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Specification No. IA 948 (a, c)

GENERAL SPECIFICATION (WITH APPENDICES) TO GOVERN THE MANUFACTURE
AND QUALITY ASSURANCE OF WOOD BOXES/CASES AND PACKING PIECES
FOR GUN AND SMALL ARMS AMMUNITION, EXPLOSIVES, MINES,
DEMOLITION STORES, GRENADES, PYROTECHNICS, ANTI-GAS
AND ALLIED STORES FOR LAND SERVICE.

ISSUED BY

CONTROLLERATE OF QUALITY ASSURANCE (AMMUNITION)
KHADKI PUNE - 411003

DC (I) 36081A

(a, b) (a, b)
SPECIFICATION No. I. A. 948 ~~(a, c)~~
(Partly based on specn. L/9708-A)

Supersedes Specns. I. A. 315-T (1)
I. A. 382-H(k), L/5446-N(a), L/5451-Z(a),
L/5898-AB(a), L/6131-I(a), L/8130-E(a),
S.A.A. 90-A(c), S.A.A. 137-C(a), S.A.A. 158-D(a)
S.A.A. 159-C, S.A.A. 160-C, S.A.A. 171-F(a),
S.A.A. 190-A(c), C-1308-BB.

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to be used for any other purpose whatsoever without the sanction of the Director General of Quality
Assurance.

GENERAL SPECIFICATION (WITH APPENDICES) TO GOVERN THE
MANUFACTURE AND QUALITY ASSURANCE OF WOOD
BOXES/CASES AND PACKING PIECES FOR GUN
AND SMALL ARMS AMMUNITION, EXPLOSIVES,
MINES, DEMOLITION STORES, GRENADES,
PYROTECHNICS, ANTI-GAS AND
ALLIED STORES FOR
LAND SERVICE

Approved on 4-4-1956

SECTION ONE - GENERAL

1. This Specification is equally applicable to all boxes, cases/crates (hereinafter referred to as the package) used for packing of on ammunition, S.A.A..., Pyrotechnics, Explosives, Mines, Demolition stores, Grenades, Anti-Gas and allied stores, other than those for which a separate or individual specification has been sealed or unless otherwise stated to the contrary in this specification or the relevant drawings.
2. Where British Standard Specifications are quoted, the current issue is implied. Copies of British Standard and Indian Standard Specifications may be obtained from the Indian Standards Institution, 9, Mathura Road, Manak Bhavan, New Delhi-1.
3. The supply of all materials or articles produced in accordance with this specification will be governed by the "Conditions of contract governing Department of Supply Contracts" as amended to date.
4. The construction, assembling and marking of the package and/or drawings are to be in accordance with the drawing or drawings quoted on the order governing the supply of the package.
5. Special attention is directed to any note on the drawing or drawings issued, which explain the system of dimensioning adopted also to any special requirements regarding materials, the treatment of materials or conditions of manufacture.
6. Any question relating to the drawing or drawings, and this specification should be referred to the Controller of Quality Assurance (Amn.), Kirkee or other Quality Assurance Officer duly authorised to act on behalf of him, herein after called the Quality Assurance Authority and Quality Assurance Officer respectively.
7. Where this specification or the drawing permits, a choice of alternative materials, or forms for particular components, the Manufacturer is required to notify the Quality Assurance Officer, in writing, which of the alternatives he chooses to produce. Should the Manufacturer during the course of his order, wish to alter his choice he shall again notify the Quality Assurance Officer in writing and obtain his sanction before commencing production of his revised choice.
8. A tender sample/advance sample submitted by the Manufacturer and approved by the Quality Assurance Authority from a general constructional point of view, will be taken only as a general guide and not as a guide to quality of materials dimensioning, workmanship and finish of the bulk supply of stores on the order/acceptance of Tender.
9. Neither the store nor any component part may be built up or repaired in any way not provided for by the Drawing or this specification unless authorised by the Quality Assurance Authority.
10. The manufacturer must notify, the Quality Assurance Officer when he is in a position to start work, and must inform him in writing of all suborders placed in connection with the order, as soon as they are placed, in order that arrangements may be made for testing the materials as necessary. The Quality Assurance Officer shall have the right of access in all times, to enter all Departments of manufacturing plant or storage accommodation which are concerned with the production and storage of material or components at the works either of the Manufacturer or as Sub-Manufacturers, in order to test materials, check processes of manufacture or inspect components/stores.
11. No material/ingredient shall be taken into use until the same has been approved by the Quality Assurance Officer for the purpose intended. The Quality Assurance Officer may at his discretion, require the bulk of materials/ingredients to be bonded or sealed until the results of the tests are known. It is, however, the Manufacturer's sole responsibility to ensure that all materials and ingredients used in the manufacture of packages conform strictly to the approved relevant specification.

12. The Quality Assurance Officer, on receiving notification from the Manufacturer, may also arrange to be represented at the works of the latter or at those of his Sub-Manufacturers.
13. The Manufacturer is entirely responsible to ensure that no deterioration takes place in packages or materials used in their construction, either before or after Quality Assurance on their premises or during storage.
14. Nothing in this specification shall relieve the Manufacturer responsibility for the safety of his operations.

