07	66.06	1.35
W/3 CM BW		33.7	0.95	35.7	1.27	36.9	0.64	37.3	0.73	38.6	0.35
AW		35.35	0.63	38.03	0.89	41.57	1.45	44.02	0.72	48.43	0.35
STITCH LENGTH BW		4.5	0.015	4.07	0.012	3.67	0.013	3.13	0.02	2.64	0.006
mm AW		4.53	0.018	4.09	0.030	3.58	0.018	3.10	0.008	2.62	0.011
BURST STRENGTH BW		316	9.01	356.7	13.39	431.2	22.67	469.8	23.3	570.5	21.92
kn/m² AW		329.85	22.51	363.4	22.49	446.14	21.33	464.99	29.69	585.0	34.06
SPIRALITY ANGLES BW		13.87	1.74	13.27	1.17	11.11	1.08	8.14	1.05	6.97	0.88
AW		49.0°	1.13	43.76	0.92	39.66	1.23	27.04	0.98	17.18	0.77

COMMENTS:
Shrinkage Test IIC KT 1A SWASH + 5 TUMBLE DRY CYCLES

FABRIC DETAILS:
28G Plain Single-Jersey GREIGE

INTERNATIONAL INSTITUTE FOR COTTON. KNITTING REF. LAB. REF. 607 SUBMITTED BY: JCS DATE:

TESTS REQUIRED		1/34 cc SAMPLE									
	✓	1	95%CL	2	95%CL	3	95%CL	4	95%CL	5	95%CL
% SHRINKAGE length		34.44	2.92	35.01	2.22	33.23	3.06	24.49	0.70	14.46	0.36
width		30.53 EXT	5.07	21.0 EXT	5.07	6.72 EXT	4.50	9.16	0.90	19.13	0.57
FABRIC WEIGHT BW		75.4	2.78	81.4	3.42	101.0	4.10	103.0	4.96	118.2	4.18
gm/m² AW		104.4	4.69	114	3.04	129.2	3.44	143.6	3.78	164.8	1.62
C/3 CM BW		25.4	1.28	25.6	0.91	31.3	0.44	40.7	0.66	57.9	0.94
AW		38.98	2.24	39.92	0.82	45.35	1.17	53.39	1.91	63.39	1.76
W/3 CM BW		31.9	0.85	36.1	0.73	37.2	0.44	37.4	0.49	38.7	0.57
AW		34.88	1.49	39.69	2.0	41.57	0.82	44.33	0.82	48.82	0.35
STITCH LENGTH BW		4.72	0.03	4.16	0.009	3.64	0.024	3.14	0.015	2.64	0.011
mm AW		4.78	0.019	4.19	0.021	3.59	0.018	3.10	0.016	2.59	0.015
BURST STRENGTH BW		254	16.14	291.2	24.89	326.4	9.42	360.9	19.73	453.3	16.82
kn/m² AW		281.53	15.96	336.1	21.18	370.53	20.53	407.53	21.39	473.95	29.31
SPIRALITY ANGLES BW		14.73	1.21	12.79	1.56	11.4	1.24	10.01	0.82	7.62	0.98
AW		55.06	1.13	47.84	1.04	42.16	1.08	32.24	1.02	21.5	0.81

COMMENTS:
Shrinkage Test IIC KT 1A SWASH + STUMBLE DRY CYCLES

FABRIC DETAILS:
28G PLAIN SINGLE JERSEY GREIGE

INTERNATIONAL INSTITUTE FOR COTTON: KNITTING REF. LAB. REF. 607 SUBMITTED BY: JCS DATE:

