SRI LANKA STANDARD 1109 : PART 1 : 1995

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SPECIFICATION FOR TIMBER PRESERVATION BY MEANS OF COPPER/CHROME/ARSENIC COMPOSITIONS

PART 1 : TREATMENT PROCESS

SRI LANKA STANDARDS INSTITUTION

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SLS 1109: Part 1 : 1995

Gr. 16

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Sri Lanka Standards are subject to periodical revision in order to accommodate the progress made by industry. Suggestions for improvement will be recorded and brought to the notice of the Committees to which the revisions are entrusted.

This standard does not purport to include all the necessary provisions of a contract.

SRI LANKA STANDARD
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PART 1 TREATMENT PROCESS

FOREWORD

This standard was approved by the Sectoral Committee on Timber based products and was authorized for adoption and publication as a Sri Lanka Standard by the Council of the Sri Lanka Standards Institution on 1995-12-14.

With the industrial and agricultural development of the country coupled with increased construction activity , the demand for timber for various purposes has increased considerably. Due to the limited availability of naturally durable timber species, timber supply has to be augmented by selected timber species of lesser durability which, when suitably preservative treated, would give adequate service life Most imported timber also need treatment. Hence, preservative treatment of timber forms a very important part of the national effort to conserve the natural resources of the country, and to achieve their maximum economic utilization. Already many new treatment plants are being planned to increase, substantially, the treatment capacity locally.

Copper/chrome/arsenic (CCA) preservative is widely used for treatment of timber. It has also proved effective for treating a wide range of species for a variety of applications due to the following favourable considerations: (a) The solvent water is readily available at negligible cost, (b) Required retentions can be easily attained by varying the concentration of the treatment solution; (c) Evaporation is negligible; (d) The preservative is odourless; (e) Economy in freight due to availabiliity in powder or paste form; (f) Easy penetration into timber due to non-viscous and non-oily constitution; (g)Amenebility of treated timber to painting ,polishing and glueing ; and (h) Possibility of overcoming its toxicity to animals and humans by adopting proper precautionary measures.

The efficacy of preservative treatment of timber depends on the quality of the preservative,and also the treatment process which ensures the attainment of the required absorption and penetration of the preservative into the timber. Hence a Sri Lanka Standard on this subject was considered useful to safeguard the interests of both the consumer and the preserver as well as overall safety of the operation.

This standard is subject to the provisions of the Control of Pesticides Act No. 33 of 1980 and the regulations framed thereunder.

This part of the standard (Part 1) specifies the compositions of the preservative, the method of application , the retention and penetration desired for the prescribed treatment, and a method for assessing effectiveness of treatment.Part 2 of this standard specifies the test methods.

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

The Sri Lanka Standards Institution gratefully acknowledges the use of the publications of the British Standards Institution, the Bureau of Indian Standards, the Standards and Industrial Research Institute of Malaysia and the South African Bureau of Standards.

1 SCOPE

This part of the standard specifies treatment of timber with water-borne wood preservatives consisting essentially of copper sulphate, sodium dichromate or pottasium dichromate, and hydrated di-arsenic pentoxide, packed either as a mixture of dry ingredients or in the form of a paste in water. It covers the requirements of the preservatives, treatment process and requirements of the treated timber, but excludes treatment of round timber poles for overhead power and telecommunication lines.

2 REFERENCES

CS 159 Seasoning of timber
SLS 402 Presentation of numerical values
SLS 985 Grading of timber
Part 1:Species of timber
SLS 1012 CCA based timber preservatives
SLS 1109 Timber preservation by means of Copper/chrome/arsenic composition
Part 2 : Test Methods

3 DEFINITIONS

For the purpose of this part of the standard the following definitions shall apply.

3.1 **charge** : The quantity of timber treated in one and the same treating cycle.

3.2 **gross volumetric absorption**: The total volume of preservative solution absorbed into the timber,expressed as litres of solution per cubic metre of timber, during the treatment process, as measured immediately after release of pressure and before applying a vacuum.

3.3. **incising** : To make slit like lacerations generally parallel to the grain in the lateral surface of timbers that are resistant to treatment, so that deeper and more uniform penetration of preservative may be obtained.

3.4.inner bark : The layer of living bark (phloem) that separates the outer bark from the cambium and which in the living tree generally is moist and soft. The inner bark is usually impermeable.

3.5 net volumetric absorption : The volume of preservative solution remaining in the timber,expressed as litres of solution per cubic metre of timber, immediately after completion of the entire cycle of treatment (excluding any drying treatment).

3.6 net dry salt retention : The average mass of dry preservative salts in the timber, expressed as kilograms per cubic metre of timber, after the complete treatment operation.

3.7 outer bark : The layer of dead bark outside the inner bark, forming the exterior surface of the tree stem. The outer bark sometimes is corky and dry.

3.8 penetration : The depth to which preservative enters the timber.

3.9 pin holes: Holes in timber of more than 1.5 mm in diameter, caused by insects such as Ambrosia beetles either in the living tree or after felling.

3.10 refractory: Timber resistant to penetration of preservative.

3.11 sapstain: Abnormal colouration of the sapwood, caused by sapstain fungus; which neither causes heavy decay nor reduction of hardness.

3.12 sapstain fungus : Cryptogamous plant, without chlorophyll, feeding on organic matter and causing sapstain.

3.13 shot holes: Medium borer holes over 1.5 mm up to 3 mm in diameter.

3.14 worm holes (or grub holes) : Larger borer holes over 3 mm in diameter.

4 REQUIREMENTS OF THE PRESERVATIVE

4.1 General

Copper/chrome/arsenic (CCA) preservative to be used shall comply with the requirements specified in 4.2 and 4.3 when tested in accordance with SLS 1109 : Part 2 :1995. A typical test certificate for CCA preservatives complying with this standard shall be as shown in sample certificate in Appendix A.

4.2 Compositions of preservative

Two mixtures of slightly different composition are specified, designated as Type 1 and Type 2 respectively.

4.2.1 *Nominal compositions*

The nominal compositions of the two types of preservative(designated **Type 1 & Type 2**) together with the minimum compositions of each component shall be as shown in Table 1. The sum of compositions of the individual components shall be not less than 95 per cent (m/m) so that minimum values cannot occur together. These deviations are due to variations in the purities of the ingredients and homogenity of the mixtures.

TABLE 1 - Nominal compositions of active ingredients

Ingredient (1)	Type 1		Type 2	
	Nominal (2)	Minimum (3)	Nominal (4)	Minimum (5)
Copper % m/m (expressed as $CuSO_4.5H_2O$)	32.6	29.5	35.0	31.5
Dichromate % (m/m) (expressed as $K_2Cr_2O_7$ or $Na_2Cr_2O_7.2H_2O$)	41.0	37.0	45.0	40.5
Arsenic % (m/m) (expressed as $As_2O_5.2H_2O$)	26.4	23.5	20.0	18.0

4.2.2 *Actual compositions*

The preservatives may be supplied either as a mixture of dry ingredients or in the form of a paste in water.