SECTION TWO — MATERIALS

Following materials should conform to the specifications mentioned against them :—

| Sl. No. | Material | Specn. |
|---------|---|---|
| 1. | Timber | IND/ME/883 (Prov) ... (x) |
| 2. | Plywood BB WWR | IS 303 |
| 3. | Glue | IS 852 |
| 4. | Screws | IS 6760 (Latest issue) |
| 5. | Rivets | IS 2155 |
| 6. | Nails | IS 723 |
| 7. | *Cordage Manila H/L | IS 1084 |
| 8. | *Cordage Hemp | IS 5176 |
| 9. | *Cordage sisal *Breaking strength however should be minimum 9 times the filled mass of the box. To be rot proofed as per Appendix 'C'. | IS 1321 |
| 10. | Split pins | IS 549 |
| 11. | Wire Half hard bright annealed | IS 280 |
| 12. | Line natural whipcord (tarred) ammunition (to be rot proofed as per Appendix 'C'.) | JSS 1252 |
| 13. | Line natural whipcord nylon (to be rot proofed as per Appendix 'C') cord nylon (a, e) | IND/ME/745 JSS 4020-06 (a, e) |
| 14. | Tin plate | IS 597 |
| 15. | Steel sheets | IS 513 'O' or 'D' Grade or IS 1079 'O' Grade |
| 16. | Copper Naphthanate | IS 1078 |
| 17. | Acid cupric chrome composition | IS 401 |
| 18. | Copper chrome arsenic composition | IS 401 |
| 19. | Penta chlorophenal | IS 716 |
| 20. | Sponge Rubber Vulcanised | IND/ME/645- |
| 21. | Vulcanised Natural Rubber | IND/ME/584 |
| 22. | Paint Ready Mixed, air drying, Brushing, Spraying dipping for general purposes as applicable for defence | IS 168 |
| 23. | Webbing cotton proofed | JSS 1-69-07 JSS 8305-15 (a, e) |
| 24. | Varnish Air drying ammn | IND/ME/719 |

| <i>Sl. No.</i> | <i>Materials</i> | <i>Specn.</i> |
|----------------|---------------------------|---------------|
| 25. | Casein glue | IND/ME/381 |
| 26. | Synthetic adhesive | IND/ME/788 |
| 27. | Sodium Pantachlorophenate | IS 6515 |
| 28. | Fire Resistant Paint | IND/ME/904 |

- Note* :— (1) All ferrous fitting, screws, rivets, nails, wire and split pins are to be suitably rust proofed by tinning, galvanizing phosphating or any other process approved by the Quality Assurance Authority.
- (2) The breaking strength of the rope should be minimum nine times the filled mass of the box. The rope should be rot proofed as stated in Appendix C, unless otherwise stated in the drawing.
- (3) Link natural whip cord and webbing shall be rot proofed in accordance with Appendix C, unless otherwise stated in the drawing.
- (4) All iron, steel or metal fittings and parts used in the manufacture of packages are to be made of materials which are homogenous and free from physical defects such as cracks, flaws, laminations irregular thickness, pittings or any other imperfections. The material employed must be of suitable quality to withstand, without creaking or breaking the operations such as pressing, folding and assembling called for by the construction on the drawing. The metal fittings assembled to the box must withstand repeated functional tests laid down in clause 8 of Section Four.
- (5) Plywood should confirm to IS 303.
- (6) The Copper Naphthanate solution can be prepared by mixing approx. 8.7 g Copper Naphthanate (confirming to IS 1078-87) in 100 ml. of Petroleum Hydrocarbon solvent (confirming to the requirements for solvents 150/300 grd. material as laid down in Table 1 of Indian Standard Specification No. IS : 1745).

5.1 The dimensions.

5.1.1 The dimensions of plywood board shall be coated in the following order. The first dimension shall present length that is, the dimension parallel to the grain of the faces, the second, the width and the the third the thickness.

5.2 Tolerance. The following tolerances on the nominal sizes of finished boards shall be permissible.

| <i>Dimension</i> | <i>Nominal size</i> | <i>Tolerance</i> |
|------------------|----------------------------|------------------|
| Length | Upto and including 120 cms | + 3 mm |
| | | — 0 mm |
| | above 120 | + 6 mm |
| | | — 0 mm |
| Width | Upto and including 90 cms | + 3 mm |
| | | — 0 mm |
| | above 90 cms | + 6 mm |
| | | — 0 mm |
| Thickness | Upto and including 5 mm | ± 10 percent |
| | 6 to 9 mm | ± 7 percent |
| | above 9 mm | ± 3 percent |

5.2.1 The faces of plywood boards shall be reasonably smooth and face veneers shall be reasonably of uniform thickness. Slight sanding may be given to rough boards in order to make them reasonably smooth. The edge of the board shall be trimmed square within 3mm.

5.3 Workmanship and finish.

5.3.1 The plywood boards shall be of uniform thickness within the tolerances specified under 5.2.

5.3.2 Minimum average and individual shear strength for plywood.

| Sl. No. | Grade | Dry side | Shear strength minimum | |
|-----------|------------|----------|------------------------|------------------------|
| | | | Mycological | Resistance to moisture |
| (i) BWP | Average | 135 | 100 | 100 |
| | Individual | 110 | 80 | 80 |
| (ii) BWR | Average | 135 | 100 | 100 |
| | Individual | 110 | 80 | 80 |
| (iii) WWR | Average | 100 | 80 | 80 |
| | Individual | 80 | 65 | 65 |
| (iv) CWR | Average | 70 | 35 | 35 |
| | Individual | 55 | 30 | 30 |

5.4 Sampling

5.4.1 The method of drawing representative samples and criteria for conformity shall be as prescribed in IS 7638 (latest issue).

