International Institute for Cotton

Technical Research Division

Manchester

Research Record No. 94

Central Project 1978: Phase 2
The Operations Of Dyeing And Finishing

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Key Words: Interlock, 1x1 Rib, Bleaching, Dyeing, Finishing, Compaction

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CONTENTS

Figures & Tables

Introduction

This report describes the dyeing and finishing operations which were carried out at Meridian Dyers during the period June - November 1978, on the fabrics which were knitted at Meridian, as outlined in Research Record No. 83.

These consisted of two basic constructions - 24" diameter 20 gauge interlock and 24" diameter 14 gauge 1x1 rib, each basic construction having been knitted in a range of yarn count/stitch length combinations as listed below.

Interlock

Yarns, Ne	1/34		1/38		1/42
Stitch lengths, cm	0.307	0.324	0.340	0.359	0.377

1x1 Rib

Yarns, Ne	1/26		1/30		1/34
Stitch lengths, cm	0.267	0.285	0.306	0.326	0.350

additionally, 1/34 Ne knitted at 0.248 cm

This report is intended to be a record of processing details, measurements and observations made during the processing stages.

No test data or conclusions are given in this report. These will be presented in a later report once the test data have been processed.

Additionally, reference is made to fabrics destined for resin finishing. At the time of writing this report, this work has yet to be started and this, again, will be the subject of a further report.

Fabric Coding

In the case of the interlock, either six or ten 50-metre lengths, depending on the variant, were knitted, and these were given an individual piece number i.e. 1 - 10.

In the case of the rib, the piece lengths were of 100 metres and, therefore, fewer rolls were knitted - either 3 or 4 depending on the variant - and these were marked 1 - 4.

Each individual piece of fabric was allocated a code number which it retained throughout the entire project. The code has already been described in *Research Record No. 83*, but for convenience it is illustrated below.

Examples

Code	Fabric Type	Yarn Ne	St.Length, cm	Piece No.
I/34/359/2	Interlock	1/34	0.359	2
R/26/326/3	1x1 Rib	1/26	0.326	3

During preliminary discussions on finishing routes it became apparent that the rib fabrics would have to be split in half, so that fabrics could be included in as many processing routes as were of interest. In order to avoid confusion, the rib fabrics were remarked as follows.

Example

R/26/326/3 i.e. Piece No. 3

was cut into two equal halves and remarked as

R/26/326/31 and R/26/326/32

In this way, the original piece number, i.e. 3 was retained in the code.

Prior to processing, the fabrics were arranged into 3 sets which consisted of:

Set 1 Dyeing and finishing without mercerising;

Set 2 Reserve;

Set 3 Dyeing and finishing including mercerising.

Set 2 was a reserve set of all fabric variables, both interlock and rib, and was intended to be a back-up set in case of accidents. In the event, no such accidents occurred and therefore no further reference is made to Set 2 in this report.

As well as the code number marked at each end of the pieces, danger points (change of stitch length etc.) were marked and, also, one end of every piece was marked START. The start end of every piece was the first end to be passed through any process. In this way, it was ensured that sampling was carried out on the end of the piece which had been processed once the correct machine settings had been obtained. This involved reversing the fabrics after each processing stage, but was considered to be essential if the testing was to be meaningful.

Processing Routes

As well as the effects of construction variables on the final fabric performance, it was intended to also study the effect of the processing route. The main comparisons intended for study were:

1. Winch versus jet dyeing;
2. Winch versus continuous bleaching;
3. Processing with and without pre-mercerising.

To carry out these comparisons with every constructional variable would have resulted in a programme which would have been too large and expensive. It was therefore decided that instead of the full range of variables, only six selected fabrics of particular commercial interest, should be processed through certain processing routes. These particular fabrics are identified in *Table 1*. For clarity, it will probably be useful if the normal processing sequences used at Meridian Dyers are outlined at this point, so that divergences from the norm can be made apparent.

Dyeing with Reactive Dyestuffs

Either

Thies R-Jet 95 atmospheric jet machine (*Figure 1*) with three fabric ropes, each of approximately 500 metres (Liquor Ratio approximately 6:1),

Or

Shallow-draught type winch becks holding six or more ropes each of 80 - 100 metres (Liquor Ratio approximately 18:1).

Depending on the shade required, the fabric is either pre-scoured or pre-bleached in the dyeing machine prior to the dyeing operation.

Following the dyeing operation, the fabrics are treated with cationic softeners whilst still in the dyeing vessel. Following dyeing, the fabric is hydroextracted and dried in tubular form on a Pegg drying and finishing machine (*Figure 2*).

Winch Bleaching

This is usually only applicable to small lots where white is just one of the shades in a multicoloured order. It consists of a combined hypochlorite-caustic-peroxide bleach, incorporating optical brightening agents.

As with the dyed lots, cationic softener is usually applied in the winch prior to hydroextraction. Drying is carried out on the Pegg drying and finishing machine.

Continuous Bleaching

The majority of white interlock underwear fabric is processed on the Fleissner continuous bleaching range. The range is outlined in *Figure 3* and consists of a saturator section, a steaming section and a washing, neutralising and softening section.

The chemical feed to the saturators is automated using "Polymetron" control equipment.

The steamer consists of an endless wire mesh conveyor band which transports the fabric in plaited form horizontally through the steaming enclosure. The steaming time is of the order of 30 minutes at a temperature of 105°C. The fabric is then passed through a 4-beck suction drum washer equipped with sprays.

Tank 1 Hot water

Tank 2 Hot water

Tank 3 Acetic Acid

Tank 4 Softener

Drying is carried out on a Fleissner perforated suction drum (6 drums) dryer, equipped with a new feed-in section. In this way the fabric can be adjusted in width prior to being overfed onto the first drum. Both the continuous bleaching range and the dryer are capable of processing three strands of fabric simultaneously.

Compaction

With some fabric qualities, the only finishing treatment given, following drying, is to calender and plait the fabric, ready for parcelling. This is either carried out on a Arbach plaiter or a Heliot calender-plaiter.

For better dimensional stability, however, many of the fabric qualities processed at Meridian are compressively shrunk on one of two types of machine.

Tubetex Compactor (*Figure 4*)

With this type of machine, compaction is achieved in two stages and operates on opposite sides of the fabric tube. The compacting rollers are of relatively small diameter (5") and have engraved metal surfaces. Prior to reaching the compacting stations, the fabric is passed

through a metal detector, over a driven spreader of adjustable width and through a steaming box. Because the compacting rollers have metallic surfaces, this machine tends to produce a high degree of glaze on the fabric surface. Although a high degree of compaction is possible, its use is limited mainly to white goods or pale shades because of the glaze problem.

Hunt & Moscrop - Bestan (*Figure 5*)

Most coloured fabrics are passed through this machine. The compaction rollers are somewhat larger than the Tubetex rollers (15" and 12" diameters) and are covered with ebonite and soft rubber, giving a less severe glazing problem. Because there is only one compacting zone, however, the degree of compaction possible on this type of machine is somewhat lower than with the Tubetex machine. A recent addition to the machine has been a driven expander unit which gives some degree of control to fabric width.

Hydroextraction

Following dyeing or bleaching in a jet or winch, the fabric is dewatered in a centrifuge, which can result in badly creased fabric which requires de-twisting on the Pegg drying machine, and this results in additional back tension. During the course of these trials, Meridian took delivery of a machine which it is hoped will replace the hydroextractors. The machine, which is illustrated in *Figure 6*, uses compressed air to de-twist the fabric rope, which is then passed over a stretcher frame, using overfeed, and through a nip to remove excess liquor. The machine, named the Airtex, is of Swedish manufacture and was used in the second stage of processing for the application of softening agent to the trial fabrics. Because the fabrics had already been calendered however, the machine was simply being used as a padder.

Divergences From Normal Practice

The application of softening agent is normally integrated into the dyeing or bleaching processing cycle. One of the objectives of this project, however, is to study resin finishing of these fabrics as a separate exercise and the pretreatment of fabric with softener is undesirable. Since these fabrics were required to be bleached/dyed in the first instance, it was logical to remove the fabric for resin finishing after the dyeing operation, once the fabric had been dried. This meant that the remainder of the fabric had to be reprocessed in order to apply softening agent which is necessary not only for handle but as an aid to compaction.

As a result of this, two separate processing stages were necessary and these are outlined.

Stage 1

> Bleaching/dyeing without softener, hydroextraction, drying, calendering to width, sampling for testing.
>
> Fabric for resin finishing trials was removed at this stage and the pieces re-marked.

Stage 2

> Application of softening agents on the Airtex, drying, compacting, sampling for testing.

Since all Stage 1 processing was to be completed before starting Stage 2, it was necessary to store a large quantity of fabric in the part-processed state. In order to aid identification, and indeed to keep the fabric clean, each batch of fabric was parcelled in individual pieces and removed to a separate storage area. The fabric for resin finishing was transported back to Manchester for storage.

Targets

In preliminary discussions the following stability targets were agreed.

	Interlock	1x1 Rib
Length, max:	5%	5%
Width, max:	10%	8%

The test method to be used, being the IIC method - Hoovermatic machine wash at 60°C, tumble dry, wet-out and tumble four times, 50cm square - five replications.

In order to be able to approach these targets, it was necessary to calculate finishing widths from the fully relaxed structure of each of the fabric variables from grey state. This was necessary in order that the fabrics could be assembled for processing in ascending or descending order of width, so that width adjustments on machines equipped with stretcher frames could be achieved in an orderly manner.

In the event, the predicted finishing widths calculated from the fully relaxed structure from grey state were generally too low. The reasons for this will be discussed in a later report.

The target widths in Stage 2 of processing were therefore somewhat different from those in Stage 1.

The final finishing targets were obtained by carrying out additional testing prior to the compacting stage.

For length shrinkage or extension, the measurement of courses over a distance of 3 cm gives a fairly accurate guide to what is happening to the fabric on a particular machine. Having a target course level is an essential requirement, particularly at the compacting stage.

Throughout Stages 1 and 2 processing, fabric width and course counts were measured at as many convenient points as possible. In this way, the behaviour of a particular fabric construction to a particular process or machine could be monitored. Even though achieving target widths and course levels was one of the main objectives, at no time did this override the need to produce fabric of commercial acceptance in terms of appearance.

The rest of this report is a detailed record of individual processing conditions and measurements.

Processing Details

The Set 3 fabrics were mercerised on an Omez merceriser, installed in an Italian finishing works. This operation will be the subject of a separate Research Record.

During the dyeing of these mercerised fabrics, the same dyeing recipes were used as were used for the unmercerised fabrics, thus resulting in deeper shades. This was done so that Meridian could assess the benefits of mercerising in terms of achieving otherwise unobtainable shades rather than the economies in dyestuff saving which the mercerising could give.

For recording purposes, it was necessary to allocate each batch processed a Lot number. Since it was intended to use pieces of the same number within a batch, the Lot number used was in fact kept the same as the piece numbers. In this way, the original piece markings not

only indicated the construction, but also the process route.

The finishing routes plan is given in *Tables 2 & 3*.

Set 1 Processing (Unmercerised Fabrics)

Lot No. 1 and 2: Jet dyed interlock (shade red)		
Stage 1	Preparation and dyeing details	Table 4A
	In-Process measurements	Table 4B
Stage 2	Airtex Softened	4% owf Alcamine 544 4% owf Sapamine OC
	In-Process measurements	Table 4C

Lot No. 7: Winch bleached interlock Small batch of the six selected pieces shown in *Table 1*. Processed with a bulk lot and removed after bleaching prior to softener addition		
Stage 1	Scouring & bleaching details	Table 5A
	In-Process measurements	Table 5B
Stage 2	Airtex Softened	4% owf Alcamine 544 4% owf Sapamine OC
	In-Process measurements	Table 5C

Lot No. 8: Winch dyed interlock (shade light blue) Small batch of the six selected pieces shown in *Table 1*.		
Stage 1	Bleaching & dyeing details	Table 6A
	In-Process measurements	Table 6B
Stage 2	Airtex Softened	4% owf Alcamine 544 4% owf Sapamine OC
	In-Process measurements	Table 6C

Lot No. 9 & 10: Continuously bleached interlock Small batch of the 2 x six selected pieces shown in *Table 1*.	
Stage 1	With this process it is not possible to treat the fabrics without softener as this is an integral part of the operation. The purpose of carrying out the processing in two stages was to be able to compare finishing both with and without compaction. It was therefore necessary in stage 1 to aim for target widths and in order to achieve this the fabrics were run over a Heliot calender.

	Bleaching details	Table 7A
	In-Process measurements	Table 7B
Stage 2	Stage 2 was necessary because the fabrics were then too wide for the compactor: 3-5 cm below the target is desirable for the Tubetex compactor. To reduce the width, re-wetting was necessary and this was carried out by passing the fabrics through the bleaching range for a second time, but using water in the saturator.	
	Re-adjustment of width	
	In-Process measurements	Table 7C

Lot No. 11 & 12: Jet dyed Rib (shade navy)		
Stage 1	Scouring & dyeing details	Table 8A
	In-Process measurements	Table 8B
Stage 2 Lot 11 only	Airtex Softened	4% owf Alcamine 544 4% owf Sapamine OC
	In-Process measurements	Table 8C

Lot No. 41: Winch bleached 1x1 Rib Small batch of the six selected pieces shown in *Table 1*. These were processed with a bulk lot and removed after bleaching prior to softener addition		
Stage 1	Scouring & bleaching details	Table 9A
	In-Process measurements	Table 9B
Stage 2	Airtex Softened	4% owf Alcamine 544 4% owf Sapamine OC
	In-Process measurements	Table 9C

Lot No. 42: Winch dyed 1x1 Rib (shade light blue) Small batch of the six selected pieces shown in *Table 1*.		
Stage 1	Bleaching & dyeing details	Table 10A
	In-Process measurements	Table 10B
Stage 2	Softened in the winch	4% owf Alcamine 544 4% owf Sapamine OC
	Dewatered on the Airtex	
	In-Process measurements	Table 10C

Set 3 Processing (Mercerised Fabrics)

Lot No. 5 & 6: Jet dyed Interlock (shade red)		
Stage 1	Bleaching & dyeing details	Table 11A
	In-Process measurements	Table 11B
Stage 2	Airtex Softened	4% owf Alcamine 544 4% owf Sapamine OC
	In-Process measurements	Table 11C

Lot No. 31A & 32: Jet dyed Rib (shade navy)		
Stage 1	Scouring & dyeing details	Table 12A
	In-Process measurements	Table 12B
Stage 2	Airtex Softened	4% owf Alcamine 544 4% owf Sapamine OC
	In-Process measurements	Table 12C

Lot No. 41: Winch bleached 1x1 Rib Small batch of the six selected pieces shown in *Table 1*. Scouring & bleaching carried out with a bulk lot		
Stage 1	Scouring & bleaching details	Table 13A
	In-Process measurements	Table 13B
Stage 2	Airtex Softened	4% owf Alcamine 544 4% owf Sapamine OC
	In-Process measurements	Table 13C

Observations

The following general observations were made as the various operations were carried out. They are made in light of what was actually observed and also, to some extent, what was deduced from the test results of the fabrics after Stage 1 processing.

1. The target finishing widths determined from grey fabric testing proved to be too low, due to a larger-than-expected discrepancy between the fully relaxed wales from grey state to dyed state.
2. Because of this, many of the fabrics were almost at target width (some were in fact wider) after hydroextraction, and this gave very little opportunity to either eliminate bowing or to obtain overfeeding on the Pegg dryer.
3. Additionally, because it was not possible to stretch the fabric in the width direction during drying, dyeing creases, and in particular winch creases, were not eliminated.