TESTS REQUIRED		1/38 cc									
		SAMPLE									
	✓	1	95%CL	2	95%CL	3	95%CL	4	95%CL	5	95%CL
% SHRINKAGE length		38.46	2.55	40.68	3.78	34.18	3.19	25.58	1.84	14.67	0.42
width		32.83 EXT	6.17	30.32 EXT	5.36	7.88 EXT	3.52	8.18	2.26	19.97	1.02
FABRIC WEIGHT BW		66.7	2.86	69.0	2.48	82.8	2.26	87.4	4.26	107.2	3.30
gm/m^2 AW		100.8	2.83	110.4	3.68	119	2.15	134.6	2.57	153.0	4.02
C/3 CM BW		24.7	0.23	25.7	0.82	30.2	0.95	42.1	1.2	56.1	1.45
AW		35.59	0.43	38.35	1.32	44.49	2.01	52.28	1.63	64.65	1.12
W/3 CM BW		32.4	0.41	36.6	1.76	37.6	1.13	38.0	0.74	38.8	0.74
AW		35.43	2.29	41.73	2.19	45.67	1.95	47.32	1.22	51.60	1.93
STITCH LENGTH BW		4.78	0.011	4.23	0.016	3.63	0.012	3.13	0.008	2.64	0.0097
mm AW		4.66	0.023	4.22	0.022	3.55	0.027	3.03	0.015	2.58	0.015
BURST STRENGTH BW		211.2	15.10	251.9	16.63	305	20.76	342.9	9.38	405	15.78
kn/m^2 AW		246.19	16.63	272.39	16.07	312.33	18.17	357.43	22.02	390.05	19.63
SPIRALITY ANGLES BW		15.13	1.65	13.76	1.45	13.89	1.66	11.88	0.96	9.74	1.14
AW		54.02	1.75	52.66	1.20	43.46	1.10	37.26	1.11	26.94	0.99

COMMENTS:
Shrinkage Test IIC KT 1A SWASH + STUMBLE DRY CYCLES

FABRIC DETAILS:
28G PLAIN SINGLE JERSEY GREIGE

INTERNATIONAL INSTITUTE FOR COTTON: KNITTING REF. LAB. REF. 607 SUBMITTED BY: JCS DATE:

TESTS REQUIRED		✓	1/40 cc 1	95%CL	2	95%CL	3	95%CL	SAMPLE 4	95%CL	5	95%CL
% SHRINKAGE	length		40.03	7.71	39.52	2.03	33.62	1.89	24.61	2.14	16.62	1.27
	width		45.65 EXT	14.14	27.56 EXT	3.85	8.46 EXT	3.51	8.35	3.33	20.06	0.87
FABRIC WEIGHT gm/m²	BW		60.6	1.79	65.8	2.69	76.20	3.21	91.80	3.87	101.4	2.80
	AW		98.5	2.83	105.4	4.08	118.8	4.76	129.0	4.21	149.8	5.71
C/3 CM	BW		25.1	1.74	26.5	0.54	31.9	0.6	42.1	0.91	55.8	1.6
	AW		37.95	0.55	42.6	1.60	46.77	0.40	53.78	2.38	63.23	0.74
W/3 CM	BW		33.3	1.45	36.1	1.31	38.2	1.15	37.8	0.6	39.2	1.13
	AW		35.04	1.09.	42.52	1.42	44.80	0.72	49.29	1.44	51.50	1.52
STITCH LENGTH mm	BW		4.69	0.011	4.18	0.014	3.56	0.017	3.1	0.01	2.65	0.009
	AW		4.84	0.020	4.29	0.021	3.64	0.025	3.2	0.039	2.65	0.007
BURST STRENGTH kn/m²	BW		225	9.63	208.5	14.3	263	16.52	305.7	5.28	366.4	7.75
	AW		232.4	14.91	238.83	16.26	288.94	15.94	322.95	8.94	375.81	30.14
SPIRALITY ANGLES	BW		17.65	1.52	15.81	1.45	13.81	1.05	11.37	0.82	9.57	0.88
	AW		56.0	2.03	52.52	1.41	46.32	1.17	37.82	0.88	27.66	0.97

COMMENTS:
Shrinkage Test IIC KT 1A 5 WASH + STUMBLE DRY CYCLES

FABRIC DETAILS:
28G Plain Single Jersey GREIGE