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ESTABLISHMENT OF A CLOTHING UNIT IN THE DEPARTMENT
OF SUPPLIES TO ORGANIZE AND SUPPORT TECHNICALLY
LOCAL MANUFACTURE OF SCHOOL AND OTHER UNIFORMS

US/BOT/87/097/11-04

BOTSWANA

Technical report: Second visit*

Prepared for the Government of Botswana
by the United Nations Industrial Development Organization

Based on the work of Mortimer O'Shea
Purchase + Procurement Expert

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* This document has not been edited.

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OBJECTIVES

The objectives of this second mission (two man months) were:

- . To check for correct installation of the Textile Testing Laboratory equipment
- . To train three Counterpart Staff in the reasons for testing and the correct and efficient testing and recording procedures
- . To design test reporting forms
- . To devise and implement a special filing system for Master Samples and Test Results
- . To set up a system for close liaison between the Laboratory, the Warehouse and the Purchase and Procurement function
- . To instruct staff on equipment care and maintenance procedures

ABSTRACT

The Purchase & Procurement Consultant familiarized himself with the equipment and the specific needs of training, liaison and documentation. Procedures for both routine testing of samples submitted by suppliers and standard fabrics were initiated and implemented. Test routines appropriate to the prevailing lab. conditions were devised and staff trained in their day to day implementation. Recommendations on ordering procedures, warehouse management and inter-functionary liaison were made.

MAJOR RECOMMENDATIONS

The training of Counterpart Staff should now be consolidated by providing opportunities for further training and broadening of the educational base. A suitable candidate should be identified for the post of Textile Warehouse Manager and the chosen person afforded an opportunity to be given appropriate further education and training. Some additional items of testing equipment should be considered for purchase. One member of the Laboratory staff should be exclusively dedicated to testing and test-related work.

1.00 Appropriateness of Tests - Standard testing methods and procedures were adapted to suit:

- . The levels of scientific background and expertise
- . The prevailing ambient lab. conditions of temperature and humidity
- . Specific limitations of certain items of installed equipment

For example, because the lab. does not have a controlled or 'Standard Atmosphere' such as is mandatory in certified Testing Houses, the designation 'Comparative' type testing will apply and no test results may be regarded as legally reliable. This must not be interpreted as implying that test results shall be of any less value for internal use than those from a Controlled Laboratory. Indeed the costs for the installation and maintenance of a Standard Atmosphere would far outweigh any advantages to be derived from such. Arising from this constraint, it was necessary to establish a Light Fastness test of a simplified nature but capable of providing reliable comparability of results. Should this test method give an indication of poor light fastness this would be sufficient grounds for the rejection of a submitted sample. However, in the case of a tested sample from a delivered consignment, confirmation of a suspicion should be secured through the services of a Testing House. It is expected that this would be a rare occurrence. As it becomes known to suppliers that testing is being carried out on their samples, it is likely that they will become more alert in their adherence to correct specifications.

- 1.01 Staff Alertness Assurance - Because of the need to control the alertness of trainee staff in the monitoring of testing progressively, special procedures have been devised whereby in order to record interim observations, the test instrument must be programmed to stop automatically at predetermined stages. For example, during the Martindale Abrasion test, samples must be checked after every 500 rubs and during a Pilling test every hour (3600 revolutions) It is acknowledged that as personnel experience and scientific discipline improve, such arbitrary checks can be altered and longer runs between inspections established.
- 1.02 Special test report forms have been designed to facilitate recording by way of a tick in an appropriate box (Annexes 3-7) The Light Fastness tester is set daily for a nine hour run so that a 40 hour test can be undertaken in a week. (Annex 7)
- 2.00 Specially Devised Tests - Because of the need to be able to undertake wash shrinkage testing of garments, a Hoover Logic 800 de Luxe automatic domestic-type machine has been installed. Using this machine, some useful and informative tests on fabric samples have been introduced(Annex 5)

- 2.01 Dry and Wet Crocking (rubbing) test - Although no specific test instrument has been purchased, it was possible to devise a useful test for this cloth parameter which will be of particular benefit in testing the 'colour separations' (components) of printed textiles. (Annex 6)
- 3.00 Test Jigs and Aids - In order to ensure reliable results and reproducibility of tests, a number of templates of accurate dimensions were made for such tests as:
- . Washing shrinkage
 - . Fusing shrinkage
 - . Pilling
 - . Light Fastness
 - . Tensile
- 3.01 Jig to facilitate thread counting - A simple device was made in prototype form (Annex 12)
- 3.02 Adaptation of Test Instrument - Because no formal test instrument was available, it was possible to adapt the Fabric weight test balance by way of formula or correction factor for use in Tex counts determination. (Annex 16)
- 4.00 Filing System for Master Samples and Test Results - A simple system that will ensure fast retrieval of full information on fabric specifications as well as all test results and fabric samples was designed and implemented (Annex 2)
- 5.00 Current Status of Warehouse & Recommendations - Some faults in storage of textiles were noted and recommendations made on improvements which should be implemented before the new cloth Inspection Machine is installed. (Annex 9)
- 6.00 Recommendations for Items of Additional Laboratory Equipment - Although an excellent range of 'core' equipment and tests is now available, certain additional items of equipment could be acquired which would give added value to the service available from the lab. (Annex 10)
- 7.00 Testing & Warehouse Procedures - A comprehensive check list of a step-by-step approach to operations was provided (Annex 11)
- 8.00 Determination of Standard Cloth Parameters- Having established which cloths were to be regarded as 'Standard', i.e., regularly used and likely to be reordered in the future, these were then arranged in numerical sequence according to their already allocated Folio Numbers and accurate criteria established for them. (Annexes 13 & 14)
- 9.00 Proposal for the Rationalization of fabrics - Following the foregoing tests it became obvious that considerable scope existed for a reduction in the number of 'Standard' fabrics. This possibility had not been so obvious prior to the checking of the parameters of weight, fibre content and threads per unit area. (Annex 15) Many advantages would accrue from such a rationalization, among which would be :

