

Industrial laundry machinery —

Part 5: Methods for the assessment of the effect of shaped garment finishing machinery on textiles

Confirmed
February 2011

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Textiles and Clothing Standards Policy Committee (TCM/-) to Technical Committee TCM/25, upon which the following bodies were represented:

- Association of Manufacturers of Domestic Electrical Appliances
- British Interlining Manufacturers Association
- British Retailers Association
- British Textile Confederation
- Home Laundering Consultative Council
- International Wool Secretariat
- Lambeg Industrial Research Association
- Ministry of Defence
- Soap and Detergent Industry Association
- Textile Research Council (FCRA)
- Textile Research Council (HATRA)

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

- Department of Health
- Health and Safety Executive
- Institute of Hospital Engineering
- Textile Services Association Ltd.

This British Standard, having been prepared under the direction of the Textiles and Clothing Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on 30 September 1991

© BSI 12-1999

The following BSI references relate to the work on this standard:
Committee reference TCM/25
Draft for comment 89/42263 DC

ISBN 0 580 19589 9

Amendments issued since publication

Amd. No.	Date	Comments

Contents

	Page
Committees responsible	Inside front cover
Foreword	ii
1 Scope	1
2 Definitions	1
3 Apparatus	1
4 Test articles	2
5 Preliminary procedures	2
6 Determination of moisture removal by a polished head press	3
7 Energy consumption evaluation of a polished head press	4
8 Energy consumption of tunnel finishing machines	6
9 Determination of quality of finish by tunnel finishing machines	7
10 Test report	8
Appendix A Shaped-garment finishing machinery	9
Appendix B Crease inducing device (CID)	13
Appendix C Description and installation of specialized test apparatus	19
Appendix D Viewing equipment and procedure	19
Appendix E Garment test articles	23
Appendix F Pro forma test report	27
Appendix G Wash process	28
Figure 1 — Format of temperature profile matrix	4
Figure 2 — Scissor press	10
Figure 3 — Upstroke head press	11
Figure 4 — Rotary buck press	11
Figure 5 — Cabinet press	12
Figure 6 — Tunnel finisher	13
Figure 7 — Crease inducing device	16
Figure 8 — Heated tank	17
Figure 9 — Test arrangement for condensate measurement	18
Figure 10 — Viewing rig	21
Figure 11 — Wire hanger detail	22
Figure 12 — Viewing arrangement	23
Figure 13 — Garment test article	25
Table 1 — Format for recording details of moisture removal	3
Table 2 — Components of CID and recommended materials of construction	15
Table 3 — Garment measurements	26
Publication(s) referred to	Inside back cover

Foreword

This Part of BS 6246 has been prepared under the direction of the Textiles and Clothing Standards Policy Committee. The rapid technical development of laundry machinery and the changes in the pattern of purchasing have led to the need for a standard means of assessment of the effect of machine performance on textiles. It has therefore become necessary to draw up standard methods of test for rating or assessing the performance of the principal types of industrial laundry machinery.

The following two different approaches to the provision of the necessary information have been considered:

- a) verification of the claims made by the manufacturer on the performance of the machine, using conditions arbitrarily agreed between the manufacturer and the user;
- b) preparation of standard methods of test for rating and assessing the performance of the principal types of machines, so that the test results obtained on machines of similar type could be compared directly wherever the machines were located and whenever they were tested.

It was agreed to adopt the second of these options in the preparation of the various Parts of BS 6246 since the need was for procedures that could be used on a range of machines to evaluate their performance under reproducible conditions, including specification of the loads to be used. No performance level is set. Thus, it will be possible to compare the basic performance of one machine against another and of a machine against a specification quoted in a contract.

Another advantage in the approach adopted is that the tests can be conducted at any location where the necessary services are available.

BS 6246 is published in five Parts as follows:

- *Part 1: Methods for the assessment of the effect of rotary washing machines on textiles;*
- *Part 2: Methods for the assessment of the effect of extracting machines on textiles;*
- *Part 3: Methods for the assessment of the effect of flatwork ironing machines on textiles;*
- *Part 4: Methods for the assessment of the effect of batch drying tumblers on textiles;*
- *Part 5: Methods for the assessment of the effect of shaped garment finishing machines on textiles.*

It is hoped that with the advances of techniques, and widespread use of this British Standard, updated methods can be incorporated.

