SRI LANKA STANDARD 285 : 1998

UDC 615.468 .41

SPECIFICATION FOR
ABSORBENT COTTON
(FIRST REVISION)

SRI LANKA STANDARDS INSTITUTION

Gr.9

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FOREWORD

This standard was approved by the Sectoral Committee on Textiles Clothing and Leather and was authorized for adoption and publication as a Sri Lanka Standard by the Council of the Sri Lanka Standards Institution on 1998-08-13.

Absorbent cotton wool is used for surgical dressings as a padding or to protect dressings. It is also suitable for cleansing and swabbing wounds, for pre-operative skin preparation, and for the application of medicaments to wounds.

This standard was first published in 1974. In this revision a test method for the determination of staple length was included and the types were designated as Super grade, Grade 1 and Grade 2.

Guidelines for the determination of a compliance of a lot with the requirements of this standard based on statistical sampling and inspection are given in Appendix **A**.

For the purpose of deciding whether a particular requirement of this specification is complied with, the final value, observed or calculated, expressing the result of a test or an analysis, shall be rounded off in accordance with **CS 102**. The number of significant places retained in the rounded off value shall be the same as that of the specified value in this standard.

In the preparation of this standard, the valuable assistance derived from the following publication is greatefully acknowledged:

SABS 228 :1993 South African Standard Specification for absorbent cotton wool.

1. SCOPE

This specification prescribes the requirements and methods of test for absorbent cotton.

2. REFERENCES

CS 16	Standard atmospheres for conditioning and testing textiles.
CS 102	Presentation of numerical values
SLS 428	Random sampling methods

3. GRADES

The absorbent cotton shall be of following grades:

Super grade;
Grade 1; and
Grade 2.

4. REQUIREMENTS

4.1 General

4.1.1 Absorbent cotton shall be of 100% cotton and manufactured from raw cotton or cotton waste or both and shall be carded and bleached to an acceptable white.

4.1.2 Each grade of absorbent cotton shall be acceptably uniform in quality and each package shall be acceptably uniform in thickness and in one continuous piece.

4.1.3 Absorbent cotton shall offer acceptable resistance when pulled.

4.1.4 Absorbent cotton of Super grade shall be capable of being separated into layers (plies), Grade 1 shall be of single ply and Grade 2 shall be substantially in one continuous piece.

4.1.5 Absorbent cotton of Super grade and Grade 1 shall be free from impurities that may impair its serviceability and free from leaf, shell, seed coat and fibre dust. Absorbent cotton of Grade 2 shall be acceptably free from pieces of thread, yarn, leaf, shell, seed coat and fibre dust.

4.1.6 Absorbent cotton of all grades shall be clean and free from foreign matter like oil stains or metallic particles and at the time of packaging the moisture regain shall not exceed 9 per cent.

4.2 Specific requirements

4.2.1 Staple length

The average staple length of the absorbent cotton shall be not less than 12 mm when determined by the method given in Appendix **B**. Not more than 20 per cent by mass of the fibres shall be less than 6 mm in length.

4.2.2 Nep count

The average nep count of the absorbent cotton when determined in accordance with the method specified in Appendix **C**, shall be not more than 250 neps.

4.2.3 Fluorescent brightening agents

Fluorescent brightening agents shall not be used in the manufacture of absorbent cotton. Absorbent cotton when examined under screened ultra - violet light having wave length approximately 365 nm, not more than an occassional point of intense blue fluorescence shall be visible.

4.2.4 Absorbency

The average time for complete saturation of absorbent cotton shall not exceed 10 seconds when tested in accordance with the method given in Appendix **D**.

4.2.5 Resistance to heat

The absorbent cotton shall not turn brown and shall not show any appreciable signs of disintegration when heated to 110 ^{0}C for 20 minutes.

4.2.6 Freedom from oxidizing substances

The absorbent cotton shall not develop a blue colour (except on neps,leaf and shell) when tested in accordance with the method given in Appendix **E**.

4.2.7 Water soluble extract

The water soluble extract of absorbent cotton shall not exceed 0.35 per cent by mass when determined in accordance with the method given in Appendix **F**.

4.2.8 Ash content

Ash content of absorbent cotton shall not exceed 0.35 per cent by mass, when determined by the method given in Appendix **G**.

4.2.9 Freedom from dyes

When absorbent cotton is tested in accordance with the method given in Appendix **H**, the percolate shall show a yellow colour, but not a blue or a green tint.

