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WEARER TRIALS ON INTERLOCK AND RIB GARMENTS

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Introduction

As part of the IIC/Meridian joint project (CP78) a wear trial had been planned by Meridian on garments made from what they considered to be the most commercially promising fabrics. From a strictly scientific point of view, the trial was not (and could not be, for practical reasons) adequate to properly elucidate the influence of major construction and finishing variables.

Nevertheless, it was thought quite possible that an important contribution might be made in one crucial area which has a strong bearing on our knitgoods programmes in general and the K3 project in particular.

The area in question is the problem of deciding how the IIC full relaxation shrinkage test on knitted fabric (*Appendix 1*) relates to shrinkage in a garment under normal conditions of wear.

Furthermore, it is clear that, at some time in the future, it will be necessary for us to carry out extensive wearer trials on knitted garments so this relatively small trial was looked upon as an opportunity to develop some "hands-on" experience in organising, running, and evaluating such a trial.

Objective

To establish how the IIC full relaxation shrinkage test on fabric, relates to shrinkage in a garment, made from that fabric, under normal wearing conditions.

Fabric Selection

The fabrics selected for the trial were taken from the IIC/Meridian joint project CP78. Twenty-three fabric variants, which were considered to be commercially acceptable constructions, were selected by Meridian, and from these, three garment types, T-shirt, Singlet, and Briefs, were made up by Meridian.

Table 1 lists these constructions and processing routes.

Garment Distribution

One dozen of each garment variant was made, from which IIC had four garments. The remainder were retained by Meridian for the main wearer trials. Out of the four garments IIC received, (one small, two medium, and one large) one medium size was kept as IIC control. Of the three remaining, one was retained for laboratory testing and two were used for wearer trials.

The participants in the wearer trial were issued with a standard Meridian questionnaire (*Appendix 2*) on which washing and drying methods and comments regarding fit, comfort, appearance, size etc. were to be recorded. All participants were asked to wash and wear their garments five times and return them for assessment, and this was repeated until ten washes were completed, after which all garments were returned.

The briefs were retained by the participants for evaluation.

Fabric And Garment Testing

All the fabric used in the trial had been tested in project CP78, therefore the relevant test

results were extracted, i.e.

- Courses and Wales before and after wash,
- Shrinkage: IIC full relaxation test.

The garment retained for laboratory evaluation was tested in the same manner.

The wear trial garments were measured for shrinkage (*Diagram 1*) before wearing and after the fifth and tenth washes. As the garments were subjected to various washing and drying methods, a controlled eleventh wash was carried out at IIC and the garments re-measured for shrinkage and courses and wales.

Results

The results of fabric and garment testing are illustrated in *Tables 1-15* and *Graphs 1-19*.

Shrinkage

The evaluation of shrinkage is shown in *Tables 2-4*. *Graphs 1-8* show a composite illustration of shrinkage for all three garment types.

The overall trend seems to indicate that the fabric shrinks less when in garment form, the lab trial and worn garments giving similar results for length shrinkage. In some cases on the worn garments there is a width extension, occurring more frequently on 1x1 rib than on interlock.

Courses and Wales

Courses and wales results are given in *Tables 5-7* and *Graphs 9-16*.

In all cases, good correlation exists between courses and wales measured on the fabric and on both the lab trial and the worn garments. This suggests that courses and wales measured on a garment having received a minimum of five laundering cycles can be predicted by the measurement of courses and wales on fully relaxed fabric.

However, if courses and wales on relaxed fabric, lab trial and worn garments, are the same, good correlation would have been expected for the shrinkage results, but from the evidence already discussed (*Figures 1-8*), this was not apparent.

To try and clarify this anomaly, fabric shrinkage was calculated from courses and wales, measured on the fabric and lab trial garments (*Graphs 17-19*). Although there is considerable scatter, there now appears to be some correlation.

Conclusions On Fabric And Garment Testing

From the evidence of the results obtained from this rather restricted trial, the following points can be made regarding how the IIC full relaxation test on fabric relates to shrinkage in a garment.

1. Courses and wales in a garment having received a minimum of five laundering cycles can be predicted by the measurement of courses and wales on fully relaxed fabric.
2. Fabric shrinkage calculated from courses and wales measured on the fabric can give an estimation of fabric shrinkage in a garment, but not a very reliable one.
3. Garment shrinkage can not be predicted from the shrinkage of fabric, possibly due to:

- a) the effect of making up (seams, hems, tension applied, etc.);
 - b) distortion of shape during wear;
 - c) a garment is more difficult to handle than a fabric when making measurements.
4. More often than not, garments shrink less than fabrics, but the size of the discrepancy is unpredictable.

Visual Assessment

The visual assessment was carried out on the singlets and the T-shirts. The two worn garments were compared with the control and assessed visually for pilling, colour loss, and general appearance. Forty six people took part in the trial and each person was handed a form (Appendix 3) with an explanation and guidelines for carrying out the assessment.

Results

The results of the visual assessment are illustrated in *Tables 11-16*.

All the worn garments were assigned a value of 1-5 for each of the assessment variables. From the forty six sets of values, the overall averages for pilling, colour loss, and general appearance can be found in *Tables 11 and 12*. From these averages, the garments were ranked as shown in *Tables 13 and 14*.

From these tables it can be seen that in some cases, although the general appearance of the garment is very good, it has a high pilling value and poor colour loss. Also, in many cases, the pairs of garments differ considerably between each other, which is possibly due to the varied laundering techniques the individual wearers have used which ranged from soak/hand wash/drip dry to machine wash/tumble dry.

Tables 15 and 16 show the five highest and the five lowest rated garments. The garments have been ranked according to their mean score derived from the overall averages. (*Tables 11 and 12*).

As seen from *Table 16*, the higher rated T-shirts are all mercerised fabrics. These particular garments were either red or white. Comments were made by both the wearer trial and the visual assessment participants that the garments made from mercerised navy blue fabric had an affinity for "bits", and therefore a correspondingly low mark was given for general appearance, although colour loss and pilling were rated high.

On the singlets, the effect of mercerisation can not be established due to the fact that only two garments were made up from mercerised fabric. However, one of these was rated in the highest five.

It can also be seen from *Tables 15 and 16* that, of the thirteen highest rated garments (T-shirts and singlets), ten were made from 1x1 rib and only three were made from interlock.

There does not appear to be any overall correlation between laundering methods and garment performance.

General Comments

1. Although some of the objectives of the trial were achieved, additional information could have been obtained if a wider and/or more systematic range of fabrics could have been

selected, e.g.

- a) To evaluate garment performance one style would probably have been sufficient.
 - b) To evaluate the effect of construction, a comprehensive range of yarn count/stitch lengths through one processing route would have been preferable.
 - c) To evaluate the effect of processing route a standard construction through several routes would have been needed.
2. The sizing of the garments received from Meridian was not consistent e.g. garments labelled small were in fact large. This created problems in persuading people to take part but since, in most cases, garments were too long, excessive shrinkage in the length was not detrimental to garment performance and hence attracted no adverse comment.
 3. Additional information might have been obtained if more specific, rather than generalised, questions had been included in the questionnaire (*Appendix 2*).
 4. With regard to the visual assessment, certain points emerged for future reference.
 - a) if possible, standard lighting conditions should be used as this can affect the assessment of pilling and colour loss;
 - b) inexperienced participants found it difficult to differentiate between colour loss and change in colour;
 - c) many participants commented that there were too many garments, styles and colours to assess at any one time;
 - d) the assessment of general appearance would have been easier if the control and the two worn garments had all been the same size.

Conclusions On The Visual Assessment

As only a restricted number of fabrics from the CP78 set were included in the wearer trials, and since there were a large number of processing and constructional variables, it has not been possible to differentiate between the individual effects of yarn count, stitch length and processing route on the wear performance of a garment.

However, on the evidence of the results available, it would appear that mercerising can improve the overall wear performance, and rib seems to have performed better than interlock.

TABLE 1

LIST OF GARMENT VARIANTS

FABRIC	PROCESS CODE	GARMENT TYPE
I3A/307/1	JDH	T
I3A/359/1	JDH	T
I3A/377/5	MJDH	T
I3B/324/9	CBT	S and B
I3B/340/1	JDH	S and B
I42/307/1	JDH	T
I42/307/8	WDH	T
I42/307/9	CBT	S and B
I42/377/1	JDH	S
I42/377/5	MJDH	T
R26/267/31	MWBT	T
R26/285/11	JDH	T
R26/306/41	WBT	T
R26/306/42	WDH	S and B
R30/267/11	JDH	S and B
R30/285/41	WBT	S and B
R30/306/11	JDH	S and B
R30/326/31	MWBT	T
R34/267/31	MWBT	T
R34/267/41	WBT	S and B
R34/267/42	WDH	S and B
R34/285/11	JDH	S
R34/350/32	MJDH	S

T = T shirt
 S = Singlet
 B = Briefs

JDH - Jet dyed Hunt & Mescrop
 MJDH - Mercerised jet dyed Hunt & Mescrop
 WDH - Winch dyed Hunt & Mescrop
 CBT - Continuous bleach Tubetex
 WBT - Winch bleach Tubetex
 MWBT - Mercerised winch bleach Tubetex

Fabric Code: Interlock or Rib/Yarn Count/Stitch Length/Piece Number

TABLE 2

SHRINKAGE

SINGLET

SAMPLE CODE	PROCESS CODE	FABRIC % SHRINKAGE	LAB. TRIAL GARMENT % SHRINKAGE	WORN GARMENT AFTER 5 HOME LAUNDERINGS % SHRINKAGE		WORN GARMENT AFTER 10 HOME LAUNDERINGS % SHRINKAGE		WORN GARMENT CONTROLLED 11TH WASH % SHRINKAGE		
				L	W	L	W	L	W	L
1/30/340/1	1 JDH	L	17.51	16.25	11.14	14.17	12.97	16.37	15.9	18.37
		W	10.84	9.21	2.55Ext	5.57	2.25Ext	5.15	2.25	7.88
1/42/377/1	2 JDH	L	21.77	21.24	10.95	15.02	11.07	19.22	21.09	19.56
		W	13.64	17.21	2.20	3.48	8.05Ext	6.06	3.64	6.51
1/30/324/9	3 CBT	L	11.76	11.37	0.18	7.19	5.86	11.80	11.54	13.90
		W	10.76	9.95	3.56	5.25	4.62	4.37	7.22	6.45
1/42/307/9	4 CBT	L	11.56	10.35	3.25	6.87	5.42	6.56	10.65	12.17
		W	9.80	8.35	1.58	4.62	2.33	9.14	6.27	8.81
R/30/267/11	1 JDH	L	15.07	12.42	9.66	8.77	11.05	10.72	12.70	11.93
		W	3.89	3.85	6.48	0.50Ext	5.92	0.63	7.72	1.26Ext
R/30/306/11	1 JDH	L	17.56	12.56	11.00	6.73	12.22	9.32	13.68	12.69
		W	5.98	5.18	3.17	1.27	0.79	0.84	0.01Ext	2.25
R/34/285/11	3 JDH	L	17.35	13.60	13.65	4.77	10.44	5.14	12.16	10.15
		W	6.83	4.70	2.67	3.45	2.97	1.2Ext	2.97	2.79
R/26/306/42	4 WDH	L	11.99	10.61	6.06	3.50	10.10	2.93	9.53	9.80
		W	9.80	5.94	3.35	1.40	2.89	0.56Ext	2.89	5.59
R/34/267/42	5 WDH	L	13.13	10.60	4.64	3.72	10.30	4.59	11.01	10.78
		W	8.43	3.92	8.38Ext	0.85Ext	2.06Ext	0.57	3.44	5.11
R/30/285/41	1 WBT	L	6.20	5.83	3.01	2.66Ext	7.26	1.93Ext	7.94	3.36
		W	7.73	5.32	0.89Ext	2.20	0.45	3.03	4.35	3.58
R/34/267/41	3 WBT	L	3.90	5.10	5.43	1.40	6.81	2.72	6.58	5.33
		W	7.28	3.44	8.79	2.36	9.79	0.45Ext	3.98	5.39
R/34/350/31	4 WJJDH	L	22.92	16.71	5.06	6.87	16.00	9.17	17.57	13.59
		W	1.57	4.00	11.65	0.95Ext	8.67	0.25Ext	8.30	4.08Ext

TABLE 3

SHRINKAGE

T-SHIRT

SAMPLE CODE	PROCESS CODE	FABRIC % SHRINKAGE	LAB. TRIAL GARMENT % SHRINKAGE	WORN GARMENT AFTER 5 HOME LAUNDERINGS % SHRINKAGE		WORN GARMENT AFTER 10 HOME LAUNDERINGS % SHRINKAGE		WORN GARMENT CONTROLLED 11TH WASH % SHRINKAGE		
				L	W	L	W	L	W	
1/34/307/2	5 JDH	L	12.98	12.43	5.63	11.92	11.39	8.06/12.94	12.10	12.23
		W	10.61	8.26	1.38Ext	3.14	0.57	3.68Ext	1.73	1.19
1/34/359/1	6 JDH	L	19.71	12.45/16.38	11.3	8.32/13.92	2.7/9.7/ 17.7	9.91	15.83	15.94
		W	8.77	4.95	2.35Ext	1.73Ext	2.8Ext	3.15Ext	0.67	0.76
1/42/307/1	7 JDH	L	16.69	13.96	2.68	5.4/10.39	4.47	11.57	11.22	12.90
		W	8.35	6.86	1.58Ext	0.42	3.5Ext	0.74	3.05	3.17
1/34/377/5	8 WJJDH	L	23.90	16.75	8.65	3.33/6.98	15.00	5.29	16.81	15.09
		W	3.68	3.33	2.48	2.53Ext	0.22	1.76Ext	2.59	0.23
1/42/377/5	9 WJJDH	L	18.99	15.32	3.4/9.26	6.96	3.62/9.26	14.72	15.73	13.82
		W	8.03	4.24	0.41Ext/ 8.13	1.48Ext	5.61/1.83	0.68Ext	2.16	3.86
1/42/307/8	10 WDH	L	18.57	12.76	4.48	4.97/8.52	10.31	11.45	12.22	13.68
		W	7.95	3.92	8.31Ext	4.28	7.44Ext	2.63Ext	1.64Ext	1.74
R/30/326/31	4 WBT	L	7.73	7.80	0.2/4.44	9.88Ext	2.63Ext/ 3.33	8.85Ext	8.88	0.69
		W	2.35	2.04	11.93Ext	10.28Ext	15.18Ext	12.99Ext	2.73/ 7.37Ext	1.99Ext
R/34/267/31	13 WBT	L	6.24	6.29/2.75	2.46	2.52Ext	4.31	6.28Ext	7.05	4.19/1.04
		W	5.39	5.13	2.90	1.32	2.25	0.48Ext	4.33	6.60
R/26/267/31	14 WJJDH	L	12.26	10.58	1.33	3.17/6.03	1.61	7.88	8.03	8.33
		W	2.80	0.12	4.42	0.5Ext	3.87Ext	0.87Ext	0.42Ext	1.07Ext
R/26/285/11	11 JDH	L	15.18	10.68	10.70	2.62/7.54	9.31	5.62	11.30	10.75
		W	4.93	2.94	2.07Ext	8.94Ext	3.19Ext	9.7Ext	3.18Ext	3.4Ext
R/26/306/41	15 WBT	L	6.96	8.71	4.79	5.96/4.32/ 2.46	6.85	4.85/ 8.74	6.31	8.35
		W	4.46	3.08	1.87	11.4Ext	1.34Ext	15.84Ext	2.27Ext	7.44Ext

