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CODE OF PRACTICE FOR
PACKAGING OF STANDARD LANKA RUBBER
(FIRST REVISION)

SRI LANKA STANDARDS INSTITUTION

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(FIRST REVISION)

SLS 385:1984

Gr. 9

SRI LANKA STANDARDS INSTITUTION
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This standard does not purport to include all the necessary provisions of a contract.

SRI LANKA STANDARD
CODE OF PRACTICE FOR PACKAGING OF STANDARD LANKA RUBBER
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FOREWORD

This Sri Lanka Standard was authorized for adoption and publication by the Council of the Sri Lanka Standards Institution on 1984-12-20, after the draft, finalized by the Drafting Committee on Natural Rubber had been approved by the Technical Advisory Committee on Rubber and Rubber Products and the Chemicals Divisional Committee.

This code was first published in 1976. This revision includes *shrink wrapping*, an economical palletization method, which requires lesser usage of timber. Development of this technique is very promising and it is particularly suited to bulk shipments of rubber in containers on a *door to door* movement basis.

Standardized methods of wrapping and identifying bales of rubber has become a necessity with the new innovations in the natural rubber industry. Polyethylene wrappers are recommended for this purpose.

Most consumers do not remove the bale wrappers before processing the rubber in high temperature mixing. The standard method of packaging Standard Lanka Rubber (SLR) detailed in 3.3.1.1 is suitable for these consumers and should always be adhered to by the natural rubber producers and shippers unless an alternative is specifically requested.

Consumers who resort to mixing at lower temperature will find difficulties in dispersing the polyethylene homogeneously. It is, therefore, necessary for them to remove the wrappers prior to mixing. These consumers should specify *thick white polyethylene wrappers* as detailed in **3.3.1.2** so that the film can be more easily removed from the bales. The white colour of the thick polyethylene will also assist the mill operator in ensuring that all pieces of wrappers have been removed before the rubber is used.

These two methods of wrapping should satisfy virtually all consumers but any special requirements can be met by reference to 4.

Since natural rubber producers have no control over the temperature of mixing etc. in consumers' factories, they should not claim that the polyethylene wrappers need not be removed prior to mixing.

This code of packaging is specifically for SLR grades, but for the sake of uniformity, producers are encouraged to pack other grades of rubber in a similar manner.

Details presented in this code should be closely followed to avoid complaints from consumers.

All standard values given in the code are in SI units.

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

In the preparation of this code assistance derived from the publications of the Rubber Research Institute of Malaysia is gratefully acknowledged.

1 SCOPE

This code prescribes the methods of packaging and marking of Standard Lanka Rubber (SLR).

2 REFERENCES

CS 102 Presentation of numerical values

3 STANDARD METHOD OF PACKAGING

3.1 A Standard Lanka Rubber (SLR) pack shall normally contain one tonne of rubber in 30 bales (see Note). Each bale shall have a mass of 33.3 kg. Bales shall be wrapped and unitised in a cardboard or polyethylene lined crated pallet as detailed below. For details of packaging materials see 7.

NOTE - Certain deviations are allowed in the number of bales in a pack depending on the consumer requirements.

3.2 Temperature

3.2.1 The temperature of the rubber throughout the bale shall be less than 60 °C before it is wrapped and palletised.

3.3 Bale wrapping

3.3.1 Each bale shall be wrapped according to one of the methods described below.

3.3.1.1 The bale of rubber shall be placed in a 0.05-mm colourless polyethylene bag or wrapped with 0.05-mm colourless polyethylene film. The polyethylene bag or wrapper is then heat sealed.

3.3.1.2 The bale of rubber is wrapped with 0.1-mm thick white polyethylene (see Note) and then heat sealed. The white polyethylene wrapper shall be labelled **Strip polyethylene before use.**

NOTE - A thin layer of polyethylene shall not be used beneath the thick layer as this defeats the purpose. Polyethylene thicker than 0.1-mm can be used but it shall be white.