The tests will generally be conducted within an operating laundry and require the use of equipment other than that which is normally available. Particular attention is drawn to the care necessary in the organization of these test procedures. Adequate provision should be made for the time that will be taken and the procedural rehearsal.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 28, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This Part of BS 6246 describes methods of assessing the effects on textiles of shaped-garment finishing machinery; the types of finishing machinery covered by this standard are described in Appendix A.

The standard excludes form-finishing machines, tumbler driers and shaped-article finishing machines designed for other than laundered garments.

The test results provide an indication of a machine effect in terms of energy consumption, output rating of moisture removal and quality of finish achieved on the fabric. The procedure can be employed to assess the effect of shaped-garment finishing machinery on textiles, measurement of aspects of machine performance or to assist in optimizing machine parameters.

The following performance characteristics are evaluated:

- a) energy consumption expressed as units of energy per unit mass of moisture removed and/or as units of energy to process a reference garment;
- b) moisture removal performance expressed as the mass of moisture removed per unit time;
- c) quality of finish imparted to the article by the action of the machine.

NOTE The titles of the publications referred to in this British Standard are listed on the inside back cover.

2 Definitions

For the purposes of this British Standard the following definitions apply, together with the definitions in Parts 1 to 4 of BS 6246.

2.1

bone-dry mass (BDM)

(moisture content between 0.5 % and 1.0 %.) The mass of textile articles after being dried in a specific manner, when successive determinations of mass, after several drying procedures, show no progressive change in mass of the textile greater than 0.5 %

NOTE Specified drying procedures include repeatedly processing the articles in a heated tumbler, from which the exhaust air reaches a temperature of not less than 80 °C and not more than 120 °C, or repeatedly passing the articles through a heated flatwork ironing machine. These temperatures are appropriate to fabrics which constitute the test loads and test pieces specified in this standard.

2.2

finish

the appearance and feel of a fabric which has been smoothed by being subjected to the appropriate finishing process

2.3

fold crease

a well defined deformation of the plane surface with clearly defined directional characteristics

2.4

heat setting

the description given to a method used to impart a durable finish to garments manufactured from polyester/cotton mixture fabrics. In general the pressing is undertaken at a temperature of 190 °C or higher, in the presence of steam, followed by rapid, vacuum assisted, cooling

2.5

press time

the time that fabric is under pressure between the head and buck of a polished head press

2.6

shaped article

a textile item of clothing

2.7

wrinkle

a form of fold deformation of the plane surface of the fabric, having a random nature, and typically shallow in form

3 Apparatus

3.1 *Steam/water separator*, plate or centrifugal type.

3.2 *Pressure gauges*

3.3 *Energy measurement equipment*, of either:

- a) a condensate measuring apparatus, with temperature measurement facilities, as described in Appendix C; or
- b) a recording and integrating steam flow meter.

3.4 *Calibrated steam-pressure recording instrument*, of appropriate range, with the mid scale of the instrument not less than the maximum operating pressure of the machine under test.

3.5 *Integrating heat meter*, capable of integrating the product of the flow of the heat-transfer-fluid with the temperature difference between inlet and outlet, to within ± 2 %.

3.6 *Watt hour meter*, capable of measuring electrical power consumption to within ± 0.1 %.

3.7 *Weighing devices*, as follows:

- a) suitable for weighing individual test articles, with a maximum capacity of 1 kg and capable of weighing to within ± 0.5 % of full scale deflection;
- b) suitable for weighing trolley loads of articles, with a capacity of at least 250 kg and capable of weighing to within ± 0.1 kg.

3.8 Bags, to store damp articles and reduce loss of moisture, having approximate dimensions 500 mm × 1 100 mm, and being impermeable to moisture vapour.

3.9 Instant reading, contact thermocouple pyrometer, (small button type) with a temperature range from 100 °C to 300 °C.

3.10 Stop watch

3.11 Covered laundry trolley

3.12 Totalizing gas flow meter, complying with Part 6 of BS 4161.

3.13 Crease inducing device (CID)¹⁾ (see Appendix B).

3.14 Wire hangers (see Appendix D).

3.15 Viewing rig (see Appendix D).

3.16 Comparative finish reference photographs (see Appendix C).

3.17 Lighting equipment (see Appendix D).

3.18 Means of wetting out, hydro-extracting and tumbling test articles in accordance with the wash process (see Appendix G).