In practice, the actual compositions of the preservatives as supplied may differ from the nominal compositions as a result of the removal or addition of water. In such cases the ratio of the active ingredients shall be in the same proportions by mass as specified in Table 1, and containers shall carry information on the mass of the preservative equivalent to unit mass of the nominal composition.

4.3 **Characteristics of preservative**

4.3.1 *pH value of solution*

The pH value of a solution equivalent to 20 g/l of the nominal preservative composition shall be not less than 1.8 and not more than 2.8 when determined as described in 5 of SLS 1109 : Part 2 : 1995.

4.3.2 *Insoluble matter*

The content of insoluble matter shall not be greater than 0.5 per cent by mass, when determined by the method described in 6 of SLS 1109 : Part 2 : 1995.

4.4 Concentration and composition of preservative solution

4.4.1 *Preparation*

In those cases where the ingredients are separately packed, the solution shall be prepared from the three packs supplied in the container. It is essential to dissolve the ingredients in the order 1) dichromate 2) copper sulphate and 3) diarsenic pentoxide and to agitate the solution between the addition of each pack for a period of 5 minutes at ambient temperature.

4.4.2 *Concentration*

The concentration of the working solution shall be at the discretion of the timber preserver but shall be such that, when it is used in conjunction with a correct treatment schedule (see 6), the specified net dry salt retention is obtained. However, the concentration of the solution shall not be less than 15 g per litre of the nominal composition specified in Table 1.

4.4.3 *Temperature*

During preparation and application of the solution, a temperature up to 40°C is acceptable, but the solution shall be stored at air temperature. The storage temperature shall not be allowed to rise above 40°C.

4.4.4 *Proportions of ingredients*

The ratio of the active ingredients in the working solution shall be in the same proportion, by mass, as specified in Table 1.

4.4.5 *pH value*

The pH value of the working solution at 27°C shall be not higher than 3.0 when determined by means of a glass electrode.

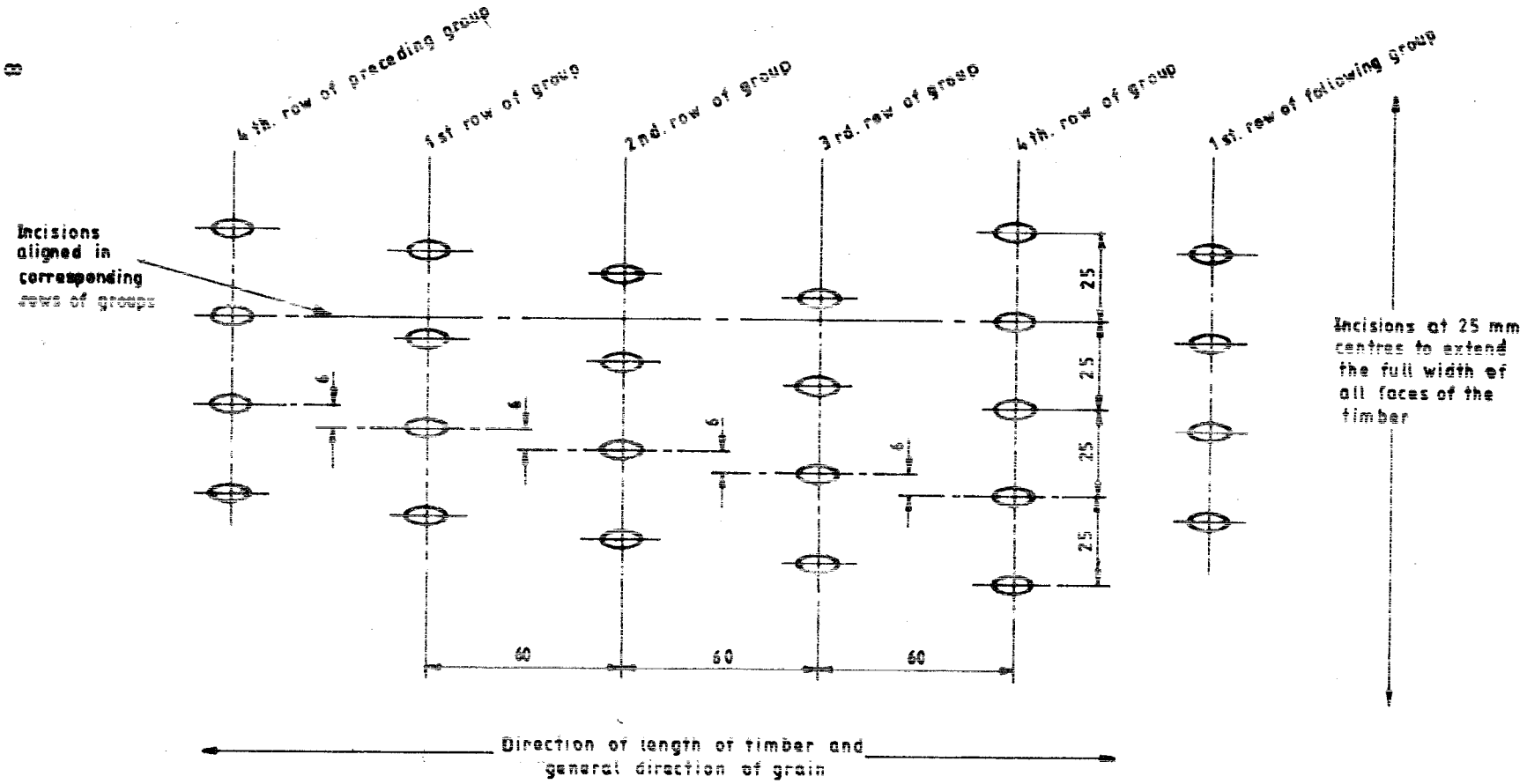
4.5 Tests on preservative and solution

4.5.1 Sampling of preservative

The preservative shall be sampled by the method described in 4 of SLS 1109 : Part 2 : 1995.

4.5.2 *Concentration of working solution*

The concentration of the well mixed solution shall be determined by the method described in 7 of SLS 1109 : Part 2 :1995. Before a solution that has been stored is used, a sample shall be taken from the bulk and the concentration again determined. (see also 4.4.2)



Approximate dimensions in millimetres

FIGURE 1 – Diagram showing spacing of incisions

4.5.3. *Analysis of working solution*

A representative sample of not less than 1 litre of the working solution shall be taken by the procedure described in 4 of SLS 1109 : Part 2 : 1995,and the proportion of active ingredients should be determined by the methods described in 8, 9 and 10 of SLS 1109 : Part 2 ; 1995 (see also 4.2). An alternative method is described in 11 of SLS 1109 : Part 2 : 1995.

