1. PLYWOOD

All plywood for exterior use is glued with the same phenolic glue. It carries the mark WBP = water boil proof.

The durability of plywood is entirely dependent on the species of wood used in the veneers. Often the manufacturer saves money by having a good but thin surface veneer, but species with low rot resistance in the core veneers.

The difference between "WBP Exterior" plywood and "Marine plywood" is in the species of timber accepted for the veneers and the thickness and number of layers. "Marine plywood" should have a minimum of 5 layers in plywood between 6 and 9 mm thickness. More layers give more equal strength along the sheet and across the sheet. The thickness of the layers should be:

- Outer layers: Minimum 1.4 mm
- Inner layers: Maximum 2.5 mm

Unless the veneers have been treated against rot at the factory, the durability of the plywood is dependent on the type of wood used. The following list of species for marine use has been prepared by Lloyds in England:

<table>
<thead>
<tr>
<th>Common name</th>
<th>Natural durability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agba</td>
<td>Durable</td>
</tr>
<tr>
<td>Gedu Nohor</td>
<td>Moderately durable</td>
</tr>
<tr>
<td>Guarea</td>
<td>Durable</td>
</tr>
<tr>
<td>Idigbo</td>
<td>Durable</td>
</tr>
<tr>
<td>African Mahogany</td>
<td>Moderately durable</td>
</tr>
<tr>
<td>Makore</td>
<td>Very durable</td>
</tr>
<tr>
<td>Omu</td>
<td>Moderately durable</td>
</tr>
<tr>
<td>Light Red Merandai</td>
<td>Moderately durable</td>
</tr>
<tr>
<td>Light Red Seraya</td>
<td>Moderately durable</td>
</tr>
<tr>
<td>Sapele</td>
<td>Moderately durable</td>
</tr>
<tr>
<td>Utile</td>
<td>Durable</td>
</tr>
</tbody>
</table>

Douglas fir and Gaboon/Okoume are acceptable provided they are given preservative treatment at the factory. Gaboon/Okoume has very low natural durability.

In plywood construction it is important to seal all edges with epoxy glue. Especially where the deck overlaps the side there are problems of rot if the edge is not well sealed before fastening the sheer batten.

2. TIMBER

The timber for the plywood boat must first of all be suitable for gluing. Generally the heavier type A timber as described on page 18 does not give as good a glue bond as the lighter timber. An exception to this is Iroko and Kapur. Generally type B timber is therefore used in plywood boat construction. The keel and keel-shoe should preferably be of a heavier and harder timber.
3. **GLUE**

There are two types of glue with a proven record as waterproof glue: Epoxy and Phenol Resorcinol.

Epoxy has a better gap filling ability which means that less clamping pressure is required to achieve a good bond. However, epoxy presents a greater health risk. Contact with the skin should be avoided as some people develop a skin rash after having used epoxy over a period. The hardener powder of phenol resorcinol is toxic and should be handled with care.

The following rules are important for a good glue bond.

a) **The correct measuring of quantities of resin and hardener and proper mixing is very important for a good bond.** Use a postal scale if necessary and follow the instructions on the tin carefully. Glue is expensive so do not spoil the result by careless mixing.

b) **The lids of the glue tins should be put on properly and the tins stored in a cool place 5-20 °C. Storage time will then be 1-2 years.** In a hot climate the 'shelf life' of the glue is much reduced.

c) **Plane the timber to equal thickness with a machine planer.** Although epoxy has a gap filling property, the surfaces should be fairly even.

d) **Freshen up the wood surface.** If time from planing is more than 48 hours before gluing, the wood should be freshened up with sandpaper followed by brushing off the dust. This gives fresh wood directly in contact with the glue.

e) **Use timber of correct moisture content.** Wet timber will not glue well and too dry timber puts high stress on the glue line when swelling takes place after the boat is put into service.

4. **FASTENINGS**

The purpose of the fastenings is to provide sufficient pressure until the glue sets. The fastening itself will take no load as long as the glue line is intact. Only in an emergency with glue failure might the fastening provide some additional safety. Use screws only where the bend in the plywood is too extreme.

**Nails**

The best type of fastening is the annular ringed or barbed bronze nail. The nails also carry the name "Gripfast". For the 9 mm plywood used in these boats the following size is recommended: Diameter = 2 mm (14 SWG), Length = 25 mm (1 in).

