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SPECIFICATION FOR POLYPROPYLENE WOVEN SACKS FOR PACKING

(FIRST REVISION)

SRI LANKA STANDARDS INSTITUTION

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Gr. 8

SRI LANKA STANDARDS INSTITUTION
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Sri Lanka Standard
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FOREWORD

This standard was finalised 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 1996-10-17.

Polypropylene woven sacks are locally manufactured for packing different products in varying sizes and dimensions. This standard which was first published in 1984 and amended subsequently in 1986 covered sacks for packing fertilizers only. In this revision the requirements of sacks for packing both industrial grade materials such as fertilizers and food grade materials such as paddy, rice, sugars, salt etc. have been included. However depending on the type of material to be packed, variation of construction and additional requirements of sacks may be as agreed to between the interested parties.

Since sacks having different dimensions are being used for packaging of different material, currently used dimensions are given in an Appendix as guidance.

Guidelines for the determination of a compliance of a lot with the requirements of this standard based on statistical sampling and inspection is 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 specification.

1 SCOPE

This specification prescribes the requirements and methods of test for tubular woven polypropylene sacks for packaging of different food grade and industrial grade materials.

2 REFERENCES

CS 16 Standard atmospheres for conditioning and testing textiles
SLS 20 Determination of the size of yarns
SLS 41 Determination of the number of threads per inch in woven fabric
CS 43 Determination of breaking load and extension of strips of woven textile fabric
CS 44 Determination of the count of yarn removed from fabric
SLS 45 Measurement of length of woven fabric (First revision)
CS 102 Presentation of numerical values
SLS 428 Random sampling methods
SLS 582 Determination fo bursting strength and bursting distension (diaphram method)
SLS 871 Code for use of plastic materials for food contact applications
Part 4 : Polypropylene (PP)

3 REQUIREMENTS

3.1 Material

The polypropylene tapes used shall be food grade and contain at least 85 per cent polypropylene by mass. All additives shall also be of food grade, conforming to **SLS 871 : Part 4.**

NOTE

Food grade materials may not be required for sacks which are used for packaging industrial grade products.

3.2 Fabric

The fabric used in the manufacture of sacks shall be tubular polypropylene fabrics woven on circular looms. The fabric shall also conform to the requirements given in Table 1 when tested by the methods given in Column 4 of the Table 1.

3.3 Seam

3.3.1 *Material for stitching*

The material used for stitching shall be polypropylene tapes suitably twisted or any other thread suitable for the purpose. The linear density of the stitching yarn shall be at least 1.2 times that of the tape used for making the sack, when tested by the method given in **SLS 20.**

TABLE 1 - Fabric requirements

Sl. No. (1)	Characteristic (2)	Requirement (3)	Method of test (4)
i)	Width of tape, mm	2.5 ± 0.2	Appendix B
ii)	Linear density of tape, tex, min	100	CS 44 or Appendix C
iii)	Construction		SLS 41
	a) Ends per dm, min	38	
	b) Picks per dm, min	38	
iv)	Fabric breaking strength, N, min	700	CS 43
v)	Bursting strength, kN/m^2, min	1600	SLS 582

NOTE

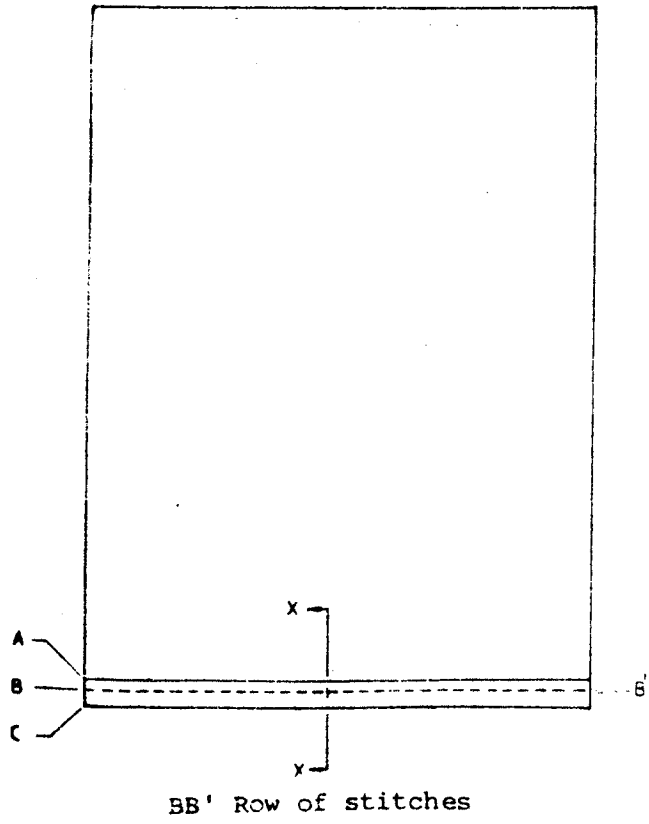
Method of test given in Appendix C which has been observed as acceptable as a routine method has been derived from CS 44.