SHRINKAGE

TABLE 4

BRIEFS

SAMPLE CODE	PROCESS CODE		FABRIC % SHRINKAGE		LAB. TRIAL GARMENT % SHRINKAGE
			L	W	
I/38/324/9	CBT	L	11.76		9.66
		W	10.76		6.97
I/42/307/9	CBT	L	11.56		13.91
		W	9.8		2.2/9.43
I/38/340/1	JDH	L	17.54		13.19
		W	10.84		0.66
R/30/267/11	JDH	L	15.07		1.38
		W	3.69		3.20
R/30/306/11	JDH	L	17.56		11.67/5.77
		W	5.98		1.17
R/30/285/41	WBT	L	6.29		0.95(Ext)
		W	7.73		6.95
R/34/267/41	WBT	L	3.90		8.52
		W	7.28		1.15
R/26/306/42	WDH	L	11.99		7.29
		W	9.80		1.73
R/34/267/42	WDH	L	13.13		4.63/11.48
		W	8.43		0.39(Ext)

COURSES AND WALES

TABLE 5

SINGLET

SAMPLE CODE	PROCESS CODE		FABRIC		LAB TRIAL GARMENT		WORN GARMENT CONTROLLED 11TH WASH	
			BW	AW	BW	AW		
I/38/340/1	JDH	C	39.10	46.10	37.80	46.40	44.20	45.60
		W	38.20	42.30	38.20	41.80	39.60	41.40
I/42/377/1	JDH	C	31.70	40.00	31.80	39.80	40.20	38.40
		W	37.30	42.30	36.20	42.20	40.60	39.00
I/38/324/9	CBT	C	41.60	46.20	42.60	47.20	46.60	44.20
		W	38.80	43.70	40.80	44.00	43.00	42.80
I/42/307/9	CBT	C	43.90	49.30	41.80	48.60	49.00	47.60
		W	42.00	46.10	44.40	46.40	46.00	44.40
R/30/267/11	JDH	C	49.20	56.50	50.40	58.00	56.80	57.40
		W	33.70	34.60	32.20	34.20	34.40	34.20
R/30/306/11	JDH	C	39.90	48.00	41.40	49.00	48.40	46.60
		W	29.40	31.00	28.60	31.20	29.80	30.80
R/34/285/11	JDH	C	42.90	51.20	44.60	51.20	51.20	50.60
		W	30.30	33.20	31.20	32.80	32.60	33.00
R/26/306/42	WDH	C	42.20	47.50	43.00	47.80	47.00	48.00
		W	29.80	32.80	29.80	32.60	31.40	31.60
R/34/267/42	WDH	C	48.10	54.60	48.40	56.20	54.60	54.00
		W	32.90	35.80	34.20	36.00	34.40	36.20
R/30/285/41	WBT	C	48.70	52.60	49.00	53.60	52.60	51.20
		W	29.50	32.80	30.80	33.20	33.00	32.60
R/34/267/41	WBT	C	51.60	55.80	48.40	56.20	56.40	56.60
		W	32.20	34.10	34.20	36.00	33.00	32.80
R/34/350/32	MJDH	C	31.80	41.50	33.80	41.80	41.20	39.60
		W	33.00	32.90	32.10	34.00	31.40	33.40

TABLE 6

COURSES AND WALES

T-SHIRT

SAMPLE CODE	PROCESS CODE		FABRIC		LAB TRIAL GARMENT		WORN GARMENT CONTROLLED	
			BW	AW	BW	AW	11TH WASH	
I/34/307/1	JDH	C	46.00	52.80	46.20	52.20	52.80	52.00
		W	38.80	43.40	39.60	44.20	43.40	31.40
I/34/359/1	JDH	C	34.90	42.70	35.80	43.60	42.80	42.40
		W	36.70	40.80	37.80	41.40	38.60	39.80
I/42/307/1	JDH	C	43.70	50.40	44.40	51.20	51.20	51.20
		W	41.80	45.70	40.40	45.60	44.60	43.40
I/34/377/5	MJDH	C	30.50	40.10	31.20	38.60	38.20	37.20
		W	43.70	46.10	44.80	47.80	47.60	46.80
I/42/377/5	MJDH	C	29.60	40.00	29.60	37.60	35.00	36.00
		W	46.40	49.70	47.20	50.00	49.60	48.60
I/42/307/8	WDH	C	40.80	49.50	42.80	49.40	48.60	48.80
		W	44.20	47.70	45.60	48.40	45.40	45.80
R/30/326/31	MWBT	C	39.20	42.70	38.80	43.60	43.00	41.60
		W	34.80	34.90	33.80	36.80	34.00	35.00
R/34/267/31	MWBT	C	50.10	52.00	50.60	54.20	54.00	51.20
		W	40.10	41.60	39.60	42.60	41.60	42.00
R/26/267/31	MJDH	C	50.60	57.40	53.60	57.20	58.80	58.80
		W	38.10	38.70	38.00	39.60	38.40	38.80
R/26/285/11	JDH	C	46.30	54.50	47.60	55.20	55.00	54.00
		W	30.30	31.70	30.60	33.20	31.20	31.40
R/26/306/41	WBT	C	45.50	48.70	43.00	47.20	45.80	46.40
		W	29.40	30.90	29.80	32.40	30.60	30.00

TABLE 7

COURSES AND WALES

BRIEFS

SAMPLE CODE	PROCESS CODE		FABRIC		LAB. TRIAL GARMENT	
			BW	AW	BW	AW
I/38/324/9	CBT	C	41.60	46.20	40.60	46.60
		W	38.80	43.70	42.20	44.80
I/42/307/9	CBT	C	43.90	49.30	44.00	50.00
		W	42.00	46.10	43.20	45.40
I/38/340/1	JDH	C	39.10	46.10	38.40	46.60
		W	38.20	42.30	39.60	42.80
R/30/267/11	JDH	C	49.20	56.50	51.00	57.00
		W	33.70	34.60	33.00	35.00
R/30/306/11	JDH	C	39.90	48.00	40.60	49.00
		W	29.40	31.00	29.20	29.80
R/30/285/41	WBT	C	48.70	52.60	49.20	52.80
		W	29.50	32.80	32.00	32.00
R/34/267/41	WBT	C	51.60	55.80	49.80	55.00
		W	32.20	34.10	32.80	34.20
R/26/306/42	WDH	C	42.20	47.50	43.40	48.20
		W	29.80	34.10	30.20	32.00
R/34/267/42	WDH	C	48.10	54.60	48.00	55.20
		W	32.90	35.80	34.80	35.00

SHRINKAGE CALCULATED FROM COURSES AND WALES

TABLE 8

SINGLET

SAMPLE CODE	PROCESS CODE	FABRIC		LAB. TRIAL GARMENT
		% SHRINKAGE		
I/38/340/1	JDH	L	17.90	22.75
		W	10.73	9.42
I/42/377/1	JDH	L	26.18	25.16
		W	13.40	16.57
I/38/324/9	CBT	L	11.06	10.80
		W	12.63	7.84
I/42/307/9	CBT	L	12.30	16.27
		W	9.76	4.50
R/30/267/11	JDH	L	14.84	15.08
		W	2.67	6.21
R/30/306/11	JDH	L	20.30	18.36
		W	5.44	9.09
R/34/285/11	JDH	L	19.35	14.80
		W	9.57	5.13
R/26/306/42	WDH	L	12.56	11.16
		W	10.07	9.40
R/34/267/42	WDH	L	13.51	16.12
		W	8.81	5.26
R/30/285/41	WBT	L	8.01	9.36
		W	11.19	7.79
R/34/267/41	WBT	L	8.14	16.12
		W	5.90	5.26
R/34/350/31	MJDH	L	30.50	23.67
		W	0.30	5.92

SHRINKAGE CALCULATED FROM COURSES AND WALES

TABLE 9

T-SHIRT

SAMPLE CODE	PROCESS CODE		FABRIC % SHRINKAGE		LAB. TRIAL GARMENT % SHRINKAGE	
			L	W	L	W
I/34/307/1	JDH	L	14.78		12.99	
			11.86		11.62	
I/34/359/1	JDH	L	22.35		21.79	
			11.17		9.52	
I/42/307/1	JDH	L	15.33		15.32	
			9.33		12.87	
I/34/377/5	MJDH	L	31.48		23.72	
			5.49		6.70	
I/42/377/5	MJDH	L	35.14		27.03	
			7.11		5.93	
I/42/307/8	WDH	L	21.32		15.42	
			7.92		6.14	
R/30/326/31	MWB	L	8.93		12.37	
			0.29		8.88	
R/34/267/31	MWB	L	3.79		7.11	
			3.74		7.58	
R/26/267/31	MJDH	L	13.44		6.72	
			1.57		4.21	
R/26/285/11	JDH	L	17.71		15.97	
			4.62		8.50	
R/26/306/41	WBT	L	7.03		9.77	
			5.10		8.72	

SHRINKAGE CALCULATED FROM COURSES AND WALES

TABLE 10

BRIEFS

SAMPLE CODE	PROCESS CODE		FABRIC % SHRINKAGE		LAB. TRIAL GARMENT % SHRINKAGE	
			L	W	L	W
I/38/324/9	CBT	L	11.06		14.78	
			12.63		6.16	
I/42/307/9	CBT	L	12.30		13.64	
			9.76		5.09	
I/38/340/1	JDH	L	17.90		21.35	
			10.73		8.08	
R/30/267/11	JDH	L	14.84		11.76	
			2.67		6.06	
R/30/306/11	JDH	L	20.30		20.69	
			5.44		2.05	
R/30/285/41	WBT	L	8.01		7.32	
			11.19		0	
R/34/267/41	WBT	L	8.14		10.44	
			5.90		4.27	
R/26/306/42	WDH	L	12.56		11.06	
			14.43		5.96	
R/34/267/42	WDH	L	13.51		15.00	
			8.81		0.57	

TABLE 11

OVERALL AVERAGES: Singlets (after 46 sheets)

Sample	Pilling grade	Colour loss	General app.	Mean score
14	2.4	4.4	3.0	3.3
15	2.0	4.0	2.6	2.9
25	2.8	4.4	3.2	3.5
27	1.7	4.1	2.4	2.8
10	1.5	4.0	2.7	2.7
12	1.7	3.9	2.6	2.7
22	1.4	3.9	2.3	2.5
24	2.8	4.0	2.8	3.2
43	4.0	4.6	4.0	4.2
44	3.7	4.4	3.4	3.9
49	2.6	4.0	3.3	3.3
50	2.7	4.1	3.1	3.3
64	2.8	3.8	3.4	3.3
65	2.5	3.3	2.9	2.9
40	2.1	1.8	2.8	2.2
42	2.4	4.2	3.2	3.3
61	3.2	3.9	3.6	3.6
63	1.9	3.9	2.8	2.8
46	4.0	3.3	3.4	3.6
48	1.8	3.6	2.5	2.6
59	2.8	3.2	2.4	2.8
60	2.5	3.7	3.1	3.1
68	3.0	4.1	2.1	3.1
69	3.5	4.3	2.3	3.4

TABLE 12

OVERALL AVERAGES: Tshirts

(after 46 sheets)

Sample	Pilling grade	Colour loss	General app.	Mean score
1	3.2	3.9	3.4	3.5
2	1.6	3.0	2.2	2.3
4	2.0	4.2	3.0	3.1
5	2.1	4.0	2.7	2.9
16	2.3	3.9	3.1	3.1
17	2.0	3.9	2.9	2.9
7	4.0	4.6	3.4	4.0
8	3.7	4.7	3.4	3.9
28	2.9	4.3	2.8	3.3
29	3.0	4.4	3.0	3.5
20	1.6	4.2	2.8	2.9
21	1.6	4.1	2.7	2.8
52	4.2	4.3	3.2	3.9
53	3.9	4.4	3.4	3.9
55	3.8	3.7	3.4	3.6
56	4.3	4.4	4.2	4.3
31	4.0	4.2	3.1	3.8
32	3.6	3.8	2.8	3.4
34	2.3	2.8	2.3	2.5
35	2.9	3.7	3.1	3.3
37	2.5	3.8	2.7	3.0
38	2.4	3.6	2.6	2.9

TABLE 13

RANKING OF OVERALL AVERAGES
SINGLETS

SAMPLE CODE	SAMPLE NO.	PROCESS CODE	PILLING	COLOUR LOSS	GENERAL APPEARANCE	RANK
I/38/340/1	14	JDH	10	2	7	6
I/38/340/1	15	JDH	12	6	11	9
I/42/377/1	25	JDH	6	2	5	4
I/42/377/1	27	JDH	15	5	13	10
I/38/324/9	10	CBT	16	6	10	11
I/38/324/9	12	CBT	15	7	11	11
I/42/307/9	22	CBT	17	7	14	13
I/42/307/9	24	CBT	6	6	9	7
R/30/267/11	43	JDH	1	1	1	1
R/30/267/11	44	JDH	2	2	3	2
R/30/306/11	49	JDH	8	6	4	6
R/30/306/11	50	JDH	7	5	6	6
R/34/285/11	64	JDH	6	8	3	6
R/34/285/11	65	JDH	9	11	8	9
R/26/306/42	40	WDH	11	13	9	14
R/26/306/42	42	WDH	10	4	5	6
R/34/267/42	61	WDH	4	7	2	3
R/34/267/42	63	WDH	13	7	9	10
R/30/285/41	46	WBT	1	11	3	3
R/30/285/41	48	WBT	14	10	12	12
R/34/267/41	59	WBT	6	12	13	10
R/34/267/41	60	WBT	9	9	6	8
R/34/350/32	68	MJDH	5	5	15	8
R/34/350/32	69	MJDH	3	3	14	5
RANGE			1 - 17	1 - 13	1 - 15	1 - 14