5 PREPARATION OF TIMBER FOR TREATMENT

5.1 Surface characteristics

On visual inspection, the surface of the timber shall be free from mud, dirt, inner and outer bark (that may inhibit penetration), saw dust and shavings. It shall also be free from paint, polish or other surface finishs.

5.2 Freedom from decay and insect attack

On visual inspection, the timber shall be free from all signs of attack by wood destroying fungi or insects , except that timber showing signs of attack by sapstain fungi or pinhole borers (pin holes should not be confuced with shot holes and worm or grub holes) shall be acceptable subject to agreement between the preserver and the customer.

5.3 Moisture content

All timber shall be seasoned, preferably in accordance with CS 159 to an average moisture content that shall not exceed 28 per cent immediately before treatment. In the case of timbers having a smallest dimension of 150 mm or over, the moisture content shall not exceed 28 per cent when measured to a depth of 15 mm from the surface, or the full depth of the sapwood if this exceeds 15 mm.

Acceptable methods for determining moisture content are described in 12 of SLS 1109: Part 2 : 1995.

5.4 Fabrication before treatment

All timber(see 6.2.1) shall be sawn or planed, where necessary, before treatment to achieve the finished cross-section at the moisture content at which the timber is to be used. As far as possible adzing, cross-cutting,sawing to size, planing, boring, framing, drilling, rebating,chamfering or other fabrication shall be done before treatment. However, it is preferable if adzing is avoided to conserve timber.

5.5 Assembled units

It is recommended that dovetailed, mortice - and - tennon or similar joints should not be assembled before treatment, as unequal shrinkages occur during re-drying.

5.6 Incising

In the case of timber in which heartwood is non-durable and is refractory to treatment and when treating thick timbers like beams, sleepers, foundation piles etc., incision of all the surfaces, other than ends, is necessary for the proper penetration of the preservative.

Sawn timbers rated as resistant to penetration (see Appendix D), 75 mm or thicker, and intended for exterior use, may benefit from incising before treatment.

If incising is specified, the incisions shall be made parallel to the general direction of the grain. They shall penetrate to a depth of approximately 20 mm and be spaced 25 mm apart in rows extending across all four faces of the timber. The distance between the rows shall be 60 mm and incisions in adjacent rows shall not be in direct line but staggered at intervals of approximately 6 mm [i.e.incisions in every fourth row are in direct line(see **Figure 1**].

Timber of nominal thickness less than 75 mm or faces of softwoods that will be horizontal in use should not be incised.

6 TREATMENT PROCEDURES

6.1 General

The timber shall be treated with an aqueous solution of the preservative by a pressure impregnation process or by the hot and cold process. Heartwood of certain timber species (see Appendix F) requires no preservative treatment.

Treatment by a pressure impregnation process is the most effective way of applying the preservative to timber. In the absence of facilities for pressure impregnation, the latter process is recommended for material containing sapwood and easily treatable heartwood (see permeability Class 1 timber of Appendix D, where the smaller cross-sectional dimension does not exceed 50 mm). The hot and cold process does not permit the same control over the amount of preservative absorbed as does a pressure impregnation and it also requires stricter observance of the safety precautions.

The CCA preservative relies on the effect of chromium to fix the compounds of copper and arsenic in the timber so that the toxic salts become difficult to leach by the action of water. Hence, it is necessary to allow the treated timber to dry from 3 to 6 weeks to complete the fixation process. Further, this preservative should be applied cold as it is liable to get precipitated when heated due to interaction with certain wood constituents.

6.2 Pressure Impregnation Process

6.2.1 *Selection of Timber and treatment schedule*

As far as possible, only timbers of similar species, dimensions and permeability shall be included in any one charge. If this is not possible the treatment schedule shall be applicable to the timber most resistant to penetration.

6.2.2 *Stacking in the Treatment Vessel*

The pieces of timber shall be separated, when necessary, by stickers or laths so that the solution will have free access to all faces of the timber. This is particularly important when planed timber is to be treated.

6.2.3 *Method of Application*

6.2.3.1 General

Three methods commonly used are the Bethell (full-cell) process, Lowry (empty-cell) process and Rueping (empty-cell) process. In these, the basic process consists of enclosing the timber in a pressure vessel (usually a cylinder) and forcing the preservative into the wood under hydrolic pressure. The pressure may be preceded by a period under vacuum as in Bethell (full-cell) process or under air pressure as in the Rueping (empty-cell) process. When no preliminary vacuum or pressure is applied, the process is known as the Lowry (empty-cell) process. After the pressure cycle, the vessel is drained and a final vacuum is applied to recover excess preservative and to ensure that the treated timber is free from dipping solution,in the case of Bethell or Rueping process while a vacuum may be applied in the case of Lowry process.

The term "empty-cell" is used because surplus preservative is removed by the expansion of air compressed in the wood cell spaces while sufficient preservative is left in the cell walls to give adequate protection. Bleeding of preservative is less likely to occur after an empty-cell process than after a full-cell process. Empty-cell processes allow the achievement of deep penetration and the required net retention. Further, there is usually less variation in net retention in individual pieces of timber in a charge where an empty-cell process is used than when full-cell process is used.

Rueping process is not recommended in this standard as it is more expensive than the Lowry process, although it has two advantages that recovery of preservative may amount to about 60 per cent of the gross absorption and that it is ideal for treating timber of mixed species and also timber containing sapwood and heartwood.

6.2.3.2 Bethell (full-cell) process

6.2.3.2.a Initial Vacuum stage

The timber shall be subjected to an intial vaccum of at least 85 kPa*. (25 in. Hg) as specified in each particular schedule (see **Appendix B**).

6.2.3.2.b Flooding

On completion of initial vacuum stage the vessel shall be flooded with preservative solution before releasing the vacuum.

* 1 kPa = 0.01 bar = 0.145 psi.

6.2.3.2.c Pressure stage

The timber and preservative shall be subjected to a hydraulic pressure not exceeding 1500 kPa* and not less than 1300 kPa*. Pressure shall be maintained until the anticipated gross volumetric absorption is reached which will ensure the stipulated penetration and the final minimum net dry salt retention of the preservative (see **Appendix C**). If the timber is such that there is difficulty in obtaining the desired impregnation, the pressure shall be maintained until the further absorption in each of two consecutive half-hour periods is less than 2 per cent of the total absorption up to the commencement of the first of these periods. This last condition is taken as the point of refusal.