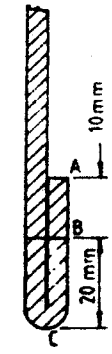
3.3.2 *Stitching*

The bottom of the sack shall be sewn with a row of chain stitches. The row of stitches from the edge shall be at a minimum distance of 10 mm. The number of stitches per decimetre shall be between 12 and 15 (see Fig. 1). Stitching shall be done with fold over seam, in a way stitches of which so as to pass through a minimum of 4 layers of the fabric. The minimum depth of fold over seam shall be as given in Table 2.

TABLE 2 - Depth of fold over seam

Sl. No. (1)	Net content, kg (2)	Depth of fold over seam (d), mm (3)
i)	Up to 15	10
ii)	16 - 25	15
iii)	Above 25	20





Enlarged section XX sewn through 4 layers of the fabric

FIGURE 1 - Stitching of sacks

3.3.3 *Seam strength*

The seam breaking strength of sack when tested by the method given in Appendix D shall be not less than 300 N.

3.4 Mouth of the sack

The mouth of the sack shall be selvedged, hemmed or heat-cut to ensure that the tapes do not fray. In case of hemming, the width of hem shall be not less than 10 mm.

NOTE

As agreed to between the purchaser and the supplier, the mouth of the sack may be heat-cut to give a serrated effect and in such case, the length of sack shall be measured excluding the serration.

3.5 Inner lining of sack

The sack shall be supplied with a loose liner sealed at the bottom end and of low density polyethylene of suitable thickness, if requested by the purchaser. In such cases, the length of loose liner shall be at least 100 mm more than that of the sack and the width shall be at least 25 mm more than that of the sack.

In instances, where air permeability affects to the packing material, the fabric used for making the sack may be laminated with low density polyethylene or any other suitable material. The thickness of the coating of lamination shall be as agreed to between the purchaser and the supplier.

NOTE

For packing of materials which require more air permeability the sack may be perforated as agreed to between the purchaser and the supplier.

3.6 Dimensions of sacks

The dimensions of sacks shall be as agreed to between the purchaser and the supplier.

The agreed dimensions of sacks shall be measured by the method given in SLS 45. A tolerance of ± 10 mm shall be permitted on both length and width of the sack.

The dimensions of sacks for packing selected items are given in Appendix E as a guide.

NOTE

The effective length excluding the bottom hem shall be taken as the length of the sack.

3.7 Bulk strength of sack

The sack shall pass the test given in Appendix F.

NOTE

This test may not be applicable for perforated sacks.

4 HANDLING OF FILLED SACKS

In handling of sacks, the following instructions shall be strictly followed to prevent subsequent damages during usage.

4.1 Iron hooks or similar tools which would cause damages to sacks shall not be used.

4.2 Sacks shall be handled only in the manner, in which those are expected during packaging and storage, depending on the material to be packed.

5 PACKAGING AND MARKING

5.1 Packaging

The sacks shall be packed in bales of 50,100, 250 or 500 or any other number agreed to between the purchaser and the supplier. The bales shall be suitably wrapped and secured to prevent subsequent damages.

In case of sacks intended for packing of food items precautions shall be taken to prevent any contamination.

5.2 Marking

5.2.1 The information requested by the purchaser shall be legibly and indelibly marked or printed on each individual sack.

5.2.2 The following information shall be legibly and indelibly marked or printed on the wrapper of each bale:

a) Name and address of the manufacturer and/or supplier of sack;
b) Batch identification number; and
c) Any other marking requested by the purchaser.

NOTE

Attention is drawn to the certification marking facilities offered by the Sri Lanka Standards Institution. See the inside back cover of this standard.