4.2.10 Detergents

Detergents shall not be present in absorbent cotton.

a) The aqueous extract on gentle shaking shall show no appreciable signs of frothing, when tested in accordance with Method **A** given in Appendix **J**.

b) Presence of anionic, cationic or non - ionic detergents shall not be indicated when tested in accordance with Method **B** given in Appendix **J** .

4.2.11 pH value

The pH value of the absorbent cotton shall be between 5.5 and 8.5 when tested in accordance with the method given in Appendix **K**.

5. PACKAGING

5.1 Absorbent cotton shall be suitably folded and placed one over the other and a number of these shall be wrapped neatly to form a package. The net mass and size of each package shall be agreed to between the manufacturer/supplier and purchaser.

5.2 Absorbent cotton shall be packed in entirely closed packages, wrapped in suitable packaging materials which do not adversely affect the absorbent cotton and which protects it from contamination.

5.3 Packages obtained as in **5.1** and **5.2** may be packed in suitable bulk containers. Only absorbent cotton of the same grade and net mass shall be packed together in a bulk container.

6. MARKING

6.1 The following information shall be legibly and indelibly marked on each package or a label securely attached to each package.

a) The words 'absorbent cotton' or 'absorbent cotton wool';
b) Grade;
c) Name and address of the manufacturer;
d) Trade mark; if any ;
e) Net mass, in g ; and
f) The words 'not sterilized';

6.2 Bulk containers

The following information shall be legibly and indelibly marked on each bulk container

a) The words 'absorbent cotton' or 'absorbent cotton wool';
b) Grade;
c) Name and address of the manufacturer; and
d) Number of packages.

7. METHODS OF TEST

The absorbent cotton shall be tested as prescribed in Appendices **B** to **J** of this specification.

APPENDIX A

This sampling scheme should be applied where compliance of a lot to the requirements of this standard is to be assessed based on statistical sampling and inspection.

Where compliance with this standard is to be assured based on manufacturer's control systems complied with type testing and check tests or any other procedure, appropriate scheme of sampling and inspection should be adopted.

A.1 LOT

In any consignement bulk containers of absorbent cotton of the same size and grade, belonging to one batch of manufacture or supply shall constitute a lot.

A.2 SCALE OF SAMPLING

A.2.1 Samples shall be tested from each lot for ascertaining the conformity of the product to the requirements of this specification.

A.2.2 The number of bulk containers and packages shall be selected according to the following table. As far as possible an equal number of packages of absorbent cotton shall be selected from the bulk containers selected as in Column 2, to form the number of packages given as in Column 3. From these packages a sub sample as given in Column 5 shall be formed.

TABLE - Scale of sampling

No. of bulk containers in the lot (1)	No. of bulk containers to be selected (2)	No. of packages to be selected (3)	Acceptance number (4)	Size of sub sample (5)
Up to 150	5	10	1	3
151 to 500	8	20	2	4
501 to 1 200	10	30	3	5
1 201 and above	20	50	5	8

A.2.3 Bulk containers and packages shall be drawn at random. In order to ensure randomness of selection random number tables as in SLS 428 shall be used.

A.3 NUMBER OF TESTS

A.3.1 Each bulk container and package of absorbent cotton selected as in **A.2.2** shall be inspected for marking and packaging requirements.

A.3.2 Each package of absorbent cotton selected as in **A.2.2** shall be tested for requirements as given in **4.1.2** , **4.1.3** , **4.1.4**, **4.1.5**, **4.2.4** and **4.2.11** .

A.3.3 A sub sample of size as given in Column 5 of the table shall be tested for requirements **4.2.1**, **4.2.2**, **4.2.3**, **4.2.5**, **4.2.6**, **4.2.7**, **4.2.8**, **4.2.9** and **4.2.10** .

A.4 CRITERIA FOR CONFORMITY

A lot shall be declared as conforming to the requirements of this specification if the following conditions are satisfied:

A.4.1 Each bulk container and package inspected as in **A.3.1** satisfies marking and packaging requirements.

A.4.2 Number of packages of absorbent cotton not conforming to the requirements when tested as in **A.3.2** is less than or equal to the corresponding acceptance number given as in Column 4 of the table .

A.4.3 Each package of absorbent cotton in the sub sample when tested as in **A.3.3** satisfies the relevant requirements.

APPENDIX B
DETERMINATION OF AVERAGE STAPLE LENGTH OF FIBRES

B.1 APPARATUS

B.1.1 Cotton sorter, a rack that is equipped with a number of lower and upper combs, the attachment of the lower combs being such that they can be dropped successively on to the rack. The upper combs are hinged to one end of the rack.