TABLE 14

RANKING OF OVERALL AVERAGES
T-SHIRTS

SAMPLE CODE	SAMPLE NO.	PROCESS CODE	PILLING	COLOUR LOSS	GENERAL APPEARANCE	RANK
I/34/307/1	1	JDH	8	8	2	6
I/34/307/1	2	JDH	16	12	11	14
I/34/359/1	4	JDH	15	5	5	9
I/34/359/1	5	JDH	14	7	8	11
I/42/307/1	16	JDH	13	8	4	9
I/42/307/1	17	JDH	15	8	6	11
I/43/377/5	7	MJDH	3	2	2	2
I/43/377/5	8	MJDH	6	1	2	3
I/42/377/5	28	MJDH	10	4	7	8
I/42/377/5	29	MJDH	9	3	5	6
I/42/307/8	20	WDH	16	5	7	11
I/42/307/8	21	WDH	16	6	8	12
R/30/326/31	52	MWBT	2	4	3	3
R/30/326/31	53	MWBT	4	3	2	3
R/34/267/31	55	MWBT	5	10	2	5
R/34/267/31	56	MWBT	1	3	1	1
R/26/267/31	31	MWBT	3	5	4	4
R/26/267/31	32	MWBT	7	9	7	7
R/26/285/11	34	JDH	13	13	10	13
R/26/285/11	35	JDH	10	10	4	8
R/26/306/41	37	WBT	11	9	8	10
R/26/306/41	38	WBT	12	11	9	11
RANGE			1 - 16	1 - 13	1 - 11	1 - 14

TABLE 15

RANKING OF THE 5 HIGHEST AND THE 5 LOWEST RATED SINGLETS

SAMPLE CODE	SAMPLE NO.	PROCESS CODE	MEAN SCORE	RANK
R/30/267/11	43	JDH	4.2	1
R/30/267/11	44	JDH	3.9	2
R/34/285/41	46	WBT	3.6	3
R/34/267/42	61	WDH	3.6	3
I/42/377/1	25	JDH	3.5	4
R/34/350/32	69	MJDH	3.4	5
SAMPLE CODE	SAMPLE NO.	PROCESS CODE	MEAN SCORE	RANK
I/42/377/1	27	JDH	2.8	10
R/34/267/42	63	WDH	2.8	10
R/34/267/41	59	WBT	2.8	10
I/38/324/9	10	CBT	2.7	11
I/38/324/9	12	CBT	2.7	11
R/30/285/41	48	WBT	2.6	12
I/42/307/9	22	CBT	2.5	13
R/26/306/42	40	WDH	2.2	14

SCORES: 1 = Unacceptable
 2 = Poor
 3 = Satisfactory
 4 = Good
 5 = Very Good

TABLE 16

RANKING OF THE 5 HIGHEST AND THE 5 LOWEST RATED T-SHIRTS

SAMPLE CODE	SAMPLE NO.	PROCESS CODE	MEAN SCORE	RANK
R/34/267/31	56	MWBT	4.3	1
I/34/377/5	7	MJDH	4.0	2
I/34/377/8	8	MJDH	3.9	3
R/30/326/31	52	MWBT	3.9	3
R/30/326/31	53	MWBT	3.9	3
R/26/267/31	31	MWBT	3.8	4
R/34/267/31	55	MWBT	3.6	5
SAMPLE CODE	SAMPLE NO.	PROCESS CODE	MEAN SCORE	RANK
R/26/306/41	37	WBT	3.0	10
R/26/306/41	38	WBT	2.9	11
I/34/359/1	5	JDH	2.9	11
I/42/307/1	17	JDH	2.9	11
I/42/307/8	20	WDH	2.9	11
I/42/307/8	21	WDH	2.8	12
R/26/285/11	34	JDH	2.5	13
I/34/307/1	2	JDH	2.3	14

SCORES: 1 = Unacceptable

2 = Poor

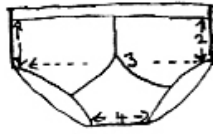
3 = Satisfactory

4 = Good

5 = Very Good

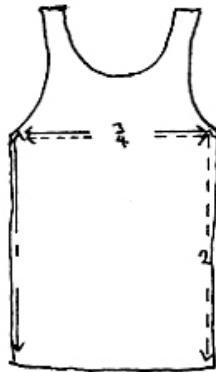
DIAGRAM 1

Briefs.



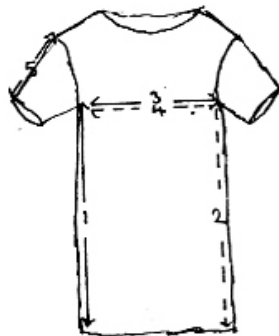
4 measurements.
2 length, 2 width
--- Back measurement

Singlet



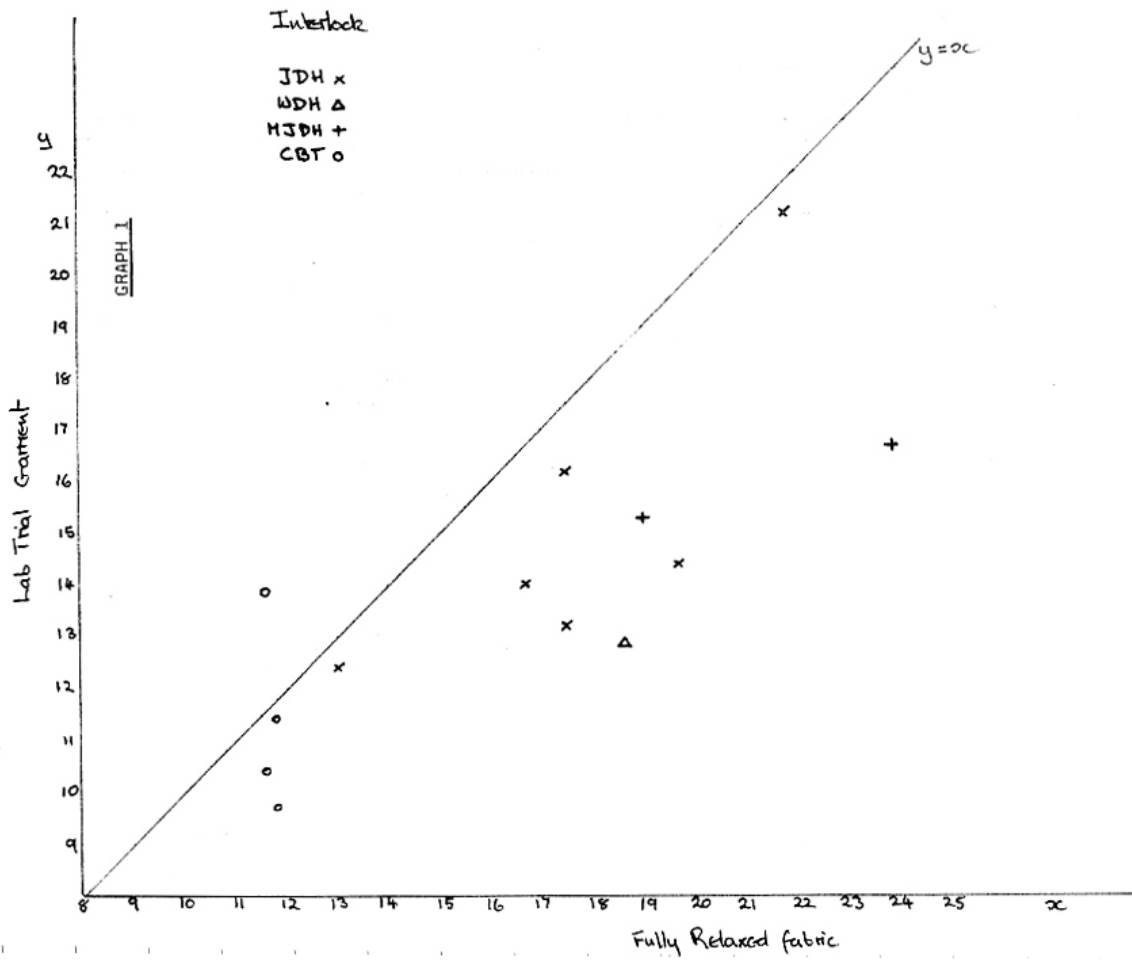
4 measurements
2 length, 2 width
--- Back measurement

T-shirt.

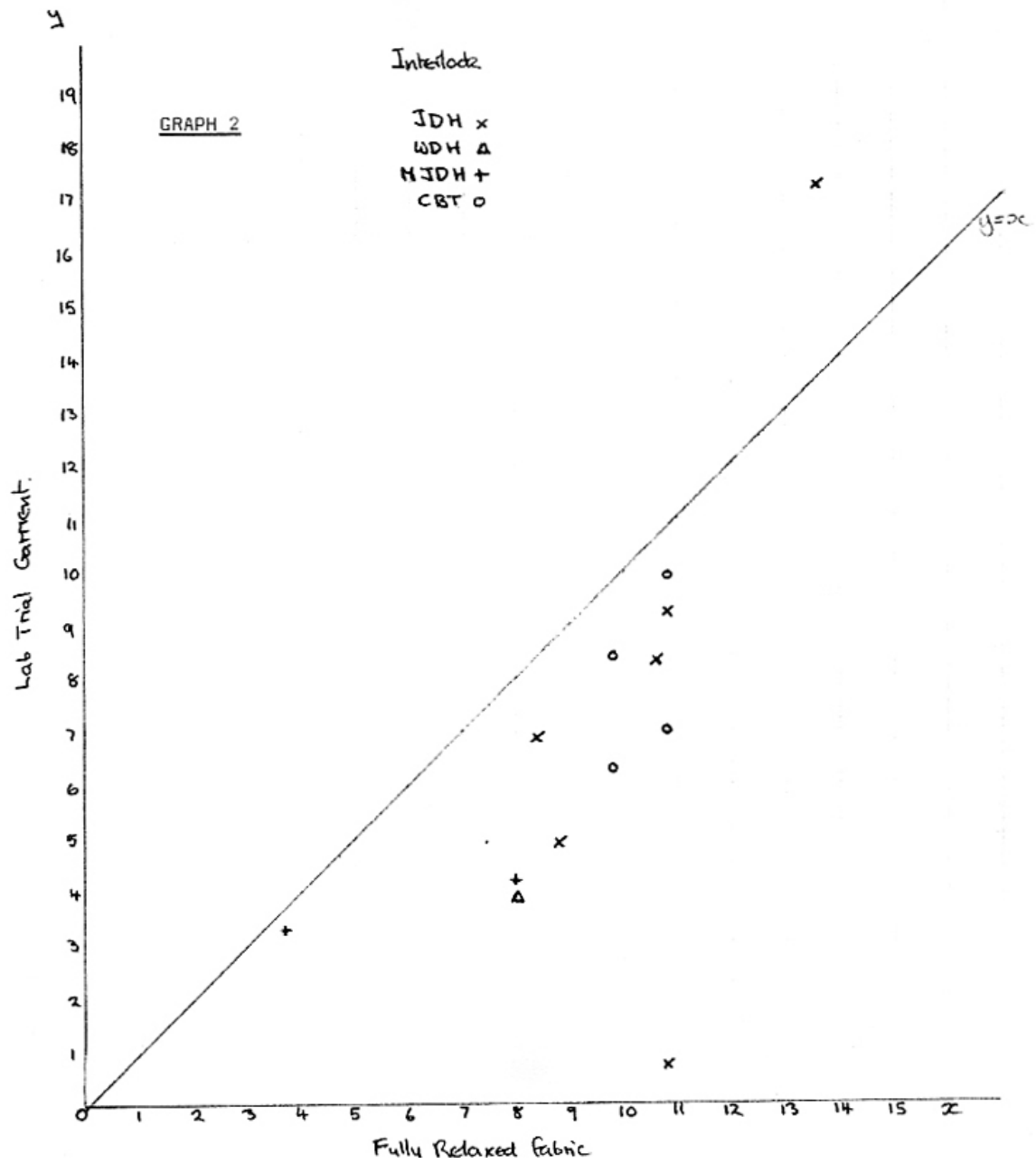


5 measurements
3 length, 2 width
--- Back measurement.

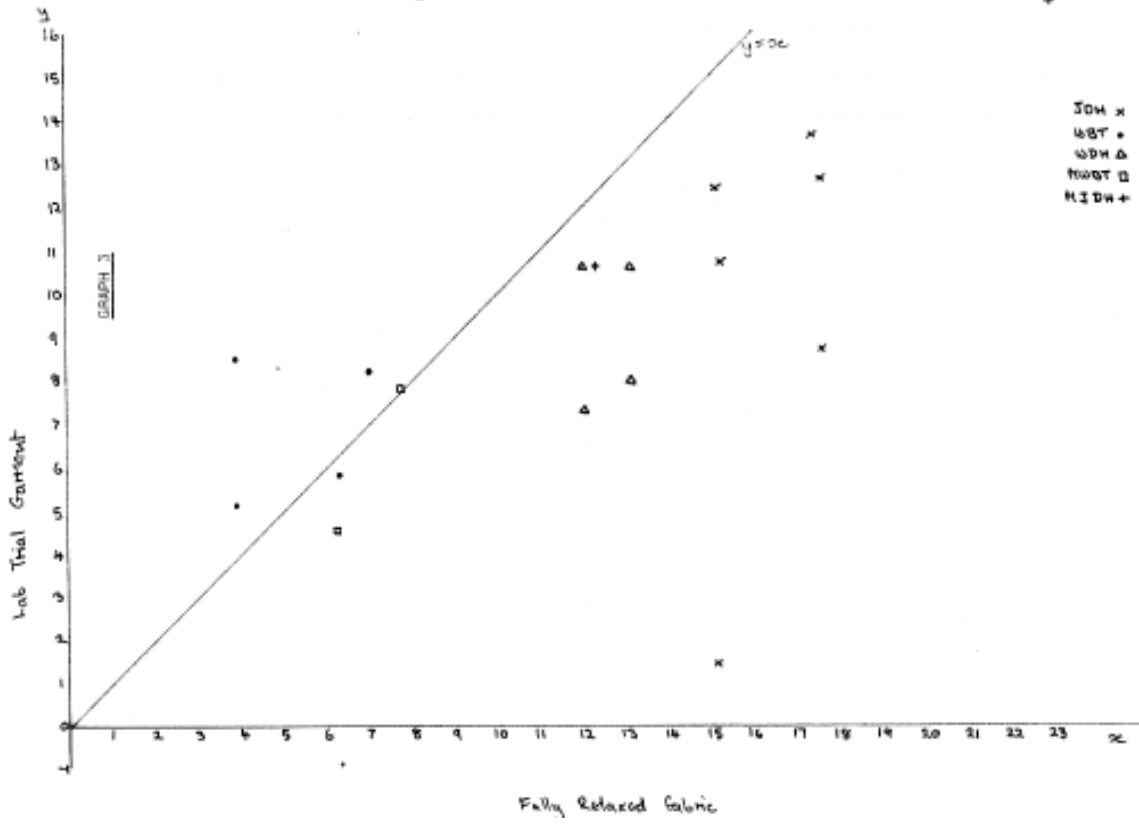
1/2 Length Shrinkage on T-Shirts, Singlets and Briefs