NOTE This should be normal laundry equipment and the test organization would not be expected to provide this equipment.

3.19 Means for measuring ambient temperature and relative humidity

3.20 Test meter, suitable for measuring current and voltage to within ± 0.1 %.

4 Test articles

4.1 General

Test articles shall be as described in 4.2 to 4.3.

The fabric used for the test articles shall be subjected to a crease resistant treatment prior to make-up of the test articles and the make-up process shall be completed with a hot-head finishing process in accordance with the fabric manufacturer's instructions.

Test articles made up as garments shall be numbered individually and the information noted. The articles shall be laundered three times before use in this test procedure and shall be discarded after a total of 30 laundering cycles. A record of the number of laundering cycles shall be noted and marked on the garment with indelible marking ink.

NOTE 1 Garments should be free from pucker and other faults.

NOTE 2 For multiple tests it may be necessary to ensure that test articles are from the same batch.

4.2 Fabric test articles

Twenty test articles shall be made up from white cotton test fabric reference WC280 of BS 1771-2. These shall be made up specially for each machine being tested as pieces to match the area and profile of the press table and shall have an area not less than 90 % of that of the press head. The test articles shall be overlock-stitched at the edges to give minimum hem and each article shall be marked with its bone-dry mass which shall also be recorded.

NOTE In the event that the area of press head exceeds that of the press table, note this information in the test report, together with the percentage cover achieved.

4.3 Garment test articles

4.3.1 Sixty garment test articles shall be made up as described in E.1.1 and E.2 to E.5.

4.3.2 Forty eight garment test articles shall be made up as described in E.1.2 and E.2 to E.5.

5 Preliminary procedures

5.1 Machine identification

5.1.1 Record the details of the machine to be evaluated by completing the test report as listed in Appendix F.

5.1.2 Record the throughput rates recommended by the manufacturer.

5.2 Installation of test apparatus

5.2.1 General

Ensure that a pressure gauge (3.2) is fitted to the compressed-air feed-line to the machine.

5.2.2 Steam heated machines

If the machine is steam heated, fit a steam/water separator (3.1) to the machine steam inlet, to ensure dry saturated steam conditions at the inlet to the heat exchange surfaces.

If a steam flow meter is employed, fit a pressure gauge (3.2) to the condensate line.

If condensate receiving apparatus [3.3 a)] is used, fill the receiving tank with a predetermined quantity of cold water sufficient to ensure that, at the end of the test, the tank water temperature does not exceed 70 °C to minimize the escape of flash steam.

Fit the machine with a pressure recording instrument (3.4) in the steam input line to record supply pressure throughout the test.

5.2.3 Fluid heated machines

On a machine employing a fluid heat transfer medium, fit an integrating heat meter (3.5) across the flow and return lines.

¹⁾ For information on the availability of the crease inducing device write to Customer Information, BSI, Linford Wood Milton Keynes MK14 6LE.

Fit the machine with a Watt hour meter (3.6) where applicable.

5.3 Installation and test running conditions

5.3.1 The manufacturer of the test machine shall provide, wherever practicable, a complete statement of the installation conditions of the machine and the running conditions required. Each condition shall be expressed as a range within which the test procedure is acceptable rather than as a single specific value.

5.3.2 The manufacturer shall be informed and invited to inspect and check, and to certify in the test report that the machine and all relevant aspects of its installation and functioning under test conditions are satisfactory.

5.3.3 If the installation and/or test running conditions are outside the limits stated by the manufacturer, he or his authorized representative shall be invited to agree to or otherwise advise on the conditions. In the absence of such guidance or agreement, the installation and test running conditions shall be considered acceptable, but details of any differences between the manufacturer's stated limits and the actual conditions measured or observed during testing shall be set out and attached to the test report.

5.3.4 The power rating of the electric motor or motors (in kW), the function which each motor performs and the manufacturer's stated peak loading and running load (in kV·A) shall be recorded with the format shown in Appendix F.