6 METHODS OF TEST

6.1 Tests for the requirements given in 3 shall be carried out as prescribed in the relevant Sri Lanka Standards given therein and Appendices B, C, D and F of this specification.

6.2 The conditioning and testing atmosphere shall be the standard atmosphere for conditioning and testing textiles as defined in CS 16. i.e. a relative humidity of 65 $\pm$ 2 per cent and a temperature of 27 $\pm$ 2^{0}C.

APPENDIX A
COMPLIANCE OF A LOT

The sampling scheme given in this Appendix 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 coupled with type testing and check tests or any other procedure, an appropriate scheme of sampling and inspection should be adopted.

A.1 LOT

All polypropylene woven sacks of the same dimensions, manufactured under relatively similar conditions of production, shall constitute a lot.

A.2 SCALE OF SAMPLING

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

A.2.2 The number of sacks to be selected from the lot shall be in accordance with Column 1 and Column 2 of Table 3.

TABLE 3 - Scale of sampling

No. of sacks in the lot (1)	No. of sacks to be selected (2)	Sub-sample size (3)	Acceptance no. (4)
Up to 500	8	2	0
501 to 1 000	13	2	1
1 001 to 3 000	20	3	1
3 001 to 10 000	32	5	2
10 001 to 35 000	50	8	3
35 001 and above	80	13	5

A.2.3 Four bales or 5 per cent of the bales, whichever is higher, shall be drawn from the bales in the lot. As far as possible an equal number of sacks shall be drawn from each bale selected.

A.2.4 The bales and sacks shall be selected at random. In order to ensure randomness of selection, random number tables as given in SLS 428 shall be used.

A.3 NUMBER OF TESTS

A.3.1 Each sack in the sample shall be tested for the requirements specified in 3 other than those of width of tape, linear density, fabric breaking strength and seam breaking strength.

A.3.2 Two sub-samples, each having sizes as given in Column 3 of Table 3 shall be drawn at random and tested for the following requirements:

a) Sub-sample 1 - Width of tape, linear density, fabric breaking strength and seam breaking strength, and
b) Sub-sample 2 - Bulk strength.

A.4 CRITERIA FOR CONFORMITY

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

A.4.1 The number of sacks not conforming to one or more requirements when tested as in A.3.1 is less than or equal to the corresponding acceptance number given in Column 4 of Table 3.

A.4.2 Each sack in sub-sample tested as in A.3.2 satisfies the relevant requirements.

APPENDIX B
DETERMINATION OF THE WIDTH OF TAPE

B.1 TEST SPECIMEN

Five warp-tapes and five weft-tapes taken from different places in each sack.

B.2 PROCEDURE

B.2.1 Determine the width of a tape by comparing it with a graticule on a microscope slide with 0.05-mm divisions, both being examined by means of a projection microscope or any other suitable optical instrument.

B.2.2 Take 10 readings of tape width measured to the nearest 0.1 mm at points spread equally over the length of the tape.

B.2.3 Repeat the procedure for all the warp and weft threads.

B.2.4 Report the average of all the readings.

APPENDIX C
DETERMINATION OF LINEAR DENSITY OF TAPE

C.1 APPARATUS

Metal or transparent template having dimensions of 30 mm x 30 mm.

C.2 PROCEDURE

Lay the woven sack on a flat surface. Place the template on a defect free area and while giving sufficient pressure on it to remove unnecessary wrinkles and creases mark the borders of the template on the fabric with a sharp marker pen.

Remove the template from the fabric and by a pair of scissors or suitable means cut the specimen internally along the marked dimensions.

Examine the four sides of the specimen and remove all partly cut tapes. Count the number of tapes in either direction (n_1 and n_2).

Measure the mass of the specimen in grams (m) to the nearest milligram.

Take a sufficient number of tapes from either direction and measure the length of tapes separately, in mm, including the crimp applied, (For this purpose, a crimp tester may be used). Calculate the average length of tape for each direction (l_1 and l_2).

Take at least two specimens from each sack.

C.3 CALCULATION

$$\text{Linear density of tape, in tex} = \frac{m}{n_1 \times l_1 + n_2 \times l_2} \times 10^6$$

Where,

m is the mass in grams of the specimen;
n_1 ,n_2 are the number of tapes in each direction; and
l_1 ,l_2 are the average length, in mm, of tapes in each direction.

