SCHEME OF TESTING AND INSPECTION
FOR CERTIFICATION OF
PLYWOOD FOR CONCRETE SHUTTERING WORK
ACCORDING TO IS 4990-1993 (Second Revision)

1. **LABORATORY** – A laboratory shall be maintained which shall be suitably equipped and staffed where different tests given in the specification shall be carried out in accordance with the methods given in the specification.

1.1 All testing apparatus/measuring instruments shall be periodically checked and calibrated and records of such checks/calibration shall be maintained.

2. **TEST RECORDS** - All records of tests, inspection and calibration shall be kept in suitable forms approved by the Bureau of Indian Standards (BIS) (See Forms I, II, III and IV annexed for guidance).

2.1 Copies of any records and other connected papers that may be required by the Bureau shall be made available at any time on request.

3. **QUALITY CONTROL** – It is recommended that, as far as possible, Statistical Quality Control (SQC) methods may be used for controlling the quality of the product during production as envisaged in this Scheme [See IS 397(Part I)::2003, IS 397(Part 2):2003 and IS 397(Part 3):2003].

3.1 In addition, effort should be made to gradually introduce a Quality Management System in accordance with IS/ISO 9001.

4. **STANDARD MARK** – The Standard Mark, as given in Column (1) of the First Schedule of the licence, shall be stamped on the surface of the plywood board indelibly, provided always that the plywood boards on which this Mark is applied conform to every requirement of the specification.

4.1 **MARKING** - In addition the following information shall be given on the face of each Plywood board near one edge :

   a) Name of the manufacturer, his initials and/or his recognized trade Mark, if any;
   b) No. of plies in the board and its dimensions;
   c) Type of plywood and designation;
   d) Control unit number to trace back factory test records; and
   e) Year of manufacture.

5.0 **RAW MATERIAL** - The processing and use of various raw materials going into the production of plywood shall be as follows :
5.1 **TIMBER** - Any Species of timber may be used for the manufacture of concrete shuttering plywood.

5.2 The veneers used in the manufacture of shuttering plywood shall be either rotary cut or sliced and dried to a moisture content not exceeding 6% in the mechanical drier before bonding. Two samples of the dried veneers shall be drawn from each deck at the discharge end of the drier every hour and tested for moisture content. Records of all such determinations shall be kept (see Form II annexed).

5.3 Veneers used for manufacture of concrete shuttering plywood shall be thoroughly checked and shall conform to clause 6.1, 6.1.1, 6.2 and 6.3 of the specification.

5.4 **ADHESIVES** - The adhesives used for bonding shall be of the hot press synthetic resin (phenol formaldehyde) type and shall conform to BWP type specified in IS 848:1974 and shall be as per clause 5.2 of the specification.

5.4.1 Sample from each consignment of adhesive received, shall be tested for its conformity to BWP type of IS 848:1974. In case, the adhesive used carries Standard Mark no further testing shall be required.

5.5 The plywood shall be manufactured as per cl. 6.1 to 6.5 of the specification and after manufacture shall be given preservative treatment as covered in IS 5539-1969 & cl. 6.6 of the specification. A suitable record shall be maintained of all these preservative treatment (see Form IV annexed).

5.5.1 The plywood after preservative treatment shall be reconditioned to a moisture content as laid down in clause 6.6 of the specification.

5.6 Plywood for concrete shuttering, work with plastic coating or with suitable overlay shall be made as per clause 6.7 of the specification and a suitable record shall be maintained for all those surface coatings.

6.0 **LEVELS OF CONTROL** - The tests, and inspection indicated in Table 1 attached and at the levels of control specified therein, shall be carried out on the whole production of the factory which is covered by this scheme and appropriate records and charts maintained in accordance with paragraph 2.0 above. All the production which conforms to the Indian Standard and covered by this licence shall be marked with certification mark of the Bureau.