5.5 Tests

5.5.1 Test pieces, cut from each of the boards selected under 5.5.1 shall be subjected to tests specified under 1.2.1, 10.2.2 and 10.2.3 of IS 303 of 75.

5.5.2 For the purpose of test specified under 10.2 and 10.3 of IS 303 the mean of all the observations shall be taken as average.

5.6 Retest. If samples selected as specified under 5.4.1 are found not to fully complying with requirements of 10.2 and 10.3 of IS 303 : 75 a further similar set of samples shall be taken at random from the same batch and subjected to the tests, if any of the samples in second test is also found not to comply fully with the requirements of tests, all the boards in the batch represented by the samples shall be rejected.

5.7 Quality requirements of plywood for general purposes are given in Appendix 'F' to this specification.

SECTION THREE—CONSTRUCTION

1. All components of the package must conform to the Drawing or Drawings supplied. Only the methods of securing shown therein are to be employed and the package must be accurately assembled as indicated on the drawing. The surface finish of the wood work is to be smooth.

2. When the sides, ends, lid or bottom are made in more than one piece, the joints must be grooved cross-tongued and glued. Any excess glue must be carefully removed from all joints. The tongues used are to be normally 25mm. Wide, except where in special circumstances the Quality Assurance Authority approved the use of 18mm wide tongues. Plywood to the same standard as permitted for

internal fitting (Appendix 'B' Para 2 refers) may be used for tongues. The thickness of the tongues is to be 3mm for boards up to 15mm thick and 5mm for thicker boards. The depth of grooves must be 13mm or 9mm to suit the side of the cross-tongues. No cross tongue piece used in any joint should be less than 152mm in length. Alternatively the "Lidderman" or other mechanically locked joint may be employed subject to prior approval of the Quality Assurance Officer having been obtained. No piece of timber is to be less than ~~16mm~~ width, and care is to be taken that a joint do not come within 25mm of the position for any screw or pin-hole. When packages are fitted with end handles, the ends of the packages should, if possible be one piece only. Joints in the sides and ends of a package must not be continuous to each other. Such joints must be at a minimum distance of 38mm apart. L 76 mm
(a, b)

Note :- (1) Each piece of timber is to be secured at each end by at least one screw.

(2) The number of screws and/or nails shown on the relevant drawing is the minimum required to be used and is based on the use of planks of normal widths. When a number of narrow widths of timber are used, the number of screws and/or nails will require to be increased as decided by the Quality Assurance Authority.

(3) Strict attention must be paid to the position of screws and/or nails which must be positioned as shown on the drawing subject to the provisions laid down in the penultimate sentence of Note 2 above.

(4) Where a number of widths of timber are used, the greatest widths available should be used for the bottoms, ends and lower portions of the sides of packages.

(5) Excessive splitting during nailing operation will mean rejection.

3. Any of the materials employed are to conform to the requirements of current approved specifications as stated in Section Two.

4. (a) The iron, steel or metal fittings, where called for, must be inserted so that they will not fall out under normal conditions when the screws are removed.

(b) All ferrous fittings must be rust proofed by tinning, galvanising, phosphatising or other approved process. Where a phosphate process is used, the phosphated fittings will be coated with one coat of paint immediately after rustproofing. When manufactured for bulk issue as components only, the tinned and galvanised fittings will be further treated by a coat of paint prior to issue. This painting instruction does not refer to nails, screws, rivets or split pins, before used.

5. All nails are to be driven home clear of the face of the work, protruding nails are to be clinched on the inside in the direction of the grain of the wood and below the surface of the wood.

6. All holes for screws are to be countersunk and the screws, which should be well greased, screwed home clear of the face of the work, those for the lid passing through the brass seatings when provided. Screws will only be inserted by means of a screw-driver used in the proper manner. The use of any implement as a hammer for the insertion of screws is expressly forbidden. In order to ensure that the correct screws are used and that the method of screwing is satisfactory, a few screws from atleast 5% of the boxes selected at random should be removed from screwed components and re-inserted, during inspection of the completed store.

7. All corners and sharp edges of the package, cleats and battens are to be removed.

8. Where tarred string is employed for securing split pins to the package, the free ends of the string are to be dipped in waterproofing material to prevent untavelling, such as paraffin wax to the approved specification.

9. When packages are fitted with split pins for securing the lid or lid fasteners, the split pins prior to insertion, will be dipped in good quality grease or thick lubricating oil; surplus oil or grease will be removed.

Note:— The split pins must be capable of being inserted by hand. The use of a mallet or similar implement is not permitted. Care should be taken to ensure that holes are drilled sufficiently deep and that they are free from wood chips or other debris.

10. Where handles are called for, the following methods of constructions are to be applied :—
Spliced Handles. The ends of the wire are to be hook jointed, the joint being made by hooking each of the 4 plies separately, turning back the joint ends on each side of the joint, lapping one end over the other and then whipping together as indicated on the drawing. Care is to be taken that the wire is unlaidd and each ply bent and hooked with the opposite ply in such a manner as to bring equal stress upon each of the hooked plies. The joint is to be covered, as shown, with leather from which the grain side has not been removed, stitched with black waxed thread, six stitches per 25 mm.

Grummet Type Handles. The handle is to consist of a grummet, made from a strand of 4 wires of the description shown on the drawing 4 turns forming the grummet.

A strip of leather about 64 mm long and 25 mm wide is to be split half its length into two equal parts and each part passed under separate strands of the wire as shown. The three ends are to be securely sewn to the leather grip and the projecting ends neatly trimmed off. The grip is to be made of leather from which the grain side has not been removed or buffed, stitched with black waxed thread, six stitches per 25mm. The leather grip must not be capable of movement along the wire.