APPENDIX D
DETERMINATION OF BREAKING STRENGTH OF SEAM

D.1 PRINCIPLE

A 50-mm wide specimen is extended at a constant rate of 200 ± 10 mm/min until it breaks.

D.2 APPARATUS

The apparatus shall be in accordance with that described in **CS 43** with the following exceptions:

a) A constant rate of extension machine or constant rate of traverse (strain gauge type) shall be used.

b) The rate of separation of the pulling jaw from the fixed jaw shall be 200 ± 10 mm/min.

c) The distance between the two jaws shall be 200 ± 1 mm.

D.3 TEST SPECIMENS

D.3.1 Dimensions of specimens

The width of the test specimen excluding any fringe, shall be 50 mm. The opened length of each test specimen shall be greater than the required gauge length of 200 mm by an amount necessary to ensure adequate clamping at each end.

D.3.2 Number of specimens

Test five specimens from each type of seam as applicable. The sample from which the specimens are cut shall be as representative of the lot as possible.

D.3.3 Preparation of specimens

Cut each test specimen, 150-mm wide, with its length perpendicular to the seam being tested and include an equal length on each side of the seam. Make cuts inwards from each edge, parallel to the seam and 15 mm away from it on each side such that a width of 50 mm is left uncut centrally in the specimen. The tapes so cut shall not be frayed out.

NOTE

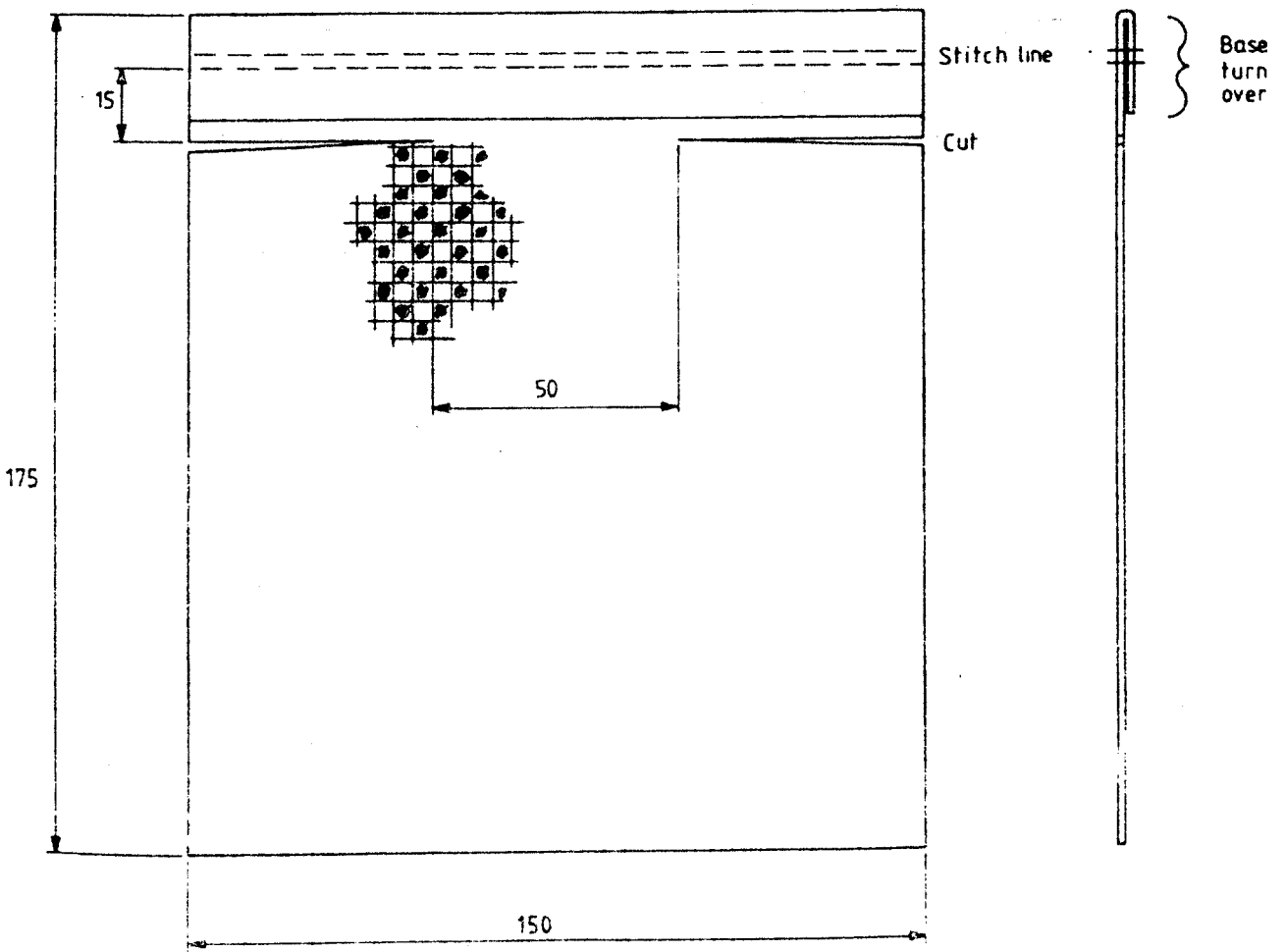
It is convenient to make the cuts prior to opening out the test specimen as shown in Fig. 2.