6.1 **CONTROL UNIT** - For the purpose of this scheme, all the plywood boards of similar construction pressed under similar conditions with same mix of adhesive shall constitute a control unit (Plywood Board in which the arrangement of veneers is similar as regards thickness and species of timber on both sides of central ply shall be considered to be of similar construction).
6.2 **MOISTURE CONTENT** - Two samples from every control unit shall be tested for its conformance to the requirement of moisture content as laid down in clause 10.1.1 of the specification. In the event of the failure of any sample, the plywood in the entire control unit shall be suitably reconditioned. Such reconditioned material when tested again shall conform to the requirement of the specification for moisture content.

6.3 **GLUE ADHESION IN DRY STATE AND WATER RESISTANCE TEST**

6.3.1 Two samples from every control unit which have passed the requirements of moisture content as given in clause 6.2 above, shall be subjected to test for glue adhesion in dry state and water resistance test for its conformance to the requirement of the specification as laid down under 10.1.2, 10.1.3 respectively. If the samples tested are found not to be fully complying with any one of the requirements all the material in the batch represented by this sample shall be rejected.

6.4 In case of plywood with plastic coating or suitable overlay, one sample from every control unit which has passed the requirement of clause 6.3.1 above shall be subjected to the test laid down under cl. 10.1.4 of specification. If the sample tested is not complying with the requirement, all the material in the control unit represented by this sample shall be rejected.

6.5 One sample from each control unit shall be checked for retention of preservative chemical as per requirement of cl. 10.1.5 of IS 4990:1993. In case of failure the control unit shall be rejected.

6.6 **TENSILE STRENGTH**

6.6.1 Two samples from each control unit shall be subjected to tensile strength for its conformity as laid down in cl. 10.1.6 of the specification. If either of the sample fails, the entire material in the control unit shall be rejected.

6.7 **MYCOLOGICAL TEST**

6.7.1 One sample from each month’s production shall be tested for mycological test. In case a sample fails to conform to the requirement as laid down I 10.1.7 of the specification, the control unit shall be rejected. A thorough check shall be made about the type of adhesive used and corrective actions shall be taken to check the failure in subsequent production.

6.8 **MODULUS OF ELASTICITY**

6.8.1 Two samples from each control unit shall be tested for modulus of elasticity for its conformity to requirement laid down in cl. 10.1.8 of the specification. If either of the sample fails, the entire control unit shall be rejected.
6.9 INSPECTION OF FINISHED PRODUCTS

6.9.1 WORKMANSHIP AND FINISH - All finished plywood boards, passed as in 6.2, 6.3, 6.4, 6.5, 6.6 and 6.7 above shall be examined for freedom from visual defects and surface finish for conformance to the requirements laid down in clause 8 of the specification. Only those plywood boards which are satisfactory in all respects shall be marked.

6.9.2 DIMENSIONS - The dimensions of all the plywood boards shall be measured and those found to be not conforming to the requirements as laid down in clause 7 of the specification shall not be marked.

6.9.2.1 The plywood boards found defective as laid down in 6.9.1 and 6.9.2 above may, however, be dimensioned to the next lower sizes to remove the defects. Such boards shall be given suitable protective treatment to the edges after cutting and when examined again shall satisfy to the requirements of visual defects, finish and dimensions.

6.10 The manufacturer shall supply on demand to the purchaser the information regarding technical data, recommended method of use and loading as per cl. 12 of the specification.

7.0 In respect of all other clauses of the specification the factory will maintain appropriate control and checks to ensure that their product conforms to the various requirements of the specification.

8.0 REJECTIONS – A separate record shall be maintained giving information relating to the rejection of the production not conforming to the requirements of the specification and the method of its disposal. Such material shall in no circumstances be stored together with that conforming to the specification.

9.0 SAMPLES – The licensee shall supply, free of charge, the samples required in accordance with the Bureau of Indian Standards (Certification) Regulations, 1988, as subsequently amended, from the factory or godowns. The Bureau shall pay for the samples taken by it from the open market.