4. Jet-dyed fabrics and in particular jet-dyed interlock fabrics were always wider than the corresponding winch-dyed fabrics.
5. Winch dyeing or bleaching extends the fabric length more than a jet treatment.
6. The Fleissner continuous bleaching range extends fabric length to a high degree, which is not only apparent in a low course count, but also in narrow fabric at the end of the washing range.
7. Jet dyeing causes more fibre disturbance than winch or continuous processing. This is revealed in poorer stitch clarity, more surface hairiness and, in the case of the mercerised fabrics, a loss in lustre.
8. It was possible to approach target course levels when compaction was carried out on the Tubetex machine.
9. The level of compaction obtainable on the Bestan machine was not very great. The amount of compaction which could be introduced was limited by fabric appearance - orange peeling occurring at relatively low levels of compression.

These are only broad observations. More detailed conclusions relating to effects of processing routes on final fabric properties will be made once final testing has been concluded.

Acknowledgement

The dyeing and finishing operations outlined in this report have been carried out with the utmost of co-operation from departmental managers down to machine operatives and for this the author is most grateful.

Particular thanks are due to Mr. Russell Cox (Development Manager at Meridian), who has organised the processing, assembled fabrics and generally made sure that the processing did not interfere too much with normal production schedules.

Without this kind of co-operation a project of this size would be virtually impossible to undertake.

Figure 1: Thies R-jet 95 Dyeing Machine

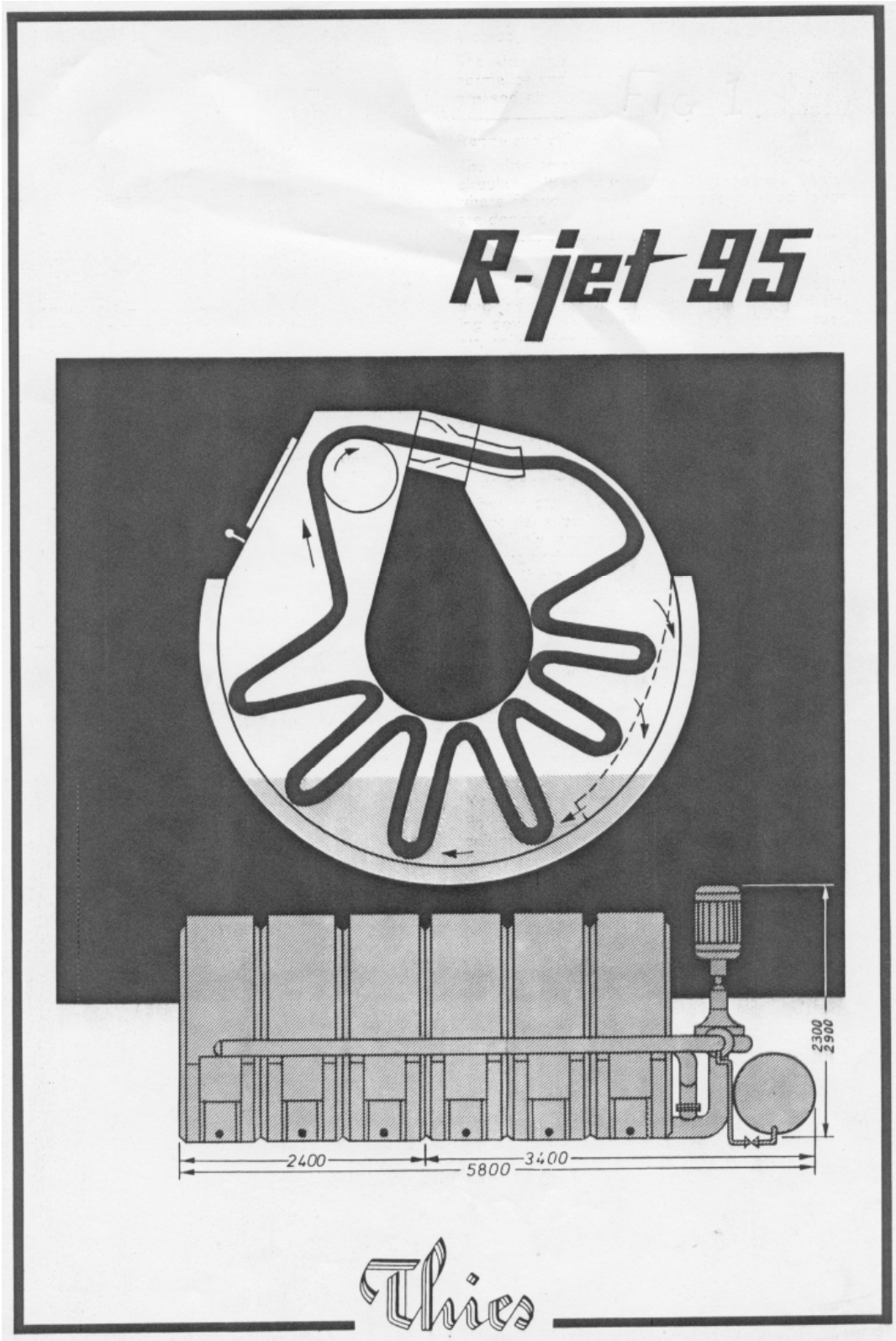
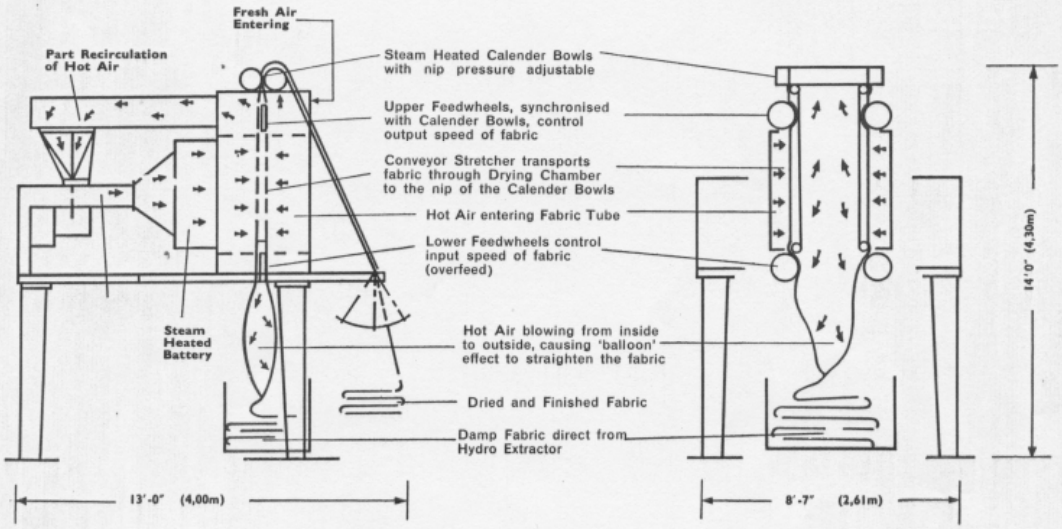


Figure 2: Pegg Tubular Drying Machine

PEGG

DIAGRAMMATIC ARRANGEMENT OF PEGG DRYING AND FINISHING MACHINE



SHIPPING SPECIFICATION

Packed in two cases

	Case No. 1	Case No. 2
Gross Weight (approx.)	3 tons 10 cwts. (3555 kgs.)	7½ cwts. (380 kgs.)
Case Size (approx.)	150″ x 95″ x 95″ (380 cms x 241 cms x 241 cms)	75″ x 41″ x 35″ (190 cms x 104 cms x 89 cms)

SAMUEL PEGG & SON LTD

BARKBY ROAD · LEICESTER · ENGLAND

Telephone: Leicester766651 Telex: 34311

Telegrams: Pulsator, Leicester

Figure 3: Fleissner Continuous Bleach Range

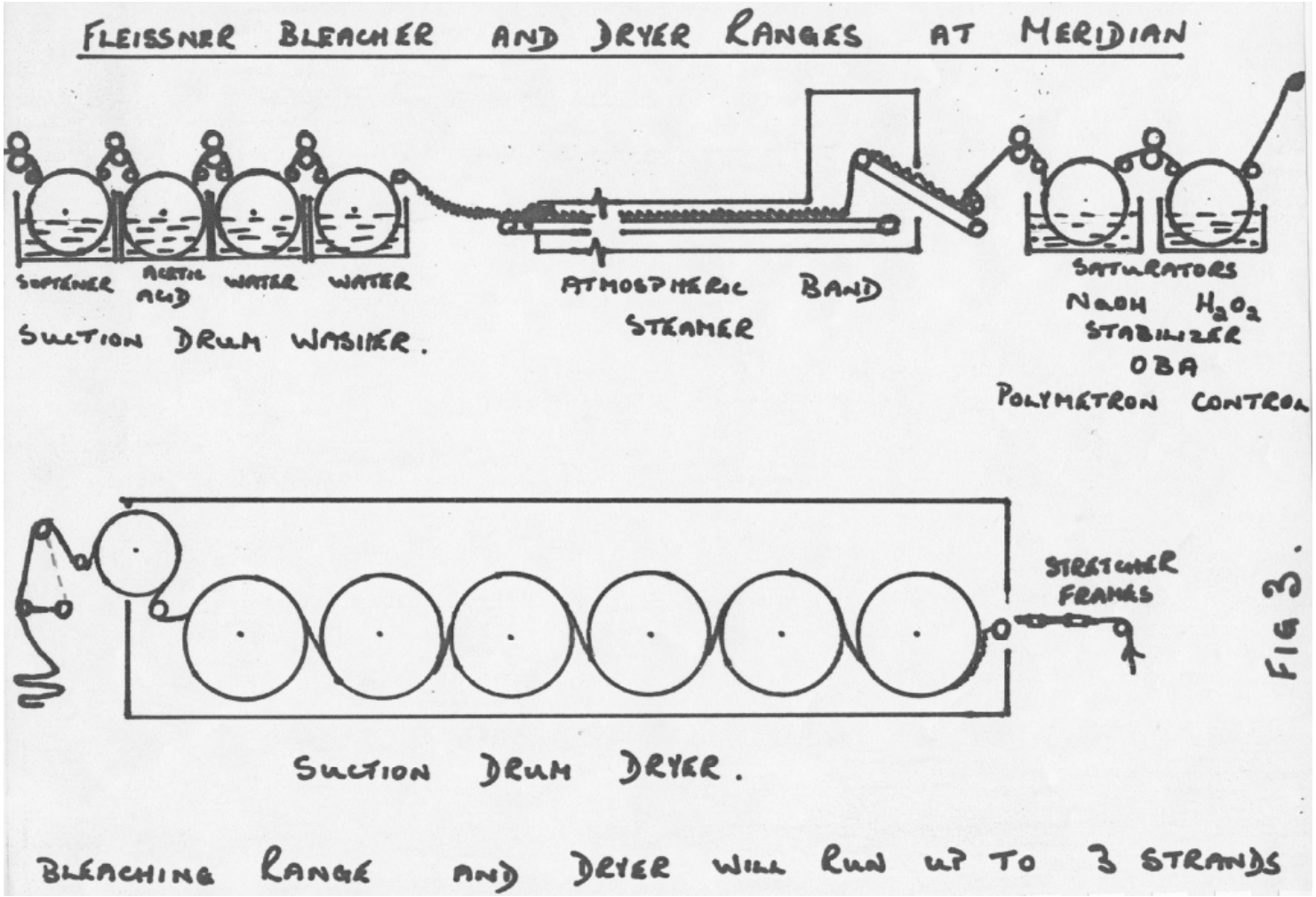


Figure 4: Tubetex Pak-nit Compactor

Figure 5: Hunt & Moscrop Bestan Compactor

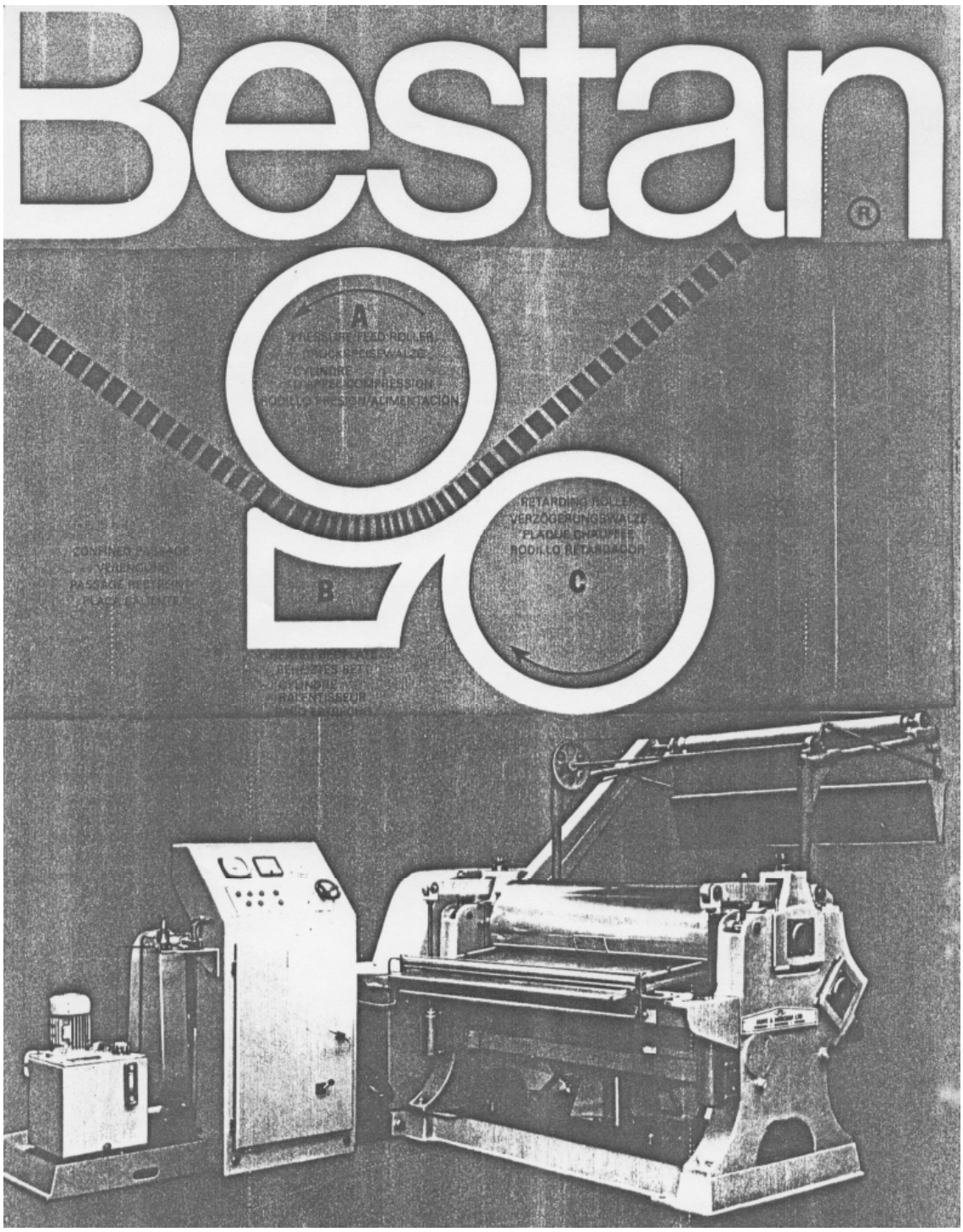
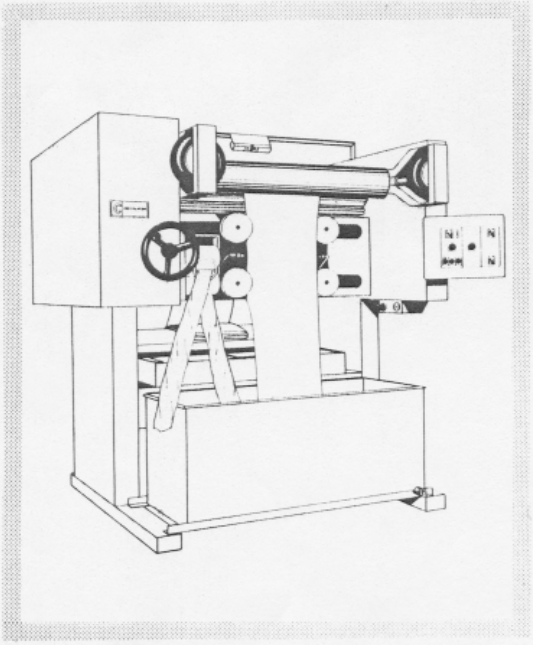