6.2.3.2.d Final vaccum

After the pressure period is completed the vessel shall be emptied of preservative and a vacuum corresponding to not less tha 85 kPa* (25 in. Hg) shall be established and maintained until the net volumetric absorption is sufficient to give the specified net dry salt retention.

NOTE

With the full-cell process the net volumetric absorption is commonly 90 per cent to 100 per cent of the gross volumetric absorption.

6.2.3.3 Lowry (empty-cell) process

The Lowry empty-cell process is similar to the full-cell process but no initial vacuum is applied. Recommended conditions are as follows.

6.2.3.3.a Flooding

The vessel shall be flooded with preservative solution.

6.2.3.3.b Pressure stage

As in 6.2.3.2.c.

6.2.3.3.c Final vacuum

If a final vacuum is applied, it shall be as specified in 6.2.3.2.d.

NOTE

With the Lowry process, the net volumetric absorptions vary with the treatment schedules employed and a net absorption of 60 per cent of the gross volumetric absorption is regarded as typical.

* 1 kPa = 0.01 bar = 0.145 psi

6.2.3.4 Recommended schedule

The timber shall be loaded into a suitable pressure vessel and impregnated with the preservative using the recommended treatment schedules given in Appendix B. When treatment to refusal is anticipated, full-cell process is preferred.

6.3 Hot and cold process

6.3.1 General

6.3.1.1 In this process, the timber is submerged in the preservative solution prepared in accordance with 4.4.2, which is then heated to above 90°C , but not more than 95°C, and maintained at this temperature for a suitable period till timber gets heated. It is then allowed to cool until the required absorption of preservative is obtained. During the heating period, the air in the timber expands and the moisture is converted into vapour and is expelled. During cooling, the residual vapour in the timber contracts, creating a partial vacuum, which causes the preservative to be sucked into the timber.

6.3.1.2 However this process should not be used with CCA preservatives as stated above to prevent the evolution of arsine at this high temperature.

6.3.2 *CCA Preservative*

With CCA preservatives, there is a danger of precipitation of the chemicals at high temperatures and in contact with the extractives in timber. To overcome this difficulty, two baths are used, the first containing water where the hot treatment is given, and the second, the cold bath containing the preservative into which the material is transferred immediately after heating. In the second bath, volume of preservative solution should be such as to prevent the temperature rise in above 40 °C during immersion. After the timber has remained submerged at this chosen temperature, within the above limit,for the the required period in the hot bath, the timber should be maintained in the cold bath of preservative solution for a period of up to 4 hours depending on the dimensions and the species of timber. It should be ensured that the timber is completely submerged throughout the process.

6.4 Standard of accuracy of plant instruments

The plant instruments shall be so installed and maintained that their maximum errors, after a correction factor has been applied do not exceed:

Thermometer : ± 1°C

Pressure gauges : ± 3%

Vacuum gauges : ± 3%

Scales for weighing sample pieces : ± 1%

Working tanks and volume gauges : ± 2% on measurement of absorption.

Hydrometers : ± 0.02 per cent on specific gravity.

NOTE

Track scales are used for weighing the timber charge before and after treatment for calculating the absorption of the preservative. Tank scales are used to determine the absorption of the preservative per charge by taking the readings of the depth of the preservative in the service tank before and after treatment of charge. Small balances are used for the determination of the moisture content of specimens of timber prior to treatment, bigger ones being used for weighing preservatives and chemicals for making solutions.

6.5 Durable timbers

Heartwood of timber species of Appendix F need no preservative treatment.

7 REQUIREMENTS OF TREATED TIMBER

7.1 General

Detailed records of the treatment schedule shall be made available to the customer on request, in addition to a simple form of certificate stating that the specification has been followed. Apart from these documents covering the process and the specification followed, the customer may, on request, observe the treatment of a given charge to satisfy himself that the process specification has been adhered to.

The customer or his agent shall have access to all parts of the plant used in the preparation and treatment of the timber, including records thereof, and shall be free to be present, whenever he desires to see that the treatment is carried out as specified.

Before the treatment is carried out, the moisture content of the material shall be determined by the method given in 12 of SLS 1109: Part 2:1995, and it shall satisfy 5.3.

The strength of the preservative solution shall be determined by analysis in accordance with 7 of SLS 1109 :Part 2:1995 for computation of the net salt retention.

7.2 Penetration of preservative

7.2.1 *Sampling and testing*

Penetration shall be determined by cross-cutting or boring a representative number of pieces that are well distributed throughout each charge. The number of pieces selected shall be 5 per cent of the number of pieces in the charge, rounded to the nearest integer, subject to a minimum of 5.

From a piece of timber sampled, take a cross-section free of defects at least 500 mm from the end of the timber and far enough from holes or notches to avoid the effect of end penetration. Cross-sections cut from timber that have re-dried after treatment can be tested immediately, but it is necessary to dry cross-sections taken from freshly treated timber. Plane the surface of the cross-section smooth. If it is not possible to plane the surface, free it from adhering sawdust.

If it is not permissible to cross-cut the timber,an indication of the penetration may be obtained from a boring made with an increment borer, or plug cutting tool.

Penetration shall be determined in each specimen by the method given in 13 of SLS 1109 : Part 2 :1995.

7.2.2 *Penetration requirement*

The minimum penetration of the preservative for each commodidty class of timber is as specified in Table 3 of Appendix C.

All sapwood shall be completely penetrated. The depth of penetration into the heartwood of the timber, shall be the maximum possible within the treating conditions detailed in 5 and 6.

7.3 Retention of preservative

7.3.1 *Determination of net dry salt retention.*

7.3.1.1 General

Timber Volume for the calculation of absorption shall be based on the nominal volume of the timber (Sum of nominal cross-sectional area times nominal length of each piece).

7.3.1.2 By service tank readings

The calculation of the net dry salt retention shall be based on volumetric measurement of the treating solution in the plant before and after treatment of the charge.
The calculation is as follows:

Net dry salt retention, kg/m^3 = A X C/1000

where :

A is the net volumetric absorption in l/m^3; and
C is the concentration of the preservative solution in g /l,

In the estimate of the absorption of the treating solution, correction shall be made for leakage from the vessel during the pressure and final vacuum periods. Leakage shall be collected and measured.

7.3.1.3 By mass of charge before and after treatment.

Alternatively, if required by the customer or if it is desired to test the variation between individual pieces of timber, the calculation may be based on the difference in mass before and immediately after treatment of samples, to be mutually agreed upon by the customer and the timber preserver.

Samples shall be drawn from locations well distributed throughout each charge and the number of samples selected shall be 2 per cent of the number of pieces in the charge, rounded to the nearest integer , subject to a minimum of 5.