11. Where rope handles are called for they must be spliced or the ends 'knotted' in the manner shown in the drawing. The rope must not be a loose fit in the wooden cleats, but should allow sufficient movement, to enable the handle loop to be drawn to its fullest extent, or 'knots' to be pulled into the recesses provided in the box for this purpose.

12. Where rubber pads or packing pieces are called for in a package, the rubber is to conform to the latest approved specification and the pads or packing pieces are to be thoroughly secured as shown on the drawing, by nails and an approved adhesive. The method of using the adhesive is given in Appendix 'E'.

SECTION FOUR - TESTS

1. Before proceeding to manufacture a store, materials must be submitted (in batches) to the Quality Assurance Officer to enable him to select samples for tests in all instances where such tests are laid down in the specification or elsewhere, as a condition of acceptance, and the Manufacturer must not take into use any material before it has been accepted by the Quality Assurance Officer as satisfactory for the purpose intended.

Note:— If during bulk manufacture of a store it becomes necessary to replenish any stocks of materials, the Manufacturer should in his own interest take necessary action, well in advance to get the fresh material tested and approved by the Quality Assurance Officer. No responsibility will rest on the Quality Assurance Officer, for any delay in this connection.

2. The manufacturer will be required to supply, free of charge, necessary materials for tests or analysis, selected by the Quality Assurance Officer of his representative.

3. MOISTURE CONTENT OF TIMBER

(a) The moisture content of the timber at the time of manufacture and Quality Assurance of boxes shall be within the limits stated in Appendix 'A', Para 10.

(b) The percentage moisture contents of timber is based on the oven dry mass of wood and shall be calculated as follows :-

$$\text{Percentage of moisture} = \frac{M_1 - M_0}{M_0} \times 100$$

Where M_1 = Original mass

M_0 = Oven dry mass

- (c) For the determination of moisture content according to the formula given above, an adequate number but not less than three (depending on the type of store) or representative sections of wood of suitable size shall be taken at random, and each accurately weighed M_1 . They shall be dried in an oven at a temperature of 373.15K to 378.15K till the dry mass of each is constant (M_0). Care should be taken to prevent changes in moisture content between the cutting of the section and the first weighing or between removal from the oven and subsequent weighing.
- (d) In cases where samples cannot be obtained in the manner described above samples shall be taken by the use of an auger or bit, boring to the entire depth (thickness of the boards/planks, and boring from each piece collected separately and placed in a proper receptacle to guard against moisture loss before they are weighed. The location of the bore shall be in the centre of the width of board/plank at a point not less than 305 mm from either end excluding the longest end split. The borings from each receptacle shall be dried separately in an oven in the manner described in 3(c) above, till a constant dry weight is attained. At the discretion of the Quality Assurance Officer or his representative, boring to a depth of one half the thickness of the piece may be permissible when the thickness is above 38 mm.
- (e) An electronic instrument based on resistance of dielectric measurements and suitably calibrated for moisture content for specific species of timber, may also be used for routine determinations. But the method specified in 3 (c) shall be regarded as standard in all cases of dispute.
- (f) When testing the moisture content of planks by the method in 3(c) above the test should be taken in the centre of the width of the plank and at a position not less than 305 mm from either end of the plank excluding the length of the longest end crack, if any.

4 METAL FITTINGS (NON-FERROUS)

Any brass, copper or copper alloy employed in the manufacture of screws, seatings of screws, corner brackets, handles or other metal fittings, is to be of an approved commercial quality. The fittings must withstand repeated functional tests as laid down in Clause 8 of Section Four.

5 WIRE GALVANISED

The galvanising of the wire to be employed in the manufacture of the handles will be tested as follows :-

The wire will be stranded and a single wire, which has been previously dipped into Methylated Spirit or Denatured Spirit and wiped dry, will be immersed in a freshly made neutral saturated solution of Copper sulphate at about 288.65 K for a period of one minute. It will then be removed, washed in clean water and wiped clean. The galvanising must admit of this process being performed twice with each sample of wire without any sign of a deposit of metallic copper. Not more than three samples of wire are to be immersed in the solution at one and the same time.

Should the sample show a metallic copper deposit, the whole of the wire represented by the sample will be rejected.

6. HANDLES

Handles, wire or rope, will be capable of withstanding a test load of three times the filled mass of the Box with a minimum load of 136 kg except those for small Arms Ammunition Boxes, which will be capable of withstanding a test load of three times the filled mass only. The test load will be applied for a minimum period of five minutes.

7. Where rust proofed components are called for the rust proofing will be tested in accordance with the relevant specification according to the method of rust proofing agreed.

8. ROUGH USAGE

To ensure that the packages have been properly constructed and will meet the normal service requirements, representative sample/samples from each batch/consignment drawn at random and packed to simulate its design purpose, shall be subjected to rough usage tests, given in Appendix 'D'. At the conclusion of tests, minor damage to the package like, cracks, dents, loosened screw/nails, loosened planks, damaged hinges/latches/fitments etc not rendering the package unusable/unserviceable, can be accepted provided the contents are in undamaged and serviceable condition.

SECTION FIVE - PRESERVATION

1. Timber will be pressure impregnated with preservative salts unless otherwise stated to the contrary in accordance with the conditions laid down in Appendix 'A'.

2. All components and fitments made from plywood are to be dipped in 10% Copper Naphthanate dispersion in White Spirit or Kerosine oil superior for a period of five minutes. The edges of all plywood components after being cut to size and holes drilled in such components, will be liberally brushed with an approved preservative.