Figure 6: Airtex Spreader & Padder

airtex



UTILIZATION
Tubular fabrics

OPERATION
From a bin or similar, the fabric rope goes

- through a twin-roller feeding device
- into a water tank
- upwards over a fabric expander with two pairs of feeding rollers (the first pair with adjustable over-feed).
- between two squeezing rollers (one being a Roberto roller)
- via a photocell speed synchronization device to a conveyor
- down to plaiting

ELIMINATES
Separate processes for
De-twisting
Hydroextracting
Wet plaiting

TECHNICAL DATA
Width fabric: up to 900 mm
Speed: 0–25 m/min, infinitely variable
Residual moisture: 50–65% depending on fabric
Compressed air: 2–4 bar
Power: 220 V, 50/60 cycles, 1-phase
Measurements: 205 x 175 x 187 cm
Weight: net 1.050 kgs

RESULT
Squeezed
Straight → fabric
Normalized
Plaited

with
minimized moistness
even yield

airtex cares for your textiles

Table 1: Fabrics of Particular Interest Included in Every Finishing Route

Interlock

Yarn	Stitch Length, cm				
	1	**2**	**3**	**4**	**5**
1/34	0.307	0.324	**0.340***	0.359	**0.377***
1/38	0.307	**0.324***	0.340	**0.359***	0.377
1/42	**0.307***	0.324	**0.340***	0.359	0.377

1x1 Rib

Yarn	Stitch Length, cm				
	1	**2**	**3**	**4**	**5**
1/34	0.267	0.285	**0.306***	0.326	**0.350***
1/38	0.267	**0.285***	0.306	**0.326***	0.350
1/42	**0.267***	0.285	**0.306***	0.326	0.350

*** Fabrics included in every finishing route**

Table 2: Interlock Finishing Route Plan

Piece lengths 50 metres nominal

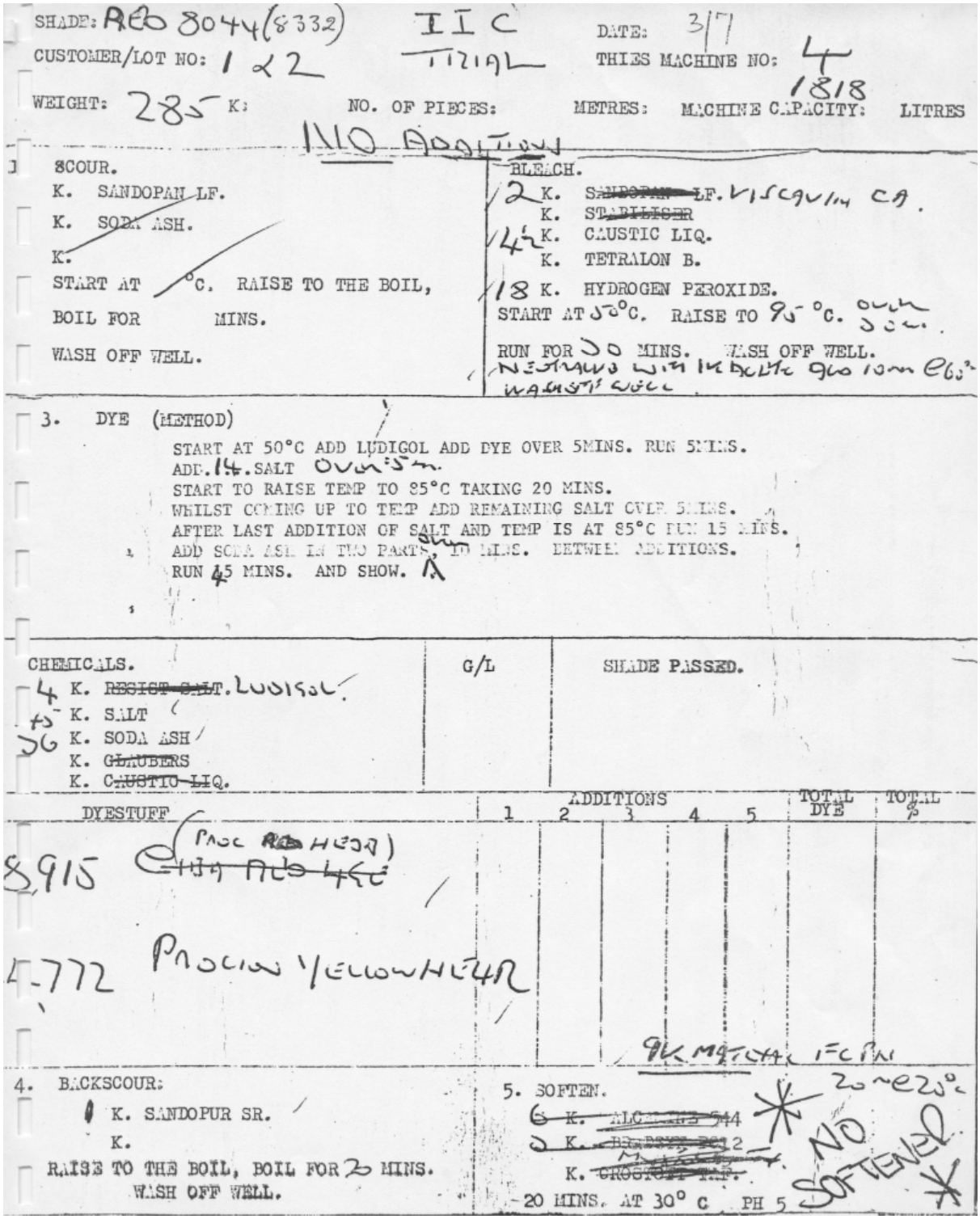
Lot	Piece No.	No. pieces	Stage 1	Stage 2
1	1	15	Jet scour & dye, hydroextract, Pegg dry, calender, sample & pack	Airtex soften, Pegg dry, Bestan compact, sample & pack
2	2	15		Hold for resin finishing
	3	15	**Set 2 Reserve**	
	4	15		
5	5	15	Pre-mercerised in Italy Process as Lots 1 & 2	Airtex soften, Pegg dry, Bestan compact, sample & pack
6	6	15		Hold for resin finishing
7	7	6	Winch scour & bleach, hydroextract, Pegg dry, calender, sample & pack	Airtex soften, Pegg dry, Tubetex compact, sample & pack
8	8	6	Winch scour & dye, hydroextract, Pegg dry, calender, sample & pack	Airtex soften, Pegg dry, Bestan compact, sample & pack
9	9	6	Fleissner cont. bleach & soften, Fleissner dry, calender, sample & pack	Re-wet on Fleissner bleach range, Fleissner dry, Tubetex compact, sample & pack
10	10	6		

Table 3: 1x1 Rib Finishing Route Plan

Piece lengths 50 metres nominal

Lot	Piece No.	No. pieces	Stage 1	Stage 2
11	11	16	Jet scour & dye, hydroextract, Pegg dry, calender, sample & pack	Airtex soften, Pegg dry, Bestan compact, sample & pack
12	12	16		Hold for resin finishing
	21	16	**Set 2 Reserve**	
	22	16		
31A	31	10	Pre-mercerised in Italy Process as Lots 11 & 12	Airtex soften, Pegg dry, Bestan compact, sample & pack
32	32	16		Hold for resin finishing
31B	31	6	Pre-mercerised in Italy Process as Lot 41	Airtex soften, Pegg dry, Tubetex compact, sample & pack
41	41	6	Winch scour & bleach, hydroextract, Pegg dry, calender, sample & pack	Airtex soften, Pegg dry, Tubetex compact, sample & pack
42	42	6	Winch scour & dye, hydroextract, Pegg dry, calender, sample & pack	Airtex soften, Pegg dry, Bestan compact, sample & pack

Table 4A: Lots 1 & 2 Jet Dyed Interlock, Red - Dyer's Recipe Card



SHADE: RED 8044 (8332) IIC TRIAL DATE: 3/7
CUSTOMER/LOT NO: 1 & 2 THIES MACHINE NO: 4
WEIGHT: 285 K: NO. OF PIECES: METRES: MACHINE CAPACITY: 1818 LITRES
1110 ADDITIVE

1. SCOUR.
K. SANDOPAN LF.
K. SODA ASH.
K.
START AT °C. RAISE TO THE BOIL,
BOIL FOR MINS.
WASH OFF WELL.

BLEACH.
2 K. SANDOPAN LF. VISCOLIN CA.
K. STABILISER
4½ K. CAUSTIC LIQ.
K. TETRALON B.
18 K. HYDROGEN PEROXIDE.
START AT 50°C. RAISE TO 95° °C. OVER 30 MINS.
RUN FOR 30 MINS. WASH OFF WELL.
NEUTRALISE WITH 1% ACETIC 90% 10 MINS @ 60°C
WARM & COLD

3. DYE (METHOD)
START AT 50°C ADD LUDIGOL ADD DYE OVER 5MINS. RUN 5MINS.
ADD 14. SALT OVER 5 MINS.
START TO RAISE TEMP TO 85°C TAKING 20 MINS.
WHILST COMING UP TO TEMP ADD REMAINING SALT OVER 5 MINS.
AFTER LAST ADDITION OF SALT AND TEMP IS AT 85°C RUN 15 MINS.
ADD SODA ASH IN TWO PARTS. 10 MINS. BETWEEN ADDITIONS.
RUN 45 MINS. AND SHOW.

CHEMICALS.	G/L	SHADE PASSED.
4 K. ~~RESIST SALT~~. LUDIGOL		
42 K. SALT		
56 K. SODA ASH		
K. ~~GLAUBERS~~		
K. ~~CAUSTIC LIQ~~.		

DYESTUFF	ADDITIONS 1	2	3	4	5	TOTAL DYE	TOTAL %
8.915 ~~C.I. Acid Red 44~~ (PROCION RED H-EXL)							
1.772 PROCION YELLOW H-EXL							
			9K MgSO4 IECPN				

4. BACKSCOUR:
1 K. SANDOPUR SR.
K.
RAISE TO THE BOIL, BOIL FOR 20 MINS.
WASH OFF WELL.

5. SOFTEN.
~~6 K. ALCAPOL 544~~
~~2 K. BEROL 2012~~
K. ~~CROSCOUT TMP.~~
20 MINS. AT 30° C PH 5
20 ~ 25°c
NO SOFTENER

Table 4B: Lots 1 & 2: Jet Dyed Interlock, Red - Stage 1

LOT NO: 1 and 2 STAGE 1 TABLE NO: 4B

INTERLOCK - JET DYE - SHADE RED

SAMPLE REF.	FINISHING TARGETS WIDTH	FINISHING TARGETS C/3CM	AIRTEX FRAME SETTING	WIDTH AFTER HYDRO	C/3CM AFTER	WIDTH AFTER PEGG	C/3CM AFTER PEGG	ARBACH FRAME SETTING	WIDTH AFTER ARBACH	C/3CM AFTER	WIDTH AT SAMPLING	C/3CM AT SAMPLING
34/377	61.5	44/45		67		63.5	34	64.5	64		64	34
34/359	59.5	47/48		66		61	35/36	62	62		62	35/36
38/377	58.5	44/45		61		59.5	31/32	60.75	61		60	31/32
34/340	57.5	49/50		60		58.5	37/38	60.75/59.5	61/59.5		59	39/40
38/359	57.5	46		61		58	34/35	59.5	59.5		58.5	35
34/324	57	52		60		57	41	58.5	58.5		58	41/42
38/340	57	49		59		57.5	37/38	58.5	58.5		58.5	37/38
42/377	56.5	43/44		62		58	31/32	58.5	58.5		58.5	31
42/359	55.5	47		61		56.5	35	58.5/57	58.5/57.5		57.5	34/35
34/307	55	55/56		57		55.5	46	57	57		56.5	46
38/324	55	52/53		54		55	40	56	56.5		55.5	41
42/340	54.5	48/49		58		55	37	56	56		55.5	37/38
38/307	54	54/55		55		54.5	44	56	55.5		55	45
42/324	54	52		52		54	40	56	55.5		55	40/41
42/307	52.5	54/55		50		53	43	54.5/55.5	55/54		53	42/43

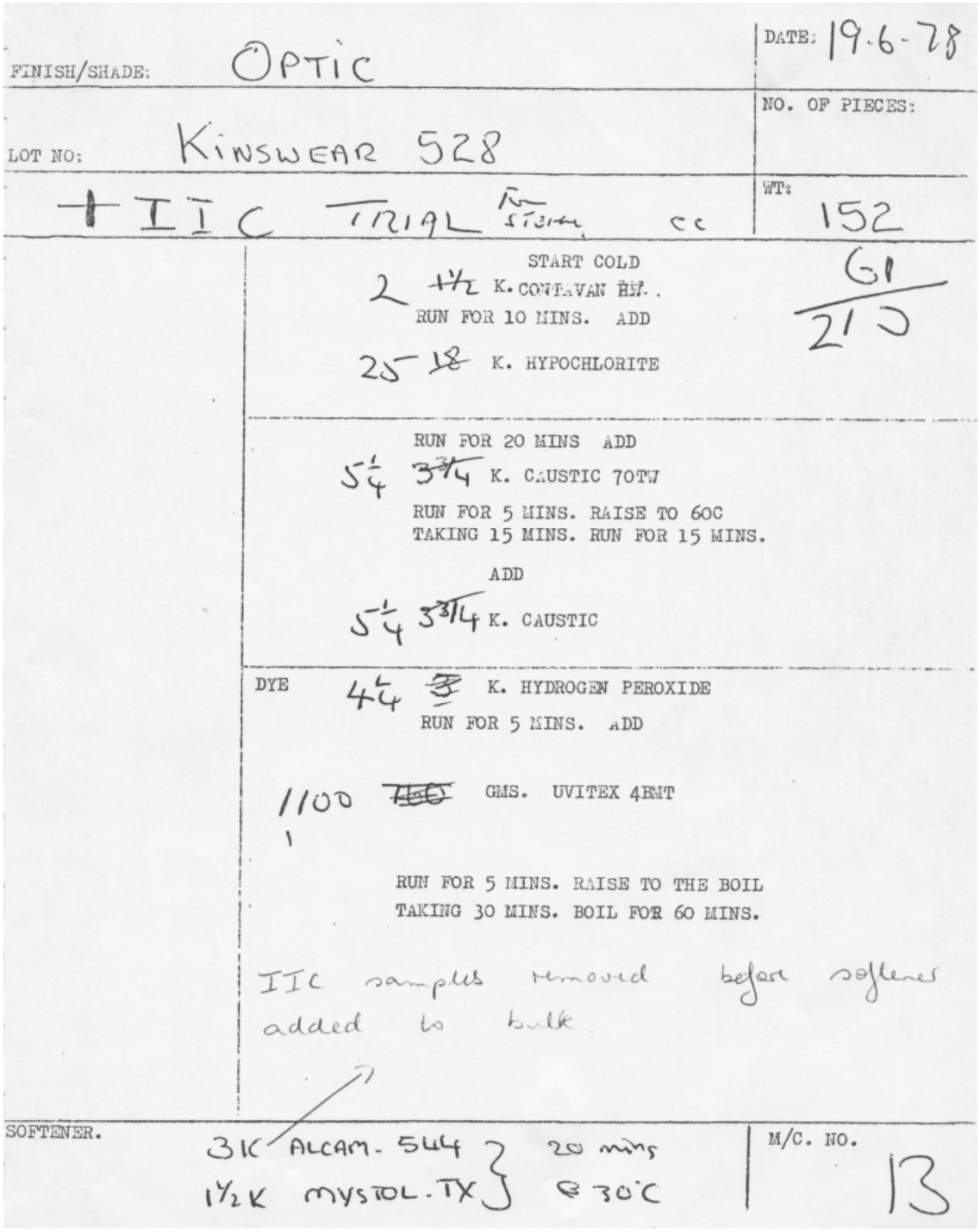
Table 4C: Lot 1 Jet Dyed Interlock, Red - Stage 2