If these nails are not available, hot dipped galvanized nails can be used. The nails should have a small head so that they can be countersunk below the surface of the plywood and the hole plugged with a filler to avoid any surface corrosion. For 9 mm plywood the dimension should be: Diameter = 2.65 (12 SWG), Length = 30 mm

The length of these nails means that they have to be set at an angle in the 25 mm battens to avoid splitting the inside surface.
# PLYWOOD BOAT 5.2 M - TIMBER (including 25% waste)

FOR THE OTHER BOATS MULTIPLY THE LENGTHS WITH THE FACTOR F:
6.3 M BOAT: F = 1.2  
7.4 M BOAT: F = 1.4  
8.5 M BOAT: F = 1.6.

NOTE: The keel for the 7.4 m and 8.5 m boats is 68 x 68 sawn from 75 x 150

<table>
<thead>
<tr>
<th>TYPE OF TIMBER</th>
<th>DIMENSION FROM SAWMILL mm</th>
<th>TOTAL LENGTH m</th>
<th>SAWING INTO SMALLER SECTIONS mm</th>
<th>TOTAL LENGTH m</th>
<th>PLANED DIMENSION mm</th>
<th>ITEM LETTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>20 x 150</td>
<td>8</td>
<td>20 50 50</td>
<td>24</td>
<td>16 x 44</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15</td>
<td>25 150</td>
<td>15</td>
<td>20 x 143</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>25 x 150</td>
<td>A</td>
<td>25 75 75</td>
<td>4</td>
<td>20 x 68</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>25 50 50</td>
<td>3</td>
<td>20 x 44</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.5</td>
<td>25 37 37 37 37</td>
<td>18</td>
<td>20 x 32</td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>38 x 150</td>
<td>9</td>
<td>38 150</td>
<td>9</td>
<td>32 x 143</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>38 75 75</td>
<td>6</td>
<td>32 x 68</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.6</td>
<td>38 50 50 50</td>
<td>14</td>
<td>32 x 44</td>
<td>H</td>
</tr>
<tr>
<td></td>
<td>38 x 200</td>
<td>5</td>
<td>38 200</td>
<td>5</td>
<td>32 x 193</td>
<td>I</td>
</tr>
<tr>
<td></td>
<td>50 x 150</td>
<td>A</td>
<td>3.2 75 75</td>
<td>6.4</td>
<td>44 x 68</td>
<td>J</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8</td>
<td>50 37 37 37 37</td>
<td>32</td>
<td>25 x 44</td>
<td>K</td>
</tr>
<tr>
<td></td>
<td>75 x 150</td>
<td>2.5</td>
<td>75 150</td>
<td>2.5</td>
<td>68 x 143</td>
<td>L</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5</td>
<td>75 37 37 37 37</td>
<td>13</td>
<td>25 x 68</td>
<td>M</td>
</tr>
</tbody>
</table>

Marine plywood 9 mm in sheets 1.2 m x 2.4 m
Total = 7 sheets
Optional floorboards not included except forward.
**PLYWOOD BOATS - MATERIALS**

**TIMBER (Including 25% waste)**

<table>
<thead>
<tr>
<th>TYPE OF TIMBER</th>
<th>DIMENSION FROM SAWMILL</th>
<th>TOTAL LENGTH OF TIMBER IN METRES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MM</td>
<td>5.2 M BOAT</td>
</tr>
<tr>
<td>A</td>
<td>25 x 150</td>
<td>1 x 6</td>
</tr>
<tr>
<td></td>
<td>50 x 150</td>
<td>2 x 6</td>
</tr>
<tr>
<td></td>
<td>75 x 150</td>
<td>3 x 6</td>
</tr>
<tr>
<td>A m³</td>
<td>20 x 150</td>
<td>¾ x 6</td>
</tr>
<tr>
<td></td>
<td>25 x 150</td>
<td>1 x 6</td>
</tr>
<tr>
<td></td>
<td>38 x 150</td>
<td>1 ½ x 6</td>
</tr>
<tr>
<td></td>
<td>38 x 200</td>
<td>1 ¼ x 8</td>
</tr>
<tr>
<td></td>
<td>50 x 150</td>
<td>2 x 6</td>
</tr>
<tr>
<td></td>
<td>75 x 150</td>
<td>3 x 6</td>
</tr>
<tr>
<td>B m³</td>
<td>0.35</td>
<td>0.41</td>
</tr>
<tr>
<td>Total volume A + B in m³</td>
<td>0.41</td>
<td>0.48</td>
</tr>
<tr>
<td>Marine plywood, 9 mm., sheet of 1.2 x 2.4 m</td>
<td>7 sheets</td>
<td>9 sheets</td>
</tr>
</tbody>
</table>