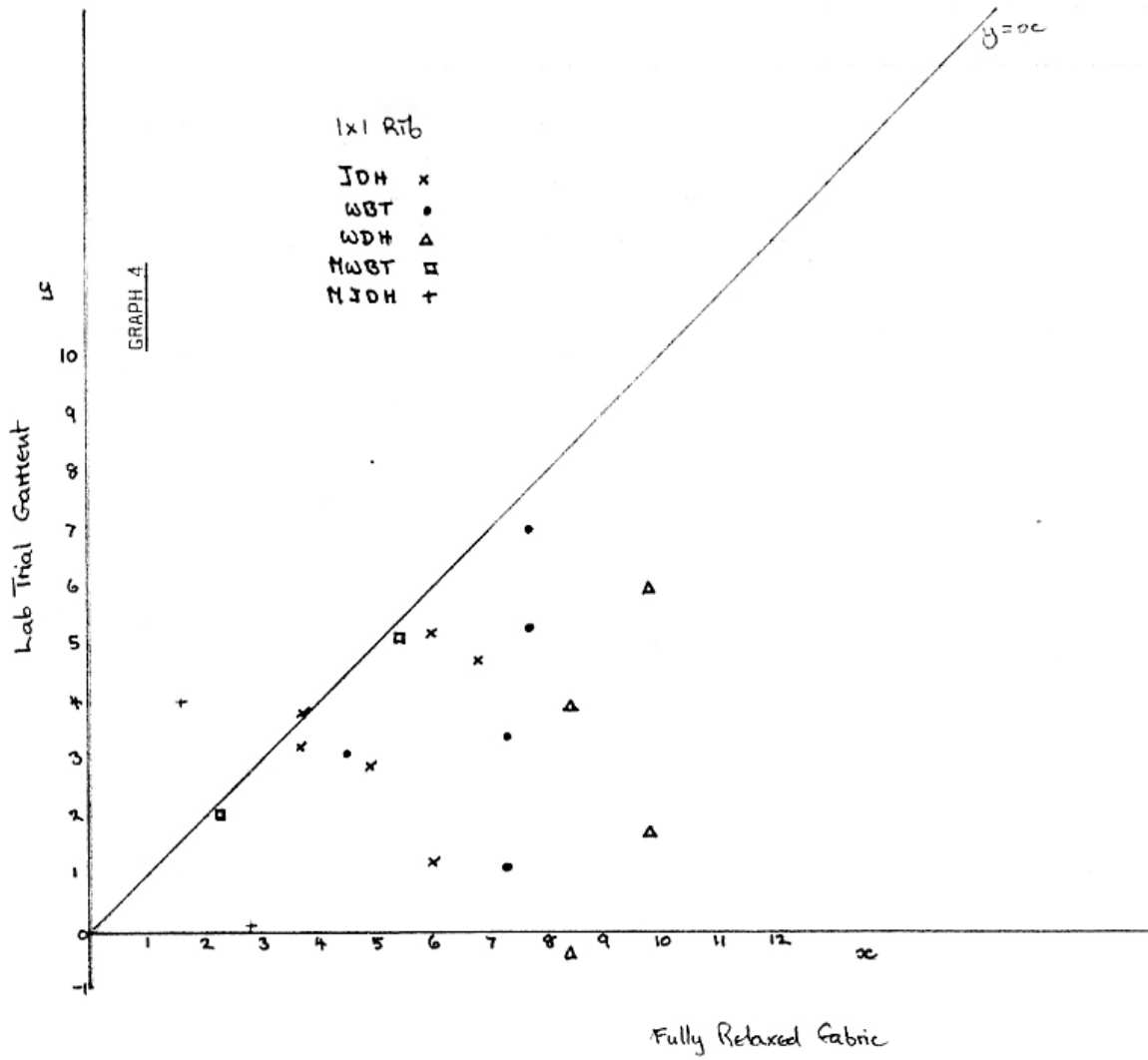
% Width Shrinkage on T-Shirts, Singlets and Briefs



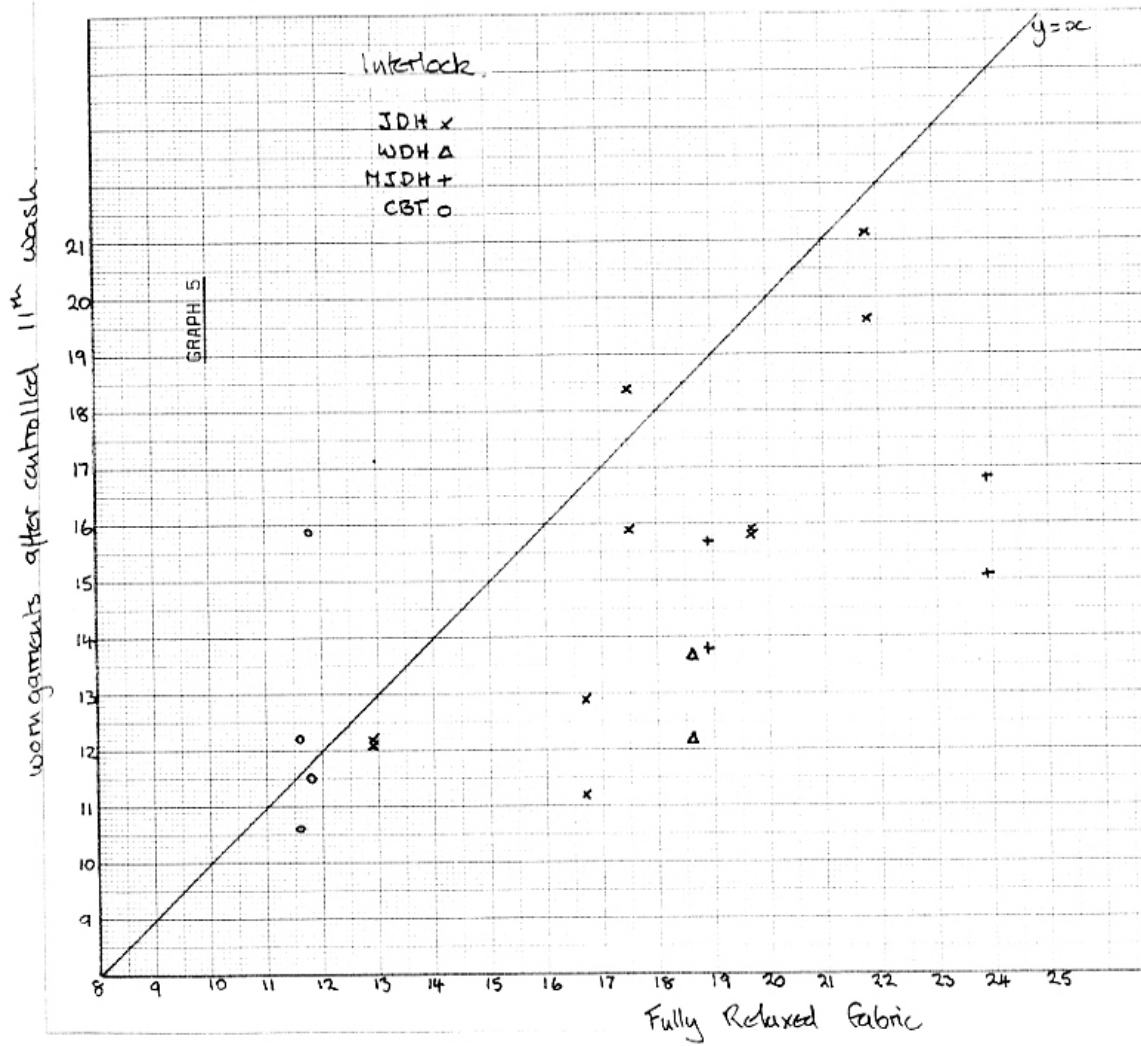
% Length Shrinkage on T-Shirts, Singlets and Briefs

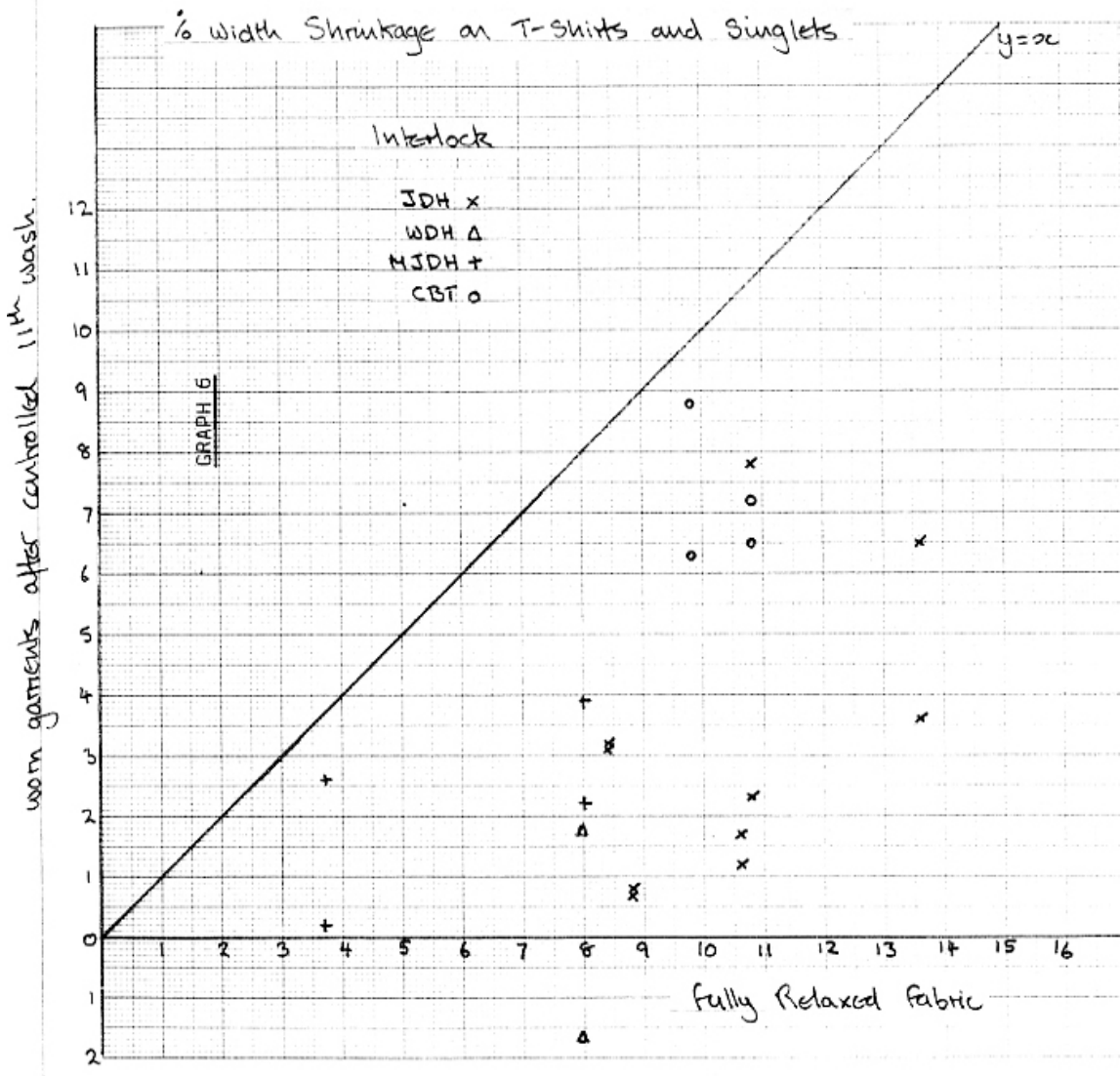


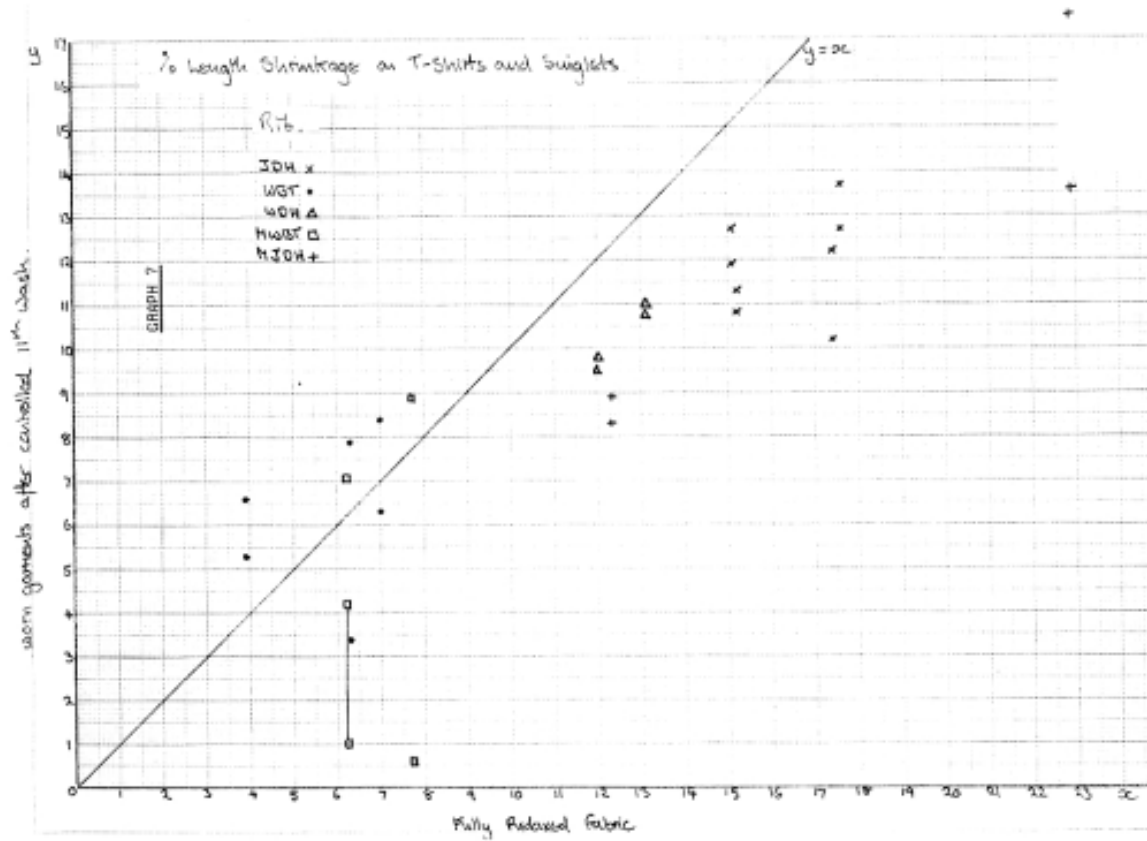
% Width Shrinkage on T-Shirts, Singlets and Briefs