The manufacturer's stated and/or recommended conditions in respect of electric power supply, water, steam or heat transfer fluid and any other external services (e.g. compressed air) shall be obtained and recorded.

5.4 Ambient conditions

The ambient conditions shall be noted in the test report.

NOTE If the ambient conditions fall outside the following limits the test results may not be valid for comparative purposes:

- a) temperature: 15 °C to 26 °C;
- b) relative humidity: 50 % r.h. to 80 % r.h.;
- c) altitude: from sea level to 1 000 m.

6 Determination of moisture removal by a polished head press

6.1 Principle

This test records the capability of the machine to remove moisture from reference test articles under controlled conditions. Test articles of known moisture content are pressed for various times to establish a graphical representation of the relationship between press time and moisture removal.

6.2 Preparation of test articles

6.2.1 Prepare 20 test articles (see 4.2), suitable for the machine to be tested.

6.2.2 Mark and weigh each test article by means of the weighing device [3.7 a)] and record each individual bone-dry mass in a table with the format shown in Table 1.

Table 1 — Format for recording details of moisture removal

Press time(s)		7	10	12	15	20
Article number	Bone dry mass	Mass of moisture removed at indicated press time				
	g	g	g	g	g	g
1 (to 20)						
Mean						

6.3 Test procedure

6.3.1 Wash and hydro-extract test articles in accordance with the procedure given in Appendix G to give an average moisture retention of 50 ± 2 % (m/m). Record individual masses and store the articles in closed impermeable bags (3.8).

6.3.2 Record the steam pressure immediately before the test.

6.3.3 Record the temperature profile of the face of the heated head of the press as follows.

- a) Prepare a drawing illustrating a matrix consisting of 10 columns and six rows resulting in 60 rectangles each having dimensions 15 mm × 10 mm (see Figure 1).
- b) Sketch the approximate outline of the heated head on to this drawing.

NOTE For a conventional polished head press the scale is approximately 1 : 10.

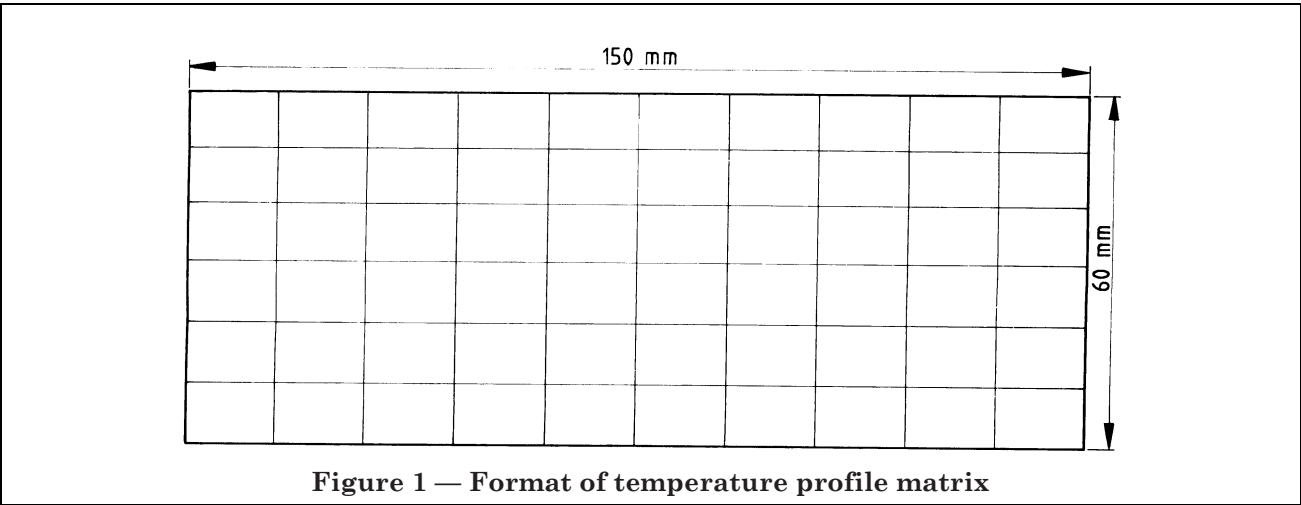


Figure 1 — Format of temperature profile matrix

- c) Lightly mark the corresponding rectangular lines on the surface of the heated head with high temperature marking ink.
- d) By means of the pyrometer (3.9) take temperature readings in the centre of each complete rectangle on the press head and record results on the matrix.