- 9.01 A reduction from the current 29 different fabric categories to the more manageable two main categories plus a small number of divergent fabric types that are not amenable to rationalization.
- 9.02 Space saving in the warehouse
- 9.03 Economies deriving from the possibility of larger orders
- 9.04 The possibility of ordering as undyed fabric to be stocked for considerably lower purchase price.
- 9.05 Arising from the foregoing, the feasibility of placing economical dyeing orders
- 9.06 Also arising from 9.04, the possibility, should the facility become available in the future in a nearby textile mill, of arranging with the mill to hold a stock of undyed material from which dyeing orders would be prepared only as the need would arise. This arrangement would be the equivalent of operating a JIT system (See Note to Annex 9)
- 9.07 The possibility that a local manufacturer would be in a position to facilitate the Department of Supplies by finding associate or otherwise known suppliers of any difficult-to-procure fabrics.
- 10.00 Textile manufacturers should be encouraged to set up plants in Botswana which would have the effect of strengthening the country's textile base through supplying import-substitution fabrics and exporting to both neighbouring countries and to Developed Countries to take advantage of the preferential tariff rates under the Lome Convention.
- 11.00 General Advice for Laboratory Personnel - This is given as Annex 17 and consists of a number of common sense directions.
- 12.00 Other recommendations -
- . Dust covers should be provided for the more sensitive instruments
 - . Safety of electricity outlets needs attention, notably the outlet located immediately below the plumbing for the washing machine and Light Fastness tester.
 - . Should any chemicals be used in future in the lab. a source of running water should be provided.
- 12.01 Infrastructure - Local Vocational Education institutions might now be encouraged to initiate a programme of education and training for the developing Textiles and Garment industries. Such courses would be expected to receive the enthusiastic support of the industries concerned. Department of Supplies personnel should be encouraged to participate in appropriate courses. All proposed entrants to the study courses should have attained a good level of Secondary Education which should include Physics and/or Chemistry. Training courses for Training Officers might also be undertaken by these colleges.

ANNEX 1 - List of Laboratory Equipment

Martindale Abrasion Tester

Die-cutter to prepare specimens for abrasion tests

ICI Pilling Box

Shirley Developments Fabric Balance

Goodbrand GBX Micro 350 Universal Electronic Tester C/W :

- . Load Cells 0-500N and 0-5000N
- . Set of Bollard Grips for Yarns
- . Set of Bridge Grips for samples 50mm wide
- . Micro Computer Data Analysis Package comprising:
 - . Amstrad PC 1512 Double Disc Drive Monochrome Monitor
 - . 3250 DI Printer
 - . Cables and Interfaces
 - . Software programme for Yarns, Fabrics and Peel Bond Strength

Light Fastness Tester

Hoover Logic 800 de Luxe Automatic Washing Machine

Moving Pointer Thread Counting Glasses (3)

Fusing Press

Note - All of the above items except the Fusing Press were provided by UNIDO

ANNEX 2 Filing System for Master Samples and Test Results

Background - The system that existed prior to the installation of the new one was most inaccurate in that incorrect fabric parameters such as weight per square metre and ends/picks per centimetre were as given by the supplier and were found to be frequently incorrect. There was no rational system for the keeping of key samples and test reports were not filed. Those that were available were merely reports without proof of testing by way of specimens.

New System - The first step in devising a new system was to arrange the fabrics in numerical sequence, continuing to utilize the already allocated Folio Numbers. Ends and picks per cm as well as weight per square metre were ascertained.

It was considered opportune to utilize the existing standard Government 'Gen. 32' file covers and standard cabinet with Suspension Filing.

Master File - A sample of a standard fabric is cut to fit the inside of an open file cover. This sample must include a selvedge running along the left hand side of the cover. The sample is stapled through the folded ends of the cover. Attached to one of the folded ends are the specimen which gave the weight per square metre and the warp and weft yarn wrappings as used to check the Tex counts. A slip attached to the outside of the cover gives the full set of cloth particulars.

Numbering system - The file envelope tab gives the fabric number and the file cover is given the title 'Master File' Only the Master Sample (or set of Master Samples if more than one colour) is held in this envelope.

Subsidiary Files - These consist of:

- . File for suppliers' counter samples
- . A separate file for each tested parameter
- . File for reference cuttings taken from each piece delivered

These files are placed in the Filing Cabinet behind the Master File.