3. String, line, rope and webbing will be rot-proofed as called for in Appendix 'C' unless otherwise called in the drawing.

SECTION SIX-PAINTING OR STAINING OF PACKAGES

1. (a) Unless otherwise specified in the order, or elsewhere the package are to be painted externally with a prime coat of Fire Resistant Paint to specification IND/ME/904 or as an alternative a primer coat of paint ready mixed quick drying mattfinish general purposes Red Oxide (JSC-446 to IS : 5) may also be used (latest issue) followed by a coat of the colour called for in the relevant drawings, the paint to conform to the current approved specifications. Metal fittings however be given one coat of primer red-oxide followed by one coat of service paint as specified in the relevant drawing.

(b) Where staining is called for on the drawing, this will be in accordance with the relevant specification.

(c) The undermentioned colours of paints as applicable, when used for packages, will approximate those given in the Indian Standard Schedule of Colours No. IS 5 : 1961 of current issue.

Paint Ready Mixed Quick Drying
Matt for general purposes to Specn
IS 168 (amended update)

Olive Green

Colour No ISC 220

Green Brunswick Light
(Matt Finish)

Colour No 225

Grey, Admiralty Dark
(Matt Finish)

Colour No 632

Red Signal (Matt Finish)

Colour No 537

Brown Light (Matt Finish)

Colour No 410

(d) Painting, whether brushed or sprayed will give a continuous and homogeneous external coat all over the store including metallic fittings, but excluding rope handles or any webbing line of string, used in the construction of the packages.

2. Plywood packing pieces where used must be well coated with shellac varnish 20% or 30% or Varnish air drying ammunition to specification IND/ME/719 on both sides and edges. Alternatively these may be painted with Paint Ready for use Finishing, Ammunitions, Air-drying, Semi-Glossy/Matt Finish, Brushing/Spraying/Dipping or appropriate shades.

SECTION SEVEN - MARKING

1. The packages are to be marked with the particulars in the positions shown on the drawing. The branding or stamping is to be completely legible to the satisfaction of the Quality Assurance Officer.

SECTION EIGHT - QUALITY ASSURANCE

1. When packages are to be painted or stained, they will be inspected both prior to and after painting or staining.

2. The packages or the materials used may be inspected during the process of manufacture by the Quality Assurance Officer. The Quality Assurance Officer, may, at his discretion, at any stage during the manufacture of the packages, take samples of any of the materials and ingredients used, for the purpose of analysis or testing. On completion the work will be subject to examination by and to the final approval of the Quality Assurance Officer, either in the Manufacturer's works, or after delivery, as may be stated in the relevant Order/Acceptance Tender.

3. Any component or complete package which is not finished to the satisfaction of the Quality Assurance Officer, or which has any flaw or imperfection will be rejected. If the Quality Assurance Officer has reason to believe that more than 5% of the timber scanaling/timber components used in the manufacture of any lot of boxes tendered for Quality Assurance do not satisfactorily comply with the condition laid down in Appendix 'A' of this specification, he will have the right to return the lot of boxes to the Manufacturer even though the preliminary quality Assurance of these boxes may have been carried out. If the Manufacturer wishes to resubmit these boxes for acceptance he must arrange to resubmit them to the Quality Assurance Officer after eliminating all discrepancies from each box.

4. If at any time during examination of 20% of a lot of packages tendered for quality assurance on any one day, it is found that 20% of the packages in the lot depart from the approved design, further examination may be suspended and the whole of the lot returned to the Manufacturer for the elimination or rectification of the faulty packages.

5. These packages in which departures can be rectified may be brought upto the approved design by the Manufacturer and the packages resubmitted for examination. The Quality Assurance Note will be endorsed to this effect.

SECTION NINE - REPLACEMENT BY MANUFACTURER

1. Where finished or partly finished packages or components thereof are expended or damaged in test, re-test or examination, as stipulated for in this specification, or elsewhere as a condition of acceptance, the Manufacturer supplying the packages will be required, to supply, place or repair the quantity or number so expended or damaged, free of charge.

SD/-

(A J DAWSON)

for CHIEF SUPDT OF DEVELOPMENT (AMMUNITION)
for DIRECTOR OF TECHNICAL DEVELOPMENT

- Notes :-*
- (i) This specification is to be returned to the Controller of Quality Assurance (Ammunition), Kirkee, immediately on submission of tender or completion of order.
 - (ii) This specification only holds good for the particular order for which it was issued.

Correct copy of the sealed specification at this date.

(P.C. (S) (K. Q. A. S.))
J&O
ASSTY. CONTROLLER
for CONTROLLER OF QUALITY ASSURANCE (AMN)

KIRKEE

DATED: 21/1/97

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(a, b)

APPENDIX 'A' TO SPECIFICATION IA 948 (ac)
(See Section 2, Para 1)

TIMBERS WHICH ARE SUITABLE FOR THE PURPOSE OF THIS SPECIFICATION

1. Unless specially stated to the contrary in the Order/Acceptance Tender/Drawing, only the following species of timber will be used in the manufacture, of packages. Quotations will clearly indicate which species of timber are intended to be used by the Manufacturer.

| | |
|------------|---|
| Mango | Mangifera indica |
| Aini | Artocarpus Hirusta |
| Mundani | Acrocarpus fraxingifolius |
| Champ | Michelia champaca |
| Hollock | Terminalia myriocarapa |
| Chaplash | Artocarpus Chaplasha |
| Kathal | Artocarpus heterphyllus (Attocarpus integrifolious) |
| Chickrassy | Chukrasias tabularis |
| Jaman | Eugonia Jambolana |
| Kokko | Albizzia lebbeck |
| Kanju | Holoptelea integrifolia |

2. Normally a package will not be manufactured using two or more species of timber in the same package, without the prior sanction of the Quality Assurance Authority or unless shown in the drawing.