6.3.4 To condition the machine, press 10 test articles as quickly as possible, within an overall time interval not greater than 4 min using a 10 s press time for each article.

6.3.5 Immediately, press the remaining 10 test articles each with a press time of 7 s, again within an overall time interval of less than 4 min.

6.3.6 Immediately after pressing, transfer each test article into a closed impermeable bag (3.8).

6.3.7 Immediately following the completion of pressing of the last test article repeat the readings described in 6.3.2 and 6.3.3.

6.3.8 Weigh the 10 articles individually and record the masses after pressing.

6.3.9 Repeat the test sequence with press times of 10 s, 12 s, 15 s and 20 s.

6.4 Calculation and expression of results

6.4.1 From the mass of the test articles before and after pressing calculate the mass of moisture removed by pressing. Record test results in a table with the format shown in Table 1.

6.4.2 Express the data as an average mass of moisture removed for each press time.

6.4.3 Represent the five sets of results graphically, plotting the actual moisture removed vertically against the press time horizontally.

NOTE Once the moisture content of the cotton fabric has been reduced to 3 % of bone-dry mass, further drying is controlled by the rate at which moisture can migrate from within the fibres to the surface. Therefore 4 % is taken as the lowest effective percentage for the purpose of the test.

7 Energy consumption evaluation of a polished head press

7.1 Principle

A batch of articles is weighed before and after pressing, and the mass of moisture removed is evaluated against the measured energy consumption over the test period. Energy consumption of the machine idling with the head open is also recorded.

7.2 Preliminary procedure

7.2.1 Wash, extract and, if necessary, tumble the test batch of articles specified in 4.3.1, in accordance with normal commercial procedure, to achieve a moisture content to the manufacturers recommendation.

7.2.2 Weigh together 10 articles from the test batch by means of the weighing device 3.7 b), tumble them until bone-dry and reweigh them. Record the data.

7.2.3 The initial moisture content, expressed as a percentage, is given by the equation:

C_i = (M_w - M_D) × 100 / M_D

where

- C_i is the initial moisture content;
- M_w is the wet mass (in kg);
- M_D is the bone dry mass (in kg).

7.2.4 From the results for initial moisture content the manufacturer shall be invited to recommend a press time for the particular circumstances. This press time shall be stated in the appropriate section of the machine record, to achieve a final moisture content between 104 % and 108 % of bone-dry mass. This shall be verified and the press time corrected, if necessary.

7.3 Procedure

7.3.1 Weigh the batch of test articles by means of the weighing device **3.7 b**) and record the total damp mass.

7.3.2 Utilize the press under normal commercial conditions for not less than 30 min prior to the test being made, to allow all conditions to stabilize. Conduct this procedure simultaneously with that specified in **7.2**.

7.3.3 Record the initial readings of the energy consumption measuring equipment.

7.3.4 Immediately following the procedure given in **7.3.3** start the stop watch (**3.10**) and commence press finishing of the test batch of 60 articles.

Use the press time established in **7.2.4** on each lay of the press.

7.3.5 Immediately after pressing, transfer each item into a covered laundry trolley (**3.11**), to limit any alteration in moisture content.

7.3.6 Immediately upon removal of the last item from the machine, stop the stop watch and note the final readings of the energy consumption measuring equipment. Record the results.

7.3.7 Weigh the batch of test articles in total and record the mass.

7.3.8 With the machine idling with the head up, record the energy consumption over a 30 min period.

7.4 Calculation and expression of results

7.4.1 Calculate the mass of moisture removed.

7.4.2 Calculate the energy consumed per kilogram of moisture removed and per test article.

7.4.3 Record the rate energy consumption (in kJ/h) with the machine idling.

Calculate the following:

- a) total rate of steam consumption (in kg/h);
- b) total energy utilized per hour (in kJ/h) including idling losses and condensate and flash discharge losses;
- c) useful energy absorbed per hour (in kJ/h);

d) energy consumption per unit mass of moisture removed (in kJ/kg) from the equation:

$$Q_c = \frac{M_s \times L_s}{M_B - M_A}$$

where

Q_c is the energy consumption per unit mass of moisture removed;

M_s is the mass of steam consumed (in kg);

L_s is the latent heat of steam (in kJ/kg);

M_B is the mass of the article before pressing (in kg);

M_A is the mass of the article after pressing (in kg).