B.1.2 Grip, a grip of width approximately 25 mm and suitable for gripping and pulling out tufts of cotton wool.

B.1.3 Wooden depressor, a wooden depressor suitable for pressing the cotton tufts into the combs of the cotton sorter.

B.1.4 Blunt needle

B.1.5 Board covered with black velvet, a board covered with black velvet (for mounting the sorted cotton fibres to form a cotton sorter diagram).

B.1.6 Rulers, two steel rulers graduated in millimetres.

B.1.7 Balance, a balance having a minimum sensitivity of 0.001 g .

B.2 PREPARATION OF TEST SPECIMEN

B.2.1 Take approximately 80 tufts of the fibres from widely separated parts of the conditioned sample that the aggregate mass of the tuft is 1.0 g to 2.5 g .

B.2.2 Divide this composite specimen into quarters and, by halving each quarter twice,discarding alternately the right-hand and left-hand portions and turning the tuft through a right angle between the two halvings, obtain from each quarter a tuft of mass 70 ± 10 mg . Combine these four tufts and throughly mix them between the fingers by repeated drawing and doubling.

B.2.3 By repeating **B.2.2** above, obtain a final tuft of mass 15 mg to 20 mg (see Fig. 1).

B.2.4 By carefully drawing and doubling the final tuft (i.e. the test specimen) several times, mix the fibres and get them to lie as parallel to one another as possible.

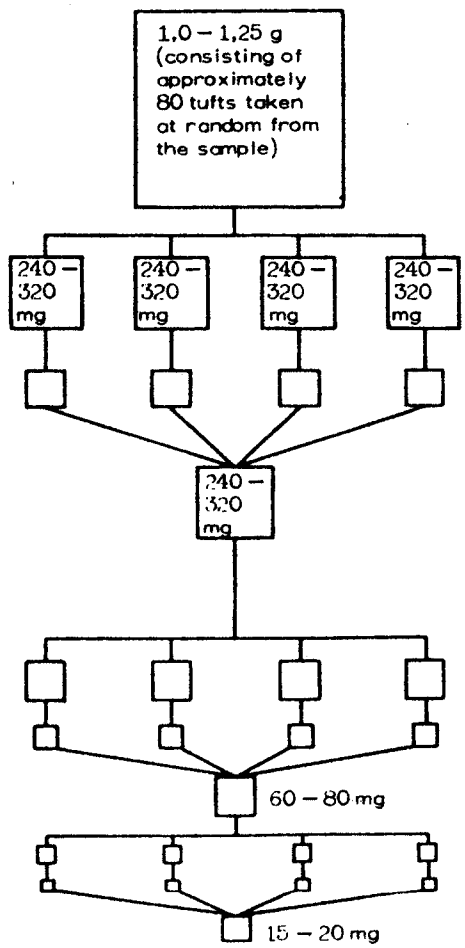

Figure 1 - Preparation of sample to determine staple length.

B.3 PROCEDURE

B.3.1 Preparation of fibre diagram

B.3.1.1 With the back of the cotton sorter towards the operator and the upper combs lifted out of the way, roll (or very slightly twist) the test specimen and so place it in the lower combs at the right-hand side of the sorter that the fibres protrude slightly from the comb nearest to the operator. By means of the grip remove all the loose cotton fibres from the protruding tuft until a straight edge is left. Retain these fibres for re-incorporation in the specimen (see **B.3.1.3**).

B.3.1.2 Using the grip, pull a small number of fibres from the protruding tuft, taking care to grip each fibre as near to the end as possible. Comb these fibres (retaining the combings for re-incorporation in the specimen but discarding any neps found later), then transfer the combed fibres to the left-hand side of the cotton sorter, ensuring that the coterminous ends of the fibres are almost flush with the nearest comb and that the fibres lie straight and at right angles to the combs. Press the fibres into the combs by means of the depressor.

B.3.1.3 After reincorporating in the specimen the loose fibres and combings retained in terms of **B.3.1.2** repeat the procedures given in **B.3.1.1** and **B.3.1.2** until all the fibres in the specimen (including all combings, etc.) have been transferred from the right-hand side to the left-hand side of the sorter.