7.3.1.4 By analysis

If required, the preservative retained in the treated timber may be analysed by the methods described in 8, 9 and 10, of SLS 1109: Part 2: 1995. An alternative method is given in 11 of SLS 1109:Part 2 : 1995. It should be appreciated, however, that extensive sampling is necessary to confirm that a given charge has been treated to a specified average net dry salt retention.

Samples shall be drawn from locations well destributed throughout each charge and the number of samples selected shall be at least 10.

Timber samples for analysis shall be of the full cross-section of the piece of a thickness as required by the laboratory at least either 500 mm from the end of the piece or 300 mm from the end of the longest split or check, whichever is further from the end of the piece, to avoid distortion of the result due to end penetration by the preservative. In the event such sections cannot be obtained, borings shall be taken preferably midway, but not outside the middle-third of the length measured between the ends of the pieces selected, avoiding checks, knots, pitch pockets, shakes and splits. An increment borer is recommended for this process. The bored holes should be filled with preservative and then plugged with tight fitting cylindrical pieces of treated timber.

7.3.2 *Retention requirement*

The average net dry salt retention within the charge of timber, shall comply with **Table 3 of Appendix C.**

In determination of net dry salt retention, preferred method is that given in 7.3.1.2, while 7.3.1.3 gives the alternative method. Under exceptional circumstances, 7.3.1.4 may be used.

7.4 Retreatment of unsatisfactorily treated charges

All charges not complying with the requirements of **Table 3 of Appendix C,** shall be re-dried to the specified moisture content (see 5.3) and retreated using a solution strength adequate to achieve the specified retention. No charge shall be retreated more than twice.

8 RECORD KEEPING AND TREATMENT CERTIFICATE

8.1 Plant equipment

Plant equipment shall be checked frequently to determine its reliability. Any error which exceeds the limits specified under **6.4** shall be entered in the records till the equipment is restored to normal working order. As far as possible recording instruments shall be used.

8.2 Record of treatment

Charge sheet or treatment record as given in **Appendix E** shall be fully entered at each stage of the treatment cycle and shall be available to the customer or to the Sri Lanka Standards Institution upon request. Such charge sheets shall be signed by the plant operator as a true record of the treatment carried out.

8.3 Treatment Certificate

A treatment certificate shall be produced for each charge and/or consignment of timber delivered from the treatment plant. On this certificate shall appear the following information:

a) Name of customer;
b) Name of preserver;
c) Preservative name;
d) Average retention of preservative obtained;
e) Charge sheet numbers and dates of treatment;
f) Species of timber as identified by the customer, and
g) Sizes and volume of treated timber.

The certificate shall be signed by the preserver, certifying that the timber has been treated in accordance with this specification,

9 HANDLING OF TIMBER AFTER TREATMENT

9.1 Handling

Treated timber shall be held for 48 hours or until drip-dry, whichever is the longer, before dispatch or erection. Fixation of the preservative may take up to 07 days and this should be taken into account before use with metal fittings.

To prevent damage to treated timber, handling with pointed tools of heavy treated timber such as piles, poles or sleepers should be confined to the ends only.

Normal preservative treatment does not affect the strength properties of timber to any extent that is of practical significance, provided moisture content is unaltered. Hence same handling method can be used before and after treatment, although as a result of wetting during treatment strength properties may be temporarily reduced.

9.2 Redrying

Timber treated with CCA preservatives becomes wet during processing and a period of redrying may be required after treatment. Even where the nature of the commodity does not require such redrying, a period of 7 days before use should be allowed for the preservative salts to fix, i.e become non-leachable. It is essential to stack timber carefully during this period because wetting and drying will cause timber movement and in some cases may cause distortion. It is essential that metal fittings are of a suitable composition and that they are not applied to the treated wood until this fixing period has elapsed.

After redrying, the treated timber is odourless and clean in appearance although slightly coloured, and can be glued, painted or polished. Changes in dimensions and shape of timber and grain-raising may be caused by wetting during treatment with these preservatives and subsequent redrying.

By agreement between customer and preserver, timbers in which subsequent shrinkage is undesirable, such as carpentry and flooring, or timbers which will subsequently be painted or glued, shall be redried after treatment to a specified moisture content suitable for the end use of the timber.

9.3 Fabrication after treatment

Timber to be treated should, wherever possible, be fully fabricated before treatment and all planing, cutting and boring operations on the treated material should be avoided.

Timber cross-cut, checked out or drilled for bolts after pressure treatment, shall have the exposed surfaces or bolt holes treated with a 100 g/l solution of the wood preservative. The preservative shall be liberally applied by brushing or dipping, and all cut surfaces and bolt holes shall be thoroughly treated. It should be borne in mind that this remedial treatment will not replace the full preservative protection of the impregnation process.

Timber rip-sawn or machined, other than as above, shall be retreated. This does not apply to light machining provided such machining does not expose untreated wood.

9.4 Application of metal fixing

Certain types of metal fixing will be liable to corrode if the wood in which they are embedded becomes wet. The presence of CCA preservatives in these conditions will increase the risk of corrosion. Where there is a risk that the moisture content of the timber will exceed 20 per cent (m/m), choose the metal fixings so that the effects of corrosion are minimized taking the following into account:

a) Do not fix fittings to the timber until 14 days after treatment or until the moisture content has fallen below 20 per cent (m/m);

b) If the timber is likely to become wet and a long service life is required, use fittings of austenitic stainless steel (excluding free machining grades), or copper or silicon bronze in preference to other types of fitting;

c) Take into account the likelihood of corrosion against intended service life of the component in selecting such fittings;

NOTE

If only occasional dampness is expected, coated low carbon steel (e.g sherardized, galvanized or cadmium plated) fittings may be used. Better performance will be obtained from fittings with thicker coatings.

d) Use fittings of unprotected low carbon steel, iron and aluminium only on timber,the moisture content of which is expected to remain below 20 per cent (m/m) for most of its service life and then only in indoor or well protected environments. Do not use aluminium alloys containing copper; and

e) Do not use sheet aluminium roof coverings or claddings in direct contact with CCA treated timber.

NOTE

These materials may be used if a bitumen emulsion, bitumen barrier paper or felt of other suitable water repellent barrier is placed between the timber and the aluminium sheeting.

9.5 Adhesive application

Before application of the adhesive, lightly sand the treated timber or brush with a wire brush to remove excess preservative salts. Follow the adhesive manufacturer's instructions concerning the moisture content.

NOTE

For internal dry conditions, phenol-formaldehyde, casein or urea-formaldehyde resin adhesives are recommended. For external and damp conditions resorcinol or phenol-formaldehyde type are recommended.

9.6 Painting and polishing

Allow to dry to a suitable moisture content, as specified,any treated timber that is to be stained, painted or varnished. Brush the surface of the dried timber to remove any dirt or excess preservative salts.