LOT NO: 1 STAGE 2 TABLE NO: 4C

INTERLOCK - JET DYE - SHADE RED

SAMPLE REF.	FINISHING TARGETS WIDTH	FINISHING TARGETS C/3CM	AIRTEX FRAME SETTING	WIDTH AFTER AIRTEX	C/3CM AFTER AIRTEX	WIDTH AFTER PEGG	C/3CM AFTER PEGG	ARBACH FRAME SETTING	WIDTH AFTER H AND M COMPACTOR	C/3CM AFTER H AND M COMPACTOR	WIDTH AT SAMPLING	C/3CM AT SAMPLING
34/377	62.5	41/42	58	60.5/61	30/31	61	31		65/63	35	63.5	35
38/377	61	42/43	58	61		60	30		63/62	33.5	62	33
42/377	60	40/41	58	60/59.5		59.5	29.5		60/60.5	32	60.5	32
34/359	60	43	58	61		59	33		60.5	35	60.5	35/36
38/359	60	42	58	60	32/33	59	33.5		60	35	60	35
34/340	58.5	46	58	61/60	37	58.5	36		58	38.5	58	39
38/340	58.5	46/47	58	60.5		57.5	36		57/58	38.5	58.5	39/40
42/359	58	43	53	57.5/59		57	33		59/58	36	59	35
34/307	57.5	53/54	53	57/57.5		56	42.5		56.5/56	44	56.5	46/47
42/340	57	46	53	56	34.5	56	35		60/58	41.5	57.5	39
34/324	57	49/50	53	57		56	38.5		57.5	41	57	43/44
38/324	55.5	48	53	56	38	54.5	39		56.5	42	55	41/42
42/324	54	49	53	55.5		54	37.5		54.5	43	54	40/41
42/307	54	51	53	55.5	41	52	40		53	44.5	53	43/44
38/307	53.5	51/52	53	56.5		54	43		53	45	53.5	45/46

Table 5A: Lot 7 Winch Bleached Interlock - Dyer's Recipe Card



FINISH/SHADE: OPTIC

DATE: 19-6-78

NO. OF PIECES:

LOT NO: KINSWEAR 528

WT: 152

+ IIC TRIAL For Steam cc

START COLD

2 ~~1½~~ K. CONTRAVAN HF.

RUN FOR 10 MINS. ADD

25 ~~18~~ K. HYPOCHLORITE

G1 / 21 J

RUN FOR 20 MINS ADD

5¼ ~~3¾~~ K. CAUSTIC 70TW

RUN FOR 5 MINS. RAISE TO 60C
TAKING 15 MINS. RUN FOR 15 MINS.

ADD

5¼ ~~3¾~~ K. CAUSTIC

DYE 4½ ~~3~~ K. HYDROGEN PEROXIDE

RUN FOR 5 MINS. ADD

1100 ~~TEE~~ GMS. UVITEX 4BMT

RUN FOR 5 MINS. RAISE TO THE BOIL
TAKING 30 MINS. BOIL FOR 60 MINS.

IIC samples removed befor softener added to bulk

SOFTENER. 3K ALCAM. 544 } 20 mins
1½K MYSTOL. TX } @ 30°C

M/C. NO. 13

Table 5B: Lot 7 Winch Bleached Interlock - Stage 1

LOT NO: 7 STAGE 1 TABLE NO: 5B

WINCH BLEACHED INTERLOCK

SAMPLE REF.	FINISHING TARGETS WIDTH	FINISHING TARGETS C/3CM	AIRTEX FRAME SETTING	WIDTH AFTER HYDRO	C/3CM AFTER	WIDTH AFTER PEGG	C/3CM AFTER PEGG	ARBACH FRAME SETTING	WIDTH AFTER ARBACH	C/3CM AFTER ARBACH	WIDTH AT SAMPLING	C/3CM AT SAMPLING
34/340	57.5	49/50		53		56.5	35/36	60.75	59		57.5	36
34/377	61.5	44/45		52		59.5	29/30	66	63.5		61.5	31
38/324	65	52/53		49		54	36/37	58.5	56		55.5	36/37
38/359	57.5	46		50.5		55.5	31/32	60.75	59		57.5	32/33
42/307	52.5	54/55		47		50.5	38/39	54.5	53.5		52.5	39/40
42/340	54.5	48/49		48.5		54	33/34	57	55		54.5	34

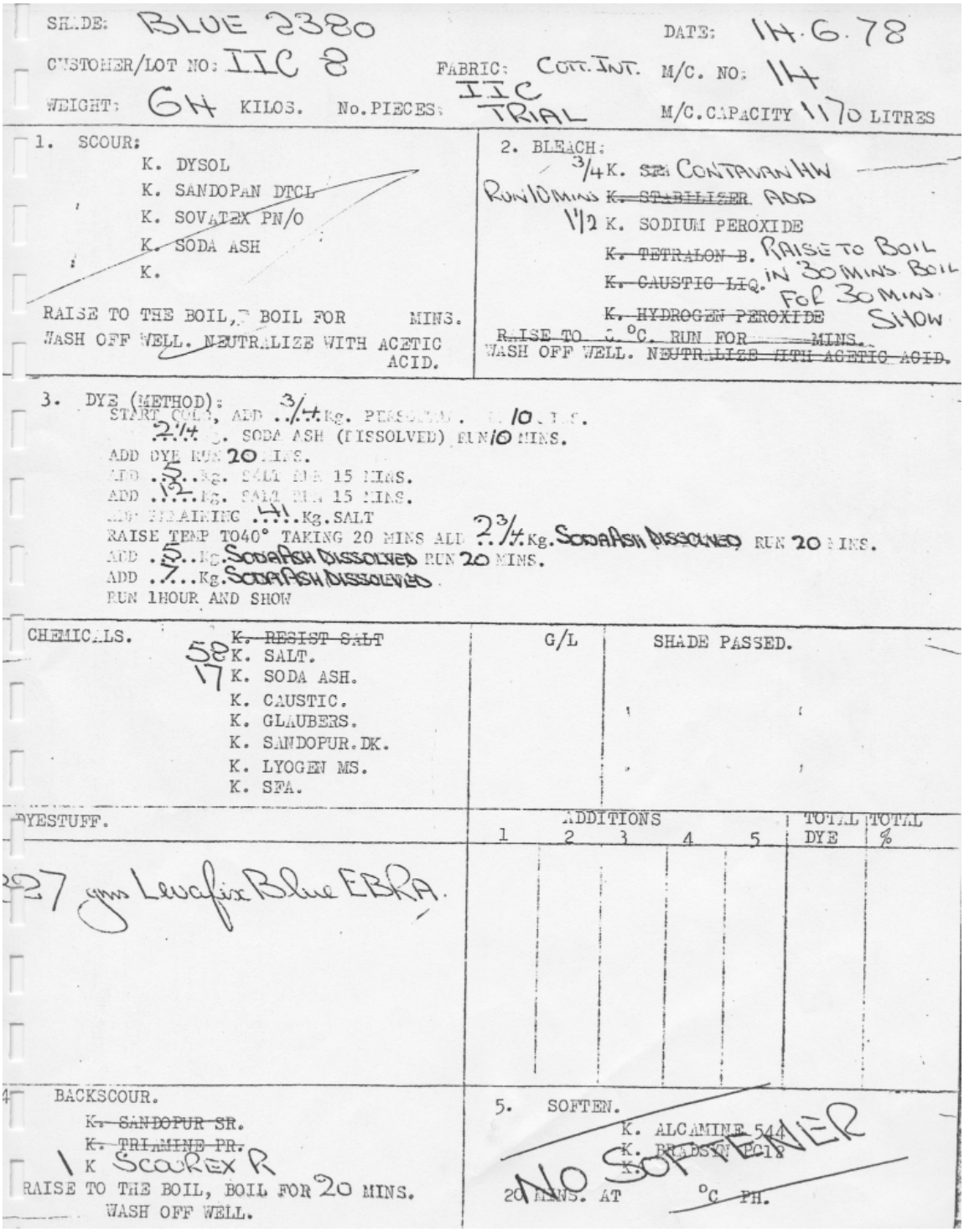
Table 5C: Lot 7 Winch Bleached Interlock - Stage 2

LOT NO: 7 STAGE 2 TABLE NO: 5C.

WINCH BLEACHED INTERLOCK.

SAMPLE REF.	FINISHING TARGETS WIDTH	FINISHING TARGETS C/3CM	AIRTEX FRAME SETTING	WIDTH AFTER AIRTEX	C/3CM AFTER AIRTEX	WIDTH AFTER PEGG	C/3CM AFTER PEGG	ARBACH FRAME SETTING	WIDTH AFTER TUBE-TEX COMPACTOR	C/3CM AFTER TUBE-TEX COMPACTOR	WIDTH AT SAMPLING	C/3CM AT SAMPLING
34/377	59.5	39	48.5	54	29/30	60.5	30/31		61.5/60.5	38/36	60	36
34/340	57.5	44/45	48.5	55/53	35	57	35/36		58	42	58.5	42
38/359	56	41	48.5	53	30/31	54	31		56.5	38	56.5	38
42/340	54	44	48.5	51.5	33	52	34		54	39/40/41	53.5	40
38/324	54.5	46/47	48.5	51.5	37	51.5	35/36		54	43	54	43
42/307	51.5	50	43	51.5/48	38/39	49	37/38		50/51	46	51	—

Table 6A: Lot 8 Winch Dyed Interlock, Light Blue - Dyer's Recipe Card



SHADE: BLUE 2380 DATE: 14.6.78

CUSTOMER/LOT NO: IIC 8 FABRIC: COTT. INT. M/C. NO: 14

WEIGHT: 6H KILOS. No. PIECES: IIC TRIAL M/C. CAPACITY 1170 LITRES

1. SCOUR:
K. DYSOL
K. SANDOPAN DTCL
K. SOVATEX PN/O
K. SODA ASH
K.
RAISE TO THE BOIL, BOIL FOR MINS.
WASH OFF WELL. NEUTRALIZE WITH ACETIC ACID.

2. BLEACH:
3/4 K. CONTAVAN HW
RUN 10 MINS ~~K. STABILISER~~ ADD
1½ K. SODIUM PEROXIDE
~~K. TETRALON B.~~ RAISE TO BOIL
~~K. CAUSTIC LIQ.~~ IN 30 MINS BOIL
~~K. HYDROGEN PEROXIDE~~ FOR 30 MINS SHOW
RAISE TO °C. RUN FOR MINS.
WASH OFF WELL. ~~NEUTRALISE WITH ACETIC ACID.~~

3. DYE (METHOD):
START COLD, ADD 3/4 Kg. PER[illegible]. 10 MINS.
2¼ K. SODA ASH (DISSOLVED) RUN 10 MINS.
ADD DYE RUN 20 MINS.
ADD .5.. Kg. SALT RUN 15 MINS.
ADD .12.. Kg. SALT RUN 15 MINS.
ADD REMAINING .41.. Kg. SALT
RAISE TEMP TO 40° TAKING 20 MINS ADD 2¾ Kg. SODA ASH DISSOLVED RUN 20 MINS.
ADD .5.. Kg. SODA ASH DISSOLVED RUN 20 MINS.
ADD .5.. Kg. SODA ASH DISSOLVED
RUN 1 HOUR AND SHOW

CHEMICALS.		G/L	SHADE PASSED.
~~K. RESIST SALT~~			
58 17	K. SALT.		
	K. SODA ASH.		
	K. CAUSTIC.		
	K. GLAUBERS.		
	K. SANDOPUR. DK.		
	K. LYOGEN MS.		
	K. SFA.		

DYESTUFF.	ADDITIONS 1	2	3	4	5	TOTAL DYE	TOTAL %
227 gms Levafix Blue EBRA.							

4. BACKSCOUR.
~~K. SANDOPUR SR.~~
~~K. TRILAMINE PR.~~
1 K SCOUREX R
RAISE TO THE BOIL, BOIL FOR 20 MINS.
WASH OFF WELL.

5. SOFTEN.
K. ALCAMINE 544
K. BRADSON PC18
K.
NO SOFTENER
20 MINS. AT °C PH.

Table 6B: Lot 8 Winch Dyed Interlock, Light Blue - Stage 1

LOT NO: 8. STAGE 1. TABLE NO: 6B.