**FASTENINGS AND MISCELLANEOUS**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5.2 M BOAT</td>
</tr>
<tr>
<td>Bolt, hexagonal head, hot dip galvanized</td>
<td>8 x 80</td>
</tr>
<tr>
<td>galvanized with nut</td>
<td>8 x 90</td>
</tr>
<tr>
<td>Alternative: Cup - square coach bolt</td>
<td>8 x 100</td>
</tr>
<tr>
<td>bolt, hot dip galvanized with nut</td>
<td>8 x 110</td>
</tr>
<tr>
<td>8 x 120</td>
<td>4</td>
</tr>
<tr>
<td>8 x 140</td>
<td>2</td>
</tr>
<tr>
<td>Barbed ringnail, flat head, 2.0 x 25 (14 SWG x 1 in)</td>
<td>2.5 kg</td>
</tr>
<tr>
<td>bronze</td>
<td>3.2 x 32 (10 SWG x 1 ¼ in)</td>
</tr>
<tr>
<td>3.2 x 45 (10 SWG x 1 ½ in)</td>
<td>0.6 kg</td>
</tr>
<tr>
<td>Alternative: Round wire nail,</td>
<td>2.6 x 30 (12 SWG x 1 ¼ in)</td>
</tr>
<tr>
<td>countersunk head, hot dip galvanized</td>
<td>3.2 x 45 (10 SWG x 1 ½ in)</td>
</tr>
<tr>
<td>Woodscrew, AISI 316 Stainless steel</td>
<td>4.0 x 25 (8 Gauge x 1 in)</td>
</tr>
<tr>
<td>5.0 x 50 (10 Gauge x 2 in)</td>
<td>60</td>
</tr>
<tr>
<td>5.0 x 63 (10 Gauge x 1 ½ in)</td>
<td>20</td>
</tr>
<tr>
<td>Epoxy glue including hardener</td>
<td>5.0 kg</td>
</tr>
<tr>
<td>Filler for epoxy glue</td>
<td>1.0 kg</td>
</tr>
<tr>
<td>Wood primer</td>
<td>5.0 kg</td>
</tr>
<tr>
<td>Paint</td>
<td>6.0 kg</td>
</tr>
<tr>
<td>Antifouling paint</td>
<td>1.0 kg</td>
</tr>
<tr>
<td>Paint thinner</td>
<td>2 L</td>
</tr>
<tr>
<td>Buoyancy material, polyurethane, polystyrene, Emergency sail and rudder fittings, see drawing.</td>
<td>0.1 cub.m</td>
</tr>
</tbody>
</table>

Note: Two component polyurethane paint will give a much more durable finish than ordinary oil paints.
DIMENSIONS OF FRAMES ARE SAME AS FOR PLANKED CONSTRUCTION

The bottom part of the frames forward of midship must be curved because of the natural bending of the plywood. The depth of the cutout for the batten must be determined in place as shown on page 41 and 56.

FRAME 3

Straight line from frame dimensions

Use flexible batten to draw curve

Remember that this distance is 12 mm lower than for planked construction except for the forward frame

TRANSOM

Plywood pad on inside glued in place

Wood plate 20 x 193 bolted on outside same as for planked transom

Curve in aft deck determined after fixing sheer batten

Construction base

Cut from F 32 x 143

H
32 x 44

N
Ptw 9

96
32

108
FRAME CONSTRUCTION IS SAME AS SHOWN FOR PLANKED CONSTRUCTION EXCEPT FOR GLUED GUSSET

Frames aft of midship

Frames from midship and forward

Filler piece, Cut from

Plywood 9 both sides

32 x 68

32 x 193

32 x 143

Use annular ringed bronze nails 2.0 x 25 (14 SWG Gripfast) to obtain glue pressure

MIDSHIP

FORWARD

Do not nail near edge or near chine position

The glue area should be the same on each frame
1. The forward side of the stem has the same shape as the planked boat. The width of the stem is modified as shown below:
Make a pattern of the stem out of 4 mm plywood.

To transfer the shape of the stem from the drawing on the plywood sheet, use transparent drawing paper or place the head of nails along the line, hammer the head so the nail does not roll and press the 4 mm sheet onto the nailheads to leave marks of the curve.

2. Cut the end of one board so that the pattern is inside the edges of the two boards. Trace the shape and cut.

3. The three layers are laminated together. Use sufficient clamps or heavy weights to get a good glue pressure.
1. Plane the scarf in the two battens to be joined at the same time.