3.4 Grade identification

3.4.1 If the bale was wrapped as detailed in 3.3.1.1, a 50-mm wide grade identification band (see Note) shall be wrapped around the polyethylene wrapper. Details of identification bands and marking are described in **8.**

3.4.1.1 Alternatively, a 50-mm identification band can be printed on the polyethylene bag or wrapper.

3.4.2 If the bale was wrapped as detailed in **3.3.1.2,** the white polyethylene wrapper should have been previously printed with the 50-mm identification band (see Notes 1 and 2), the details of which are described in **8.**

NOTES

1 Larger identification marks can be used as bale marks, as described in **8.5.**

2 The use of a separate 50-mm identification band is not permitted.

3.5 Crated pallet

3.5.1 The pallet and crate frame shall be constructed from new, chemically treated sound timber, free from borers and other insects. The pallet or bearers shall be secured to adjacent timber by nails, at least 2.5-mm diameter which must penetrate the blocks or bearers at least 40 mm. The cardboard shall be glued to the vertical crate timbers as detailed in **7.3.**

3.5.2 The cardboard shall be separated from the rubber bales by placing two lengths of 0.05-mm colourless polyethylene at right angles across the bottom of the crate. These shall be large enough to cover the sides and overlap the top. Before the lid is finally fixed, these free ends are placed across the top of the rubber, two ends exceeding 200 mm from the sides of the crate, while the opposite ends completely

cover the top of the rubber and fold down outside the polyethylene as shown in Figure 1.

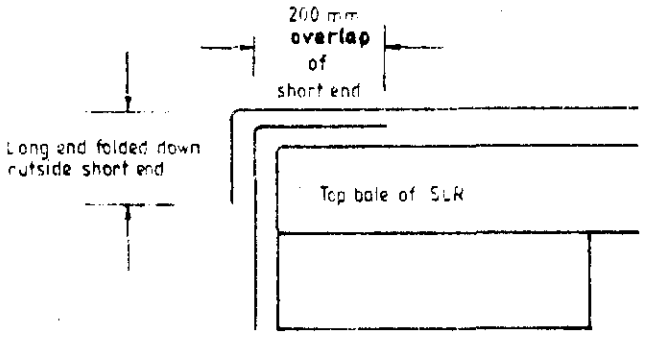


FIGURE 1 - Folding of polyethylene on top of rubber

3.5.3 Alternatively, 0.15-mm white or black polyethylene can be used to line sides and top of the crate instead of cardboard and 0.05-mm polyethylene.

3.6 Crate loading

3.6.1 The wrapped bales are then loaded into the polyethylene lined pallet crate following the pattern as shown in Figure 2. Before loading, four U-shaped galvanized iron or aluminium guards are placed on the top of the crate sides to prevent bale wrapper damage and to hold the polyethylene lines in place. After each layer of bales is positioned in the crate, it shall be completely covered by an interleaf of 0.05-mm colourless polyethylene.

3.6.2 When the final layer of bales has been positioned the rubber shall be allowed to settle into the crate. When the rubber has settled the ends of the polyethylene liner are folded over the rubber and the loose ends are tucked in outside the polyethylene liner. If white polyethylene is used to wrap the bales, the top layer should be covered with a sheet of 0.1-mm white polyethylene. The top cover cardboard and crate lid are positioned. The pallet is then strapped and sealed.

3.7 Pallet marks

All pallets shall be immediately marked with a number which identifies its production lot (see **6.7**). Before despatch, the pallet shall bear the grade identification symbol, mass, and other shipping marks as detailed in **8**.

4 SPECIAL METHODS OF PACKAGING

4.1 The methods detailed in 3 are satisfactory for almost all purposes but some variations are permitted to allow for individual consumer preference or special producer needs.

4.2 Individual bale shipment

4.2.1 Individual bales in 0.2-mm white polyethylene may be shipped without further wrapping. Bales wrapped in 0.05-mm colourless polyethylene may be shipped in multilayered paper bags.

4.3 Wrapper thickness

4.3.1 Thicknesses other than those specified in 7.1 shall be used only at consumer's request and any thickness over 0.1-mm shall be coloured white and labelled Strip polyethylene before use.

4.4 Shrink wrapping

4.4.1 In shrink wrapping, the crate sides and top are replaced by a tight plastic cover.

4.4.2 The bales of rubber are first consolidated in a specially designed box. Initially a one-tonne top load is applied before increasing the force. The setting period should take at the most three days depending on the grade of rubber. The rubber is kept in these boxes to facilitate storage until required for shipment. The box is then removed and the shrink wrapping bag is placed over the rubber.

4.4.3 The edge of the bag should overhang a few inches below the pallet deck so that on shrinkage, the film is firmly anchored to the pallet.

4.4.4 A hand-gun or a suitable oven can be used for shrinking the film. The temperature used for shrinking the film is around 150 ^{o}C to 180 ^{o}C.