7.4.4 Where the condensate measuring tank method is employed for determining steam consumption (see **C.2**), record the results and carry out calculations as follows:

- a) initial volume of water in tank (in m³);
 - b) initial temperature of water in tank (in °C);
 - c) initial density of water in tank (from standard water density versus temperature tables) (in kg/m³);
 - d) initial mass of water in tank (density × volume) (in kg);
 - e) final volume of water in tank (in m³);
 - f) final temperature of water in tank (in °C);
 - g) final density of water in tank (from standard water density versus temperature tables) (in kg/m³);
 - h) final mass of water in tank (density × volume) (in kg);
- NOTE 1 If the means are available it is acceptable to determine the mass of condensate collected directly.
- i) average steam pressure (in bar);
 - j) latent heat of steam (from steam tables) (in kJ/kg);
 - k) sensible heat (from steam tables) (in kJ/kg);
 - l) initial heat energy in water in tank (temp. × mass) (in kJ);
 - m) final heat energy in water in tank (temp. × mass) (in kJ);
 - n) heat energy increase (in kJ);
 - o) mass of condensate (final mass of water in tank — initial mass of water in tank) (in kg);
 - p) sensible heat given up by condensate (mass of condensate × sensible heat) (in kJ).

The total heat energy given up in the machine per test (in kJ) is given by the equation:

$$Q_T = (M_c \times L_s) - (Q_i - Q_c)$$

where

Q_T is the total heat energy given up in the machine per test (in kJ);

M_c is the mass of condensate (in kg);

L_s is the latent heat of steam (in kJ/kg);

Q_i is the heat energy increase (in kJ);

Q_c is the sensible heat given up by the condensate (in kJ).

This represents the total energy utilized in the test which is to be used in the calculations in 7.4.2 and 7.4.3.

8 Energy consumption of tunnel finishing machines

8.1 Principle

The energy consumption of a tunnel finishing machine is evaluated in terms of kilojoules per test article processed. The energy consumption is evaluated while processing test articles at a predetermined rate for a period of approximately 1 h.

8.2 Preliminary procedure

8.2.1 Ensure that the energy measurement recording equipment (3.3) is fitted to the machine. For a machine employing steam as a heating medium, measure the steam consumption by means of a recording steam flow meter [3.3 b)], with a steam/water separator (3.1), fitted to the supply flow immediately before the steam flow meter. For a machine employing a heat transfer fluid an integrating heat meter (3.5) is used.

For gas heated machines, fit a totalizing gas flow meter (3.12) to the fuel supply.

NOTE See also 5.3.

8.2.2 Record the manufacturer's recommendations for optimum quality output with regard to the test article (4.3.2) under the following headings:

- a) input percentage moisture content expressed as a percentage of bone-dry mass. This shall be expressed as a range;
- b) speed of machine and rate of production;
- c) minimum values of supply services required.

8.2.3 Wash 10 test articles (4.3.2) of known bone dry mass in accordance with the process described in Appendix G and extract to give a moisture content in the range 40 % to 45 % by mass. Weigh each article and record its mass. Calculate the initial moisture content, expressed as a percentage, of each article from the equation:

$$C_i = \frac{(M_i - M_D) \times 100}{M_D}$$

where

C_i is the initial moisture content;

M_i is the initial mass (in kg);

M_D is the bone-dry mass (in kg).

8.2.4 In the case of a steam heated machine, record the condensate line pressure.

8.2.5 Run the machine at the recommended speed [see 8.2.2 b)] and with the supply services not less than as indicated [see 8.2.2 c)].

Process the 10 test articles for a period of 10 ± 1 min together with a sufficient number of additional articles to fill the available capacity of the machine. The additional articles shall each have a mass within ± 10 % of the mass of a test article and shall comprise items which are intended for normal commercial processing.