ANNEX 3 -

ICI PILLING TEST

START TIME: ----- FINISH TIME: ----- TESTED BY: -----

DATE: ----- DATE: -----

ORDER NO: -----

SUPPLIER: -----

CLOTH NO: -----

FCLIO NO: -----

COLOUR: -----

QUALITY: -----

COMPOSITION: -----

WIDTH: -----

WEIGHT: -----

THREAD/CM: -----

THREAD COUNT WARP/WEFT:---

WEAVE: -----

END USE: -----

ESTIMATED USAGE: -----

PROGRESSIVE ASSESMENTS; MACHINE STOPPED EVERY HOUR OR 3,600 REVS

HOURS	REVS	SLIGHT			MODERATE			SEVERE		
		Fuzz.	Pill.	Col. loss	Fuzz.	Pill.	Col. loss	Fuzz.	Pill.	Col. loss
01	3600									
02	7200									
03	10800									
04	14400									
05	18000									
06	21600									
07	25200									
08	28800									
09	32400									
10	36000									

TARGET : REVS (TICK AS APPROPRIATE)

ASSESSMENT OF REMOVED AND CARD MOUNTED SPECIMENS (RATE ACCORDING TO PHOTOGRAPHS)

ANNEX 3 (contd.)

Assessment warp 1

Rating	Description	Points to be taken into consideration during assessment
5	No change	No visual change
4	Slight change	Slight surface fuzzing
3	Moderate change	The test specimen may exhibit either or both of the following: (a) moderate fuzzing; (b) isolated fully formed pills.
2	Significant change	Distinct fuzzing and/or pilling
1	Severe change	Dense fuzzing and/or pilling which covers the specimen

NOTE. The rating for pilling may alter on storage of the tested specimens.

Assessment weft 1

Rating	Description	Points to be taken into consideration during assessment
5	No change	No visual change
4	Slight change	Slight surface fuzzing
3	Moderate change	The test specimen may exhibit either or both of the following: (a) moderate fuzzing; (b) isolated fully formed pills.
2	Significant change	Distinct fuzzing and/or pilling
1	Severe change	Dense fuzzing and/or pilling which covers the specimen

NOTE. The rating for pilling may alter on storage of the tested specimens.

Assessment warp 2

Rating	Description	Points to be taken into consideration during assessment
5	No change	No visual change
4	Slight change	Slight surface fuzzing
3	Moderate change	The test specimen may exhibit either or both of the following: (a) moderate fuzzing; (b) isolated fully formed pills.
2	Significant change	Distinct fuzzing and/or pilling
1	Severe change	Dense fuzzing and/or pilling which covers the specimen

NOTE. The rating for pilling may alter on storage of the tested specimens.

Assessment weft 2

Rating	Description	Points to be taken into consideration during assessment
5	No change	No visual change
4	Slight change	Slight surface fuzzing
3	Moderate change	The test specimen may exhibit either or both of the following: (a) moderate fuzzing; (b) isolated fully formed pills.
2	Significant change	Distinct fuzzing and/or pilling
1	Severe change	Dense fuzzing and/or pilling which covers the specimen

NOTE. The rating for pilling may alter on storage of the tested specimens.

ANNEX 4 - Forms for Abrasion Test Reporting

MARTINDALE ABRASION TEST

DATE:..... DATE..... TESTED BY.....
START TIME..... FINISH TIME.....

ORDER NUMBER
CLOTH
COLOUR
WEIGHT Grams / Sq.Metre
YARN COUNTS WARP Tex
YARN COUNTS WEFT Tex
SUPPLIER
QUALITY
WIDTH cm.
WARP THREADS PER cm
WEFT THREADS PER cm
WEAVE
FOLIO NUMBER
END-USE
ESTIMATED ANNUAL USAGE
COMPOSITION PER CENT

TARGET NUMBER OF RUBS.....

LOADING OF SPECIMENS....9Kpa for Apparel Fabrics

MACHINE TO BE SET TO STOP FOR SPECIMEN ASSESSMENT AFTER EACH
SUCCESSIVE 500 RUBS

ANNEX 4 (Contd.)

APPEARANCE ASSESSMENT* (Compare with unabraded specimen)

Number of rubs	Slight		Moderate		Severe			
	Fuzz- iness	Pill- ing	Col. loss	Fuzz- iness	Pill- ing	Loss	Colour ing	loss
0500								
1000								
1500								
2000								
2500								
3000								
3500								
4000								
4500								
5000								
5500								
6000								
6500								
7000								
7500								
8000								
8500								
9000								
9500								
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12000								
12500								
13000								
13500								
14000								
14500								
15000								
15500								
16000								
16500								
17000								
17500								
18000								
18500								
19000								
19500								
20000								

Highlight End Point, i.e. when two threads will have broken

* Tick as appropriate

ANNEX 5 - Washing Shrinkage & Colour Change Test

SHRINKAGE (DIMENSIONAL STABILITY) TESTING USING

HOOVER LOGIC DE LUXE MACHINE

- NOTE 1: When testing 25 x 25 cm textile samples, always programme " Half Load. "
- NOTE 2: Select normally for dyed materials of 100% cotton, polyester/cotton and polyester/viscose, programme " C " (fast coloureds)
- NOTE 3: For wool and wool blends, select programme " E "

PREPARATION OF SAMPLES:

Using the 25 x 25 cm template, cut the material with great accuracy and check dimensions at three points in warpwise and weftwise directions. Mark with indelible marker either the warp or weft direction; marked area about 2 cm in from cloth edges. Place each sample flat inside a white fabric envelope made from any surplus cotton, polyester/cotton or polyester/viscose material, loosely stitched. If a number of similar samples from different suppliers are being tested, identify each sample by some means such as indelible-ink. After completion of wash/rinse (spin programme, remove sample/s)

Dry flat and iron

Measure dimensions with great accuracy

Express any change as A % of 25 cm original dimension in both warp and weft.