WINCH DYED INTERLOCK (SHADE LIGHT BLUE)

SAMPLE REF.	FINISHING TARGETS WIDTH	FINISHING TARGETS C/3CM	AIRTEX FRAME SETTING	WIDTH AFTER HYDRO	C/3CM AFTER	WIDTH AFTER PEGG	C/3CM AFTER PEGG	ARBACH FRAME SETTING	WIDTH AFTER ARBACH	C/3CM AFTER	WIDTH AT SAMPLING	C/3CM AT SAMPLING
34/340	57.5	49/50		55		56.5	36	60.75	58.5		57.5	37
34/377	61.5	44/45		58		57	30/31	65.5	62/63		60	31
38/324	55	52/53		51.5		53	37	57	55/56		54	38
38/359	57.5	46		56		56	32/33	59.5	58		57	33
42/307	52.5	54/55		49		51	39	54.5	53.5		52.5	41
42/340	54.5	48/49		54		53.5	34/35	57	56.		55	35

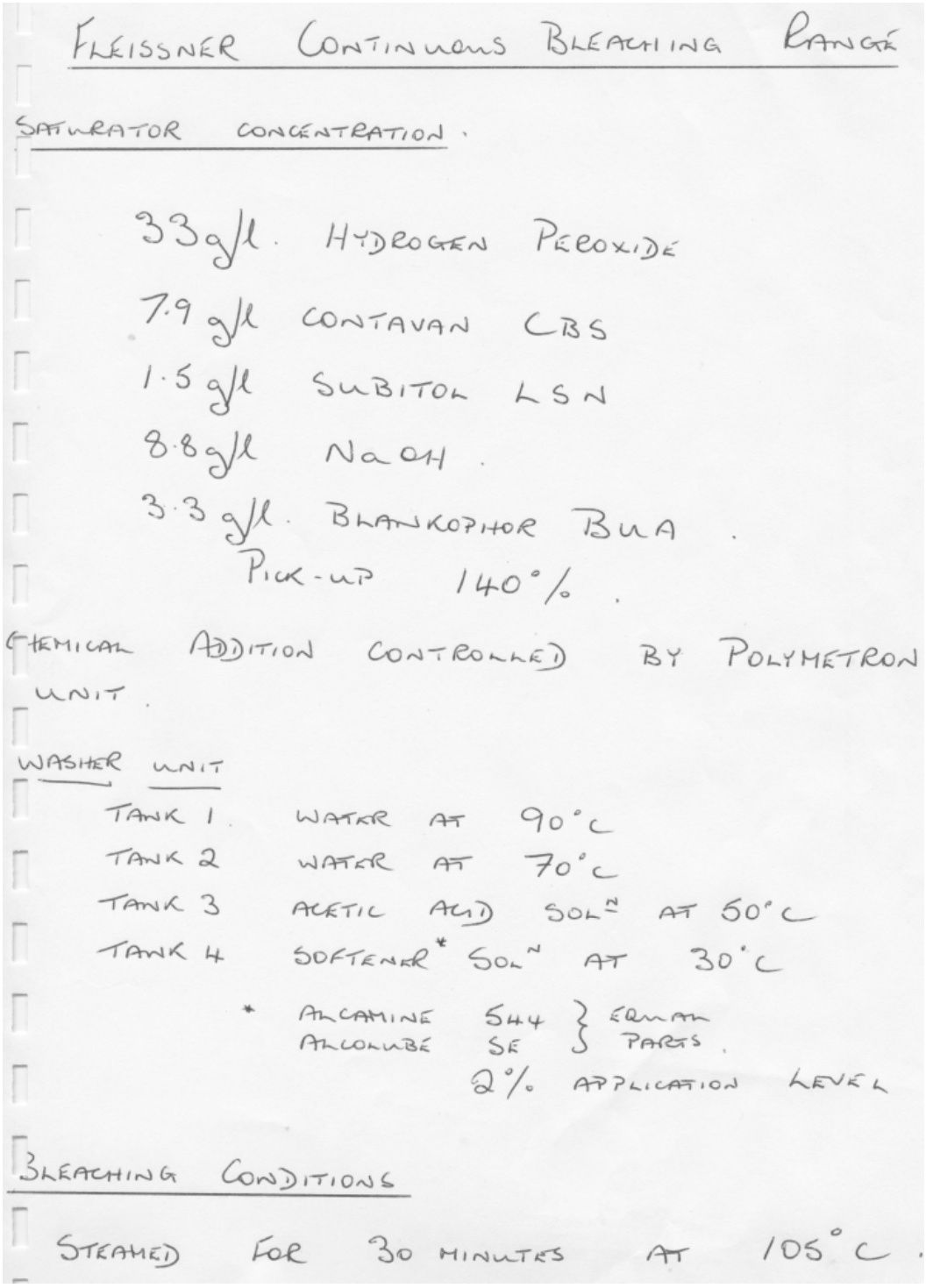
Table 6C: Lot 8 Winch Dyed Interlock, Light Blue - Stage 2

LOT NO: 8 STAGE 2 TABLE NO: 6C

WINCH DYED INTERLOCK (SHADE LIGHT BLUE)

SAMPLE REF.	FINISHING TARGETS WIDTH	FINISHING TARGETS C/3CM	AIRTEX FRAME SETTING	WIDTH AFTER AIRTEX	C/3CM AFTER AIRTEX	WIDTH AFTER PEGG	C/3CM AFTER PEGG	ARBACH FRAME SETTING	WIDTH AFTER H and M COMPACTOR	C/3CM AFTER H & M COMPACTOR	WIDTH AT SAMPLING	C/3CM AT SAMPLING
34/377	60	39	52	55.5	29	58	29/30		58/59.5	33	58.5	31/32
34/340	57	44	52	55	35	56	35		57/58	39	56	37/38
38/359	56.5	41	52	54.5	31	56	31/32		57	34	56.5	34
42/340	54.5	44	52	54	34	54	33/34		54/55	37	54	36/37
38/324	54	46	52	54.5	37/37.5	52.5	37		53.5	40/39	54	40
42/307	51.5	48	52	53.5/54	40	50	39		53/51	45/43	51	41

Table 7A: Lots 9 & 10 Continuous Bleach Interlock - Processing Conditions



FLEISSNER CONTINUOUS BLEACHING RANGE

SATURATOR CONCENTRATION.

33 g/l. HYDROGEN PEROXIDE
7.9 g/l CONTAVAN CBS
1.5 g/l SUBITOL LSN
8.8 g/l NaOH.
3.3 g/l. BLANKOPHOR BUA.
PICK-UP 140%.

CHEMICAL ADDITION CONTROLLED BY POLYMETRON UNIT.

WASHER UNIT

TANK 1. WATER AT 90°C
TANK 2 WATER AT 70°C
TANK 3 ACETIC ACID SOLN AT 50°C
TANK 4 SOFTENER* SOLN AT 30°C

* ALCAMINE 544 } EQUAL
ALCOLUBE SE } PARTS.
2% APPLICATION LEVEL

BLEACHING CONDITIONS

STEAMED FOR 30 MINUTES AT 105°C.

Table 7B: Lots 9 & 10 Continuous Bleach Interlock - Stage 1

LOT NO: 9 and 10 STAGE 1. TABLE NO: 7B

FLEISSNER CONTINUOUSLY BLEACHED INTERLOCK.

SAMPLE REF.	FINISHING TARGETS WIDTH	FINISHING TARGETS C/3CM	AIRTEX FRAME SETTING	WIDTH AFTER BLEACHING RANGE	FLEISSNER DRYER FRAME SETTING	WIDTH AFTER FLEISSNER DRYER	C/3CM AFTER FLEISSNER DRYER	ARBACH FRAME SETTING	WIDTH AFTER HERIOT CALENDER	C/3CM AFTER	WIDTH AT SAMPLING	C/3CM AT SAMPLING
34/340	57.5	49/50		44.5	23"	48.5	33		59		57	34
34/377	61.5	44/45		43	23"	49	27/28		61.5		58.5	28/29
38/324	55	52/53		42	22"	47	34		56.5		54.5	36
38/359	57.5	46		42	22"	48	29		58.5		55.5	31
42/307	52.5	54/55		42	21"	46/47	37		54		52.5	38
42/340	54.5	48/49		41	21"	47	31		56		55	33

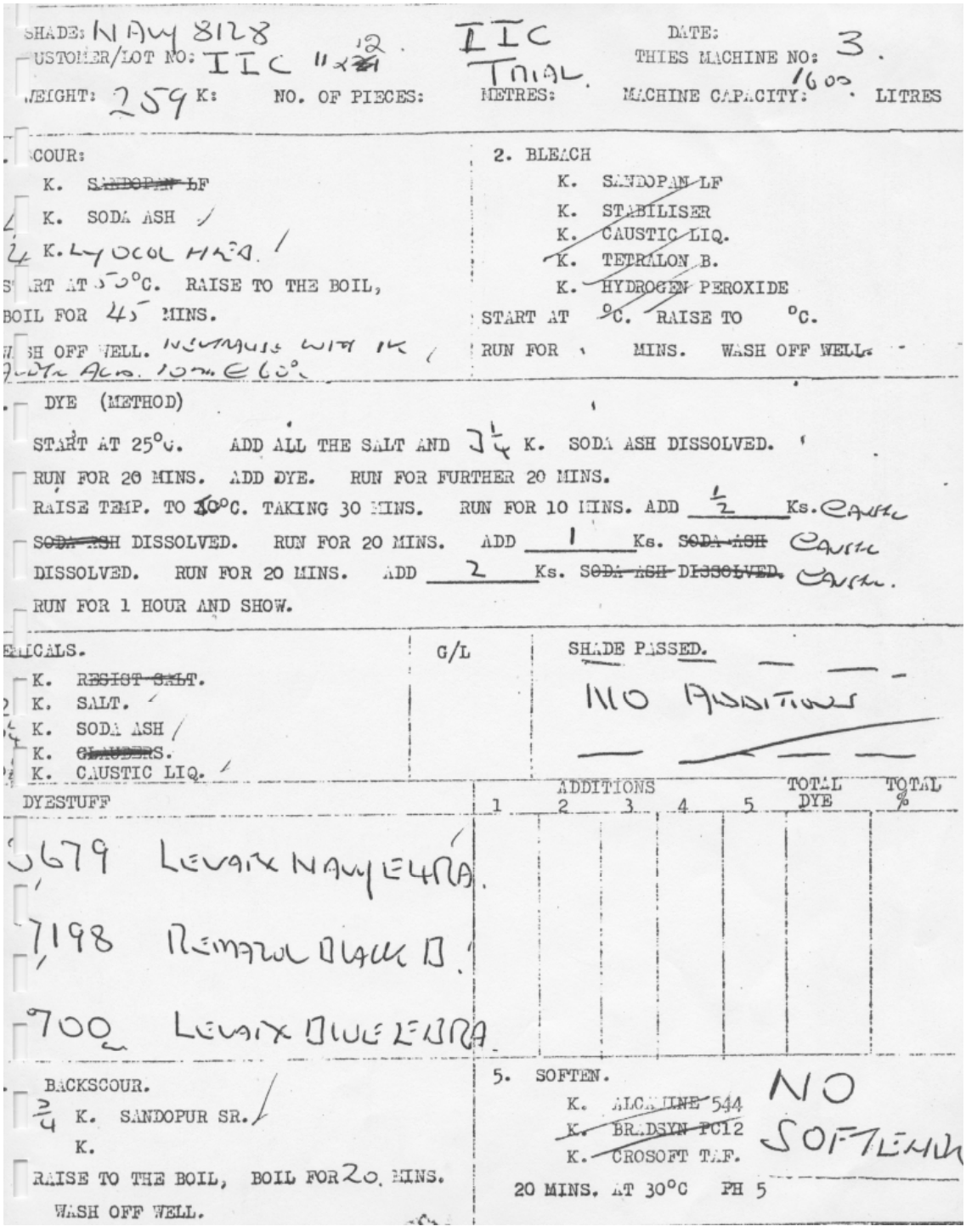
Table 7C: Lots 9 & 10 Continuous Bleach Interlock - Stage 2

LOT NO: 9 and 10 STAGE 2 TABLE NO: 7C

FLEISSNER CONTINUOUSLY BLEACHED INTERLOCK

SAMPLE REF.	FINISHING TARGETS WIDTH	FINISHING TARGETS C/3CM	FLEISSNER DRYER FRAME SETTING	WIDTH AFTER FLEISSNER DRYER	C/3CM AFTER FLEISSNER DRYER	WIDTH AFTER PEGG	C/3CM AFTER PEGG	ARBACH FRAME SETTING	WIDTH AFTER TUBE-TEX COMPACTOR	C/3CM AFTER TUBE-TEX COMPACTOR	WIDTH AT SAMPLING	C/3CM AT SAMPLING
34/377	59.5	39	23"	52/53.5	28.5/29				61	37	63	36.5
34/340	57	43	23"	52	34/33.5				59	42	58.5	42
38/359	58	40/41	22"	50/49	30/29.5				59	38	59	37
38/324	54.5	46	22"	48/50	34/34.5				55.5	43	55.5	42
42/340	54.5	43	21"	47/49	31.5				55	40/41	55	39
42/307	52	48	21"	48.5/49	38/37.5				52	44/45	53	45

Table 8A: Lots 11 & 12 Jet Dyed 1x1 Rib, Navy - Dyer's Recipe Card



SHADE: NAVY 8128 IIC DATE:
CUSTOMER/LOT NO: IIC 11 x 12 TRIAL. THIES MACHINE NO: 3.
WEIGHT: 259 K: NO. OF PIECES: METRES: MACHINE CAPACITY: 1600 LITRES

1. SCOUR:
K. ~~SANDOPAN LF~~
K. SODA ASH
K. LYOCOL HA-A
START AT 50°C. RAISE TO THE BOIL,
BOIL FOR 45 MINS.
WASH OFF WELL. NEUTRALISE WITH 1K Acetic Acid 10% @ 60°C

2. BLEACH
K. SANDOPAN LF
K. STABILISER
K. CAUSTIC LIQ.
K. TETRALON B.
K. HYDROGEN PEROXIDE
START AT °C. RAISE TO °C.
RUN FOR MINS. WASH OFF WELL.

DYE (METHOD)
START AT 25°C. ADD ALL THE SALT AND 3¼ K. SODA ASH DISSOLVED.
RUN FOR 20 MINS. ADD DYE. RUN FOR FURTHER 20 MINS.
RAISE TEMP. TO ~~60~~°C. TAKING 30 MINS. RUN FOR 10 MINS. ADD ½ Ks. CAUSTIC
~~SODA ASH~~ DISSOLVED. RUN FOR 20 MINS. ADD 1 Ks. ~~SODA ASH~~ CAUSTIC
DISSOLVED. RUN FOR 20 MINS. ADD 2 Ks. ~~SODA ASH DISSOLVED.~~ CAUSTIC.
RUN FOR 1 HOUR AND SHOW.

CHEMICALS. G/L SHADE PASSED.
K. ~~RESIST SALT~~.
K. SALT.
K. SODA ASH
K. ~~GLAUBERS~~.
K. CAUSTIC LIQ.
NO ADDITIONS

DYESTUFF	ADDITIONS 1	2	3	4	5	TOTAL DYE	TOTAL %
679 LEVAIX NAVY EHRA							
7198 REMAZOL BLACK B							
700 LEVAIX BLUE EHRA							

BACKSCOUR.
¾ K. SANDOPUR SR.
K.
RAISE TO THE BOIL, BOIL FOR 20 MINS.
WASH OFF WELL.

5. SOFTEN.
K. ~~ALCALINE 544~~
K. ~~BRADSYN PC12~~
K. ~~CROSOFT T.F.~~
20 MINS. AT 30°C PH 5
NO SOFTENER

Table 8B: Lots 11 & 12 Jet Dyed 1x1 Rib, Navy - Stage 1

LOT NO: 11 and 12 STAGE 1. TABLE NO: 8B

JET DYED 1x1 RIB SHADE - NAVY.

SAMPLE REF.	FINISHING TARGETS WIDTH	FINISHING TARGETS C/3CM	AIRTEX FRAME SETTING	WIDTH AFTER HYDRO	C/3CM AFTER	WIDTH AFTER PEGG	C/3CM AFTER PEGG	ARBACH FRAME SETTING	WIDTH AFTER ARBACH	C/3CM AFTER	WIDTH AT SAMPLING	C/3CM AT SAMPLING
34/350	63.5	44		61		64	33	64.5	63.5		64.5	33/34
30/350	61	44		65		61.5	34	62/60.75	62		62	34
26/350	59.5	45		65		60	34/35	59.5	60.5		61.5	35
34/326	58.5	47/48		57		59	36	59.5	59.5		60	38
30/326	57	47/48		58		57	36	58.5	59		58	38
26/326	56.5	48/49		62		58	38/39	57	58.5		58.5	39
30/306	54	50/51		57		55	40/41	56/54.5	56.5		56.5	40
34/306	54	50		60		55	38/39	54.5	56		56	39
26/306	53	51/52		60		55.5	42/43	54.5	56		56	42/43
26/285	51	56/57		54		53	48/49	53	54		54	48
30/285	50	56		58		51.5	46	52/50.75	52		51.5	47
34/285	49.5	55/56		58		51	45/46	50.75	52/51.5		52	45
26/267	49	61/62		51/52		51.5	53/54	50.5	52		52	52/53
34/267	48.5	60		51		50.5	48	49.5/50.5	50		50	47/48
30/267	48.5	59/60		52		49.5	49	50.5	50		50	50
34/248	46.5	65/66		48.5/49		47	55	48.5	48		48	54/55.