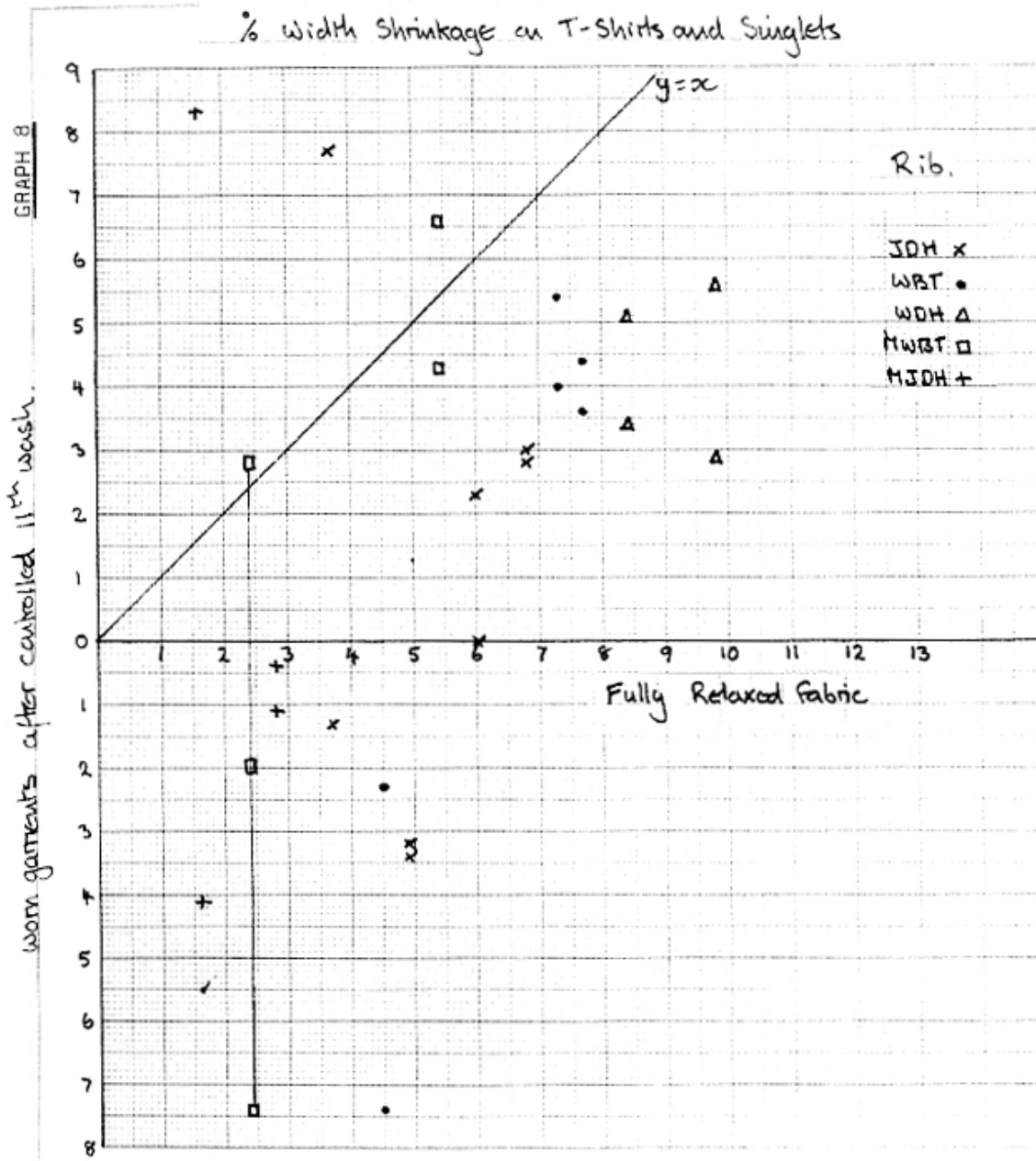


% Length Shrinkage on T-shirt and Singlet - worn garments

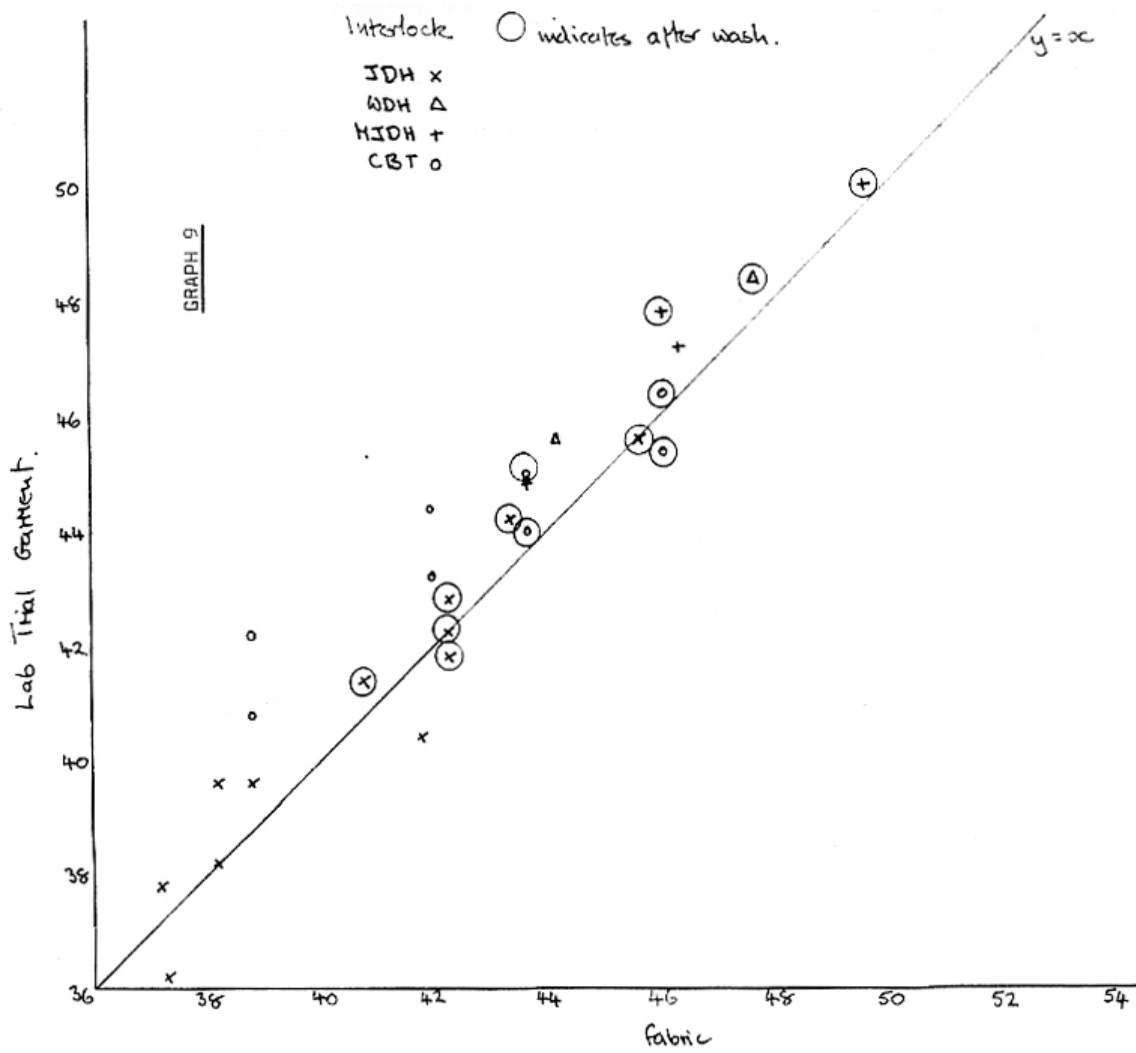




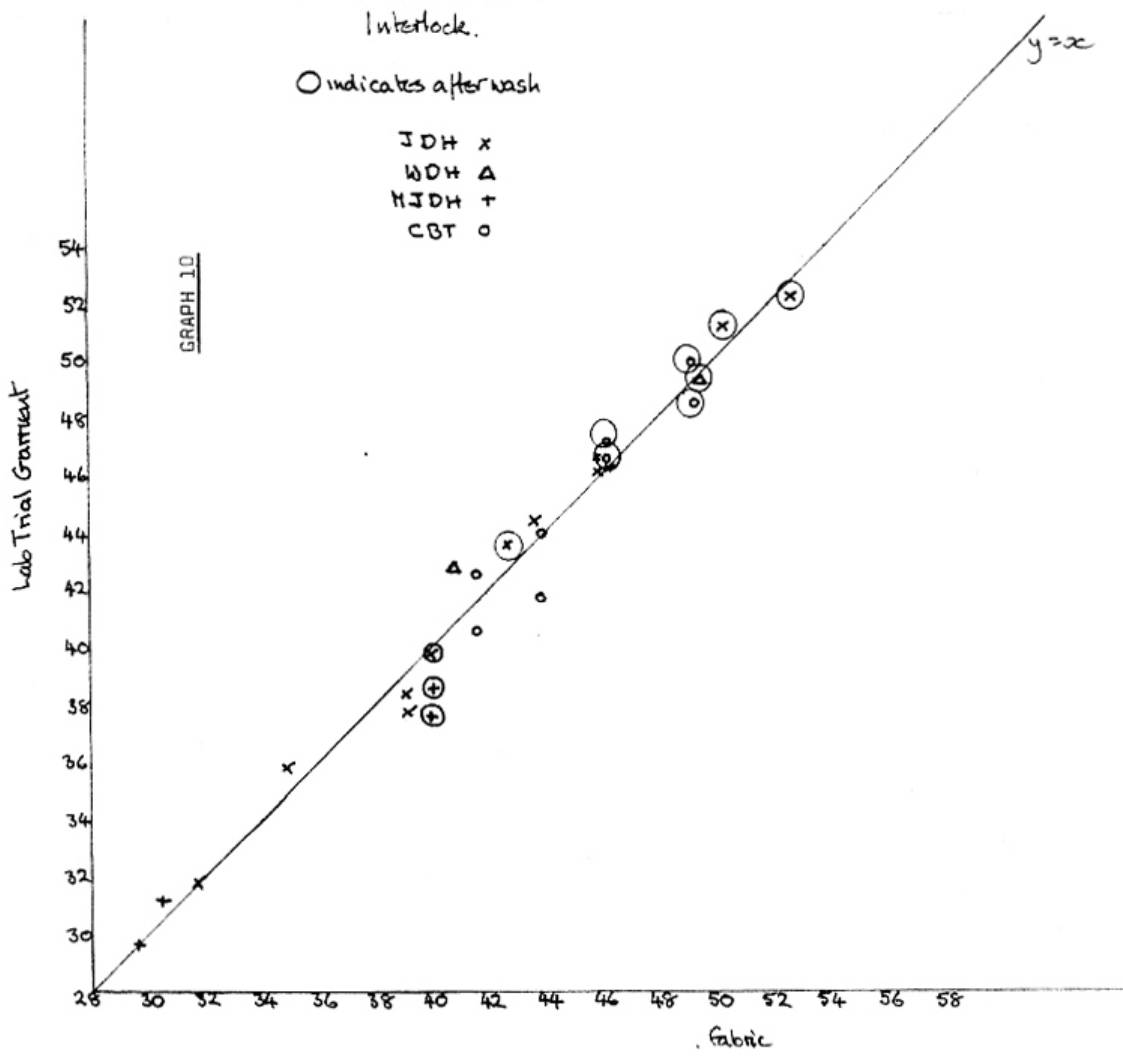




Wales / 3cm on T-shirt, Singlet and Briefs.



Courses/3cm on T-shirt, Singlet and Briefs.

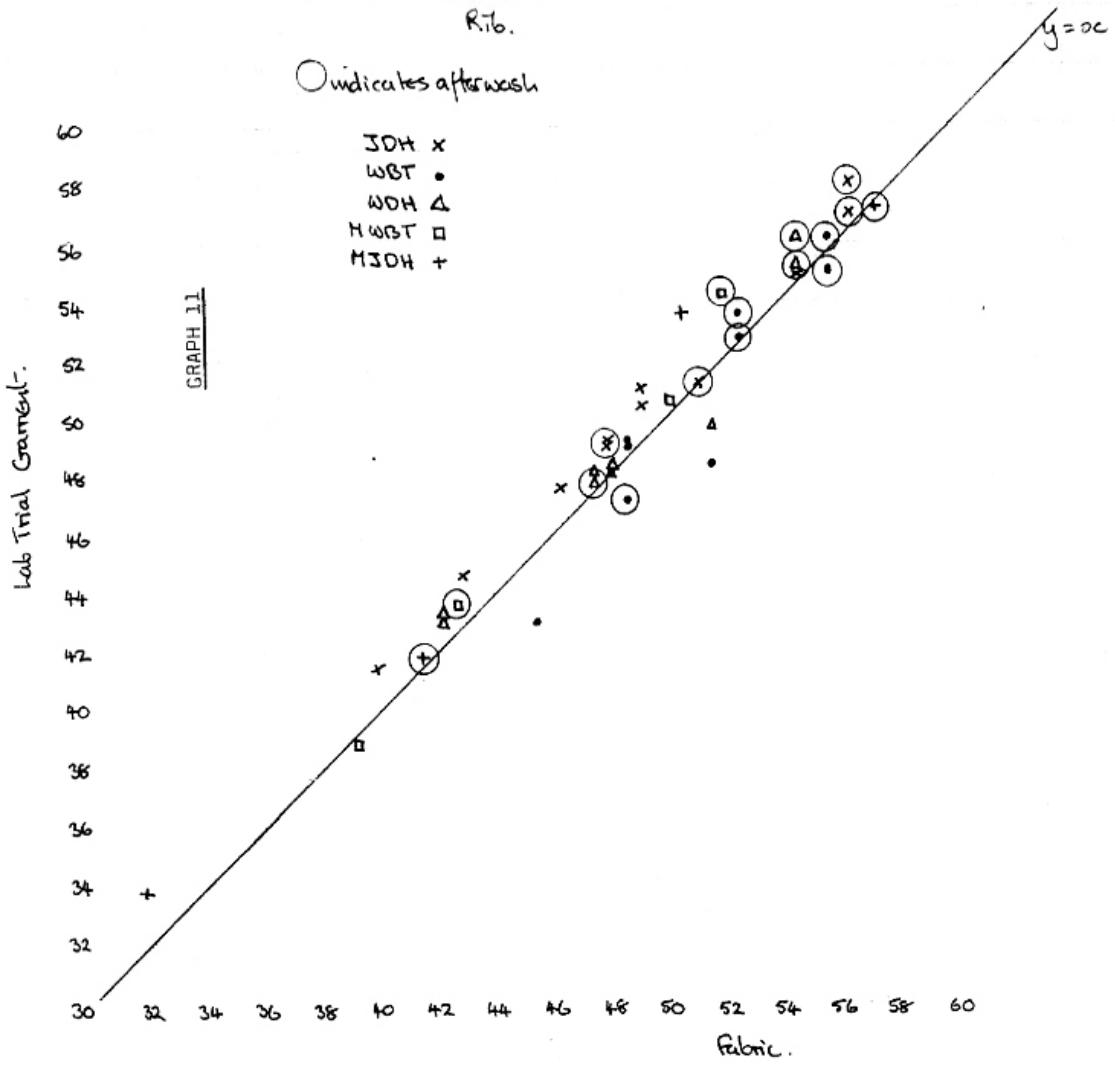


Courses/3cm on T-shirt, Singlet and Briefs.