COLOUR CHANGE

Compare the washed and dried sample with the original preferably on a matt black background and an angle of 45° to the horizontal in a good south light. Note any change using a 1 to 5 points scale. Tick 5 if no change, 4 if very slight change and so on down to 1 for a very severe change. Use the grey scale as a basis for colour change assessment.

Visual assessment of dried specimen against original with ratings 1 to 5 to indicate colour loss or change against the grey scale.

(Tick as appropriate)

SAMPLE	RATING					Remarks eg. greener, redr, blr, ylr etc
	1	2	3	4	5	
A						
B						
C						
D						
E						
F						
G						

NOTE 4: If staining of white enveloping material occurs please record this; Also if there is a significant deposit of detached fibre inside the envelope.

NOTE 5: Envelopes may be reused if considered suitable.

NOTE 6: Turn off water supply to machine at end of programme.

ANNEX 6 - DRY AND WET RUB TESTS (CROCKING)

MAIN APPLICATION : Colour Separations of Printed Textiles

1. DRY RUB TEST

RATING 1 TO 5

SPECIMEN	1	2	3	4	5	REMARKS
A						
B						
C						
D						
E						
F						
G						
H						

ANNEX 6 (contd)

2. WET RUB TEST

RATING 1 TO 5

SPECIMEN	1	2	3	4	5	REMARKS
A						
B						
C						
D						
E						
F						
G						
H						

ANNEX 7- Light Fastness Test (Adaptation of Method II, Page 10 of Manual)

INSTRUCTION: Mount a full set of blue standards in middle holder and utilise as fully as possible the two remaining holders, e.g. if there are less than eight colours per sample the balance of spaces can be used to test another quality with an appropriate number of colours on the same holder or there can be a transfer to the second holder. Light fastness tests take a long time: e.g. Standard Four on Grey Scale will require approximately 80 hours to fade Blue Standard 8.

DATE _____ DATE _____ TESTED BY _____
 START TIME _____ FINISH TIME _____

ORDER NO. _____ SUPPLIER _____
 CLOTH NO. _____ FOLIO NO. _____
 COLOUR _____ QUALITY _____
 COMPOSITION _____ WIDTH _____
 WEIGHT _____ THREADS/cm _____
 THREAD COUNT WARP/WEFT _____ WEAVE _____
 END USE _____
 ESTIMATED USAGE _____

TARGET FASTNESS _____ (OR WHAT SPECIFICATION REQUIRES)

SPECIMEN INSPECTED AT:

ORIGINAL SAMPLE
TESTED SAMPLE

HOURS	BLUE STANDARD No.	TICK AS APPROPRIATE	
		PASS	FAIL
005			
010			
020			
040			
080			
160			
320			
640			

NOTE 1. Staple the original colour and test colour side by side to this sheet.

NOTE 2. Use the one sheet for each colour and staple together all sheets representing colours from the one cloth No. Retain in a manilla envelope in filing cabinet.

ANNEX 8 - (Specimen) TENSILE TEST RESULTS

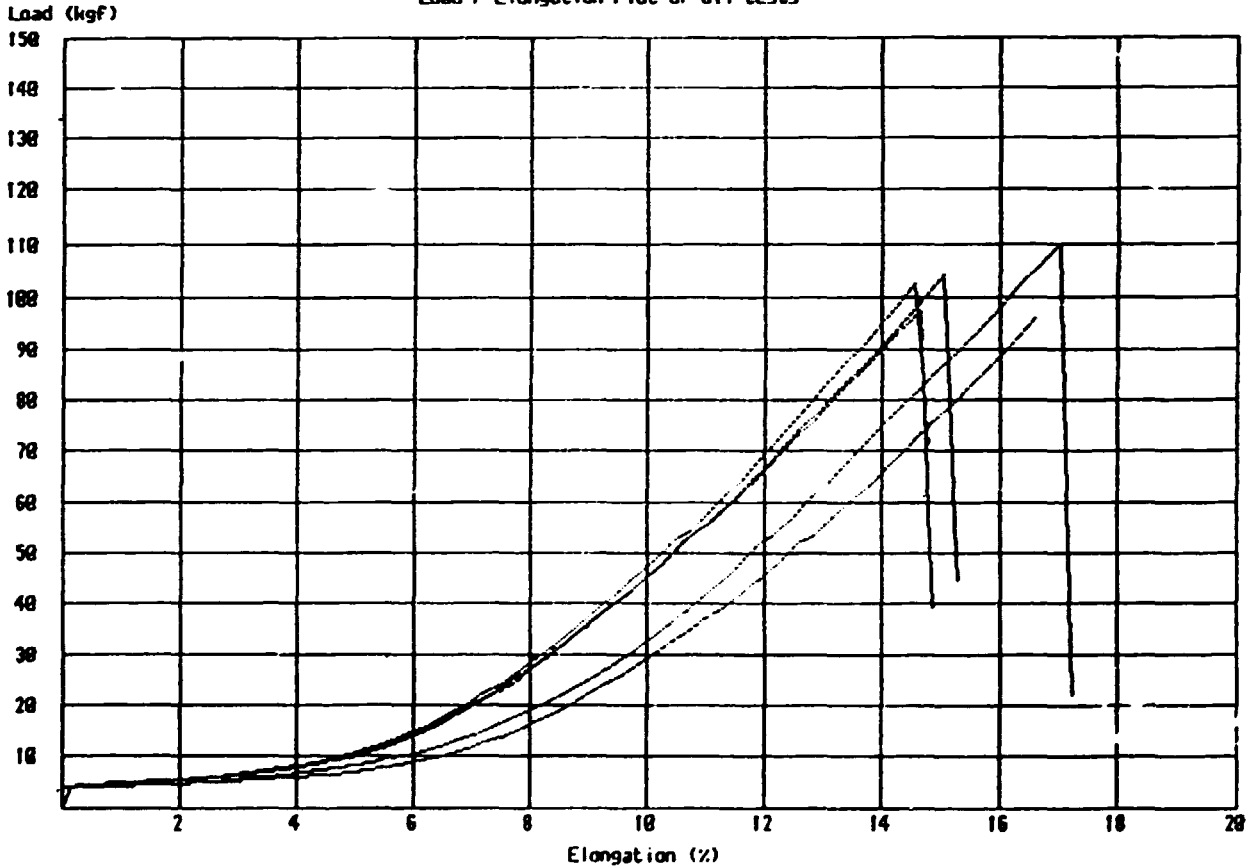
REFERENCE 1 : CamSpl C Warp
 REFERENCE 2 :
 REFERENCE 3 :
 DATE TESTED : 06-02-90