B.3.1.4 Turn the sorter round so that the longest fibres are at the front. So place the top combs in the rack as to grip the specimen and to prevent uncontrolled slippage of the fibres, then drop the lower combs one by one until the ends of the longest fibres are exposed and, by means of the grip, pull out the fibres in tufts of successively shorter lengths, dropping the combs successively as required. Comb the fibres straight and so place them on the black velvet board that the coterminous ends of the fibres are aligned along a straight line marked across the pad. By placing the longest fibres on the left and the shorter fibres successively on the right, form a cotton sorter diagram that shows the longest fibres on the left, with the tops of the fibres tapering down gradually to the shortest fibres on the right.

B.3.2 Measurement of fibre length

B.3.2.1 Place a ruler along side and parallel to the longest fibres, and the second ruler horizontally on the fibres (i.e. perpendicular to the first ruler) in such a position that the longest fibre protrudes exactly 2 mm beyond the upper edge of the horizontal ruler.

B.3.2.2 Remove all the protruding fibres,determine their mass as a group and take the length of the longest fibre as the length of this fibre group.

B.3.2.3 By moving the second ruler (keeping it perpendicular to the first) in 2 mm steps towards the base of the fibres and repeating the procedure given in **B.3.2.2** , determine the mass and length of each fibre group in the diagram.

B.4 CALCULATION

Calculate the average staple length as follows :

$$\text{Average staple length, mm} = \frac{\Sigma m}{(m/l)}$$

where,

Σm is the sum of the masses, in g, of each fibre group,

(m/l) is the sum of the values,in g/mm, obtained by dividing the mass of each fibre group by the length of that fibre group.

APPENDIX C
DETERMINATION OF NEP COUNT

C.1 APPARATUS

C.1.1 Glass plates

Two glass plates having dimensions 230 mm x 305 mm.

C.2 CONDITIONING OF TEST SPECIMENS

Prior to test, specimens shall be conditioned to moisture equilibrium in a standard atmosphere for testing as specified in **CS 16.**

C.3 PREPARATION OF TEST SPECIMENS

Take not less than 50 pinches of fibres from widely separated parts of the conditioned sample so that the aggregate mass of the pinches is 0.5 g. Take these pinches from the fibres in the middle of the sample (protruding fibres must not be pulled). Prepare three 0.5 g specimens in this manner.

C.4 PROCEDURE

Tease out each 0.5 g specimen on the glass plate to form a thin even layer having an area of approximately 450 cm^2 and cover the cotton with the other plate. Under a uniform transmitted light, count the total number of neps in the specimen.

C.5 RESULTS

Take the mean number of neps in the three 0.5-g specimens as the nep count of the sample.

APPENDIX D
DETERMINATION OF ABSORBENCY

D.1 CONDITIONING OF TEST SPECIMENS

Prior to test, specimens shall be conditioned to moisture equilibrium in a standard atmosphere for testing as specified in **CS 16.**

D.2 APPARATUS

Wide bore glass tube, diameter 32 mm open at both ends, glass plunger, glass trough, stop watch and a pair of forceps.

D.3 PROCEDURE

Draw from each sample under test, specimens each of mass approximately 1 g. Take one test specimen and place it on the wide bore glass tube. Gently compress the test specimen to a volume of about
20 ml using the glass plunger.

Pour distilled water into the glass trough, so that the level of water is 70 mm below the top of the trough. This is necessary to prevent or minimize the air draught acting on the test specimen when the specimen is dropped on the surface of water. Take the compressed specimen and place it lightly by means of a pair of forceps on the surface of the water starting the stop watch when the test specimen touches the surface of water. Stop the stop watch when the test specimen just disappears under the surface of water. Note the time taken.

D.3.1 Repeat the test with the remaining test specimens.

D.4 RESULTS

Average of time recorded before the specimens are completely submerged, shall be a minimum of the absorbency of the absorbent cotton wool.

APPENDIX E
TEST FOR FREEDOM FROM OXIDIZING SUBSTANCES

E.1 TEST SPECIMENS

Draw from each sample under test, specimens each of mass approximately 1 g.

E.2 PROCEDURE

Take a test specimen and immerse in 100 ml of starch mucilage containing 0.5 g of cadmium iodide and 0.5 ml of glacial acetic acid, allow to stand for 10 minutes.
Blue colour should not appear on the absorbent cotton wool except on neps, parts of leaf and shell.

APPENDIX F
DETERMINATION OF WATER SOLUBLE EXTRACT

F.1 TEST SPECIMENS

Draw test specimens of mass approximately 12 g from the sample under test. Prior to test, the specimens shall preferably be conditioned to moisture equilibrium in a standard atmosphere for testing as specified in **CS 16**.