NOTES

1. Provided that the timber has been dried to a moisture content less than 25 per cent (m/m),any normal painting system may be used.

2. Paint does not key satisfactorily to wet timber whether treated or untreated.

10 SAFETY CONSIDERATIONS

The CCA preservative is toxic and skin irritant. Great care should be taken when handling, mixing and using it. Bodily contact or ingestion should be avoided. Use of protective clothing and gloves is desirable, and adequate provision should be made to capture and/or chemically neutralize any spillage of the preservative.

When powder formulations are used, care should be taken to avoid powder being blown out when opening bags of the preservative during the mixing of the solution. The open end of the bag should be put into close contact with the surface of the water and the powder discharged slowly into the solution.

Skin contact with timber still wet after treatment should be avoided. If it is necessary to handle treated timber while wet, it is essential that protective gloves are worn.

Timbers treated with a solution of CCA with concentration of 50 g/l or higher should not be disposed by open burning or bonfires, because both the fumes emitted by burning timber treated with these preservatives and the ash are potentially toxic.

In the case of this preservative,do not use the timber sooner than 2 days after the treatment and thoroughly hose the timber down and scrub it or dress it lightly before putting it into use. Such treated timber is known to have been used satisfactorily in cold storage chambers, bread bakery tunnels, grain storage silos, fishing boats, truck container floors, wooden pallets used with packed goods, tool handles, manufacture of beehive boxes, enclosed quarters for animal occupation, and in situations subject to repeated licking by animals.

If by accident a person contacts CCA preservative, remove contaminated clothing. If skin is contaminated, wash immediately with plenty of running water. In case of contact with eyes,flush with plenty of water. In the event of accidental ingestion, body contamination or feeling unwell, seek medical advice immediately.

As regards disposal of wasetes generated by CCA treatment, advice shall be obtained from the Director General, Central Envirenmental Authority of Sri Lanka.

APPENDIX-A
SAMPLE TEST CERTIFICATE FOR COPPER/CHROME/ARSENIC PRESERVATIVE

TABLE 2 - Sample test certificate for copper/chrome/arsenic preservative

Supplied by :.....

Tested by :.....

Description of Test	Results	Compliance with SLS 1109:Part 1 1995
1.Composition of preservative a) Copper ($CUSo_4.2H_2O$) b) Dichromate ($K_2Cr_2O_7$ or $Na_2Cr_2.2H_2O$) c) Arsenic($As_2Os.2H_2O$)	..%m/m ...%m/m ...%m/m ..%m/m	Yes/no Yes/No Yes/No Yes/No
2. pH value		Yes/No
3.Content of insoluble matter	...%m/m	Yes/No
4.Concentration of the working solution	...%	Yes/No

The copper/chrome/arsenic preservative tested complies/does not comply * with SLS 1109 : Part 1:1995.

*Delete the inapplicable

APPENDIX B
RECOMMENDED SCHEDULES

B.1 SCHEDULE 1 FOR COMMODITY CLASSES C1 AND C2(SEE TABLE 3) AND PERMEABILITY CLASS I (See Table 4)

Longer treatment schedules than those stated are required in order to obtain satifactory treatment of the less permeable timbers listed in permeability classes II and III.

B.1.1 *Initial vacuum.* Not less than 85 kPa (625 mm Hg) and held for a period of not less than 60 min.

B.1.2 *Pressure period.* Immediately after flooding the vessel the pressure shall be raised to not less than 1300 kPa and held at this pressure for not less than 4 hours. If the timber charge is such that there is difficulty in obtaining the desired impregnation, the pressure shall be maintained until further absorption in each of two consecutive half-hour periods is less than 2 per cent of the total absorption up to the commencement of the first of these periods.

B.1.3 *Final vacuum.* A final vacuum of not less than 85 kPa (625 mm Hg) shall be drawn and released immediately or maintained for a period up to 10 min.

B.1.4 *Minimum solution strength.* 100 g/l

B.2 SCHEDULE 2 FOR COMMODITY CLASSES C3 AND C4 PERMEABILITY CLASSES I AND II

Longer treatment schedules than those stated are required in order to obtain satisfactory treatment of the less permeable timbers listed in permeability class III .

B.2.1 *Initial vacuum.* Not less than 85 kPa (625 mm Hg) and held for a period of not less than 60 min.

B.2.2 *Pressure period.* Immediately after flooding the vessel the pressure shall be raised to not less than 1300 kPa and held at this pressure for not less than 3 h. If the timber is such that there is difficulty in obtaining the desired impregnation, the pressure shall be maintained until further absorption in each of the two consecutive half-hour periods is less than 2 per cent of the total absorption up to the commencement of the first of these periods.

B.2.3 *Final vacuum.* A final vacuum of not less than 85 kPa (625 mm Hg) shall be drawn and released immediately or maintained for a period up to 20 min.

B.2.4 *Minimum solution strength.* 50 g/l

B.3 SCHEDULE 3 FOR COMMODITY CLASSES C5, C6 AND C7 AND PERMEABILITY CLASSES I, II AND III

B.3.1 *Initial vacuum.* Not less than 85 kPa (625 mm Hg) and held for a period of not less than 30 min.

B.3.2 *Pressure period.* Immediately after flooding the vessel, the pressure shall be raised to not less than 1300 kPa and held at this pressure for not less than 2 h. If the timber is such that there is difficulty in obtaining the desired impregnation, the pressure shall be maintained until further absorption in each of the two consecutive half-hour periods is less than 2 per cent of the total absorption up to the commencement of the first of these periods.

B.3.3 *Final vacuum.* A final vacuum of not less than 85 kPa (625 mm Hg) shall be drawn and released immediately or maintained for a period up to 20 min.

B.3.4 ***Minimum solution strength.*** 30 g/l

NOTE

Commodity classes of timbers and the permiability classes are given in Table 3 and Table 4. Species of timber that do not require preservative treatment are given in Appendix F.

APPENDIX C
CLASSIFICATION OF USAGE OF TREATED TIMBER AND REQUISITE SALT RETENTIONS

Table 3 shows the net dry salt retentions for copper/chrome/arsenic wood preservatives that are regarded as minimal for the preservation of timber subjected to different kinds of hazards.