4.4.5 Recommended specifications for shrink film and bag sizes are given in 7.4.

5 PALLET AND BALE SIZES

5.1 The pallet and bale dimensions shall be as follows (see Note):

Pallet size (outside)		Bale size
1 000 mm x 1 200 mm	OR	380 mm x 570 mm
1 100 mm x 1 425 mm		330 mm x 670 mm

NOTE - Deviation from the pallet size is allowed depending on the consumer requirements.

6 PACKAGING PROCEDURE

6.1 Temperature of baling

6.1.1 Excessive baling temperature can lead to weakening and breakage of the bale wrappers, adhesion between bales in a pallet, and rubber degradation. Low baling temperature leads to less compact bales or a longer pressing cycle. The baling temperature should therefore be 50 °C to 60 °C. This temperature shall be measured by inserting a thermometer into the crumbs before the bales are pressed.

6.1.2 A suitable method of cooling is to include re-circulation cooling in the drier as a final stage. This system circulates air through the rubber, drawing in a small amount of cool fresh air and discharging an equal amount of warm air to the main drier section. If procedures install a rapid cooling system, then the surface of the uncompressed crumb is cooled before the centre and therefore the surface of the rubber bale will warm up during and after pressing. The temperature of the centre of the bale must not exceed 60 °C.

6.2 Polyethylene sealing

6.2.1 The most satisfactory seals are made using hot strip bag sealers designed for this purpose and available through most polyethylene suppliers.

6.2.2 When a bag sealer is not available, and a hot iron is used to seal polyethylene, a piece of polyetetrafluoroethylene (PTFE) or other suitable material should separate the iron from the polyethylene to prevent the plastic melting and thereby exposing the rubber.

6.2.3 Cellulose tape shall not be used to seal polyethylene films.

6.2.4 Sealing gums based on concentrated rubber latex could also be used successfully for this purpose.

6.3 Interleaves

6.3.1 A sheet of 0.05-mm colourless polyethylene shall be placed between each layer of bales in the pallet as mentioned in **3.6**. The interleaves should cover the layer of bales completely and fold down the sides a distance of about 100 mm.

6.4 Pallet construction

6.4.1 The timber used for pallet construction shall be new, sound, clean, chemically treated and free from borers and other insects.

6.4.2 During pallet assembly, the pallet base, sides, and top shall not be nailed to each other, but joined with strapping, planks etc. so that they can be easily dismantled at the destination without the need to remove nails.

6.4.3 The pallet base, sides and top shall be constructed as separate pieces. Nails joining thin planks should penetrate both planks and the protruding end should be turned and hammered back into timber.

6.4.4 All timber, especially the spacing blocks or bearers beneath the pallet must be dried in the shade for several weeks before pallet construction. Failure to dry the block sufficiently will result in loose and detached blocks before the pallet reaches its destination.

6.5 **Palletising bales**

6.5.1 The crate sides should be covered with inverted U-shaped galvanized iron or aluminium guards to help protect the wrapper from damage.

6.5.2 The bales shall be placed in the pallets so that the grade marks are visible on each layer as the packaging proceeds.