TEST SPEED : 200 mm/min
 SAMPLE LENGTH : 200 mm
 SAMPLE WIDTH : 50 mm
 PRE-TENSION : 0 kgf

TEST No.	BREAKING LOAD (kgf)	ELONGATION (%)	T.E.A. (kgf.m)
1	109.90	17.220	1.2453
2	96.90	16.635	1.0273
3	104.00	15.275	1.1062
4	97.70	14.865	1.0061
5	102.00	14.785	1.0547

LOWEST	96.90	14.785	1.0061
MEAN	102.28	15.756	1.0879
MAXIMUM	109.90	17.220	1.2453
STD. DEVIATION	5.30	1.105	0.0956
CO-EFF VARIATION	5.177	7.013	8.790
LOWER 95% CONF. LIMIT	95.71	14.384	0.9692
UPPER 95% CONF. LIMIT	108.85	17.128	1.2066

Load / Elongation Plot of all tests



ANNEX 9- Current Status of Warehouse & Recommendations

OBSERVATIONS

1. Bin storage under-utilized
2. Rolls of materials not supported over full width, leading to possible stretching and compression problems in the making-up processes
3. Metal framework causing possible pressure marks on fabrics
4. many instances of torn Polythene wrappings
5. Only translucent Polythene wrapping being used
6. Some cloths - notably No. 052 (blue/white check) - stored unwrapped and consequently very dirty
7. The ordering quantity for the Botswana National Flag would appear to have been overestimated; also, there was evidence of a significant variation in one of the constituent colours, i.e., the Blue
8. BGP Sheeting material: a portion of the stored piece goods was delivered in uneconomic short lengths which will lead to a good deal of waste in cutting

RECOMMENDATIONS

1. Pallets should not be used as flooring for bins. A good alternative would be the use of either smooth chipboard or MDF to form the bases and subdivisions for bins
2. Pieces should be wrapped by the supplier or re-wrapped in the warehouse with black Polythene in order to avoid photodegradation (damage caused by prolonged exposure to light)
3. Consideration should be given to the introduction of a JIT ordering/stocking regime

EXPLANATION OF JIT

JIT means 'Just-in-time'. This is a modern concept whereby raw materials, etc. for a manufacturing industry are ordered from a group of reliable and carefully vetted suppliers who will guarantee delivery shortly before the goods are scheduled for use by the manufacturer, thus providing important advantages such as:

- . a significant reduction in warehouse space requirements
- . a significant reduction in tied-up capital
- . avoidance of losses due to long-term storage
- . a reduction in warehouse staffing requirements
- . better Quality Control by the supplier

ANNEX 10 - List of additional laboratory equipment recommendations

Fabric Thickness Gauge

Yarn Examining Machine (simple Serigraph type)

Burst Tester (hand-operated)

Thermo-Hydrograph

IWS Viewing Cabinet

Simple Laboratory Balance

Perspirometer complete with appropriate fittings

Gyrowash " " " "

Sample Cutter (suggest Heal 230/100 Standard Cut)

Crockmeter (hand-driven)

Bagginess Tester for Knitted and Woven Fabrics (suggest Zweigle)

ANNEX 11 - Testing & Warehouse Procedures

1. Suppliers should be requested to provide a half metre full width for testing and filing purposes
2. Record batch/dye lot number
3. Measure width and record. Do not tension fabric excessively
4. Colour comparisons: Use a matt black Mounting type card with two 50mm square cut outs in juxtaposition.
 - . place standard under 1st window (cut-out)
 - . place specimen for comparison under 2nd window
 - . view at 45° in a south light

record as:

 - . perfect match
 - . slightly lighter
 - . slightly darker
 - . Noticably lighter
 - . noticably darker
 - . a little: bluer, greener, redder, yellower (as appropriate)
5. If a perfect match, check:
 - . ends and picks per cm
 - . Tex yarn counts