In using the table,attention should be paid to the following points:

(a) the minimum net dry salt retention in Column 5 refers to the quantity of net dry salt determined from wood plug or boring of 25 mm or 12 mm as the case may be,as specified in Column 6 of the table;

(b) The figures specified are averages for the charge of timber,if timber of the same species or permeability class (see Table 4) is treated in the same charge, and do not necessarily apply to every individual piece in the charge;

(c) The retentions given apply to timber used in Sri Lanka;

(d) The retentions given apply whether or not the treated timber is to be painted;

(e) "Interior" means timber in buildings not exposed to the weather;

(f) Where preservative has penetrated continuosly from the outer surface and right round the periphery of the cross-section, depth of penetration shall be taken as the mean depth measured at not less than 5 points,excluding the edge of the cross-section, located so as to include the cardinal points of variation of the penetration depth;

(g) In the special case of certain hardwoods (like Hora, Eucalyptus, Microcorys, Balu and Karanji),where preservative has penetrated continuosly from the outer surface only at certain locations along the periphery of the cross-section, and the preservative has penetrated in irregular patches over the entire cross-section but covering not less than 25 per cent of the cross-section, the tested cross-section shall be considered as having secured adequate penetration;and

(h) In exceptional circumstances when treated timber is all heartwood, appropriate modification should be made to specify values of minimum net dry salt retention and minimum depth of penetration.

TABLE 3 : Minimum net dry salt retention and minimum depth of Penetration for copper/chrome/arsenic/wood preservatives

Commodity class (1)	Description (2)	Hazard (3)	Example of timber use (4)	Minimum net dry salt retention (kg/m^3) (5)	Minimum depth of penetration (mm) (6)
C1	Marine piles and timber in contact with sea water	Severe attack by marine organisms, decay and insect attack	a)Sea defence works b)Foundation piles & jetty piles c)Wooden boats, hulls & catamarans	According to usage but not less than 32.0	25
C2	Underground mining timbers	Very severe decay	a)Pitprops b)Cover boards c)Shaft timbers	16.0	25
C2	Exterior timber in fresh water installations	Severe decay, insect or termite attack	a)Lock gates b)Jetty piling c)Revetments on inland water-ways	16.0	25
C2	Cooling towers	Very severe decay	Internal laths etc.	16.0	25
C3	Foundation piles	Very severe decay and termite attack	Foundation piles not in sea water	14.0	25
C4	Exterior timbers in ground contact but not in contact with sea water	Very severe decay,severe insect and/or termite attack	a)Railway sleepers b)Bridge decking c)Fence boards and posts d)Sign boards and formwork e)verandah posts	12.0	12
C5	Exterior timbers not in ground contact	Severe decay , severe insect and /or termite attack	a)Gates b)Duck-boards c)Pallets (see C7) d)Cross arms e)Stadium seating f)Extension windows	8.0	12
C5	Transport and refrigeration timbers	Severe decay, severe insect and/or termite attack	a)Bilge timbers and hatch covers and b)Barge ceilings c)Ship cabin linings or decks	8.0	12

contd....

TABLE 3 Continued..

Commodity class (1)	Description (2)	Hazard (3)	Example of timber use (4)	Minimum net dry salt retention (kg/m^3) (5)	Minimum depth of penetration (mm) (6)
			d)Refrigeration timbers(ship's hold,railway wagons/vans and commercial installations)	8.0	12.0
C5	Exterior timbers not in ground contact and moderately exposed	Severe decay, severe insect and /or termite attack	a)Fence rails b)Exposed ladders c)Exterior doors (see) d)Weather boards	8.0	12.0
C5	Timber for agricultural and horicultural use	Severe decay, severe insect and /or termite attack	a)Seed or bulb boxes b)Horticultural/ agricultural implements c)Orchid posts and garden stakes d)Outhouses,chicken houses etc.	8.0	12.0
C6	Interior building timbers in contact with ground soil or under humid condition	Moderate decay , insect and/or termite attack	a)Doors and windows (see C7) b)Ceiling and trusses c)Timber columns	6.4	12
C7	Interior building timber not in contact with ground or soil and used in dry condition	Decay ,insect and/or termite attack	a)Doors and windows b)Ceiling and trusses c)Furniture d)Packing cases e)Pallets (see C5)	4.0	12

APPENDIX D
PERMEABILITY CLASSES OF TIMBER REQUIRING PRESERVATIVE TREATMENT

TABLE 4 - Permeability classes of timber

Class III (1)	Class II (2)	Class I (3)
Difficult/very difficult to treat	Moderately difficult to treat	Easy to treat
	Ankenda	Ambarella
	Balau*	
	Bedi del	Amba
	Beraliya	Andunwenna
	Bitis*	Aralu
	Bintangor*	
	Bu-hora	Arridda
	(Eucaliyptus/pilularis	Atu-ketiya
	Bo mee	Badulla
	Changal*	Bakmi
	Comporta	
	Dawata	Beraliya
	Dawul kurundu	Borkera
		Bombu
		Bomeriya
		Bora-dominiya
		Bu-kenda
		Bulu
		Bu-seru
		Cadju
		Cypress
		Damarminyak*
	Del	Daminiya
	Diyapara	Divikaduru
	Domba-keena	Divul
Dunumadala	Dorana	Diyataliya
Dunumalak*	Durulla	Durian
		Ela-bakmi
		Ela-kadol
Etteriya	Eta-timbiriya	Etamba
Eucalyptus camaldulen -sis	Ela-liyan	Et-demeta
	Eucalyptus deglupta	Gedumba
Eucalyptus citriodora	Eucalyptus globulus	Geronggang*
Eucalyptus microcoris	Eucalyptus saligna	
Eucalyptus pilularis	Eucalyptus toraliana	Gini-sapu
	Gal-bedawaka	Goda-kaduru
Eucalyptus robusta	Gal-mendora	Godakirilla
	Gal-seru	Golatu
Eucalyptus tereticor- -nis	Godapara	Gonna
	Gurukeena	Goraka
	Gulumora	

contd/....

TABLE 4 Contd...

Class III (1)	Class II (2)	Class I (3)
Difficult/very difficult to treat	Moderately difficult to treat	Easy to treat
Mersawa*	Mayila	Mempisang*
Murutha	Mediya	Merantibakau*
	Melanoxylon	Meranti (White)*
	Meranthi (Yellow)*	
	Mengkulamg*	
	Marawan*	
	Mihiriya	
	Molpedda	
	Mugunu	
	Nawa	
	Na-imbul	
	Nuga	
	Panakka	
	Panderu	
	panu-dan	
	Perupok*	
	Pinibaru	
	Pini-beraliya	
	Pelen	
	Pine*	Nelli
	Pol	
	Punah	
Nyatoh*	Sabukku	Netawu
	Suriya	Otha
		Para-mara
		Path-kadol
	Tal	Pathkela
		Penarahan*
		Pine *
Porawamara	Talangu	Polhunna
		Pulai*(
Rasak*	Telambu	Puwak
Red Balu*		Rambuttan
		Ramin*
		Rata-del
	Rata-dun	Ratatiya
		Rubber
	Rata-gammalu	Ruk
		Rukattana
Sapatin*	Samadara	Saligna

Contd/...