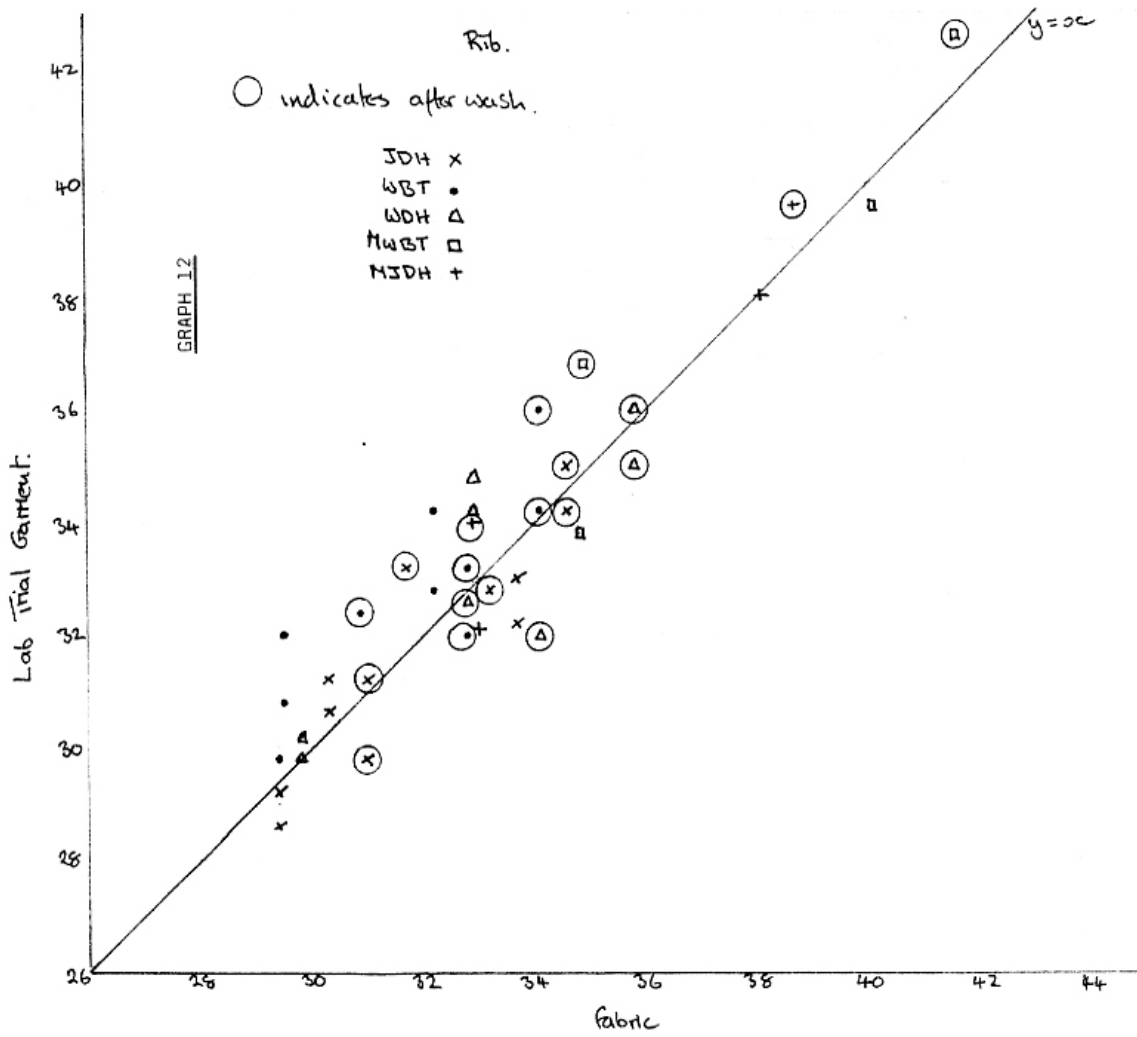
R.16.

○ indicates after wash

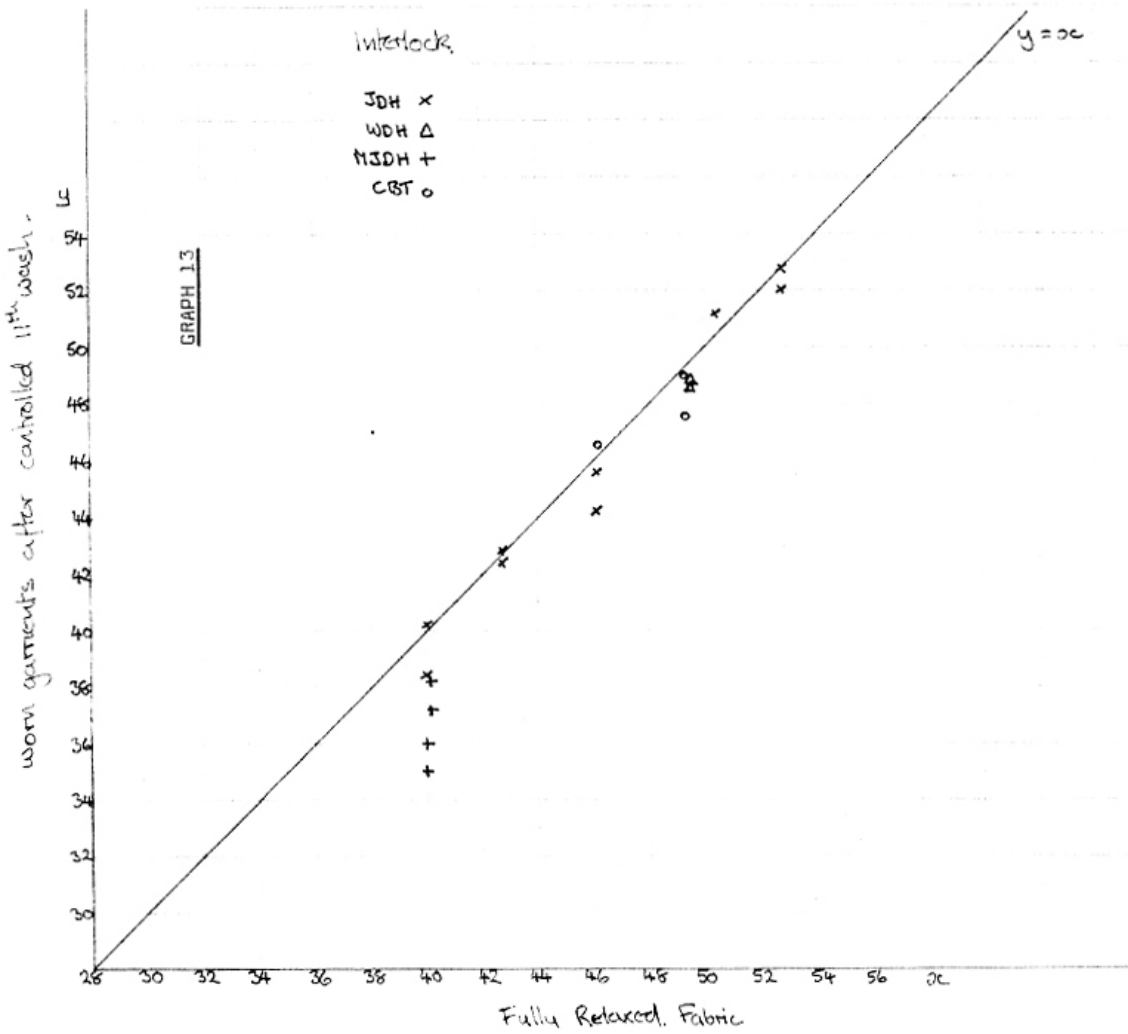
- JDH x
- WBT •
- WDH Δ
- HWBT □
- MJDH +