3. Timbers to be procured and employed in the manufacture of packages shall be sawn straight and square trimmed at the ends. They shall be free from brashness, shakes, splits across, the grains, wane, centre heart (pit) substain, warp, insect attack and any kind of decay (rot) spike/splay knots and the any other defect (except those permitted in 3.2) which is likely to reduce their strength or durability. Where necessary, corrugated fastness should be used in assembled boxes.

3.1 When nominal sizes are ordered length, width and thickness of planks and scantlinges shall be measured on the basis of accepted sizes. Plus tolerances shall not be added while calculating cubical contents.

3.1.1 The measurements of length, width and thickness and computation of volume shall be made as follows. The measurement shall be made in the midline of the surface on which it is measured.

- (a) **Length** The length shall be measured in metres. The fractions of a metre shall be taken in multiplies of 0.01 m and to the nearest lower 0.05 m.
- (b) **Width** The width shall be measured in centimeters to the nearest lower one centimetre.
- (c) **Thickness** The thickness shall be measured in centimetres to the nearest lower one centimeter.
- (d) **Volume** The shall be computed in cubic metres correct to three places of decimal on the bosis of accepted sizes.

3.2 PERMISSIBLE DEFECTS

Plugging of defects is not permissible. Permissible defects shall be considered collectively and not singly. The permissible defects for ammunition boxes shall be to the extent specified in 3.2.1 to 3.2. The defects shall be evaluated and measured as in IS 3364.

3.2.1 Cross crain permissible to a maximum deviation of 1 in 10.

3.2.2 End split – The longest end split at each end shall be measured and the lengths added together. The total length thus obtained shall not exceed 20mm per metre length of the piece. If any piece has splits exceeding this limit, the express shall be excluded from the length measurement of the piece.

3.2.3 LIVE KNOTS

- (a) Acceptable if measuring upto 15mm in diameter provided they are not so numerous or so located as to affect unduly the strength or usefulness of the piece.
- (b) Acceptable if measuring over 15mm in dia upto one knot per 750mm length of the piece to the following extent.
 - (i) Width upto 150mm. The diameter of the knot should not exceed $\frac{1}{4}$ width of the plank.
 - (ii) Width over 150mm. The diameter of the knot should not exceed 40mm.

3.2.4 DEAD KNOTS

- (i) Acceptable if measuring upto 5mm in diameter provided they are not so numerous or so located as to affect unduly the strength of usefulness of the piece.
- (ii) Acceptable if measuring over 5mm in diameter and upto 15mm diameter in width 75mm and over, provided these are located at least 25mm away from edges and limited upto one such knot for every 1200mm.

3.2.5 Live and dead knots combined – Live knot on one face and dead on the other face are permitted as given below provided the depth on the affected surface does not exceed 5mm and there is not more than one such knot for every 1200mm length and the knot is 25mm away from edges.

- (a) For planks width upto 150mm. The max dia of the knot should be 25mm.
- (b) For planks width above 150mm. The maximum length of 25mm per 300mm of length.

3.2.6 Cracks – Cracks are permissible to the following extent :—

- (a) 2mm in the face subject to a maximum length 25mm per 300mm of the length.
- (b) 3mm in the edge subject to the maximum length of 25mm per 300mm of the length and
- (c) 3mm in the ends provided the lengths of the chacks is maximu 15mm per 300mm of the length.

3.2.7 Timber is to be preserved in accordance with clause 5,6 and 7 of the Appendix A.

3.2.8 End coating. To prevent and to minimize end cracking, splitting etc the ends of each plank and scantling are recommended to be coated with any of the materials mentioned in IS 1141 for a distance of at least 25mm more than the length of the longest split. Application of end coating shall be done soon after the Quality Assurance of timber.

4. All the species mentioned in para 1 above, except teak and Padauk which may be air seasoned, will require to be well kiln seasoned.

5. All shooks/timber components made from the species of timber mentioned in para 1 above, with the exception of Teak, andaman Padauk, Sissco Aini, Chaplash and Jack are required to be impregnated with an approved timber preservative by the pressure process. In the event however, of any of the above named species, containing sapwood they will also be treated with an approved preservative by pressure treatment.

6. The timber after seasoning, as stated in para 8 below will be pressure treated with any of the following preservatives.