TABLE 4 Contd...

Class III (1)	Class II (2)	Class I (3)
Difficult/very difficult to treat	Moderately difficult to treat	Easy to treat
Gerikatu	Gurenda	
Gerutu*	Hampalanda	Gota-imbul
Giam*	Helamba	Hal
Gonapana	Heen-damba	
Jelugong*	Hik	
Kapur*	Hondapara	Havarinuga
Kasai*	Ingini	
Kedendong*		
Kekatomg kelat*	Kadumberiya	
Keledang*	Kankumbalketiya	Hora
	Karawu	Hulan-idda
Keranji*	Keena (except walu keena)	Hulan mara
	Kirihambiliya	Ipetta
Kitul	Kudumberiya	Ipil-Ipil
Kungkur*	Kasa-gasa	
	Katu-kurundu	Iriya
	Keeriya	Kadol
	Keruing*	Kaduru
		Kanagonna
		Katuboda
		Katu-imbul
		Katu-kenda
		Kekuna
		Kempas
		Kenda
		Kirille
		Kiripedda
		Kokatiya
		Kokun
		Kosgonna
	Kotikan-beraliya	
	Kulim*	Kottamba
	Kunumella	Kottapulun
	Kurundu	Labu
	Lunu-ankenda	Lawulu
	Lunumidella	
	Lunuwarana	
Mata-ulat*	Madatiya	Machang*
Marbau Medang*	Magul-karanda	Madol
Melantai*	Malmora	Makulu
Melunak*	Mahogany(broad leaf)	
Meranti (Dark red)*	Mara	Malaboda
Meranti (Light red)*	Masmora	Merpaug*

Contd/...

TABLE 4 Contd..

Class III (1)	Class II (2)	Class I (3)
Difficult/very difficult to treat	Moderately difficult to treat	Easy to treat
		Samrong(kembang samangok)*
		Sesandok*
		Simpas*
Tembusu*	Tammanna	Thiniya
	Terap*	Tel-kaduru
	Tekka	Tel kekuna
		Terantang *
	Thumpalai	Talol
	Timbiri	Toona
		Tualang*
	Titta Weralu	Ululu
	Tumpat Kurundu	Wa
	Udarata-keena	Walamba
	Ugudubal	Walambarella
	Uguressa	
	Ulkenda	Walbilin
	Uruhonda	Wal-Divul
	Welang	Walsapu
	Wal-jambu	Walukeena
	Wal- kos	Wanasapu
		wal kurundu
	Walla	
	Walmediya	
	Weralu	
Wira	Yakahalu	
	Yakul-maran	

NOTE

This classification is largely based on personel experience of the local specialits.It will be very valuble if these can be confirmed by experimental studies.

Classification of Classes of timber is based on absorption of preservative
in liters per cubic meters.

Class I - Over 240 l/m^3
Class II - 80 - 240 l/m^3
Class III _ Less than 80 l/m^3

* denotes imported timber

APPENDIX E
CHARGE SHEET

Serial No :.....
Date :.....

E.1 FULL DETAILS OF TIMBER TO BE TREATED

Species	Pieces	Size	Volume (m^3)	Moisture content	Commodity class	Customer order	Order/ Job no.
(a) Total timber quantity							

E.2. TREATMENT SPECIFICATION

(b)	Solution concentration (s)	(g/l)
(c)	Net salt retention required	kg/m^3
(d)	Net absorption required	litres/m^3
(e)	Timber quantity (a)	m^3
(f)	Total net absorption required (dxe)	litres

E.3. TREATMENT RECORD

	Time started	Time finished	Time taken (minutes)
Initial vacuum period	a.m/p.m	a.m/p.m	
Pressure period	a.m/p.m	a.m/p.m	
Final vacuum	a.m/p.m	a.m/p.m	

E.4 STORAGE TANK READINGS (LITERS)

PLANT 1

(g) Litres start of main tank	
(h) Litres finish of main tank	
(i) Difference (1) (=g-h)	
(j) Litre start of sump/mixing tank before pressurising	
(k) Litres finish of sump/mixing tank after final vacuum period	
(l) Difference (2) (= j-k)	
(m) Total used (i+l)	

PLANT 2

(q) Litres after initial vacuum period	
(r) Level after flooding	
(s) Level after pressurising	
(t) Litres after emptying	
(u) Litres after final vacuum period	

E.5 RESULTS OBTAINED

(v) Specific gravity			
(w) Solution strength			(g/l)
(x) Net absorption	PLANT 1	m	litres/m³
	PLANT 2	(q-t) - (u-t)	
(y) Net absorption x/ a			kg/m³
(z) Net dry salt retention (yxw) / 1000			%
(+) Over/under charged per cent (z-c) 100 / C			

E.6 PENETRATION TESTS

Sample No	Sap wood/ Heart wood	Penetration depth	Satisfactory/ Unsatisfactory

E.7 RATE OF ABSORPTION

(Must be recorded during pressure period at every 15 minute intervals)

Time in min after commence-ment of pressure period	Pressure kPa/bar/psi/ mm of Hg *	PLANT 1 Sump/mixing tank (1)	PLANT 2 Storage tank (1)	Absorption	
				Litres	Rate (Litres/min)
0 15 30 45		}			

* Delete the inapplicable

.....
Signature of Plant Operator

APPENDIX F
SPECIES OF TIMBER THAT REQUIRE NO PRESERVATIVE TREATMENT

Heartwood of the following species of timber, listed below, require no preservative treatment. However, sapwood of these species require preservative treatment. This means that sapwod of these timber species can be used effectively if preservative treatment is carried out, and thereby save 5 to 10 per cent of the raw materials.

For other names of these timber species refer SLS 985 : Part 1 : 1992

Alubo
Batadomba
Buruta
Diya naa
Domba
Dun (except Piniya)
Durulla
Ehela
Gal mendora
Gal Siyambala
Gal veralu
Gammalu
Gan mee
Gurukeena
Hal mandora
Hal milla
Hedawaka
Hondaberaliya
Hulanhik
Indian Rosewood
Kahata
Kalumediriya
Kaluwara
Ketakala
Kirikon
Khomba
Kolon
Kon
Kos
Kumbuk
Liyan
Ma-dan
Mahogany(narrow leaf)
Mee
Mendora
Microcorys (Eucalyptus microcorys)
Milla
Mora
Munamal
Naa
Na-mendora
Nedun
Neralu
Palu
Panamora
Pihimbiya
Ratu Keraliya
Ratu waa
Siyambala
Sudu Handun
Suriya Mara
Tallowood
Tawwenna
Thekkaa
Ubberiya
Uva-mendora
Wana-mi
Welipenna
Wewarna

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