Wales / 3cm on T-shirt, Singlet and Briefs



Courses/3cm on T-Shirts and Singlets



GRAPH 14

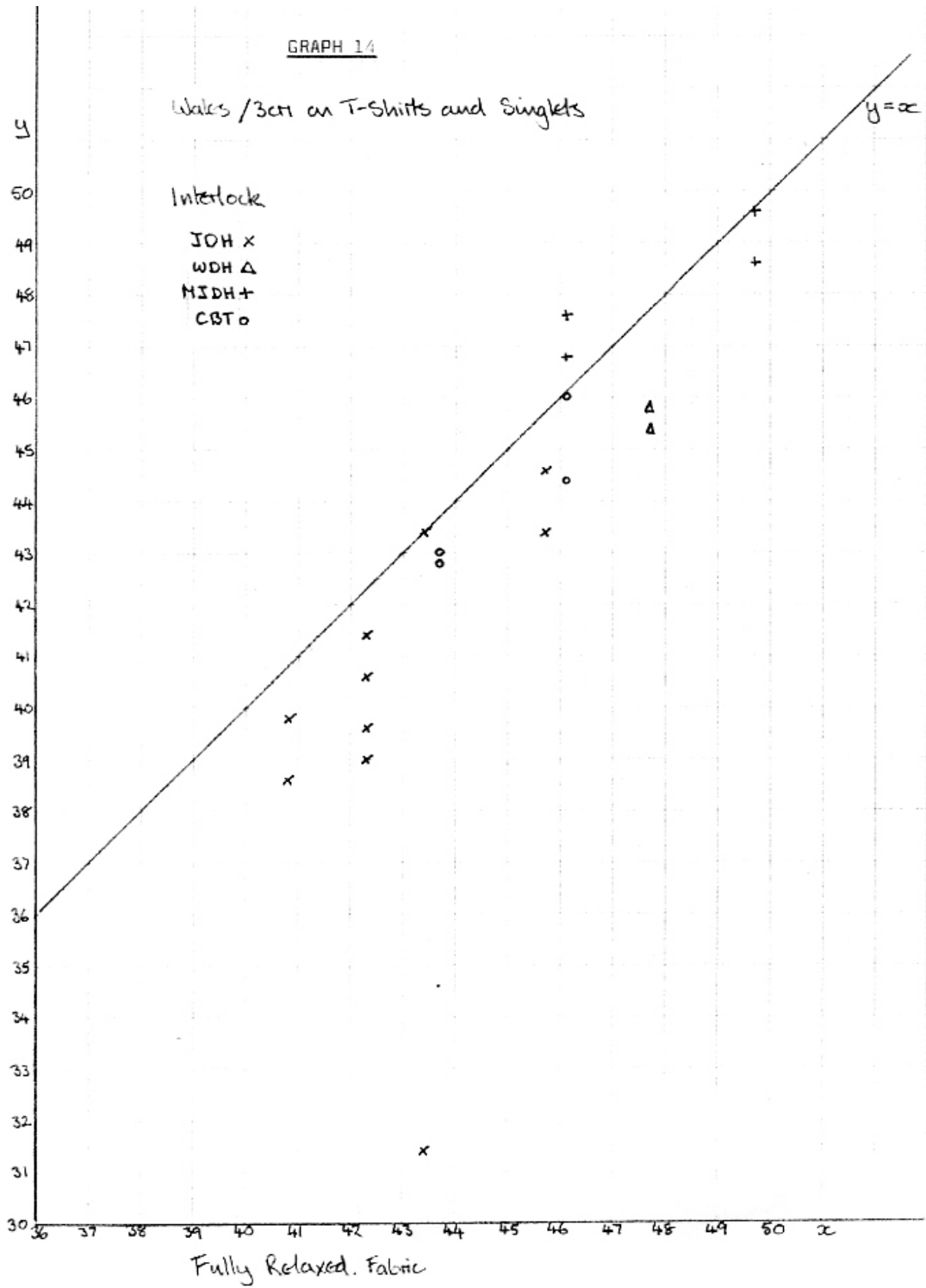
Wales / 3cm on T-Shirts and Singlets

$y=x$

Interlock

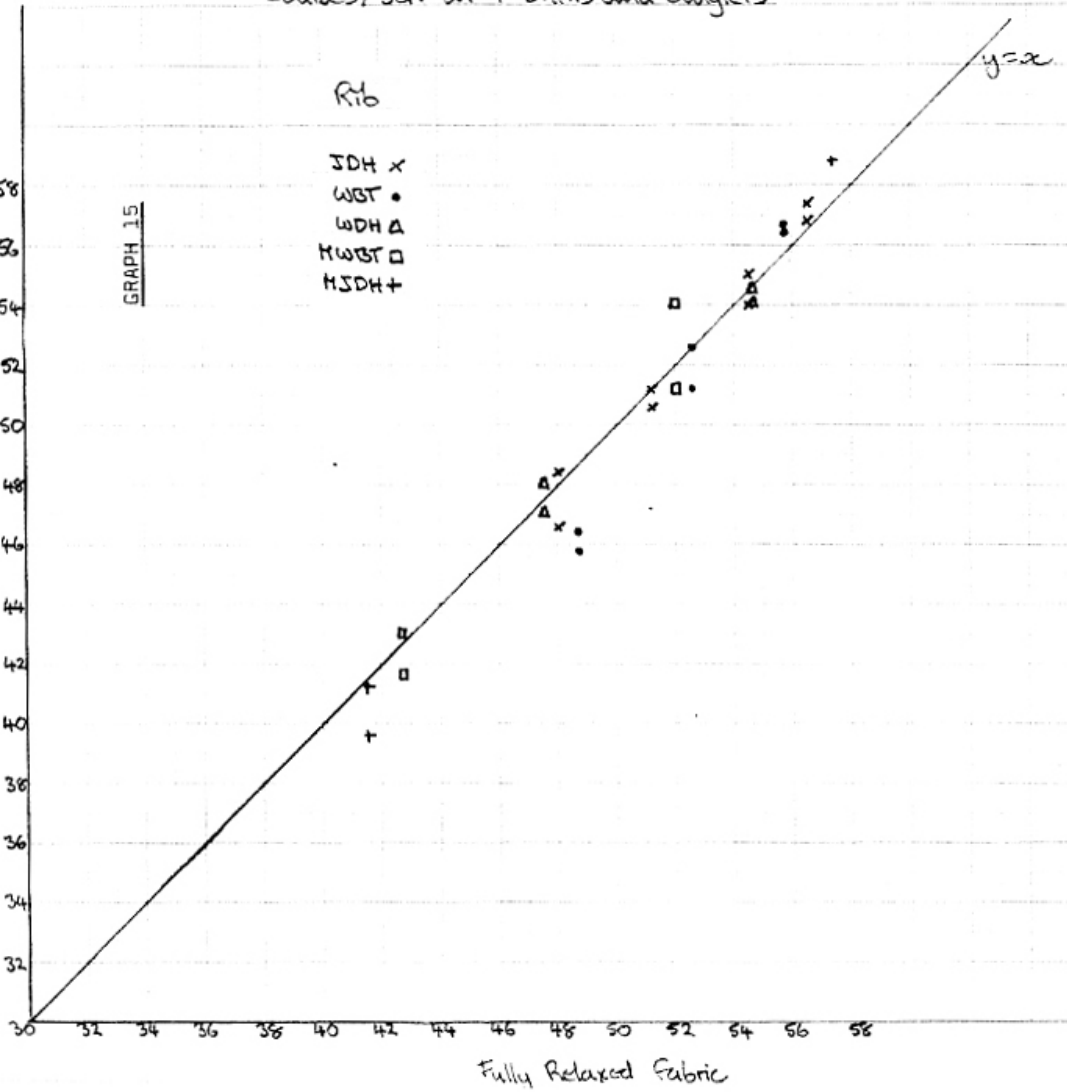
- JDH x
- WDH Δ
- MIDH +
- CBT o

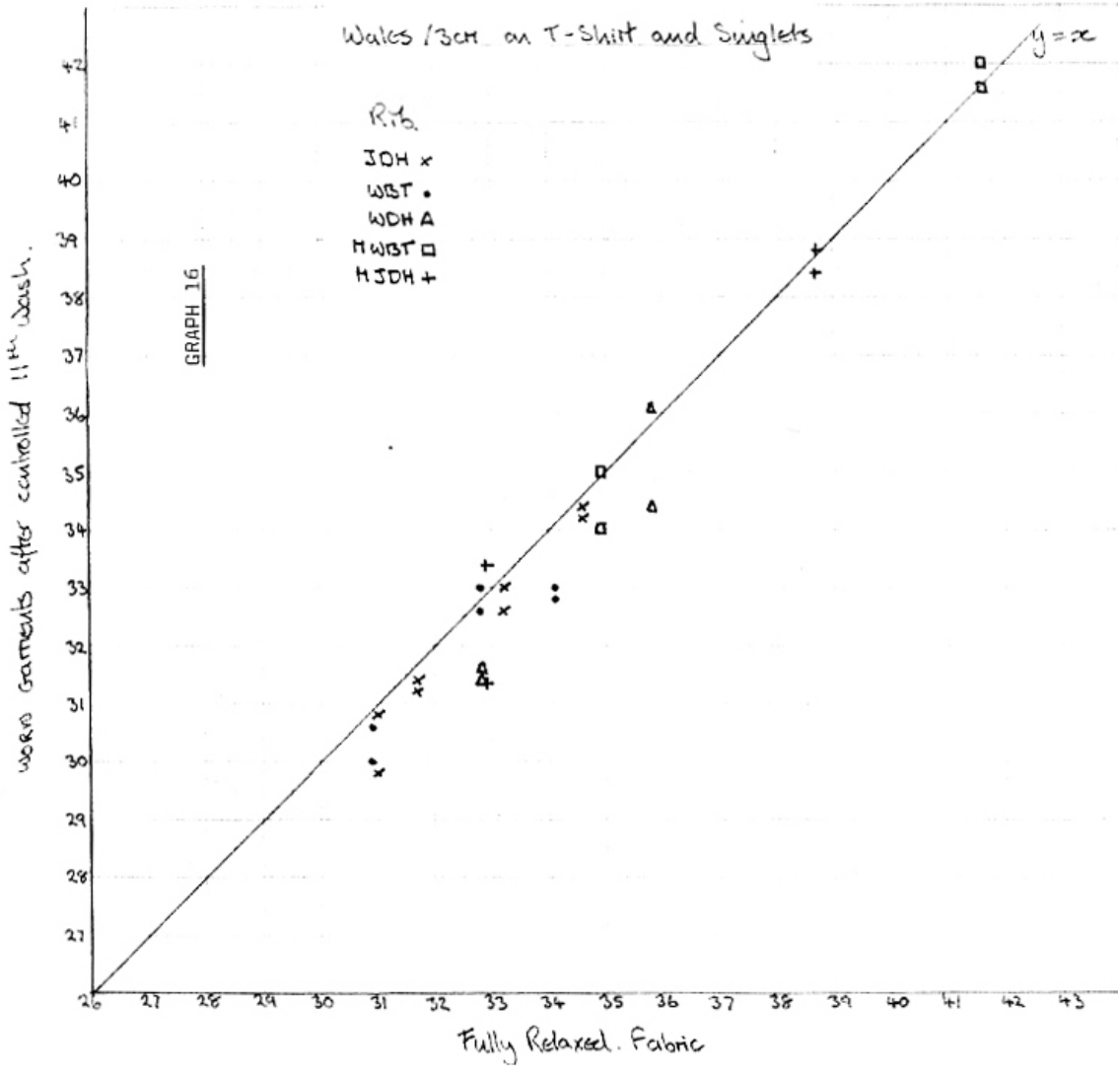
worn garments after controlled 11th wash.

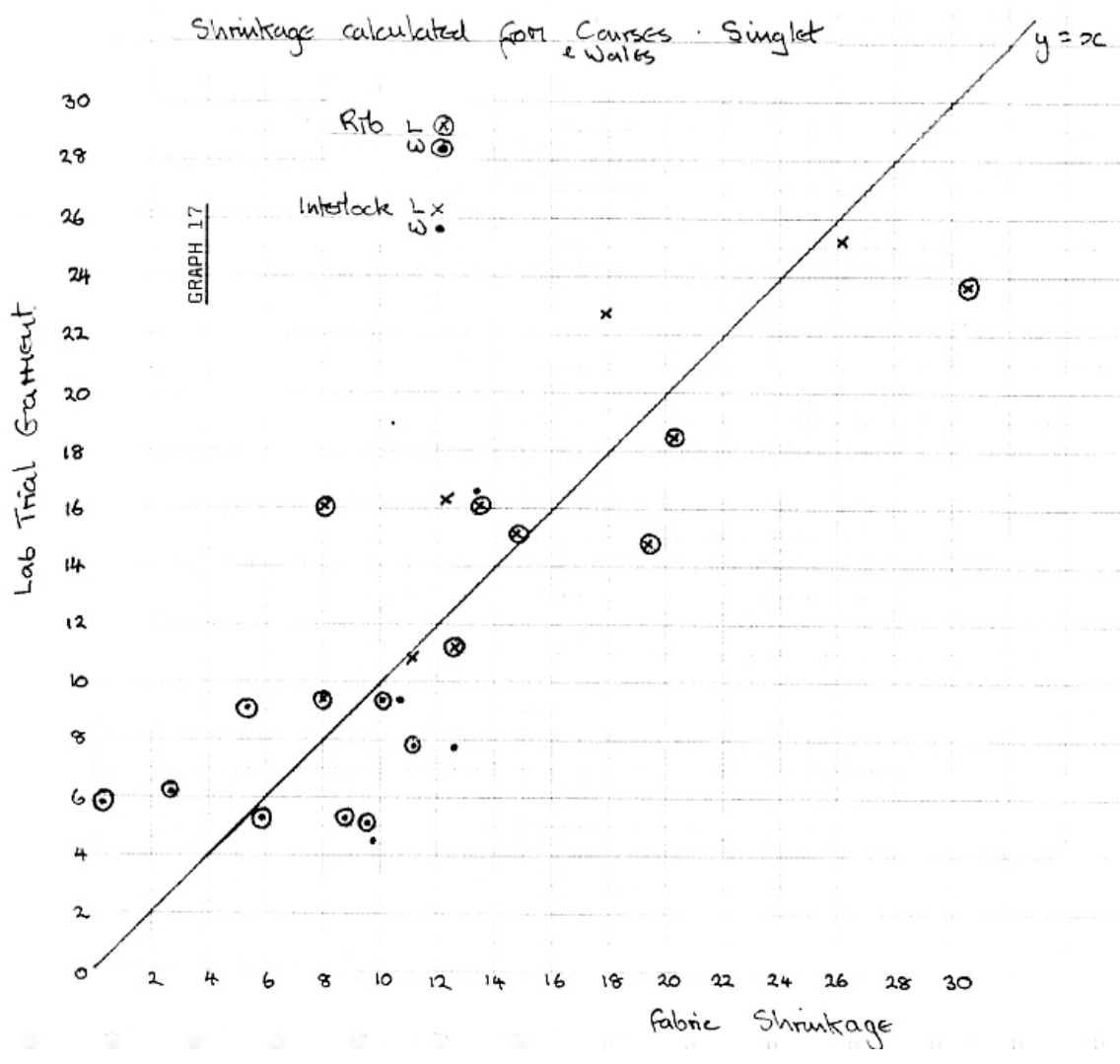


Courses/3cm on T-Shirts and Singlets

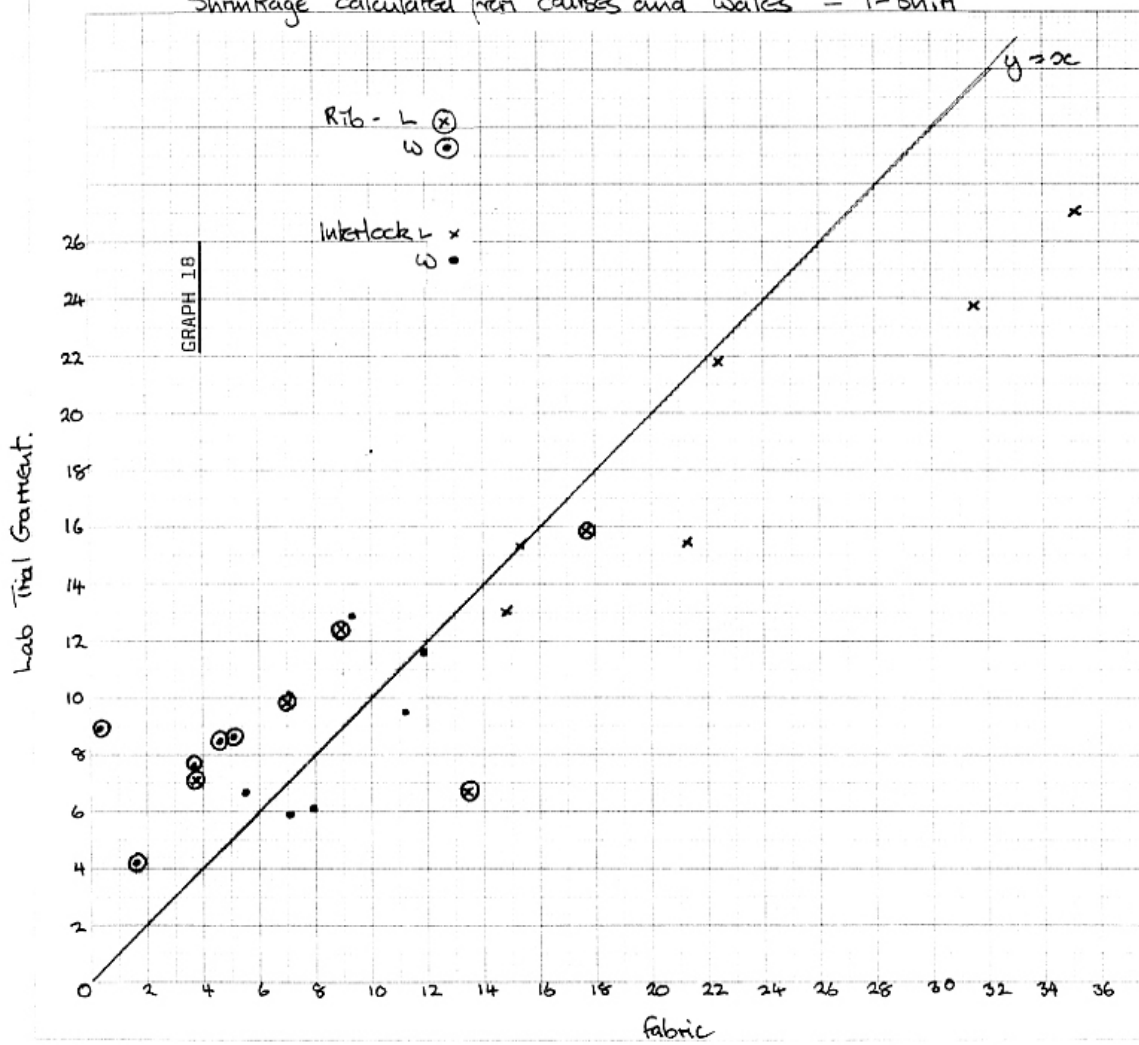
worn garments after controlled 11m wash.