6.5.3 The pattern of each layer shall be as shown in Figure 2.

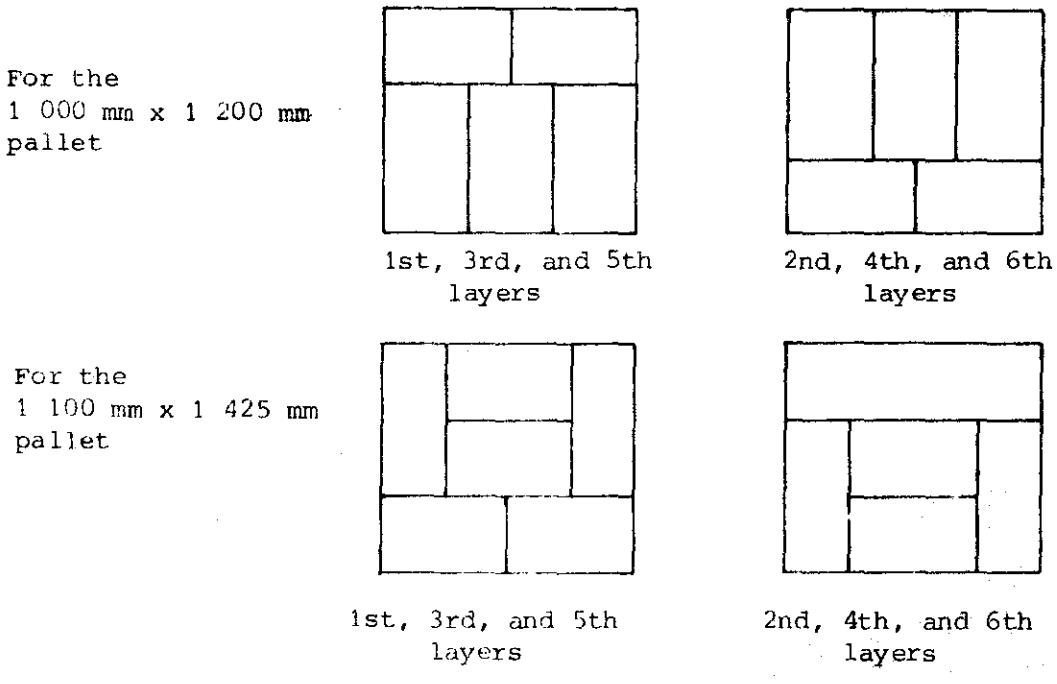


FIGURE 2 - Pattern of stacking bales

6.6 Bale compression in pallets

6.6.1 When the pallets are completely loaded with rubber, some bales will be above the top of the crate. The U-shaped galvanized iron or aluminium guards should be left on the top of the crate sides, and the bales covered with a sheet of thick polyethylene and allowed to stand until the bottom of the top layer of bales has settled below the top of the crate.

6.6.2 Further setting is then hastened by placing the pallet lid, a wooden platform and a tonne of rubber on top of the pallet. Clamps or other devices may be used to prevent excessive bulging which can cause the splitting of bale wrappings. When the lid has settled to the top of the crate, the load wooden platform, pallet lid, U-sections, and thick polyethylene are removed. The polyethylene pallet liner is folded across the top of the rubber. After positioning the cardboard top cover and lid, the crate shall be strapped and sealed.

6.7 Bale and pallet identification

6.7.1 The sides of the pallet shall be permanently and clearly marked in 25-mm size letters in the following manner:

lot number/pallet number

6.7.2 A factory packaging book should record the relevant details of grade of rubber, production lot number, number of pallets and bales obtained from that production lot and the source of other rubber included in the last pallet to complete an even tonne.

6.8 Precautions

6.8.1 Cellulose, paper or cloth tapes shall not be used to seal polyethylene bale wrappers since they are not compatible with the rubber, and could lead to faulty products.

6.8.2 High density polyethylene or polypropylene shall not be used for wrapping films.

6.8.3 Thin polyethylene wrappers or identification bands shall not be used inside thick polyethylene wrappers.

6.8.4 Hot dried biscuits of crumb rubber from driers shall be cooled to less than 60 ^{o}C before baling and wrapping, since, heat substantially reduces the strength of the polyethylene bags.

6.8.5 The bales shall be wrapped immediately after production with wrappers and identification bands for various grades. When subsequent tests indicate that the rubber is a different grade, then the wrapping materials shall be changed to indicate the correct grade. The use of incorrect wrappers and alteration of grade marks is prohibited.

6.8.6 The timber used for pallet construction shall be new, sound, clean, chemically treated and free from borers and other insect infestation. Failure to observe this precaution will not only result in weak pallets but may lead to expensive fumigation etc. at the port of destination.

6.8.7 When test results show that rubber does not conform to SLR grades, then the wrappers shall be removed before the rubber is sold.

7 PACKAGING MATERIALS

7.1 Polyethylene

7.1.1 The film which is used for packaging SLR shall be compatible with the rubber so that contamination and faults are avoided when the film is inadvertently or deliberately included with the rubber in the consumers' factory. No suitable film is available at present which is compatible with the rubber at low temperature, but thin low density polyethylene film is compatible with rubber when mill mixed at 110 °C. For this reason, producers should ensure that the film used, conforms to the following specification:

Relative density, 0.92

Melting point, 109 °C, maximum

Dispersibility, Compatible with rubber at 110 °C (see Appendix A)

7.1.1.1 Additional specifications will be included when necessary.

7.1.2 All polyethylene films used for thick bale wrapping shall be opaque white,

a) to indicate that it should be removed before the rubber is used;

b) to enable the operator to see clearly any pieces of film which have not been removed from the bale; and

c) to help protect the rubber from exposure to sunlight.