F.2 PROCEDURE

Determine the mass of the conditioned test specimen to the nearest milligramme. Cut the test specimen into small pieces and boil the pieces in 200 ml of distilled water in a beaker for half an hour and filter into a 500-ml measuring flask. Extract the test specimen twice again for 15 minutes and filter the aqueous extracts into the same flask. Pour the solution into a beaker and concentrate it into a small volume. Transfer it into a basin of known mass, washing the beaker with a little distilled water. Evaporate the contents of the basin on a steam bath and dry to constant mass in an air oven maintained at 105 ^{0}C to 110 ^{0}C. Determine the mass of the residue.

F.3 CALCULATION

$$\text{Water soluble extract, per cent by mass} = \frac{m_1}{m_0} \times 100$$

where,

m_0 is the mass, in g, of the test specimen, and
m_1 is the mass ,in g ,of the residue.

APPENDIX G
DETERMINATION OF ASH CONTENT

G.1 CONDITIONING OF TEST SPECIMENS

Prior to test, specimens shall be conditioned to moisture equilibrium in a standard atmosphere for testing as specified in CS 16.

G.2 APPARATUS

Silica or platinum crucible, muffle furnace capable of being heated to 900 ^{0}C.

G.3 PROCEDURE

Draw from the samples at least two test specimens of mass 5 g. Slowly ignite the test specimen in the crucible over a bunsen flame, transfer the crucible to the muffle furnace and ash at 900 ^{0}C for one hour or more until it attains constant mass.

G.4 CALCULATION

$$\text{Ash, per cent by mass} = \frac{m_1}{m_0} \times 100$$

where,

m_0 is the mass, in g,of the test specimen, and
m_1 is the mass, in g, of the residue in ash.

APPENDIX H
DETERMINATION OF THE PRESENCE OF DYES

H.1 CONDITIONING OF TEST SPECIMENS

Prior to test, specimens shall be conditioned to moisture equilibrium in a standard atmosphere for testing as specified in **CS 16**.

H.2 APPARATUS

H.2.1 Test-tube ,250-mm test tube having an inside diameter of 12 mm.

H.2.2 Measuring cylinder , with a capacity of 500 ml.

H.3 REAGENT

Absolute alcohol or any suitable solvent.

H.4 PROCEDURE

Form 10 g of the conditioned sample into a wad and pack it tightly into the measuring cylinder, about 50 mm below the top rim. Extract the specimen slowly with absolute alcohol or any suitable solvent at room temperature, until the percolate measures 50 ± 5 ml. Mix the percolate thoroughly and then pour it into the test tube to a depth of 150 mm and note whether the column of percolate when viewed downwards against a white background shows a blue or green tint.

APPENDIX J
METHODS OF TEST FOR DETECTION OF DETERGENTS

METHOD A

J.A.1 TEST SPECIMENS

Draw test specimens of mass approximately 12 g from the sample under test.

J.A.2 PROCEDURE

Cut the test specimen into small pieces and boil the pieces in 200 ml of distilled water in a breaker for half an hour and filter into a 500 ml measuring flask. Extract the test specimen twice again for 15 minutes and filter the aqueous extracts into the same flask.

Note whether the extract froths on gently shaking.

METHOD B

(Preparation of sample for test)

J.B.1 PRINCIPLE

The sample (of about 10 g) is extracted with hot ethanol and the extract, rendered alkaline if necessary, is evaporated to dryness. It is redissolved in water, acidified, extracted with light petroleum to remove fatty acids derived from soap and the residual aqueous solution of the detergent is adjusted to pH 7 ± 0.5 for further qualitative tests.

J.B.2 REAGENTS

The reagents shall be of a recognized analytical reagent quality. Distilled water or water of at least equal purity shall be used throughout.

J.B.2.1 *Ethanol*, absolute, neutralized to phenolphthalein indicator.

J.B.2.2 *Light petroleum*, b.p. 40 ^{0}C to 60 ^{0}C.

J.B.2.3 *Sodium hydroxide,* approximately 0.1 N solution.

J.B.2.4 *Sulphuric acid,* approximately 0.1 N solution.

J.B.2.5 *Phenolphthalein indicator*, 0.5 per cent solution in 50 per cent (v/v) ethanol.

J.B.3 PROCEDURE

Extract the active agent in the sample with the hot ethanol, in the ratio of 200 ml of solvent to 10 g of sample.