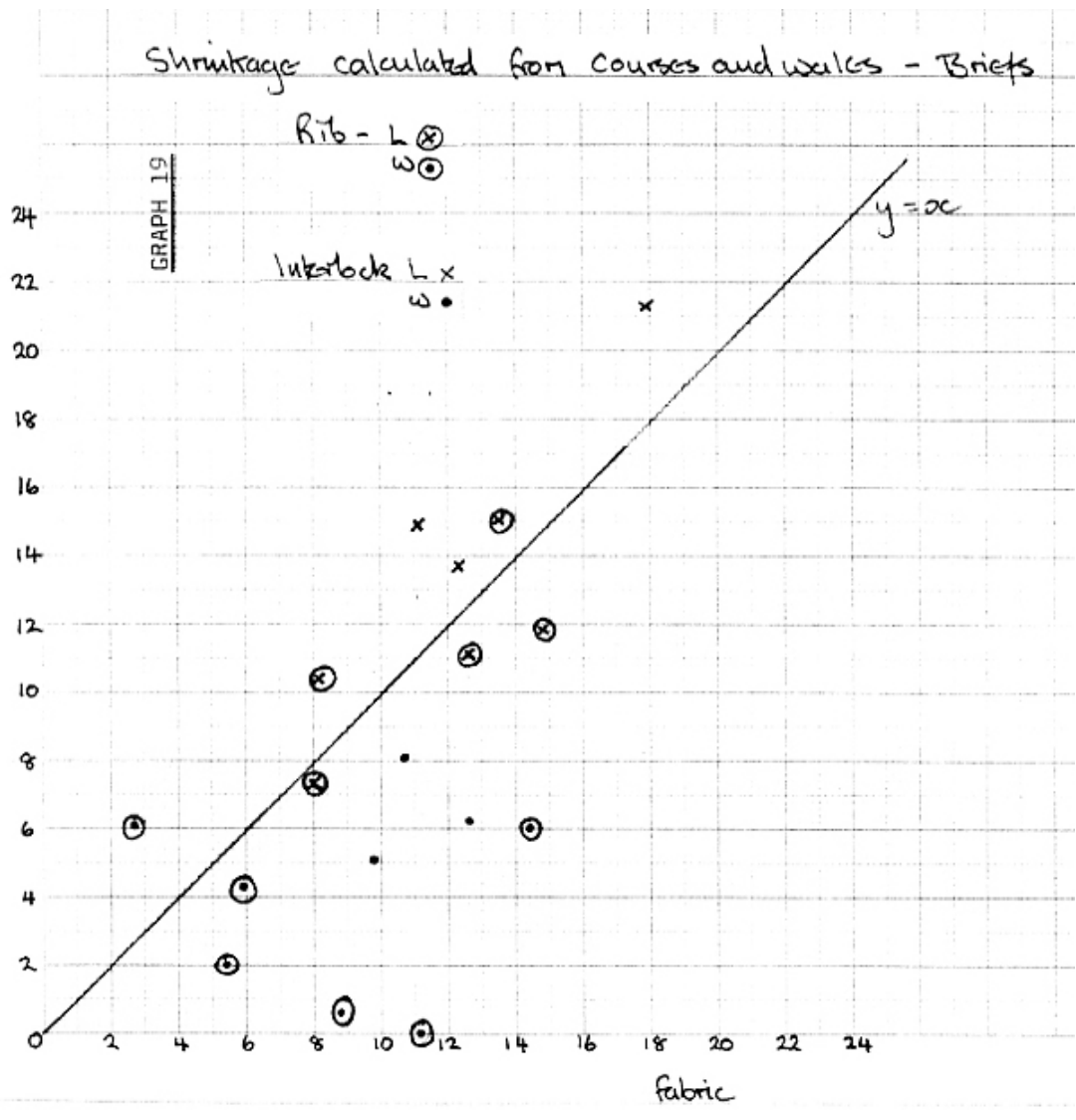




Shrinkage calculated from courses and wales - T-shirt



Lab Trial Garment.



International Institute For Cotton

Method Of Test

KT1B

Determination Of The Dimensional Changes Induced In Cotton Weft Knitted Fabrics By A Specified Relaxation Procedure.

May 1978

Principle

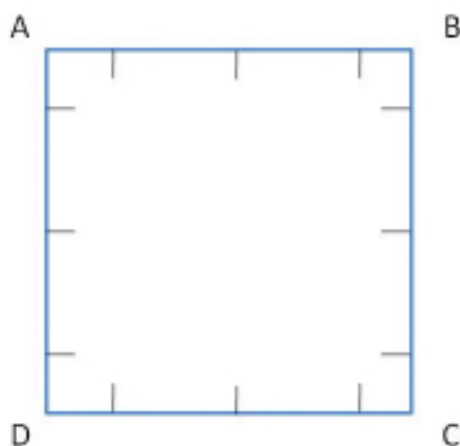
A fabric is subjected to a specified procedure and dried under the appropriate conditions, and any changes in dimensions are determined.

Method 2: By washing and tumble drying followed by soaking and tumble drying.

Apparatus

1. Hoover automatic De-Luxe washing machine.
2. Hoover tumble dryer.
3. Two Perspex templates a) 25 x 25 cm and b) 50 x 50 cm, both having equidistantly located measuring marks on all sides (*Figure 1*).

Figure 1



NB: Markings on AD are opposite those on BC (width measurement) and the markings on AB are opposite those on DC (length measurement).

4. Ruler and indelible pen.
5. A domestic automatic washing powder.
6. Lissapol NX or equivalent wetting agent.

7. Means for providing the standard atmosphere for testing textiles specified in B.S. 1051, namely $65 \pm 2\%$ RH and $20 \pm 2^\circ\text{C}$.

Test Procedure

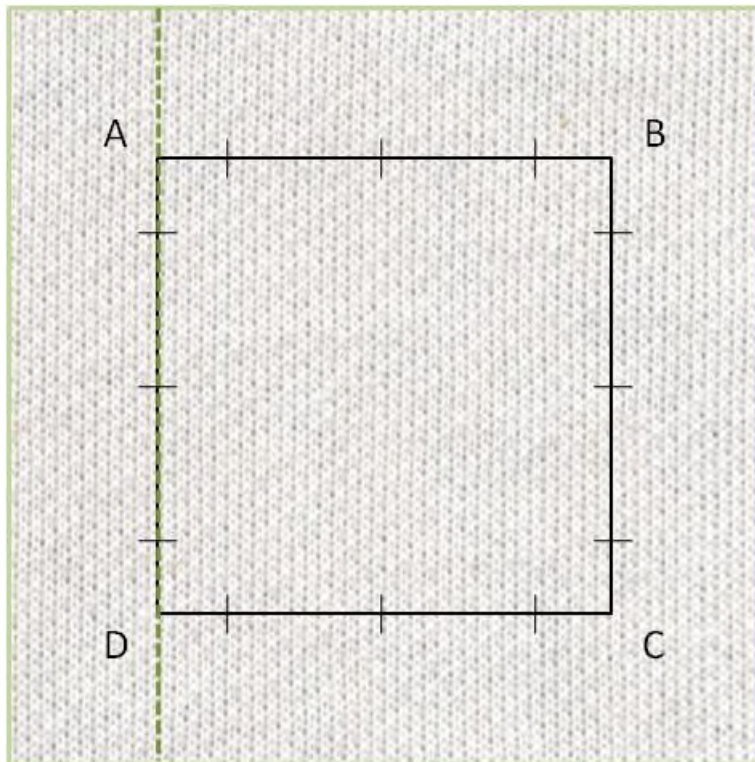
Conditioning

Samples are allowed to condition until they have reached equilibrium in the standard atmosphere for testing textiles (minimum 4 hours).

Specimen Preparation

1. The sample is laid on a flat surface removing wrinkles without stretching.
2. Five test specimens are prepared for each conditioned fabric sample, a minimum of 20cm larger in both directions than the required size of template, e.g. the 25 x 25 cm template requires a specimen of at least 45 x 45 cm.
3. The required size of template is placed centrally on the specimen so that one edge follows a wale line.
4. The test area is defined by drawing round the template. The three measuring marks are then drawn on each side of the square ABCD (*Figure 2*).

Figure 2



Laundering

1. Recommended loading for absorbent materials in a Hoover De-Luxe washing machine is 2.75 kilos (6 lb).
2. The specimens are weighed and placed in the machine. Where necessary, the load is made up to 6 lb.
3. The prescribed amount of washing powder is placed in the dispenser and the machine set to wash at 60°C with a long spin.
4. On completion of the wash cycle, the load is tumble dried at the highest temperature setting, establishing the required drying time.
5. After the first wash-and-tumble-dry cycle has been completed, the specimens are soaked in cold water with a few drops of Lissapol NX for 10 min, hydroextracted and then tumble dried for the same time as was established in 4.
6. The soaking and tumble drying is repeated a further three times, making a total of five cycles.
7. After the fifth tumble drying cycle the test specimens are conditioned before measuring.

Measurement

The specimens are laid on a flat surface, removing wrinkles without stretching.

The distances between the pairs of marks are measured and recorded.

Calculation Of Results

The mean changes in dimensions in both length and width directions are calculated and expressed as percentages of the original mean length and width respectively. The 95% Confidence Limits and the % Accuracy are also calculated.

An extension is indicated by the prefix Ext.

References

B.S. 1051

TECHNICAL SERVICES

NAME

Dept. _____

Date Issued _____

Garment Ref. _____

WEARER TRIAL REPORT

Will you please take part in a trial of
..... colour and give as much of the following
information as is relevant (see also overleaf).

Please wear a MINIMUM of.....days, hand/machine wash minimum
.....times and return to the address overleaf by.....

FIT AND COMFORT Satisfactory/Unsatisfactory.....

WHEN FIRST WORN:- comment on

a) Fit (Appearance + Shape).....

b) Sizing.....

c) Comfort (Fabric + Shape).....

FIT AND COMFORT Satisfactory/Unsatisfactory.....

AFTER WASHING:-

Comment.....

WASHING Product Used:-.....

Soaked:- Yes.....No.....

Washing Methods:-MACHINE.....HAND.....

DRYING Method:- SPUN.....DRIP.....

Final Drying:- LINE.....FLAT.....TUMBLE.....

IRONING YES.....NO.....

YOUR OPINION OF THE GARMENT PERFORMANCE

a) Fabric and Garment Appearance.....

b) Fit (Distortion Shape/Shrinkage).....

c) Sizing.....

d) Comfort.....

WOULD YOU BUY THIS GARMENT?

OTHER REMARKS

.....
.....
.....

MERIDIAN GROUP

WEARER TRIAL CALENDAR

Please tick in the appropriate column when worn.

Date	Approx. Hours Worn				Washed	Date	Approx. Hours Worn				Washed
	15	12	6	3			15	12	6	3	
1						1					
2						2					
3						3					
4						4					
5						5					
6						6					
7						7					
8						8					
9						9					
10						10					
11						11					
12						12					
13						13					
14						14					
15						15					
16						16					
17						17					
18						18					
19						19					
20						20					
21						21					
22						22					
23						23					
24						24					
25						25					
26						26					
27						27					
28						28					
29						29					
30						30					
31						31					

VISUAL ASSESSMENT OF THE WEARER TRIAL GARMENTS

Our Objective - To determine for a series of interlock and rib fabrics the effect of construction and processing routes on the wear performance of a garment.

Methods of Assessment

Two styles of garments have been used in the trial - T-shirts and Singlets. Each style will be assessed separately.

Two worn garments are to be compared with a control and assessed visually for three variables which are:-

1. Pilling

The pilling on the worn garments is to be assessed against the attached sheet of standards, numbered 1 - 5.

2. Colour Loss

The worn garments are to be compared with the control and rated numerically as the example on the sheet provided. Only the loss (fading) in colour must be compared, any change in colour should be ignored.

3. General Appearance

The worn garments are to be compared with the control and rated numerically as the example on the sheet provided. Any size difference must be ignored, but include seam puckering, shape distortion etc.

T - SHIRT

SAMPLE NO.	PILLING STANDARD	COLOUR LOSS	GENERAL APPEARANCE
1			
2			
4			
5			
16			
17			
7			
8			
28			
29			
20			
31			
30			
53			
55			
56			
31			
32			
34			
35			
37			
38			

Pilling

Use attached Pilling Standards for reference.

Colour loss

Assess garments numerically against the control on the scale 1 - 5, e.g.

- 1 - considerable loss
- 2 - poor
- 3 - acceptable loss
- 4 - small loss
- 5 - no loss

General Appearance

Assess garments numerically against the control on the scale 1 - 5, ignoring any size difference, e.g.

- 1 - unacceptable
- 2 - poor
- 3 - satisfactory
- 4 - good
- 5 - very good

SINGLET

SAMPLE NO.	PILLING STANDARD	COLOUR LOSS	GENERAL APPEARANCE
14			
15			
25			
27			
10			
12			
22			
24			
43			
44			
49			
50			
64			
65			
40			
42			
61			
63			
46			
48			
59			
60			
68			
69			

Pilling

Use attached Pilling Standards for reference.

Colour loss

Assess garments numerically against the control on the scale 1 - 5, e.g.

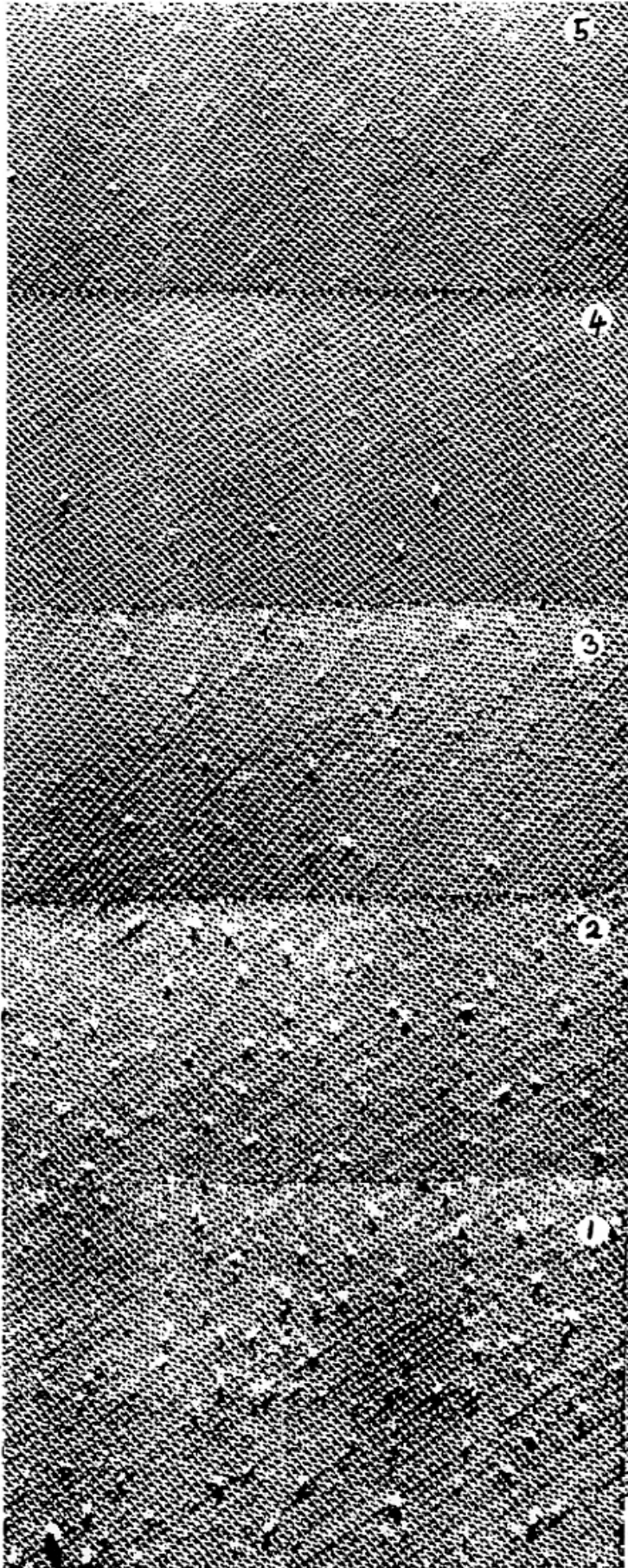
- 1 - considerable loss
- 2 - poor
- 3 - acceptable loss
- 4 - small loss
- 5 - no loss

General Appearance

Assess garments numerically against the control on the scale 1 - 5, ignoring any size difference, e.g.

- 1 - unacceptable
- 2 - poor
- 3 - satisfactory
- 4 - good
- 5 - very good

PILLING STANDARDS



5

4

3

2

1