| | | |
|--|---|------------|
| (a) Copper - Chrome - Arsenic Composition | | |
| Copper Sulphate ($\text{CuSO}_4, 5\text{H}_2\text{O}$) | | 3 parts |
| Arsenic Pentoxide ($\text{As}_2\text{O}_5, 2\text{H}_2\text{O}$) | | 1 part |
| Sodium Dichromate ($\text{Na}_2\text{Cr}_2\text{O}_7, 2\text{H}_2\text{O}$) | } | 4 parts |
| Potassium dichromate ($\text{K}_2\text{Cr}_2\text{O}_7, 2\text{H}_2\text{O}$) | | |
| (b) Acid-Cupric-Chromate-Composition | | |
| Chromic acid (CrO_3) (equivalent to 2.5 parts of sodium dichromate) | | 1.6 parts |
| Copper Sulphate ($\text{CuSO}_4, 2\text{H}_2\text{O}$) | | 50 parts |
| Sodium Dichromate ($\text{Na}_2\text{Cr}_2\text{O}_7, 2\text{H}_2\text{O}$) | | 47.5 parts |
| (c) Copper -Chrome-Boric-Composition | | |
| Boric acid (H_2BO_3) | | 1.5 parts |
| Copper Sulphate ($\text{CuSO}_4, 2\text{H}_2\text{O}$) | | 3 parts |
| Sodium dichromate ($\text{Na}_2\text{Cr}_2\text{O}_7, 2\text{H}_2\text{O}$) or | } | 4 parts |
| Potassium dichromate ($\text{K}_2\text{Cr}_2\text{O}_7, 2\text{H}_2\text{O}$) | | |
| (d) Pentachlorophenol | | |
| (e) Copper Naphthenate | | |
| (f) Zinc Naphthenate | | |

7. The treated timber shall contain the following quantities of preservatives and depth of penetration when tested in accordance with Specification IS 401 as indicated below :—

| Preservatives | Minimum absorption in Kg/m^3 | Minimum depth of Penetration in mm |
|---------------------------------------|--|---------------------------------------|
| (a) Copper Chrome Arsenic Composition | 4 | 4 |
| (b) Acid Cupric Chromate Composition | 4 | 4 |
| (c) Copper Chrome Boric Composition | 6.5 | |
| (d) Pentachlorophenol | 4.0 | |
| (e) Copper Naphthenate | 0.5 (As copper) | |
| (f) Zinc Naphthenate | 0.8 | |

8. Before commencing pressure treatment the timber will :—

- Where a water solution preservative is used, first be kiln seasoned to a moisture content not exceeding 16% before treatment.
- Where an organic solvent preservative is used, first be kiln seasoned to a moisture content not exceeding 12% before treatment.
- In all cases where a water solution preservative is used the timber scantlings/timber components will be dried out to a moisture content not more than 12% before they are used in the assembly of boxes/cases.
- Where organic solvents are used with preservatives the volatile matter must be allowed to evaporate before scantlings/timber components are assembled into boxes.

9. If the samples tested from the lot withdrawn from pressure impregnation chamber fail to indicate minimum stipulated absorption and depth of penetration is less than specified the lot represented by the samples shall be rejected and returned for reimpregnation, with the same preservatives which was originally used. In no case inadequately treated timber will be taken into use for fabrication of the boxes/crates/CWP.
10. The moisture content of timber at the time of assembly of packages will not be more than 12%. In the time of Inspection, contents of clauses 3-1 and 3-1-1 and table 1 of Specn IS : 28 7 : 1960 will be kept in view.
11. Timber thickness shown on the design must be regarded as actual finished thickness, unless a reduction in thickness is permitted either by a note on the drawing or separate instructions issued by the Quality Assurance Authority.
12. Planks containing centre heart or pith shall be rejected.
-

PLYWOOD FOR STORES COVERED BY THIS SPECIFICATION

1. Where plywood is permitted for the construction of any exterior components of packages, it must conform to the current IND/GS approved specification for "Plywood Moisture Proof".
2. Plywood used for internal fittings including partitions or tongues must, unless otherwise permitted by the Quality Assurance Authority be Grade II to IND/GS/1127.
3. The moisture content of plywood must not exceed 14% at the time of manufacture of packages.

APPENDIX 'C' TO SPECIFICATION IA 948

SPECIAL CONDITIONS FOR STRING, LINE, ROPES AND WEBBING

1. String, Line, Ropes and Webbing used in the manufacture of packages, will be rot-proofed by an approved process to the satisfaction of the Quality Assurance Authority, such as being soaked in a 5% solution of Copper Naphthenate Dispersion in Ammonia or Copper Naphthenate in White Spirit or Kerosene Oil Superior conforming to the current approved specification or by any other process approved by the Quality Assurance Authority.
 2. The period of immersion will be sufficient to ensure complete penetration of the preservative.
-

ROUGH USAGE TESTS

Each sampled package as described in Section 4, para 8 will be subjected to the following tests :

1. JOLT TEST

Package will be jolted for a total 8 hours on the machine having a lift of 50 mm and frequency 60 jolts/min on one or more sides.

OR

Package will be subjected to 5000 bumps each in three different orientations on bump test machine with 40 g rating.

2. DROP TEST

Jolt tested package will be drop tested from 1.4 metres on concrete/hard surface on

- (a) Base
- (b) Lid
- (c) One end
- (d) One side

3. STACKING

Loaded with the equivalent of $1\frac{1}{2}$ times the load of a 5.66 metres packed stack of its own nature for 24 hours.

Instruction for the use of Rubber Resin Cement (Bostrick) or Rubber/Resin Cement XN or Rubber/Resin Cement X. P. KK when sticking rubber pads and packing pieces/strips or wooden packages.

1. **GENERAL**

- (a) Cleanliness is essential at all times.
- (b) Surfaces to be stuck together must be clean and dry.
- (c) An even and adequate coat of adhesive must be used on each surface.