If correct to a tolerance of $\pm 1\%$ go on to:
6. Check weight in grams/square metre; if correct to a tolerance of 5%, go on to:
7. Test for Dry and Wet Crocking (rubbing) fastness; if satisfactory,
8. Check Tensile Strength and Elongation at break for five samples each warp and weft. If within 5% of the Standard, proceed to
9. Test Light Fastness with Blue Standards until standard 5 has faded to Grey Scale 4 (this will take 40-50 hours) It should be noted that laboratory conditions - particularly humidity - are not capable of giving parallel results to those from a controlled laboratory. It has been established, however, that the foregoing procedure can be regarded as giving a light fastness of 6/7. Test specimens should be checked every eight hours and if fading of a test specimen can be detected earlier than the fading of Blue Standard 5 to Grey Scale 4, the sample can be suspected to have inadequate fastness to light. If sample passes, go on to:
10. Test for abrasion resistance up to 7,500 rubs
11. Simultaneously test for pilling on ICI Pilling Tester. Check for appearance retention against the original sample and reject if a noticeable change is detectable at any check stage.
12. If sample passes all of the foregoing tests, apply the washing fastness and shrinkage test
13. If a sample passes all appropriate* tests and price/delivery criteria are satisfactory:

Order the calculated quantity and request a half metre full width for testing before authorizing despatch of goods by the supplier
14. Upon delivery:
 - . apply all tests in the foregoing sequence and if a sample falls down on any parameter, report this to the supplier who must then accept return of the goods at his own expense

*It would be inappropriate to test a Duster Fabric for light fastness

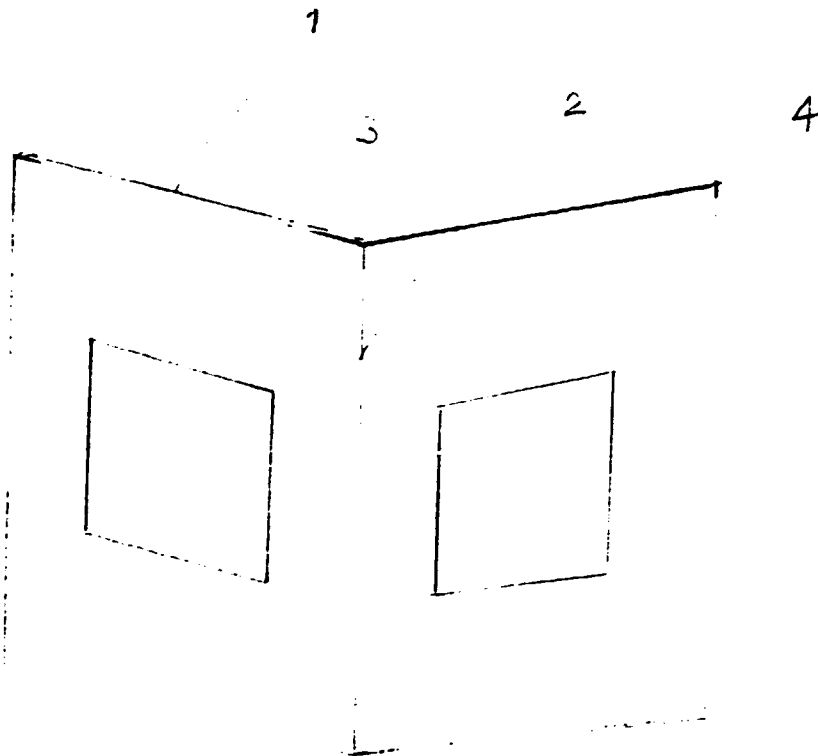
ANNEX 11 (contd.)

WAREHOUSE

- 15.00 On Cloth Examining machine:
- 15.01 Measure all pieces and apply a Trumeter length ticket to each piece
- 15.02 Stamp beginning and end of each piece using a rubber stamp bearing the Department of Supplies Logo. Use an ink pad with indelible ink.
- 15.03 Record all faults in a special Log Book making certain that details such as order No., piece No. and delivery date are included
- 15.04 Mark all serious faults at the selvedge by means of a red thread
- 15.05 Establish a claim with the supplier for all such faults
- 15.06 If a piece has an excessive number of faults it should be returned immediately and the Invoice corrected
- 15.07 Bowed and/or skewed weft is a fundamental and serious fault and can run right through a batch. Such pieces should be rejected
- 15.08 Cut a small reference sample by means of the circular cutter (to be provided) to be stapled to the piece log and a second sample (correctly labelled) for the lab. filing system
- 15.09 Constantly check, using the Standard:
- 15.09.1 that the colour of each piece is consistent,
- 15.09.2 that there is no variation from selvedge to selvedge,
- 15.09.3 that there is no variation from end to end of a piece
- 15.10 Check ends and picks at random, preferably a minimum of three times for each piece. If significant discrepancies occur, increase the frequency of checks
- 15.11 Weigh each piece accurately, allowing for any tare. Record the weight on piece swing ticket and in the log book. Convert to weight per square metre and compare with the Standard.
- 15.12 Tabulate all of the foregoing information where applicable as two columns in the log book, giving the found and the supplier's information. Take action as appropriate and if in doubt, repeat any check.