7.1.2.1 These films shall be marked "Strip polyethylene before use".

7.1.3 The thickness of polyethylene films used for different purposes shall be as indicated below:

a) 0.05-mm clear colourless, polyethylene to be used for:

Bale wrapping	(see 3.3.1.1)
Interleaving	(see 3.6)
Cardboard pallet inner lining	(see 3.5);

b) 0.1-mm opaque white polyethylene to be used for thick bale wrapping (see 3.3.1.2);

c) 0.15-mm white or black polyethylene to be used for lining pallet crates without cardboard (see 3.5.3);

d) 0.2-mm white polyethylene to be used for wrapping bales for non-unitised shipments (see 4.2).

7.1.3.1 The film thickness shall not vary by more than ± 20 per cent from the specified thickness.

7.1.4 The size of the bags used shall be as indicated below:

a) For bales measuring 380 mm x 570 mm the bags should be 675 mm wide and 800 mm long.

b) For bales measuring 330 mm x 670 mm the bags should be 675 mm wide and 900 mm long.

7.1.4.1 In both the above measurements the width given represents the *layflat* width. When the bags are gussetted the width is reduced accordingly.

7.2 Cardboard lined crates

7.2.1 Cardboard lining of a pallet shall be glued to the wooden uprights of the crates as this increases the resistance to diagonal collapse up to fifteen fold.

7.2.2 The cardboard shall conform to the following type or stronger:

Double-face corrugated cardboard with one liner having a basis mass of at least 140 g/m^2.

7.2.3 The glue may be prepared from 1 kg tapioca flour in 3 kg cold water. After mixing to a smooth paste, boiling water is added while stirring to make up 10 kg. A liberal coating of this glue should be used and the two surfaces kept pressed together until dry.

7.3 Steel strapping

7.3.1 The width of the steel strapping shall be 16-mm minimum and have a minimum tensile strength of 55 MPa and a minimum thickness of 0.55-mm.

7.4 Shrink film

7.4.1 The shrink film shall be made of polyethylene and have a minimum thickness of 0.20-mm. The shrinkage of the film when tested by immersing a 100 mm x 10 mm size of film in silicone oil (or ethylene glycol) bath at 120 °C shall be between 30 per cent to 40 per cent.

7.4.2 Bags of following sizes may be used

Mass of the pallet	Bag size, (Layflat bags) mm	Thickness min. mm
1 tonne unit	1 200 x 1 600	0.20
1 tonne to 2 tonne unit	1 200 x 1 700	0.20

8 MARKING

8.1 Printing of bale marks

8.1.1 Polyethylene is not easy to print permanently in the producers' factory. Printing should be performed by the film fabrication where oil based inks are applied after electrical treatment of the film.

8.1.2 The marking ink used shall be lead-free.

8.1.3 All Standard Lanka Rubber shall be marked with the SLR symbol, grade mark, producer's registration number, bale mass, and country of origin. The name of the producer and the trade name may also be shown. The layout for this information is shown in Figure 3 and the producers shall adhere to the dimensions given.

8.1.4 The marks appear on a 50-mm band which is placed around the bale after wrapping in polyethylene bag or, when so desired, on a continuous 50-mm band along the bag (see 3.4.1.1). The colours used for the various grades are given in 8.4.

8.1.5 All printing to be in UNIVERS type.

8.2 Marking of palletised units

8.2.1 The marks on palletised units shall clearly identify:

a) The package;