2. **INSTRUCTIONS**

- (a) The temperature in the shop in which the work is carried out should not be less than 288.65 K.
- (b) The adhesive must be well stirred before use.
- (c) The surface of the rubber and wood will be thoroughly cleaned and dried. This may be ensured by wiping them over with a clean rag moistened with trichlorethylene. The rag should be changed frequently to ensure that it is clean and free from grease. To improve the gripping power of the rubber pad its surface may be roughened slightly with a rasp.
- (d) Apply an even coat of the adhesive to both the rubber and wood surfaces ensuring that the area of wood covered is slightly larger than that of the rubber.
- (e) Allow to dry. Drying time will depend on shop conditions and should be ascertained by experiment.
- (f) When the adhesive is properly dry, the two surfaces should be pressed together and rolled to ensure that no air is trapped in the joint.

Note :— No stress should be applied to the joint for at least 24 hours after sticking the pad to the wood.

QUALITY REQUIREMENTS OF PLYWOOD FOR GENERAL PURPOSES

| Sl. No. | Defect | Type of Surfaces | | | |
|---------|---------------------------------------|---|---|---|---|
| | | A | B | C | D |
| 1 | 2 | 3 | 4 | 5 | 6 |
| (i) | Blister | Nil | Nil | Nil | Occasional |
| (ii) | Checks | Individual check not more than 25 mm in length and the total length not more than 300 mm/m ² | Individual check not more than 50 mm in length & the total length not more than 600 mm/m ² | Individual check not more than 100 mm in length & the total length not more than 1000 mm/m ² | Individual check not more than 125 mm in length & the total length not more than 1200 mm/m ² |
| (iii) | Discolouration (second not injurious) | 3% of the area | 25% of the area | 50% of the area | 75% of the area |
| (iv) | Discolouration (unsound) | Nil | Nil | Nil | 20% |
| (v) | Dote | Nil | 5cm/m ² | 15cm/m ² | 15cm/m ² |
| (vi) | Insect hole | Nil | Scattered upto 12 holes/m ² | Scattered up to 24 holes/m ² | Scattered upto 50 holes/m ² may be permitted. |
| (vii) | Joints | None in 250mm wide face and the joint for every multiple of 200mm in width | None in 200mm wide face & one joint for every multiple of 150mm in width | No restriction | No restriction |
| (viii) | Knots (dead) | Nil | 2 upto 10 mm dia/m ² | 4 upto 20mm dia/m ² | 8 knots upto 20mm in dia m ² including drop out holes may be permitted. |
| (ix) | Pin knots (dead) | Nil | 2/m ² | 6/m ² | 10/m ² |
| (x) | Pin knots (live) | Permitted, provided they do not mar the appearance | No restriction | No restriction | No restriction |
| (xi) | Knots (tight) | 3 upto 25 mm dia/m ² | 6 upto 25 mm dia/m ² | No restriction | No restriction |
| (xii) | Patches | Nil | 4 patches/m ² provided they are all tight patches & do not mar the appearance | Any number provided they are all tight patches & are matched for colour | Any number provided they are all tight patches & properly made |

| 1 | 2 | 3 | 4 | 5 | 6 |
|--------|--------|---|---|---|--|
| (xiii) | Splits | On split not more than 1.0 mm wide & not longer than 50 mm provided it is filled with a suitable filler | 2 splits, not more than 6 mm wide & total length not more than 200 mm provided they are filled with suitable veneer inserts | 3 splits, not more than 10 mm wide & total length not more than 300 mm Provided they are filled with suitable veneer inserts. Splits upto 25 mm long & 0.8 mm wide may be ignored provided they are suitably filled | 6 splits, not more than 25 mm wide & total length not exceeding 400. |
| (xiv) | Swiri | Upto 4/m ² provided they do not mar the appearance | Unlimited, provided they do not mar the appearance | No restriction | No restriction |

AIDE-MEMOIRE - W/4

This Aide-memoire should be read in conjunction with Specification IA 948 for Wood boxes/cases and packing pieces :

1. In addition to the approved species of timber quoted in Appendix A to Specification IA 948, the manufacturer may be permitted to use any of the under mentioned timbers, on concession, subject to the approval of Quality Assurance Officer.

| | |
|-------------|----------------------------|
| HALDU | ADINA CORDIFOLIA |
| JUTILI | ALTINGIA EXCELSA |
| DEODAR | CEDRUS DEODARA |
| GURJAN | DIPTEROCARPUS GRANDIFLORUS |
| KAIM | MITRAGYNA PARVIFOLIA |
| SANDAN | OUGENIA DALBERGIOIDES |
| HATTIPAILA | PTEROSPERMUM ACERIFOLIUM |
| KEORA | SONNERETIA APETALA |
| PADRI WOOD | STEREOSPERMUM CHELONOIDES |
| WHITE SIRIS | ALBIZZIA PROCERA |
| BAHERA | TERMINALIA SELERICA |

2. Quality Assurance Officer should be given prior intimation about the use of above mentioned species.

3. Concession granted to use the above mentioned species does not imply that this concession would be automatically applicable for future supplies or quantities beyond the permitted numbers.

4. Permissible defects, seasoning, preservative treatment and finish would be as stipulated in Specification IA 948. Mixing of timber of two different species in the box should not be permitted.

5. Timber from the proposed species should be separately stacked and should not be mixed up with approved species permitted vide Appendix A to Specification IA 948.

6. Five sample boxes should be made from any one of the proposed species strictly as per the relevant drawing and submitted, free of cost, to the Quality Assurance Officer for tests.

7. Receipt of samples by the Quality Assurance Officer for tests should not be taken as permission or right to commence bulk manufacture from the proposed timbers. Quality Assurance Officer is not bound to take Quality Assurance of boxes made from proposed timber if the sample submitted to him do not meet specification requirements.

8. Construction of the boxes will be governed by specification IA 948.

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