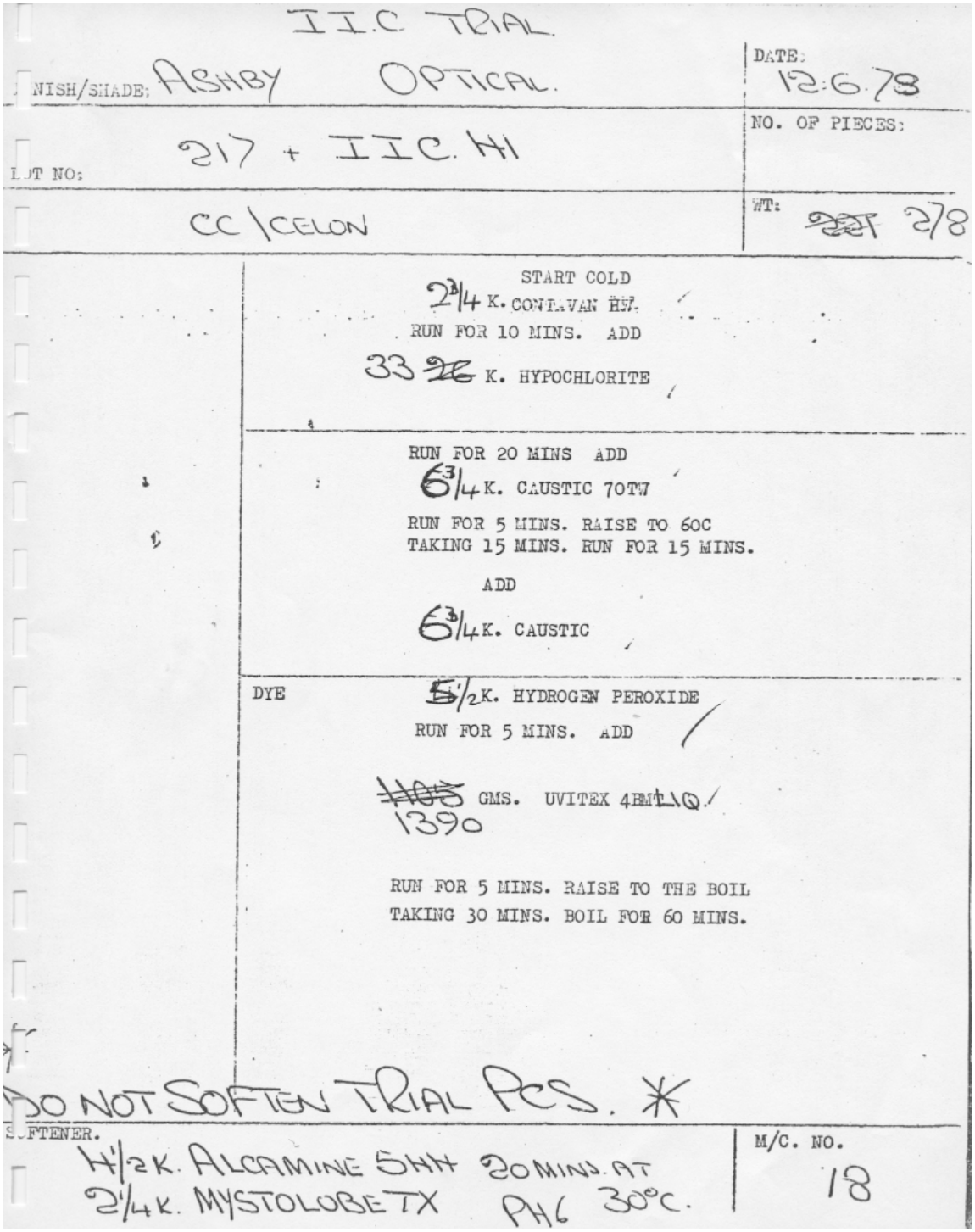
Table 8C: Lot 11 Jet Dyed 1x1 Rib, Navy - Stage 2

LOT NO: 11 STAGE 2. TABLE NO: 8C.

JET DYED 1x1 RIB SHADE - NAVY.

SAMPLE REF.	FINISHING TARGETS WIDTH	FINISHING TARGETS C/3CM	AIRTEX FRAME SETTING	WIDTH AFTER AIRTEX	C/3CM AFTER AIRTEX	WIDTH AFTER PEGG	C/3CM AFTER PEGG	ARBACH FRAME SETTING	WIDTH AFTER H&H COMPACTOR	C/3CM AFTER H&H COMPACTOR	WIDTH AT SAMPLING	C/3CM AT SAMPLING
34/350	61.5	38/39	53	53	29	58.5	31		61.5	34	62.5	32/33
30/350	60	39	53	53	31	56.5	31		61/60.5	33	62	33/34
26/350	60	39	53	52/53	34/35	57.5	33		60.5	36	61	35
26/326	57	42/43	51	53/52.5	35/36	54.5	36		58	38	57	38
30/326	55.5	42	51	51	35	53.5	35/36		55	38/39	55	37
34/326	55	41/42	51	50.5/51	36	53.5	33		53.5/55.5	37	55	36
34/306	54	44/45	48	50	36	51	37/38		54.5	38/39/41	54	38/39
30/306	54.5	45	48	51	39	51	38		54.5	41	54	40
26/306	56	45	48	54	39/40	51.5	39		56	42/43	55.5	42/43
26/285	54.5	50/51	46	49/50	46	49.5/50	43/44		53/54.5	43	53	48
34/285	54	45/46	46	47	43	48.5	41		52/54	43/44	53	42/43
30/285	52.5	49	46	45/46	46	48	41		51.5	45/46	50.5	44
26/267	51.	54	43/46	48/48.5	47	46/46.5	47		50/52	51	51	52
34/267	50	52	43	45.5	50	45	44		50.5	47	49.5	47
30/267	50	52	43	46	51	45.5	45		50	47	49.5	49/50
34/248	49	55/56	43	45	57	44.5	49/50		51.5/49.5	51	48	53

Table 9A: Lot 41 Winch Bleached 1x1 Rib - Dyer's Recipe Card



II.C TRIAL.

FINISH/SHADE: ASHBY OPTICAL. DATE: 12.6.78

LOT NO: 217 + IIC. HI NO. OF PIECES:

CC/CELON WT: ~~227~~ 278

START COLD

2¾ K. CONTRAVAN HT.

RUN FOR 10 MINS. ADD

33 ~~26~~ K. HYPOCHLORITE

RUN FOR 20 MINS ADD

6¾ K. CAUSTIC 70TW

RUN FOR 5 MINS. RAISE TO 60C
TAKING 15 MINS. RUN FOR 15 MINS.

ADD

6¾ K. CAUSTIC

DYE ~~5~~ ½ K. HYDROGEN PEROXIDE

RUN FOR 5 MINS. ADD

~~1405~~ 1390 GMS. UVITEX 4BMLQ.

RUN FOR 5 MINS. RAISE TO THE BOIL
TAKING 30 MINS. BOIL FOR 60 MINS.

DO NOT SOFTEN TRIAL PCS. *

SOFTENER. ½ K. ALCAMINE SHN 20 MINS AT
2¼ K. MYSTOLOBE TX PH6 30°C.

M/C. NO. 18

Table 9B: Lot 41 Winch Bleached 1x1 Rib - Stage 1

LOT NO: 41 STAGE 1 TABLE NO: 9B

WINCH BLEACHED 1x1 RIB

SAMPLE REF.	FINISHING TARGETS WIDTH	FINISHING TARGETS C/3CM	AIRTEX FRAME SETTING	WIDTH AFTER HYDRO	C/3CM AFTER	WIDTH AFTER PEGG	C/3CM AFTER PEGG	ARBACH FRAME SETTING	WIDTH AFTER ARBACH	C/3CM AFTER	WIDTH AT SAMPLING	C/3CM AT SAMPLING
26/306	53	51/52		49		52.5	40	54.5/55.5	53/54		53.5	40
26/350	59.5	45/46		54		54.5	33	63/65	59.5/61		58.5	34
34/267	48.5	60		45		47.5	47	50.5	49.5		49	48
30/285	50	56		48		49	44	51.5	51.5		50.5	44/45
30/326	57	47/48		48		53.5	35	60.5	58		56	36
34/306	54	50		47		49	37/38	57/58.5	54/55.5		52.5	38/39

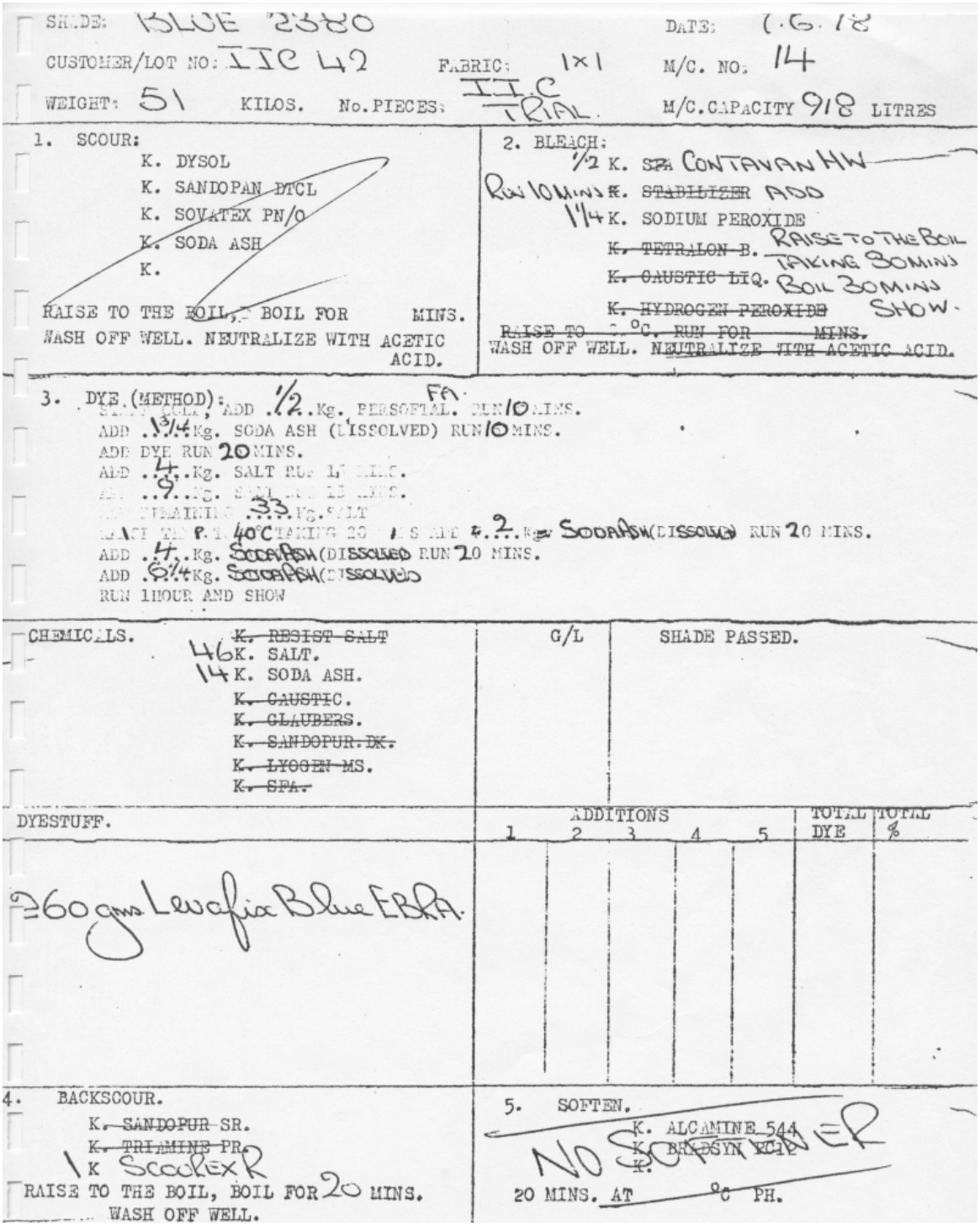
Table 9C: Lot 41 Winch Bleached 1x1 Rib - Stage 2

LOT NO: 41 STAGE 2 TABLE NO: 9C

WINCH BLEACHED 1x1 RIB

SAMPLE REF.	FINISHING TARGETS WIDTH	FINISHING TARGETS C/3CM	AIRTEX FRAME SETTING	WIDTH AFTER AIRTEX	C/3CM AFTER AIRTEX	WIDTH AFTER PEGG	C/3CM AFTER PEGG	ARBACH FRAME SETTING	WIDTH AFTER TUBE-TEX COMPACTOR	C/3CM AFTER TUBE-TEX COMPACTOR	WIDTH AT SAMPLING	C/3CM AT SAMPLING
26/350	61.5	41	48	54	32/33	55.5	32/33		62/61.5	37/39.5	63	39/40
30/326	57	43/44	48	54	34/35	53.5	35		57.5	41	58	42
34/306	53	48	43	45	35	49	36		53.5	47	53.5	45/46
26/306	53	46	43	47	38	49	38/39		53	47	52.5	45
30/286	49.5	53	43	45	42	48	42		50	49	50	49
34/267	47.5	54/55	43	45	46/47	47	45		48	54	48.5	54

Table 10A: Lot 42 Winch Dyed 1x1 Rib, Light Blue - Dyer's Recipe Card



SHADE: BLUE 2380 DATE: 1.6.18

CUSTOMER/LOT NO: IIC 42 FABRIC: 1x1 M/C. NO: 14

WEIGHT: 51 KILOS. No.PIECES: IIC TRIAL M/C.CAPACITY 918 LITRES

1. SCOUR:
K. DYSOL
K. SANDOPAN DTCL
K. SOVATEX PN/O
K. SODA ASH
K.
RAISE TO THE BOIL, BOIL FOR MINS.
WASH OFF WELL. NEUTRALIZE WITH ACETIC ACID.

2. BLEACH:
1/2 K. ~~SPA~~ CONTAVAN HW
RUN 10 MINS ~~K.~~ ~~STABILIZER~~ ADD
1¼ K. SODIUM PEROXIDE
~~K. TETRALON B.~~ RAISE TO THE BOIL
~~K. CAUSTIC LIQ.~~ TAKING 30 MINS
~~K. HYDROGEN PEROXIDE~~ BOIL 30 MINS
~~RAISE TO °C. RUN FOR MINS.~~ SHOW.
WASH OFF WELL. ~~NEUTRALIZE WITH ACETIC ACID.~~

3. DYE (METHOD): ~~START WELL~~ ADD .½. Kg. PERSOFTAL. RUN 10 MINS. FA
ADD .1¼ Kg. SODA ASH (DISSOLVED) RUN 10 MINS.
ADD DYE RUN 20 MINS.
ADD .4. Kg. SALT RUN 10 MINS.
ADD .9. Kg. SALT RUN 10 MINS.
~~ADD REMAINING~~ .33. Kg. SALT
~~RAISE TO~~ P.T. 40°C TAKING 20 MINS ~~UP~~ 4.2. Kg. SODA ASH (DISSOLVED) RUN 20 MINS.
ADD .4. Kg. SODA ASH (DISSOLVED) RUN 20 MINS.
ADD .6¼ Kg. SODA ASH (DISSOLVED)
RUN 1 HOUR AND SHOW

CHEMICALS.	G/L	SHADE PASSED.
~~K. RESIST SALT~~		
46 K. SALT.		
14 K. SODA ASH.		
~~K. CAUSTIC.~~		
~~K. GLAUBERS.~~		
~~K. SANDOPUR DK.~~		
~~K. LYOGEN MS.~~		
~~K. SPA.~~		

DYESTUFF.	ADDITIONS 1	2	3	4	5	TOTAL DYE	TOTAL %
260 gms Levafix Blue EBA.							