ANNEX 12- Jig for Thread Counting

A prototype jig to hold the fabric specimen and the thread counting glass in order to prevent relative movement and so ensure accuracy was made. This proved most satisfactory and it is now recommended that a more permanent version should be made using a suitable plastics sheet material such as Polypropylene.



1. 2mm plastics foil
2. 'live' hinge
3. cut-out to give snug fit for thread counting glass
4. cut-out with clear plastics film attached

ANNEX 13 - Determination of Standard Cloth Parameters - 1.00 - Weight per square metre

Folio No.	Tested g/M ²	Nominal g/M ²	Cloth End-use and Supplier	Colours as tested
8305-003	280	250	Prisoners' uniform - Durafoam	Brown Denim
005	174	146	Tea dish towels - DWS Malawi	Brown/white/orange
012	194	205	Government cleaners' uniform - Cone Textiles	Peacock blue
013	186	205	Hospital orderlies/cleaners - Cone Textiles	Lavender/mauve
015	184	267	Agricultural demonstrators - Ladies - Towa	Khakhi
016	170	267	Local government nurses' uniform - Towa	Fawn/beige
018	172	267	Messengers-ladies' uniform - Towa	Blue/grey
019	198	N/A	Duster cloth - Dagama Textiles	Sky blue
021	170	267	Nurses' uniform - Towa Velveteen	White
7210-025	168	267	Prison warders (M+F) uniform (Supplier N/A)	Bottle green
8305-049	160	155	Printed bedsheets BGP-DWS Malawi	Blue letters on white
052	238	280	Cooks' trousers - DWS Malawi	Blue/white Gingham
053	174	280	Traffic flags - roads/railways	Red
055	100	100	Shirting for wildlife officers - Cone Textiles	Cream
056	240	350	BDF shirts - H.F. Hartley	'Angora' fibre-dyed
057	216	280	BDF field dress (camouflage) Cone Textiles	Camouflage
058	256	N/A	BDF service dress (twill) - DWS S.A.	Olive green
059	118	100	Shirting for BDF	Light green
061	100	100	Shirting for sec. guards/mess. - Cone	Dark grey
066	98	100	Shirting for Civ. Av., loc. govt., pol. rly. Cone	Sky blue
068	100	100	Shirting for prison officers - Cone Textiles	Khakhi
072	200	N/A	Male cooks' jackets, aprons, dust coats - Cone	White
075	260	280	Railway, civil aviation overalls - Cone	Orange
Khakhi Dr.	182	280	Gate keepers' and railway uniforms - N/A	Khakhi
N/A	252	N/A	Nurses' lining (qual. 3479 - Hartley)	Cherry red
N/A	236	N/A	Nurses' capes (qual. 3871 - Hartley)	Navy
N/A	236	N/A	Hand Towels (white huckaback)	White
N/A	This parameter not significant		Police, civil aviation and roads (mesh)	Orange
N/A	"	"	"	Yellow

ANNEX 14 - Determination of standard cloth parameters - 2.00
Ends and Picks per centimetre

Folio No.	Actual		Nominal	
	Ends	Picks	Ends	Picks
8305-003	20	14	26	12.5
005	22	10	N/A	N/A
012	36	16	N/A	N/A
013	32	16	27.6	16
015	26	20	N/A	N/A
016	28	26	N/A	N/A
018	30	24	N/A	N/A
019	28	18	N/A	N/A
021	28	25	N/A	N/A
7210-025	42	18	N/A	N/A
049	28	22	23.8	23.1
8305-052	35	21	N/A	N/A
053	28	20	N/A	N/A
055	36	26	30	34
056	15	15	14.5	13
057	38.5	21.5	38.4	20
058	25*	12	N/A	N/A
059	52	26	N/A	N/A
061	40	28	30	24
066	38	26	30	24
068	36	26	30	24
072	42	26	N/A	N/A
075	34	19	28.3	18
Huckaback	28	15	N/A	N/A
Khakhi Drill	42	22	36	21
Hartley Navy	32	23	N/A	N/A
Hartley Nurses' Lining Quality 3479	13*	13*	N/A	N/A

* 'Two as one'

ANNEX 15 - Proposal for rationalization of fabrics

Recommendations:

1. Standardise weight at 180 grams/M² and composition at 65% Polyester and 35% Cotton
2. Standardise the weight at 100 grams/M² and the composition at 50% Polyester and 50% Cotton

The following cloths fall into category 1:

Folio No.	Actual Weight	Nominal Weight	Existing Composition
012	194	205	50/50% Poly/Cotton
013	186	205	" " "
015	184	267	65/35% Poly/Viscose
016	170	267	" " "
018	172	267	" " "
019	198	N/A	" " "
021	170	267	" " "
025	168	267	" Poly/Cotton
053	174	280	100% Cotton (red flags)
072	200	280	50/50% Poly/Cotton

* Preferable to Viscose

The following cloths fall into category 2:

055	100	100	50/50% Poly/Cotton
059	118	100	65/35 " "
061	100	100	50/50% " "
066	98	100	" " "
068	100	100	" " "

The following cloths fall outside the rationalization scope:

003	280	250	
005	174	146	
049	160	155	
052	238	280	
056	240	350	
057	216	280	
058	256	N/A	
075	260	280	
Khakhi Drill			
Hartley Wool Worsteds			
Reflective Mesh Materials			

ANNEX 16 - Adaptation by way of correction formula for converting
Fabric weight per square metre balance for use as a
Yarn Balance to give Tex Counts

Because of the importance of being able to check yarn counts and as there was no specific instrument available, it was possible to obtain useful results with a reasonable degree of accuracy by using the cloth balance.