Add a few drops of phenolphthalein indicator to the extract. If it is alkaline, evaporate to dryness on a steam or water bath. If it is not alkaline, divide into approximately equal portions. Make one portion just alkaline to phenolphthalein indicator with the sodium hydroxide solution and evaporate to dryness as above. The addition of sodium hydroxide will prevent hydrolisis of

sulphate esters if these are present but may decompose other materials. Evaporate the second portion to dryness without making alkaline, and test both residues separately.

Dissolve the residue in water to make an approximately one per cent solution. Test a portion of the solution at room temperature for soap by making just acid (about pH 5) with the sulphuric acid solution. The immediate separation of fatty acids or development of a milkiness usually indicates soap. However, if synthetic detergent is also present there may be no visible change. In either case extract the acidified solution with the light petroleum, wash the extract with water, and add to the extract an equal volume of the ethanol and a few drops of phenolphathalein indicator. Add dilute sodium hydroxide solution dropwise. An acid extract confirms the presence of soap.

If soap is present, acidify the remainder of the aqueous solution and extract with light petroleum as above. Discard the extract.

Adjust the pH of the aqueous solution if necessary to 7 ± 0.5.

J.B.4 TESTS

J.B.4.1 Reagents

The reagents shall be of a recognized analytical reagent quality. Distilled water or water of at least equal purity shall be used.

a) *Chloroform*

b) *Buffered bromophenol blue solution*

Mix together 7.5 ml of 0.2 N sodium acetate solution, 92.5 ml of 0.2 N acetic acid solution and 2.0 ml of 0.1 per cent (m/v) bromophenol blue solution in ethanol. The pH of this solution should be between 3.6 and 3.9 .

c) *Cetyltrimethylammonium bromide solution*

Dissolve 10 g of cetyltrimethylammonium bromide in 1000 ml of water, warm if necessary.

d) *Iodine-potassium iodide solution*

Dissolve 1.27 g of iodine and 2.0 g of potassium iodide in water and dilute to 1000 ml.

e) *Ammonium hexathiocyanate-cobaltate reagent*

Dissolve 200 g of ammonium thiocyanate and 30 g of cobalt nitrate in water and dilute to 1000 ml.

f) *Methylene blue solution*

Dissolve 50 g of sodium sulphate in about 500 ml of water, add 6.8 ml of sulphuric acid, (d = 1.84 then add 30 ml of 0.1 per cent aqueous solution of methylene blue and dilute to 1000 ml.

J.B.4.2 Procedure

Make an approximately 1 per cent solution of the prepared sample. Adjust the pH of the solution if necessary to 7 ± 0.5 .

TEST 1

Shake 5 ml of the test solution with 25 ml of methylene blue solution and 10 ml of chloroform. A blue colour in the chloroform layer indicates the presence of anionic detergent. Confirm that the colour can be discharged by the addition of cetyltrimethylammonium bromide solution.

NOTE *- If chlorine compounds are present, the original 5 ml of test solution should first be well shaken with suffucient crystals of sodium thiosulphate to de-chlorinate it. The presence of chlorine would invalidate this test since it yields an apparently positive reaction for anionic detergent.*

TEST 2

To 10 ml of buffered bromophenol blue solution, add 2 to 5 drops of the solution under test. A sky blue colour indicates the presence of cationic detergent.

If anionic or cationic compounds are shown to be present by the above tests, remove them by mixed bed ion exchange methods before performing Tests 3 and 4.

TEST 3

Add a few drops of the solution under test to 10 ml of iodine-potassium iodide reagent. A discoloration from orange to red or reddish brown, or the formation of a dirty greyish-brown precipitate, indicates the presence of non-ionic detergent.

NOTE *- A positive indication by this test is given by ethylene oxide condensates and esters of polyhydric alcohols.*

Shake 20 ml of ammonium hexathiocyanate-cobaltate reagent with 10 ml of test solution and 10 ml of chloroform. A blue colour in the chloroform layer indicates the presence of non-ionic detergent.

***NOTE** - A blue colour in this test is given by ethylene oxide condensates of average polymer length three or more units.*

APPENDIX K
DETERMINATION OF pH VALUE

K.1 TEST SPECIMENS

Draw test specimens of mass approximately 4 g from each sample under test.

K.2 PROCEDURE

Cut one of the specimens into small bits, place them in a glass vessel and wet them thoroughly with 20 ml of distilled water (having an initial pH between 6.0 and 7.0) by stirring and squeezing with a glass rod. After they are completely wet, allow them to soak for at least 10 minutes. At the end of this period, transfer the extract to the electrode vessel of the pH meter and determine the pH.

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Printed at SLSI (Printing Unit)

SRI LANKA STANDARDS INSTITUTION

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