4. BACKSCOUR.
~~K. SANDOPUR SR.~~
~~K. TRIAMINE PR.~~
1 K SCOURLEX R
RAISE TO THE BOIL, BOIL FOR 20 MINS.
WASH OFF WELL.

5. SOFTEN.
~~K. ALCAMINE 544~~
~~K. BRYDSYN EC12~~ NO SOFTENER
~~K.~~
20 MINS. AT °C PH.

Table 10B: Lot 42 Winch Dyed 1x1 Rib, Light Blue - Stage 1

LOT NO: 42. STAGE 1. TABLE NO: 10 B

WINCH DYED 1x1 RIB (SHADE LIGHT BLUE)

SAMPLE REF.	FINISHING TARGETS WIDTH	FINISHING TARGETS C/3CM	AIRTEX FRAME SETTING	WIDTH AFTER HYDRO.	C/3CM AFTER	WIDTH AFTER PEGG	C/3CM AFTER PEGG	ARBACH FRAME SETTING	WIDTH AFTER ARBACH	C/3CM AFTER	WIDTH AT SAMPLING	C/3CM AT SAMPLING
26/306	53	51/52		51.5		50	40/41	54.5	53		51.5	41
26/350	59.5	45/46		52.5		55	34	60.5/61.5	58.5/59.5		58.5	34/35
34/267	48.5	60		46		47	46/47	50	49.5		49	48
30/285	50	56		44		48	44/45	52	51		49.5	44/45
30/326	57	47/48		50		54	36	58	56.5		55.5	37
34/306	54	50		48		54	39	58	57		55.5	40

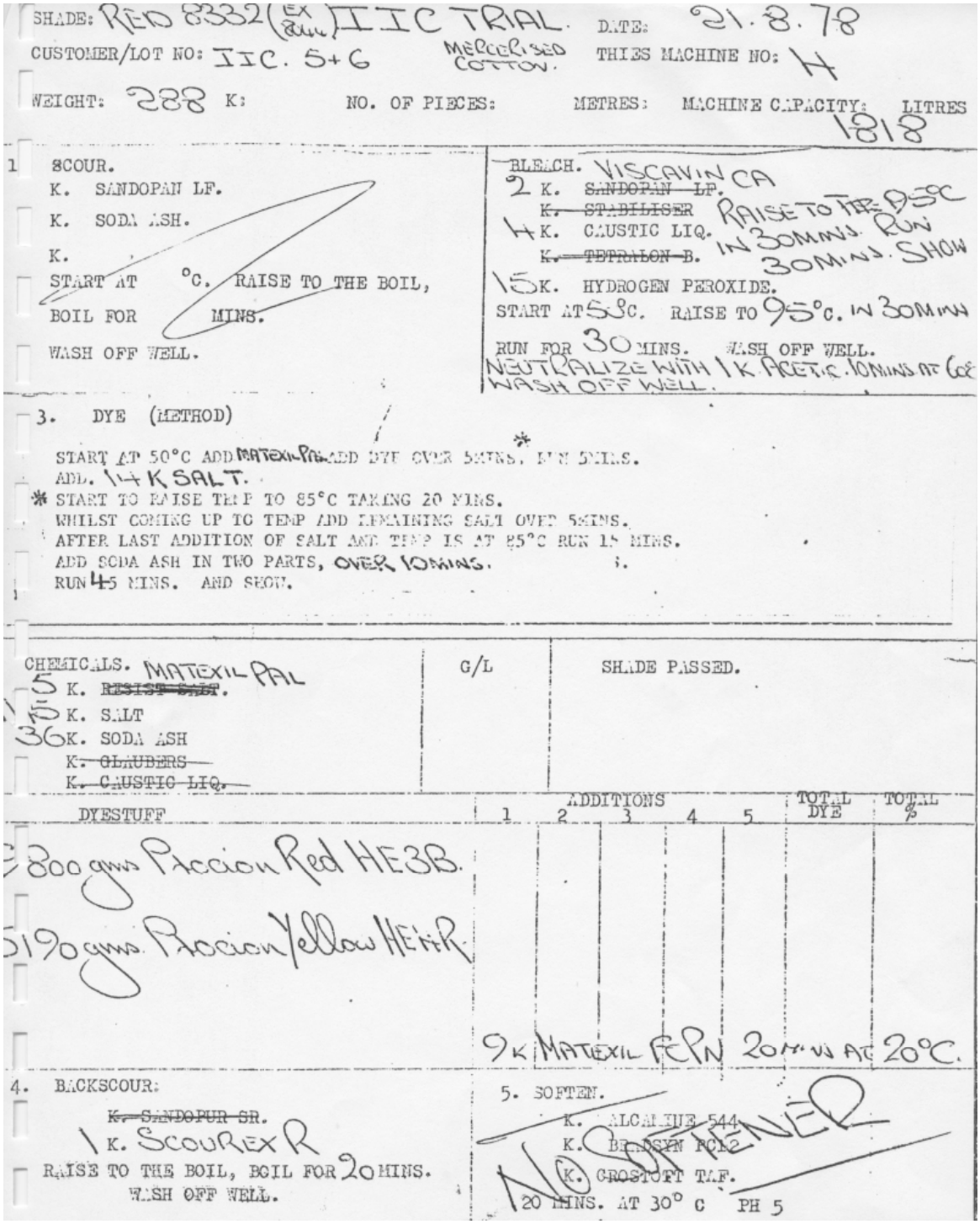
Table 10C: Lot 42 Winch Dyed 1x1 Rib, Light Blue - Stage 2

LOT NO: 42 STAGE 2 TABLE NO: 10 C

WINCH DYED 1x1 RIB (STAGE LIGHT BLUE)

SAMPLE REF.	FINISHING TARGETS WIDTH	FINISHING TARGETS C/3CM	AIRTEX FRAME SETTING	WIDTH AFTER AIRTEX	C/3CM AFTER AIRTEX	WIDTH AFTER PEGG	C/3CM AFTER PEGG	ARBACH FRAME SETTING	WIDTH AFTER H AND M COMPACTOR	C/3CM AFTER H AND M COMPACTOR	WIDTH AT SAMPLING	C/3CM AT SAMPLING
26/306	52.5	48		53		53	39/40		53	43	54	42
30/285	48.5	51		49.5		50	42/43		52/50	45.5/47	49.5	45
30/326	54	43/44		55.5		56.5	34/35		58/56.5	37/38	55.5	37/38
34/306	51.5	46/47		53.5		54.5	38		53	40	55	39/40
26/350	58.5	40		60		61.5	33/34		61.5/62	35/36	63	36
34/267	46.5	53		47.5		47.5	45/46		47	48	46.5	47

Table 11A: Lots 5 & 6 Mercerised & Jet Dyed Interlock, Red - Dyer's Recipe Card



SHADE: RED 8332 (EX RANGE) IIC TRIAL. DATE: 21.8.78
CUSTOMER/LOT NO: IIC. 5+6 MERCERISED COTTON. THIES MACHINE NO: 4
WEIGHT: 288 K: NO. OF PIECES: METRES: MACHINE CAPACITY: 1818 LITRES

1 SCOUR.
K. SANDOPAN LF.
K. SODA ASH.
K.
START AT °C. RAISE TO THE BOIL,
BOIL FOR MINS.
WASH OFF WELL.

BLEACH. VISCAVIN CA
2 K. ~~SANDOPAN LP.~~
~~K. STABILISER~~
4 K. CAUSTIC LIQ. RAISE TO THE BOIL IN 30 MINS. RUN 30 MINS. SHOW
~~K. TETRALON B.~~
15 K. HYDROGEN PEROXIDE.
START AT 58°C. RAISE TO 95°C. IN 30 MINS
RUN FOR 30 MINS. WASH OFF WELL.
NEUTRALIZE WITH 1 K. ACETIC. 10 MINS AT 60°
WASH OFF WELL.

3. DYE (METHOD)
START AT 50°C ADD MATEXIL PAL ADD DYE OVER 5 MINS. RUN 5 MINS.
ADD. 14 K SALT.
* START TO RAISE TEMP TO 85°C TAKING 20 MINS.
WHILST COMING UP TO TEMP ADD REMAINING SALT OVER 5 MINS.
AFTER LAST ADDITION OF SALT AND TEMP IS AT 85°C RUN 15 MINS.
ADD SODA ASH IN TWO PARTS, OVER 10 MINS.
RUN 45 MINS. AND SHOW.

CHEMICALS. MATEXIL PAL	G/L	SHADE PASSED.
5 K. ~~RESIST SALT~~.		
36 K. SALT		
K. SODA ASH		
~~K. GLAUBERS~~		
~~K. CAUSTIC LIQ.~~		

DYESTUFF	ADDITIONS 1	2	3	4	5	TOTAL DYE	TOTAL %
800 gms Procion Red HE3B.							
190 gms Procion Yellow HE4R.							
	9 K MATEXIL FCPN 20 MINS AT 20°C.						

4. BACKSCOUR:
~~K. SANDOPUR SR.~~
1 K. SCOUREX R
RAISE TO THE BOIL, BOIL FOR 20 MINS.
WASH OFF WELL.

5. SOFTEN.
~~K. ALCALINE 544~~
~~K. BRADSYN NC12~~
~~K. CROSTOFT TAF.~~
NO SOFTENER
20 MINS. AT 30° C PH 5

Table 11B: Lots 5 & 6 Mercerised & Jet Dyed Interlock, Red - Stage 1

LOT NO: 5 and 6. STAGE 1. TABLE NO: 11B.

PIECE MERC^D, JET DYED INTERLOCK - SHADE RED.

SAMPLE REF.	FINISHING TARGETS WIDTH	FINISHING TARGETS C/3CM	AIRTEX FRAME SETTING	WIDTH AFTER HYDRO	C/3CM AFTER	WIDTH AFTER PEGG	C/3CM AFTER PEGG	ARBACH FRAME SETTING	WIDTH AFTER ARBACH	C/3CM AFTER	WIDTH AT SAMPLING	C/3CM AT SAMPLING
38/377	53	41/42		47.5/51		52	30	55.5	55/54.5		53	31
34/359	52.5	44/45		49.5/49		52	32/33	54.5	54		52.5	33
34/377	52.5	44		48/51		52	30	54.5	53.5		52.5	30/31
38/359	52	43/44		44.5/47		51	32	53.5/52	53/51.5		51.75	32
34/340	51	45/46		48/47		50	35	50.5	51.5		50	34/35
42/377	50.5	38		46/47		50	28/29	51.5	50.5		50	30
42/359	50	42/43		49		50	32	51.5	50.5		50/50.5	33
34/324	48	47		48		48	37	50	48.5		48	38
38/340	47.5	44/45		46/47.5		47	34	50	48.5		47.75	34/35
34/307	47	51/52		45.5/44		45.5	40	49	48		46.5	40
42/340	47	46		45/47.5		46	34	49	47.5		46.5	34/35
38/324	46.5	46/47		45.5/47		45/45.5	36/37	49	47.5		46.5	36/37
38/307	45	51		44		44/43.5	38/39	—	45.5		44.5/45	39/40
42/324	44.5	45		43/44.5		44	36	—	45.5		44.5	36
42/307	40	45		43		42/42.5	38/39	43.5	44/43		42.5	39

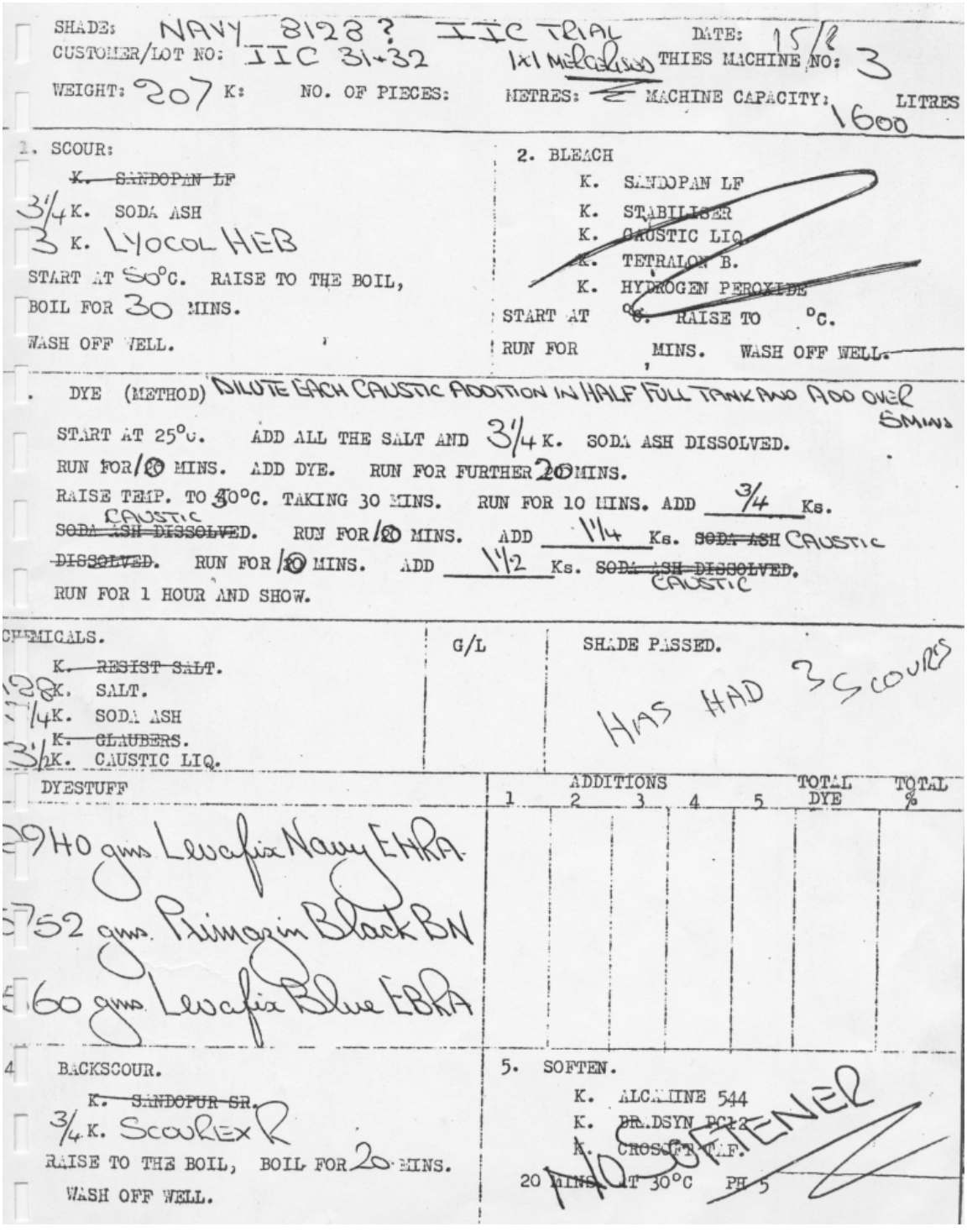
Table 11C: Lot 5 Mercerised & Jet Dyed Interlock, Red - Stage 2