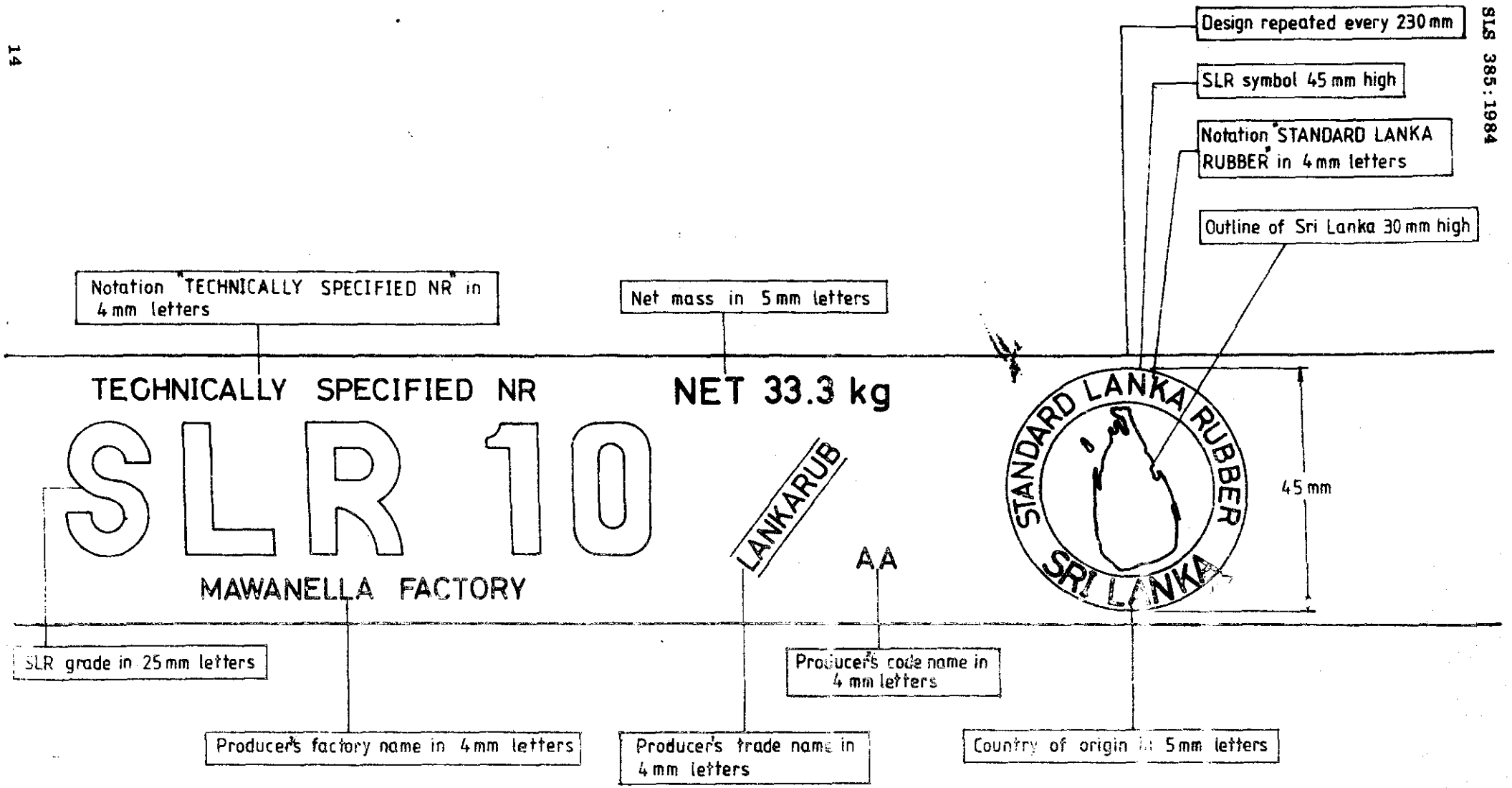
b) The grade of rubber; and

c) The source of rubber and relate it to the test certificate.

8.2.1.1 These marks shall be stencilled or printed in the SLR grade code colour or black.

8.2.2 The SLR grade code shall be shown on all four pallet sides. A band of minimum 450 mm x 100 mm shall be printed on the cardboard or printed on the timber in the appropriate SLR grade code colour.

8.2.2.1 Marking details shall be as given in Table 1.



ALL PRINTING TO BE IN UNIVERS TYPE

Colour of each grade to conform with SLR colour code

FIGURE 3 - Example of identification band marking details

TABLE 1 - Pallet marking details

Location	Mark	Size	Example
On all four sides	SLR Symbol	75 mm, minimum	Symbol as in Fig. 3
	Grade	50 mm to 100 mm	SLR 10
	Contract number	100 mm	789
	SLR Code strip	450 mm x 100 mm	Brown
Additional marks	Consignee's mark(Optional)	50 mm	DUNLOP
	Destination	50 mm x 100 mm	LIVERPOOL
	Producer's code letters	25 mm to 50 mm	A. A.
	Shipper's code number (if applicable)	25 mm to 50 mm	29
	Production lot number	25 mm	125/650
	Shipment pallet number	25 mm	Pallet 38
	Gross mass	25 mm to 50 mm	Gross app. 1 120 kg
Additional marks on one short side	Country of manufacture,	25 mm to 50 mm	Produce of Sri Lanka
	Net mass	25 mm to 50 mm	Net 1 000 kg
Additional, optional	Miscellaneous instructions	25 mm to 50 mm	Keep dry, Use spreaders
	Producer's trade name	25 mm to 50 mm	LANKA RUB
	Producer's factory name and/or shipper's name	25 mm to 50 mm	MAWANELLA and/or CEYLON TRADING CO. LTD.