<table>
<thead>
<tr>
<th>T</th>
<th>SCARF LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 mm</td>
<td>200 mm</td>
</tr>
<tr>
<td>32 mm</td>
<td>320 mm</td>
</tr>
</tbody>
</table>

2. Use a long plane and check for straightness.

3. Glue two or more battens at the same time. Apply glue and place polyethylene plastic (shopping bags) between the layers.

Secondly, clamp the glue joint.

Fix first clamps to prevent the battens from sliding apart at the glue joint.
1. Cut the sheet of plywood to the width required to cover side or bottom. Clamp the two panels to be joined to the worktable with the edges staggered as shown.

2. Plane the scarf with a long plane and check for straightness.

3. A. Gluing can be done by supporting the panels on the floor and screwing into a wooden beam.
   B. On longer boats the gluing can be done in position but not forward with bend in the plywood.

- Plywood 9 x 150
- Polyethylene plastic
- Strip of plywood temporarily screwed
- Edge of workbench
- Plywood 9 x 150
- Screws 4.5 x 40 with washer
- Screws 4.5 x 40 with washer
- Screws 5 mm bolts
- Temporary blocking

Alternatively use doubleheaded nails. Screw holes filled later with epoxy mixed with fine sawdust.
1. The hog is bolted to transom, frames and stem with 8 mm bolts, hot dip galvanized or stainless steel.
2. The position of the chine is determined in the same way as for the planked boat. The chine is fixed with stainless steel screws 5 x 50.
3. The bevelling of the hog and the chine from midship and aft is done with a straightedge held square to the hog.
4. Forward of midship the bevelling is started by placing a straightedge and dividing the distance along the chine and the stem in equal number as shown. See also details of bevelling for the planked boat.
1. Determine the depth of the cutout in the frames for the bottom battens in the same way as for planked construction, however it is very important that the straightedge is placed in the same angle to the hog as shown on the previous page.

2. Fasten the bottom battens with stainless steel screws \(5 \times 63\). If required because of twist and bend forward, make this part with two laminations \(15 \times 44\) scarred to the aft batten.

3. Check again bevel at hog and chine by using a sheet of \(4 - 6\) mm plywood \(300 \times 1200\) and bending in position.

4. By using a ladder as shown determine the approximate shape of the bottom sheet. Fit the sheet by using clamps and temporary screws and mark the correct shape. Note the transition from butting against the side sheet forward to overlapping the side sheet aft.

5. Fix the side panels and then adjust the bevel at the chine.

6. Fix the bottom sheet.

7. Bolt the keel to the hog and nail on the rubbing shoe.

8. Fix chine protection \(16 \times 44\).

---

If using hot dip galvanized nails \(2.36 \times 30\), fix at angle.

Mark and transfer to plywood.

---

Use temporary screws where the bend is hard. Fill hole with epoxy filler.

---

The keel can be bolted before or after fixing the bottom panel as preferred.

---

Make the ladder of plywood \(4 - 6\) mm. Glue and nail together.
1. Glue and nail a piece to increase the width of the rail. By using a pattern draw the rail angle and cut below the sheer batten.

2. Screw the coaming batten to the frames and to blocks at the transom and the stem. Bevel the battens. Fix deck beams forward and aft, the center plank and the framing for the engine well.

3. Nail and glue the plywood in the engine well and the deck. Plane edges and seal with epoxy glue.

4. Nail and glue the rubbing strips.

5. The floorboards are optional except forward. If floorboards are not used, the bottom should be given a non skid coating. Sprinkle fine sand over wet paint in the second last coat. After drying, paint the last coat. Floorboards can also be made of 9 mm plywood (page 17)

6. After painting, place buoyancy blocks as shown

---

**Deck beam sawn from 20 x 143. Bolt to blocks glued at side**

**Well framing 20 x 32**

**Buoyancy blocks under aft deck see page 47**

**ALTERNATIVE PLYWOOD FLOOR**

**Deck beam sawn from 20 x 143**

**Centerplank 25 x 68**

**Block**

---

**HDPE pipe 75 mm Warm in hot water to slip in place**

**FOR GILLNET FISHING**

**Block 20 x 32**

**Buoyancy block 65 x 170 x 1000 Two on each side**

**9 plw. Block**

---

**Plywood pattern for rail angle**

---

**25 x 44**

**A 16 x 44**

---

**20 x 32**

---

**Plywood pad**

---

**FOR GILLNET FISHING**

---

**Screw**

---

**Block 20 x 32**

---

**Buoyancy block 65 x 170 x 1000 Two on each side**