LOT NO: 5 STAGE 2 TABLE NO: 11C

PIECE MERC, JET DYED INTERLOCK - SHADE RED

SAMPLE REF.	FINISHING TARGETS WIDTH	FINISHING TARGETS C/3CM	AIRTEX FRAME SETTING	WIDTH AFTER AIRTEX	C/3CM AFTER AIRTEX	WIDTH AFTER PEGG	C/3CM AFTER PEGG	ARBACH FRAME SETTING	WIDTH AFTER H AND M COMPACTOR	C/3CM AFTER H AND M COMPACTOR	WIDTH AT SAMPLING	C/3CM AT SAMPLING
34/377	51	37	46	51	30/31	51.5	29/30		55/52	32	51	31
34/359	50.5	38/39	46	51		50.5	32		51	34	50	33
38/377	49.5	36	46	49		49.5	29/30		50	30/31	49	30
42/377	48.5	35	46	47/49		49	29		49.5	30/31	48	30
38/359	48.5	38	43	46/47	31/32	49	31/32		48.5	33/34	48	33
42/359	48	38/39	43	49		49	31/32		48.5	34/35	48	33
34/340	47	38	43	47.5	34/35	47.5	34		49	36	47	35
38/340	47	41	43	47		47.5	34		48	36	46.5	36
34/324	46	42/43	43	48		46	36/37		47	39	45.5	38
42/340	45.5	40/41	43	46.5	34/35	46	33/34		46	35	45.5	34/35
34/307	45	45/46	43	47		45.5	39/40		46	41	45.5	41/42
38/324	44	42/43	43	47	37	44.5	36		44.5	38/39	44.5	38
42/324	43.5	40/41	43	45		43.5	35		43	36/37	43.5	37
38/307	43	44/45	43	43.5/45.5		43	38		43	41	43	40
42/307	43	45	43	44.5/43.5	38	42	38		44	41	41.5	39

Table 12A: Lots 31A & 32 Mercerised & Jet Dyed Rib, Navy - Dyer's Recipe Card



SHADE: NAVY 8128? IIC TRIAL DATE: 15/8
CUSTOMER/LOT NO: IIC 31+32 1x1 Mercerised THIES MACHINE NO: 3
WEIGHT: 207 K: NO. OF PIECES: METRES: MACHINE CAPACITY: 1600 LITRES

1. SCOUR:
~~K. SANDOPAN LF~~
3¼ K. SODA ASH
3 K. LYOCOL HEB
START AT 50°C. RAISE TO THE BOIL,
BOIL FOR 30 MINS.
WASH OFF WELL.

2. BLEACH
K. SANDOPAN LF
K. STABILISER
K. CAUSTIC LIQ.
K. TETRALON B.
K. HYDROGEN PEROXIDE
START AT °C. RAISE TO °C.
RUN FOR MINS. WASH OFF WELL.

3. DYE (METHOD) DILUTE EACH CAUSTIC ADDITION IN HALF FULL TANK AND ADD OVER 5MINS
START AT 25°C. ADD ALL THE SALT AND 3¼ K. SODA ASH DISSOLVED.
RUN FOR 10 MINS. ADD DYE. RUN FOR FURTHER 20 MINS.
RAISE TEMP. TO 50°C. TAKING 30 MINS. RUN FOR 10 MINS. ADD ¾ Ks.
~~SODA ASH DISSOLVED~~ CAUSTIC. RUN FOR 10 MINS. ADD 1¼ Ks. ~~SODA ASH~~ CAUSTIC
~~DISSOLVED~~. RUN FOR 10 MINS. ADD 1½ Ks. ~~SODA ASH DISSOLVED~~ CAUSTIC.
RUN FOR 1 HOUR AND SHOW.

CHEMICALS.
~~K. RESIST SALT.~~
28 K. SALT.
¼ K. SODA ASH
~~K. GLAUBERS.~~
3½ K. CAUSTIC LIQ.

G/L

SHADE PASSED.
HAS HAD 3 SCOURS

DYESTUFF	ADDITIONS 1	2	3	4	5	TOTAL DYE	TOTAL %
2940 gms Levafix Navy ENRA							
752 gms Primazin Black BN							
60 gms Levafix Blue EBRA							

4. BACKSCOUR.
~~K. SANDOPUR SR.~~
¾ K. SCOUREX R
RAISE TO THE BOIL, BOIL FOR 20 MINS.
WASH OFF WELL.

5. SOFTEN.
K. ALCAMINE 544
K. ~~BR.DSYN PC12~~
K. ~~CROSOFT L.F.~~
20 ~~MINS~~ AT 30°C PH 5
NO SOFTENER

Table 12B: Lots 31A & 32 Mercerised & Jet Dyed Rib, Navy - Stage 1

LOT NO: 31A and 32. STAGE 1. TABLE NO: 12B.

PIECE MERC'D, JET DYED 1x1 RIB SHADE - NAVY.

SAMPLE REF.	FINISHING TARGETS WIDTH	FINISHING TARGETS C/3CM	AIRTEX FRAME SETTING	WIDTH AFTER HYDRO	C/3CM AFTER	WIDTH AFTER PEGG	C/3CM AFTER PEGG	ARBACH FRAME SETTING	WIDTH AFTER ARBACH	C/3CM AFTER	WIDTH AT SAMPLING	C/3CM AT SAMPLING
34/350	54.5	39		56/52		54	31	58.5/57	56.5/55		54/54.5	31/32
30/350	52.5	44		53/51		52	31	55.5	53		52.5	31/32
26/350	52	44		57/55		51.5	32/33	55.5	55/53.5		52.5/53	33/34
26/326	49	46		50		48	36/37	52/50.5	51/49.5		49	36/37
34/326	48.5	45		51		47.5	32/33	50.5	48.5		48	33
30/326	47	43		46.5		46/46.5	33/34	49/48	47		46.5/47	34/35
26/306	46.5	51		49.5		47	40	48/47.5	48/47		46.5	40/41
34/306	46	46		46		45.5	35/36	48	47		46	36
30/306	45.5	48		47		45.5	37/38	47.5	46.5		45/45.5	38
26/285	44	55		45/43		44.5/45	44	46/45	45/44.5		44	45
34/285	43.5	50		42.5		43.5	40	44	44.5		43.5/44	43
30/285	43.5	53		41.5		44	42	44	44		43	40/41
26/267	43.5	61		43.5		43.5/44	49/50	44	44.5		43.5	50
30/267	42	57		42		42	46	42.5	42.5		42	46/47
34/267	41	55		40.5		41	44/45	42	41.5		40.5/41	45
34/248	38.5	62		39.5		38	51	39/38	40/38.5		38	51

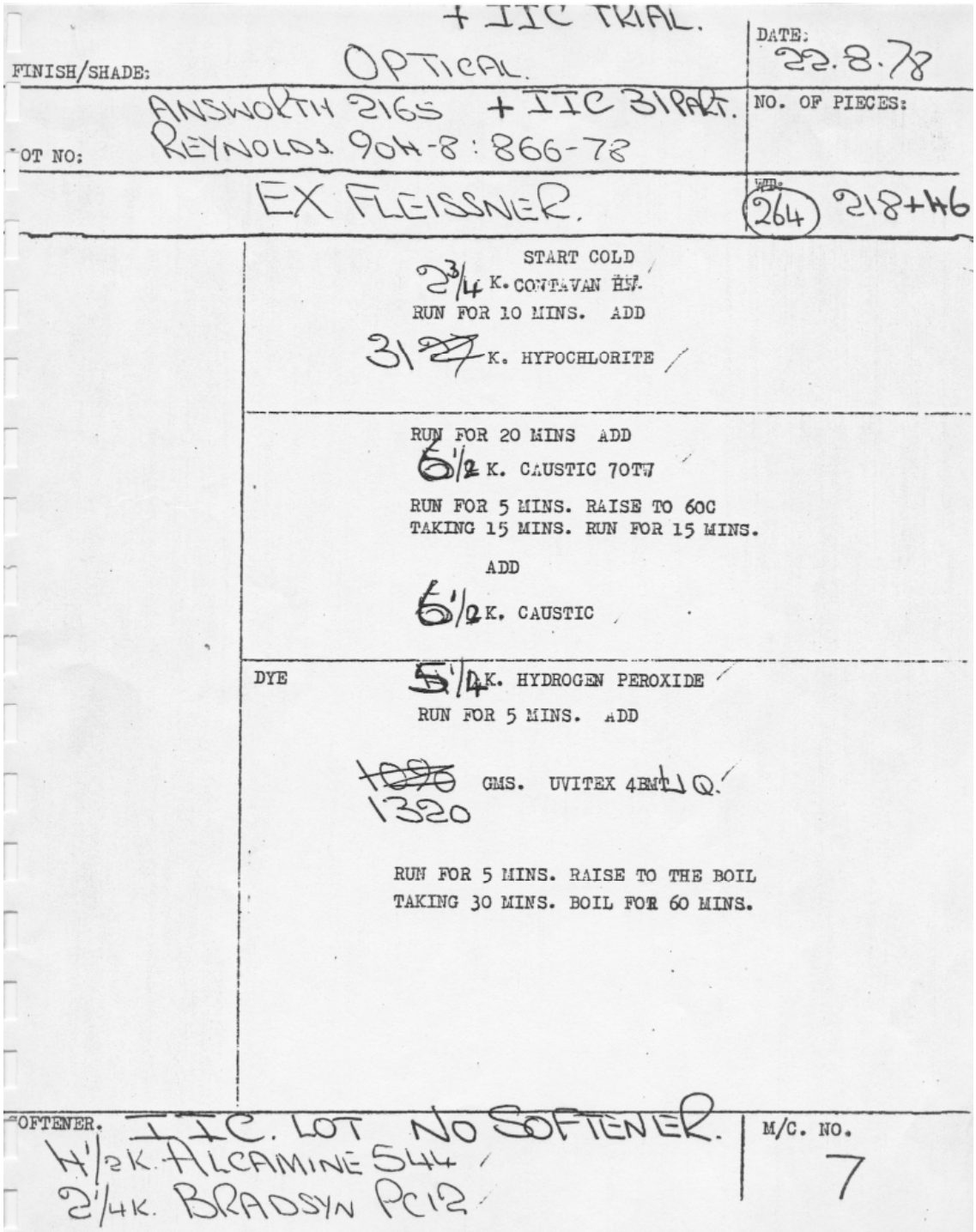
Table 12C: Lot 31A Mercerised & Jet Dyed Rib, Navy - Stage 2

LOT NO: 31 A STAGE 2. TABLE NO: 12C.

PIECE MERC'D, JET DYED 1×1 RIB SHADE - NAVY.

SAMPLE REF.	FINISHING TARGETS WIDTH	FINISHING TARGETS C/3CM	AIRTEX FRAME SETTING	WIDTH AFTER AIRTEX	C/3CM AFTER AIRTEX	WIDTH AFTER PEGG	C/3CM AFTER PEGG	ARBACH FRAME SETTING	WIDTH AFTER H AND H COMPACTOR	C/3CM AFTER H AND H COMPACTOR	WIDTH AT SAMPLING	C/3CM AT SAMPLING
34/350	50	37/38	43	43	30	46	31		49.5	32	49	32
30/350	49.5	39	43	45	30/31	47.5	32		48	32/33	49.5	32
26/326	47	43	43	46	36	45	36/37		47	38	46	37
34/326	46	40	38	46/40	32	45.5	35		46	36	47	35/36
30/306	44	45	38	44.5	36	42	38		44.5	39	43	38
26/285	43	48	38	42.5	46	42.5	48/49		43	47	43	47
26/267	42	53	38	42.5	49	42	50		42.5	53	42.5	52
34/285	41	46	36	41	41	41	44		42	44	41.5	43
30/267	40	51/52	33	38.5/39.5	47	41	49		41.5	50	41	49
34/248	37.5	55	33	38.5	52/53	40	53		40	54	39.5	55

Table 13A: Lot 31B Mercerised & Winch Bleached Rib - Dyer's Recipe Card



+ IIC TRIAL.

FINISH/SHADE: OPTICAL. DATE: 22.8.78

LOT NO: ANSWORTH 216S + IIC 31PART. REYNOLDS 90H-8 : 866-78 NO. OF PIECES:

EX FLEISSNER. WT: (264) 218+46

START COLD

2¾ K. CONTAVAN HF.

RUN FOR 10 MINS. ADD

31 ~~27~~ K. HYPOCHLORITE

RUN FOR 20 MINS ADD

6½ K. CAUSTIC 70TW

RUN FOR 5 MINS. RAISE TO 60C
TAKING 15 MINS. RUN FOR 15 MINS.

ADD

6½ K. CAUSTIC

DYE

~~5¼~~ K. HYDROGEN PEROXIDE

RUN FOR 5 MINS. ADD

~~1070~~ 1320 GMS. UVITEX 4BMT LQ.

RUN FOR 5 MINS. RAISE TO THE BOIL
TAKING 30 MINS. BOIL FOR 60 MINS.

SOFTENER. IIC. LOT NO SOFTENER. M/C. NO. 7

½ K. ALCAMINE 544

2¼K. BRADSYN PC12

Table 13B: Lot 31B Mercerised & Winch Bleached Rib - Stage 1

LOT NO: 31B STAGE 1. TABLE NO: 13B

PIECE MERC^D, WINCH BLEACHED 1×1 RIB

SAMPLE REF.	FINISHING TARGETS WIDTH	FINISHING TARGETS C/3CM	AIRTEX FRAME SETTING	WIDTH AFTER HYDRO	C/3CM AFTER	WIDTH AFTER PEGG	C/3CM AFTER PEGG	ARBACH FRAME SETTING	WIDTH AFTER ARBACH	C/3CM AFTER	WIDTH AT SAMPLING	C/3CM AT SAMPLING
26/350	52	44		50·5/52		53	31/32		53		52·75	32
30/326	47	42/43		43/45		47/47·5	33		48		47·5	34
26/306	46·5	50/51		47/48		46	39/40		47·5/48		47	40
34/306	46	46/47		44/43		46	35/36		46		46·25	35/36
30/285	43·5	53		43		43/44	42		44/45		44·75	42/43
34/267	41	55/56		43/41		40·5	44		42		41·5	43/44

Table 13C: Lot 31B Mercerised & Winch Bleached Rib - Stage 2

LOT NO: 31 B STAGE 2 TABLE NO: 13C

PIECE MERC, WINCH BLEACHED 1x1 RIB

SAMPLE REF.	FINISHING TARGETS WIDTH	FINISHING TARGETS C/3CM	AIRTEX FRAME SETTING	WIDTH AFTER AIRTEX	C/3CM AFTER AIRTEX	WIDTH AFTER PEGG	C/3CM AFTER PEGG	ARBACH FRAME SETTING	WIDTH AFTER TUBE-TEX COMPACTOR	C/3CM AFTER TUBE-TEX COMPACTOR	WIDTH AT SAMPLING	C/3CM AT SAMPLING
26/350	52.5	38	43	44	31	49.5	32		52	40	53.5	40
26/306	46	43	39	42/41	38	42	37/38		46.5	49	46.5	46/47
30/326	44.5	39	39	42.5	32/33	42.5	33		44.5	43	45	40/41
34/306	42	41	33/39	38	34	39.5	34/35		41	43	42	43
30/285	42	47	33	36	39/40	37.5	39		41	51	42	49
34/267	39.5	50	33	35	42	36	42/43		41/39.5	53/51	39.5	51