The Procedure - A test length of 20 metres of yarn is wound on two fingers to give a tidy wrapping to hang from the balance hook. the following formula was used to correct the scale reading:

$$\frac{1000 \times \text{Yarn weight according to grams/square metre scale}}{\text{yarn test length in metres} \times 100}$$

The simplified formula is:

$$\frac{1000 \times x}{20 \times 100} \quad \text{or} \quad \frac{1000x}{2000}$$

(where 'x' is the 'weight' as recorded on the scale of the grams per square metre balance)

It is recommended that the lab. should acquire a Shirley Developments Yarn Counts Slide Rule Converter Type GP in order to facilitate conversion from the found Tex counts to other counts as indirect system counts are frequently quoted by suppliers.

ANNEX 17 -

Advice on testing and maintenance of records to save time and avoid problems:

1. Set the instrument timer/revolution counter to an intermediate target, e.g. on the Martindale Abrasion Tester, 500 rubs.
2. Calculate the time of switch off, e.g. on the Martindale if you set 500 rubs you will know that the instrument will cut out after a certain elapse of time (check this out and note it in the machine records). You should have permission to leave any meeting to check results and re-start the instrument, otherwise instruct a trained colleague to undertake the operations.
3. Some tests such as Pilling and Light Fastness take a long time; such instruments should be run all day including break times. It is inadvisable to run tests overnight unless supervised; in any case, intermediate inspection and record keeping are an essential part of textile testing.
4. It is both possible and desirable to set up several tests to run concurrently.
5. Do not allow yourself to be interrupted during some vital part of a test. Ignore the telephone in such cases. Inform people looking for information that they should deliver a hand-written message to be placed in your 'in' tray.
6. Use only the specially-designed forms for recording test results.
7. File these forms as instructed behind the Master File.
8. A Register of Files to be established and strictly maintained. Anyone wishing to view a Master Sample and test results should not expect to be allowed remove these from the laboratory. A request for a sample should be met by cutting from the back-up storage. Photocopies only of test results to be provided. The filing cabinet must be locked when not in use.
9. The same rules must also apply to 'submitted' samples.
10. Discontinued or obsolete/rejected samples to be scrapped on an ongoing basis.

ANNEX 18 - List of persons met

UNDP

Dr. F. Tissot	Resident Representative
Mr. S. Nlongo	Deputy Resident Representative
Mr. P. Sweeney	Assistant Resident Representative
Mr. L.O. Vieyra	Programme Officer

UNIDO

Mr. Don Hague	Chief Technical Adviser
Mr. C. Whitehouse	Garment Industry Adviser
Mr. S.J. Hollingworth	Maintenance and Repair Adviser

GOVERNMENT

Mr. P.M. Mokgosana	Director of Supplies, Ministry of Finance & Development Planning
Mr. M.G. Bakwena	Deputy Director, Ministry of Finance & Development Planning
Ms. Catherine Mwasi	Uniform Coordinator, Ministry of Finance & Development Planning
Ms. G. Dichabeng	Assistant Coordinator, Ministry of Finance & Development Planning
Mr. K. Matambo	Deputy Permanent Secretary, Ministry of Finance & Development Planning
Ms. L. Secheba	Senior Administrative Officer, Ministry of Commerce & Industry
Mr. R.I. Bimbo	Regional Director of Supply
Mr. J. Stoneham	Director of Financial Affairs, Ministry of Finance & Development Planning
Mr. P. Mpetsane	Regional Director, North, Department of Supply
Mr. P. Molefe	Assistant Director (Purchasing) Department of Supply
Mr. L. Mothibatsela	Director of Industrial Affairs, Ministry of Commerce & Industry
Mr. D. Tsheko	Assistant Director, Integrated Field Services (IFS)
DWA Hlahlaaye	Chief Technical Officer, IFS

GENERAL

Teachers of Home Economics	24 teachers visited the Textile Testing Laboratory and were familiarized with the facilities now available
Mr. Burns O. Gaborekwe	Superintendent Quartermaster Stores, Botswana Police

ANNEX 19

ABBREVIATIONS

Lab.	Laboratory
JIT	Just-in-time
C/W	Complete with
N	Newton
Fuzz.	Fuzzing
Pill.	Pilling
Col.	Colour
Tex	'Direct' Yarn counts system based on grams per kilometre
Sq.	Square
Kpa	pascal (N/m ²)
redr.	redder
blr.	bluer
ylr.	yellower
kgf	approximately = 1 daN (decanewton)
MDF	Medium Density Fibreboard
IWS	International Wool Secretariat
M+F	Male & Female
N/A	Not available
DWS	David Whitehead & Sons
S.A.	Republic of South Africa
BDF	Botswana Defence Forces
Civ.Av.	Civil Aviation
Loc.Govt.	Local Government
Pol.	Police
Rly.	Railway
Cne.	Cone
Khakhi Dr.	Khakhi Drill
Poly.	Polyester
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Programme
ICI	Imperial Chemical Industries

EXCHANGE RATES

During the period of this mission, 8 January to 3 March, 1990, the following exchange rate prevailed:

US \$ 1 = Pula 1.94