D.4 TEST PROCEDURE

Set gauge length to 200 ± 1 mm. Clamp the specimen under slight tension and ensure that it is centred within the jaws, whose width should equal or exceed the width of the specimen, and that the specimen is firmly gripped and does not slip in the jaws during testing. Use serrated or lined clamps if necessary.

Operate the testing machine at a rate of separation of 200 ± 10 mm/min.

Record the maximum force at break. When rupture occurs within 5 mm of either jaw disregard that result. Repeat the procedure with the remaining test specimens in turn.



All dimensions are in millimetres
FIGURE 2 - Test specimen

D.5 CALCULATION AND EXPRESSION OF RESULTS

Calculate the arithmetic mean of the strengths.

Report the mean strength of the seam in newtons per 50 mm.

APPENDIX E
GUIDE FOR SACKS DIMENSIONS

TABLE 4 - Dimensions of sacks

Sl. no. (1)	Item to be packed (2)	Net content, kg (3)	Length, mm (4)	Width, mm (5)
i)	Fertilizer			
		25	700	500
		50 (Size 1)	850-870	550-570
		50 (Size 2)	920-950	580-600
ii)	Paddy			
		65	1050	650
iii)	Rice			
		10	550	360
		25	700	500
		50	950	600
		65	1050	600
iv)	Salt			
		50	900	600
v)	Sugar			
		50	950	600
vi)	Wheat flour			
		50	1000	590

APPENDIX F
DETERMINATION OF BULK STRENGTH OF SACKS

F.1 APPRATUS

If required, a hoisting device placed on a concrete or cemented surface which can raise a filled polypropylene sack at least 2.5 m above the surface.

F.2 PROCEDURE

Mark 1 and 2 on each sack on its two flat sides, 3 and 4 at its two stitched sides and 5 and 6 at two of its diagonally opposite corners. Fill the sacks upto its nominal net content with particular packing material or any other suitable material having bulk density equal to that of the intended packing material to be packed in the sack. Stitch the mouth of the sack approximately 100 cm above the top surface of the packed material. If a hoisting device is used, suspend it on the hoisting device so that the lowest point of the sack is at a height of 1.5 ± 0.03 m above the concrete or cemented surface. Drop the sack onto the surface from a constant height of 1.5 m, so that it meets the surface on specified sides and corners in turn as described in Table 5. Drop the sack freely under gravity. Examine for any breakage of the sack after each drop.

TABLE 5 - Sides and corners of drops

Drop no.	Side/corner where the surface meet	
1	Flat side marked	1
2	Stitched side marked	3
3	Corner marked	5
4	Flat side marked	2
5	Stitched side marked	4
6	Corner marked	6

F.3 RESULTS

A sack is deemed to have passed the test, if it remains unbroken after subjecting to all the six drops.

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The Sri Lanka Standards Institution is the owner of the registered certification mark shown below. Beneath the mark, the number of the Sri Lanka Standard relevant to the product is indicated. This mark may be used only by those who have obtained permits under the SLS certification marks scheme. The presence of this mark on or in relation to a product conveys the assurance that they have been produced to comply with the requirements of the relevant Sri Lanka Standard under a well designed system of quality control inspection and testing operated by the manufacturer and supervised by the SLSI *which includes surveillance inspection of the factory, testing of both factory and market samples.*

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