8.2.6 Weigh each test article immediately after removing it from the machine and record the mass. Calculate the final moisture content, expressed as a percentage, from the equation:

$$C_F = \frac{(M_F - M_D) \times 100}{M_D}$$

where

C_F is the final moisture content;

M_F is the final mass (in kg);

M_D is the bone-dry mass (in kg);

Record the individual results and calculate their arithmetic mean.

8.2.7 If the mean result for final moisture content lies within the range (3 ± 1) %, accept the manufacturer's recommendations (see 8.2.2) as the values at which this test procedure is to be conducted. If the result lies outside this range repeat the preliminary procedure with altered values of the manufacturer's recommendations for 8.2.2 a) and/or 8.2.2 b), until the required conditions are obtained. The final values shall be termed the established speed of the machine and the established production rate respectively.

8.2.8 From the value of the established production rate determine the rate required for full production for 1 h.

8.2.9 Select from a stock of items intended for current normal commercial processing a sufficient number of articles of similar mass and fabric type to the test articles to provide a 1 h production run.

Examine the stock to confirm that the average mass of each article lies within the limits of $\pm 10\%$ of the mass of a test article and the mass per unit area of the fabric lies within $\pm 15\%$ of the specified value.

8.3 Procedure

8.3.1 Wash the selected batch of articles in accordance with the process described in Appendix G and extract to a moisture content in the range 40 % to 45 % by mass. Record the mass of the damp articles as measured by the weighing device [3.7 b)] and store in a covered laundry trolley (3.11) to inhibit moisture loss.

8.3.2 Note the initial readings of the energy recording equipment utilized.

8.3.3 Process the prepared test articles over a period of 1 h at the established machine speed.

8.3.4 At the end of the 1 h processing period, immediately reweigh, record the mass, the number of articles processed and the final readings of the energy recording equipment.

8.4 Calculation and expression of results

8.4.1 Record the total electrical energy consumed (in kW).

8.4.2 Calculate the total energy consumed from energy sources other than electricity.

8.4.3 Calculate the energy consumed per article processed.

8.4.4 Calculate the energy consumed per hour whilst processing garments.

8.4.5 Calculate the energy consumed per kilogram of moisture evaporated.

8.4.6 Calculate the energy consumed per hour with no garments being processed but with the machine conveyor running.

9 Determination of quality of finish by tunnel finishing machines

9.1 Principle

The quality of finish produced by a tunnel finishing machine is evaluated from the finish produced on a series of test articles compared against reference photographs, after processing in a prescribed manner.

9.2 Preliminary procedure

9.2.1 Select 10 test articles (4.3.2), and a batch of similar articles as described in 8.2.9. Wash in accordance with Appendix G and store in closed impermeable bags (3.8).

9.2.2 Condition the machine in accordance with the manufacturer's recommendations.

9.2.3 Select from a stock of items intended for current normal commercial processing a sufficient number of articles, of similar mass and fabric type to the test articles, to provide a 1 h production run.

Examine this stock to confirm that the average mass of each article lies within $\pm 10\%$ of the mass of a test article and the mass per unit area of the fabric lies within $\pm 15\%$ of the specified value.

Wash the selected batch of garments in accordance with the procedure described in Appendix G and extract to a final moisture content in the range 40 % to 45 % by mass. Store damp garments in closed impermeable bags (3.8).

9.2.4 Set the machine to operate at the established speed (see 8.2.7).

9.3 Procedure

9.3.1 Process the 10 test articles individually in the crease inducing device (3.13), in accordance with the operating instructions described in Appendix B with conditions appropriate for use with polyester/cotton articles.

9.3.2 Drape each test article on a hanger (3.14) on which it is intended to be processed through the tunnel finishing machine.

9.3.3 Process the full quantity of garments as described in 9.2.3 through the machine at the fully loaded rate with every carrier occupied in such a manner that the 10 test articles are processed individually at intervals of approximately 5 min.

9.3.4 After processing, hang each test article on the viewing rig (3.15) in succession and compare each article, while it is on the rig under the lighting conditions given in Appendix D, with the set of five reference photographs (3.16). Assess which photograph most closely compares to the test article.

Assign to each test article a numerical rating related to the reference photographs. This assessment shall be by agreement between not less than two independent observers. Record the numerical rating. A rating which falls between two ratings, e.g. 4 and 5 shall be recorded to the nearest half unit, e.g. 4½.