10.0 REPLACEMENT – Whenever a complaint is received soon after the goods with Standard Marks have been purchased and used, and if there is adequate evidence that the goods or their components have not been misused, defective goods or their components shall be replaced or repaired free of cost by the licensee in case the complaint is proved to be genuine and the warranty period (where applicable) has not expired. The final authority to judge conformity of the product to the Indian Standard shall be with the Bureau. The firm should have own complaint investigation system as per IS 15400.
10.0 **STOP MARKING** – The marking of the product shall be stopped under intimation to the Bureau if, at any time, there is some difficulty in maintaining the conformity of the product to the specification, or the testing equipment goes out of order. if directed to do so by Bureau for any reason. The marking may be resumed as soon as the defects are removed or when the BIS gives the permission to do so. The information regarding resumption of markings shall also be sent to the Bureau.

11.0 **PRODUCTION DATA** – The licensee shall send to BIS as per the enclosed Proforma to be authenticated by a Chartered Accountant or by the manufacturer by giving an affidavit/undertaking, a statement of quantity produced, marked and exported by him and the trade value thereof at the end of each operative year of the licence.

Table 1……..
IS 4990:1993
PLYWOOD FOR CONCRETE SHUTTERING WORK
TABLE 1 LEVELS OF CONTROL
(Para 6 of the Scheme of Testing and Inspection)

<table>
<thead>
<tr>
<th>CL.</th>
<th>Requirement</th>
<th>Test Methods</th>
<th>No. of Samples</th>
<th>Frequency</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Visual defects and finish</td>
<td>8 IS 4990:1993</td>
<td>Each finished plywood board</td>
<td>The visual inspection should be carried out at a well lighted place.</td>
<td></td>
</tr>
<tr>
<td>10.1.1</td>
<td>Moisture Content*</td>
<td>IS 1734(Pt.1)</td>
<td>Two</td>
<td>Each control unit</td>
<td>In case of failure the entire control unit shall be rejected.</td>
</tr>
<tr>
<td>10.1.2</td>
<td>Glue adhesion in dry state</td>
<td>IS 1734(Pt.4) 1983 &amp; IS 1734(Pt.5):83</td>
<td>Two</td>
<td>-do-</td>
<td>-do-</td>
</tr>
<tr>
<td>10.1.3</td>
<td>Water resistance test</td>
<td>10.1.3 IS 4990:1993 &amp; IS 1734 (Pt. 4 &amp; 5):1983</td>
<td>Two</td>
<td>-do-</td>
<td>-do-</td>
</tr>
<tr>
<td>10.1.4</td>
<td>Plastic coating/overlay test **</td>
<td>IS 4990:1993</td>
<td>One</td>
<td>-do-</td>
<td>-do-</td>
</tr>
<tr>
<td>10.1.5</td>
<td>Retention of preservative</td>
<td>10.1.5 &amp; 6.6 -do- IS 2753(Pt.1)</td>
<td>One</td>
<td>-do-</td>
<td>-do-</td>
</tr>
<tr>
<td>10.1.6</td>
<td>Tensile strength</td>
<td>IS 1734(Pt.9):1983</td>
<td>Two</td>
<td>-do-</td>
<td>-do-</td>
</tr>
<tr>
<td>10.1.8</td>
<td>Modulus of elasticity</td>
<td>IS 1734(Pt.11):1983</td>
<td>Two</td>
<td>-do-</td>
<td>-do-</td>
</tr>
<tr>
<td>10.1.7</td>
<td>Mycological test</td>
<td>IS 1734(Pt.7):1983</td>
<td>One</td>
<td>Once a month</td>
<td>-do-</td>
</tr>
</tbody>
</table>

- A moisture meter may be used for the routine testing of moisture content. In that case the readings obtained for moisture content should not exceed 13%. Atleast once a week the method given in the specification may be employed for checking up the results obtained with the moisture meter and the error for the moisture meter determined accordingly. A record of all these determinations shall be kept.