8.3 Shipping marks on bales

8.3.1 The method of marking the grade of rubber on each bale is given in **8.1** . However, shipping marks are also required when individual bales are to be shipped by conventional carriers. These additional shipping marks are:

a) Destination;
b) Contract number; and
c) Shipper's name, trade mark or code number.

8.3.2 These should be printed in black in 25 mm x 50 mm letters on the same side as the grade marks. In addition the destination should also be shown on one edge.

8.3.3 When the rubber is packed in thick polyethylene, the marks should be stencilled with a suitable oil based paint, or lacquer or written with solvent based felt pen.

8.4 SLR code for grade identification

Grade	Colour of marker	Colour of polyethylene identification band
SLR L (LC)	Light green	Transparent
SLR L	Light green	Transparent
SLR 5L	Light green	Opaque white
SLR 5WF	Light green	Opaque white
SLR 5	Light green	Opaque white
SLR 5 (RSS)	Light green	Opaque white
SLR 10	Brown	Opaque white
SLR 20	Red	Opaque white
SLR 50	Yellow	Opaque white
SLR L (LC)-CV	Black/Light green	Orange
SLR CV	Black/Light green	Orange
SLR 5CV	Black/Light green	Orange
SLR 5CV (S)	Black/Light green	Orange
SLR 10CV	Black/Brown	Orange
SLR 20CV	Black/Red	Orange
SLR 50CV	Black/Yellow	Orange

8.5 Alternative specifications for identification marks on bale wrappers

8.5.1 The alternative specifications for the identification marks on bale wrappers are as follows:

a) The SLR symbol (150-mm high) including grade, and the SLR producer's registered letters.

b) Producer's code letters (10 mm high),

c) Produce of Sri Lanka (15 mm high),

d) Bale mass (10 mm high),

8.5.2 The following marks may be shown in addition to the above.

a) Producer's factory or company name, *house name* or type of rubber (25 mm high)

8.5.2.1 All these marks to be in the relevant grade code colour.

APPENDIX A

POLYETHYLENE DISPERSION TEST

A.1 PROCEDURE

A.1.1 About 100 g of a suitable grade of natural rubber is passed through the gap between the rolls of a laboratory mill. The gap is set at 0.635-mm and the rolls are heated to 110 °C. 5 g of polyethylene film is added within 3 minutes. The nip is then set to 0.381-mm and a smooth band is obtained within 30 seconds. Finally the sheet of rubber is cut and removed from the mill and observed carefully for undispersed specks of polyethylene.

A.1.2 A dispersible grade of polyethylene shall not show any specks.

SRI LANKA STANDARDS INSTITUTION

The Sri Lanka Standards Institution (SLSI) is the national standards organization of Sri Lanka established by the Sri Lanka Standards Institution Act No. 6 of 1984 which repeals the Bureau of Ceylon Standards Act No. 38 of 1964. The Institution functions under the Ministry of Industries and Scientific Affairs.

The principal objects of the Institution as set out in the Act are to prepare standards and promote their adoption, to provide facilities for examination and testing of products, to operate a Certification Marks Scheme, to certify the quality of products meant for local consumption or exports and to promote standardization and quality control by educational, consultancy and research activity.

The Institution is financed by Government grants, and by the income from the sale of its publications and from other services. Financial and administrative control is vested in a Council appointed in accordance with the provisions of the Act.

The detailed preparation of standard specifications is done by Drafting Committees composed of experts in each particular field assisted by permanent officers of the Institution. These Committees are appointed by the Divisional Committees, which in turn are appointed by the Council. All members of the Drafting and Divisional Committees render their services in an honorary capacity. In preparing the standard specifications, the Institution endeavours to ensure adequate representation of all view points.

In the international field the Institution represents Sri Lanka in the International Organization for Standardization (ISO), and participates in such fields of standardization as are of special interest to Sri Lanka.

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