** Applicable only when concrete shuttering plywood is supplied with plastic coating or with an overlay.
**FORM I**

**RECORDS OF TESTS ON PLYWOOD**

<table>
<thead>
<tr>
<th>Date</th>
<th>Details of plywood boards pressed</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mix or control unit no.</td>
<td>Consitutents of adhesive</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Test results contd.

<table>
<thead>
<tr>
<th>Water resistance test</th>
<th>Relanation of preserving</th>
<th>Plastic coating/ overlay test</th>
<th>Tensile Strength kg/cm²</th>
<th>Modulus of Elasticity</th>
<th>Dimensions and Visual Inspection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strength kg</td>
<td>Wood failure %</td>
<td>Adhesion of plies</td>
<td>No. of plywood inspected</td>
<td>No. passed</td>
<td>No. rejected</td>
</tr>
<tr>
<td>Individually Avg.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Remarks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paralel to grain</td>
<td>Prpendicular to grain</td>
<td>Total</td>
<td>Paralel to grain</td>
<td>Perpendicular to grain</td>
<td></td>
</tr>
</tbody>
</table>

* When tests have been carried out both by oven drying method and with a moisture meter for comparison, readings obtained by both methods may be recorded.

**FORM II**

**RECORDS OF MOISTURE CONTENT OF VENEERS**

<table>
<thead>
<tr>
<th>Date</th>
<th>Hour</th>
<th>Deck No. of the drier</th>
<th>Species of Timber</th>
<th>Moisture Content</th>
</tr>
</thead>
</table>

Note :- When tests have been carried out both oven drying method and with a moisture of comparison readings obtained by both the method may be recorded.
# FORM III
## RECORDS OF TESTS ON PLYWOOD
### (MYCOLOGICAL TEST)

<table>
<thead>
<tr>
<th>Date</th>
<th>Details of samples drawn</th>
<th>Mycological test results</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Separation at edge of veneers</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Strength kg.</td>
<td>Wood Failure %</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Individual</td>
<td>Average</td>
</tr>
</tbody>
</table>

# FORM IV
## RECORDS OF PRESERVATIVE TREATMENT OF PLYWOOD

<table>
<thead>
<tr>
<th>Date</th>
<th>Sl. No. of Treatment</th>
<th>Type of preservative</th>
<th>Type of Treatment</th>
<th>Details of record as per the relevant treatment or calculation of absorption of preservative</th>
<th>Retention kg/cm³</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
PERFORMA - 1

PROFORMA FOR OBTAINING QUARTERLY PRODUCTION DETAILS

Period covered

Name of Licensee

CM/L No.

Name of Articles (s) IS No. 513
Grade/Type/Size

Brand/Trade/Name(s) of BIS Certification Marked Products

Total production of the articles(s) licensed for certification marking

Total production of the article(s) conforming to Indian Standard

Production covered with BIS Certification Mark and its value

Quantity (tonne)

Invoice sale price US$

Brand Name used on production covered under BIS Certification Mark

Calculation of marking fee as per agreed Rate of Marking Fee

Signature of Authorised Signatory
Name
Date

Unit

Quantity covered with BIS Certification Mark
Information to be filled up by BO before forwarding to the licensee.
Note: Incase a clause is not applicable, suitable remarks may be given against it.

Marking fee rounded off in whole rupees as obtained by applying unit rates given in (a) on quantity given in (b)

Quantity not covered with BIS Certification Mark. If any, and the reasons for such non-coverage

Brand Name under with non certified goods were sold

Quantity Exported with BIS Standard Mark and its value

5.1 Brand Name under which BIS Certified goods are exported

Authentication by Chartered Accountant or by the manufacturer
By giving an affidavit/undertaking