

PROJECT “FISH IN ICE”

Illustrated Manual on Ice Box Construction on Fishing Vessel



Revised version August 2015

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Correct Citation:

Ishida, M., Carrette, B., Magloire, A. 2017. Project “Fish in Ice”: Illustrated Manual on Ice Box Construction on Fishing Vessel. *CRFM Special Publication* No. 17 – Volume I. 24p.

ISSN: 1995-4875

ISBN: 978-976-8257-60-4

Published by the Caribbean Regional Fisheries Mechanism Secretariat,
Belize and St. Vincent and the Grenadines.

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1. INTRODUCTION

Keeping fish in ice will allow fishers to work longer at sea and improve fish quality. You can build your own icebox on your boat, if your boat is a fiberglass boat. This illustrative manual aims to show how to make your own icebox by one or two persons within one or two working days. Two to four bags of ice should be used when you go fishing. As fish are caught they should be cleaned, then covered with a layer of ice by pouring from the bag. Place the fish on ice, then cover it with another layer of ice. Repeat this process during the fishing trip. If you do not use ice, your fish will be “cooked”. The picture shows a fish caught, with a temperature of over 40 degrees Celsius when landed.

	<p>Blue Marlin without ice landed at Fisheries Complex; recorded over 40 degrees Celsius.</p>
	<p>Another Blue Marlin on board at fisheries complex; recorded 39 degrees Celsius.</p>
	<p>Fish in ice. Blue Marlin kept in an ice box and landed at Roseau Fisheries Complex; recorded 3 degrees Celsius its surface temperature.</p>



2. GENERAL INFORMATION (MATERIAL AND COST)

Material list for about 5-6 boats:

- Resin 2 drums (\$7,000XCD)
- Hardener 3 gallon (\$440XCD)
- BIAX / Fiberglass matt one box each (\$2,359XCD, \$3,450XCD)
- Gel coat 5 gallon (\$750XCD)
- Acetone 4 gallon (\$120XCD)

Useful tools:

- Brushes 12
- Roller 15 small
- Grinder 2 and 20 discs
- Safety goggles 3
- Fiberglass suit 15
- Safety mask 2 boxes
- Globs 1 box
- Extension cord for each tool

Material for Foam sheet:

- 2 gallon of liquid foam makes 1 foam sheet. 2 foam sheets are for one boat.
- 30 gallon of liquid form for 30 sheet: for 15 boat (less than \$5,000XCD, CIF from Miami)

Material for Mold for the foam sheet (\$600XCD)

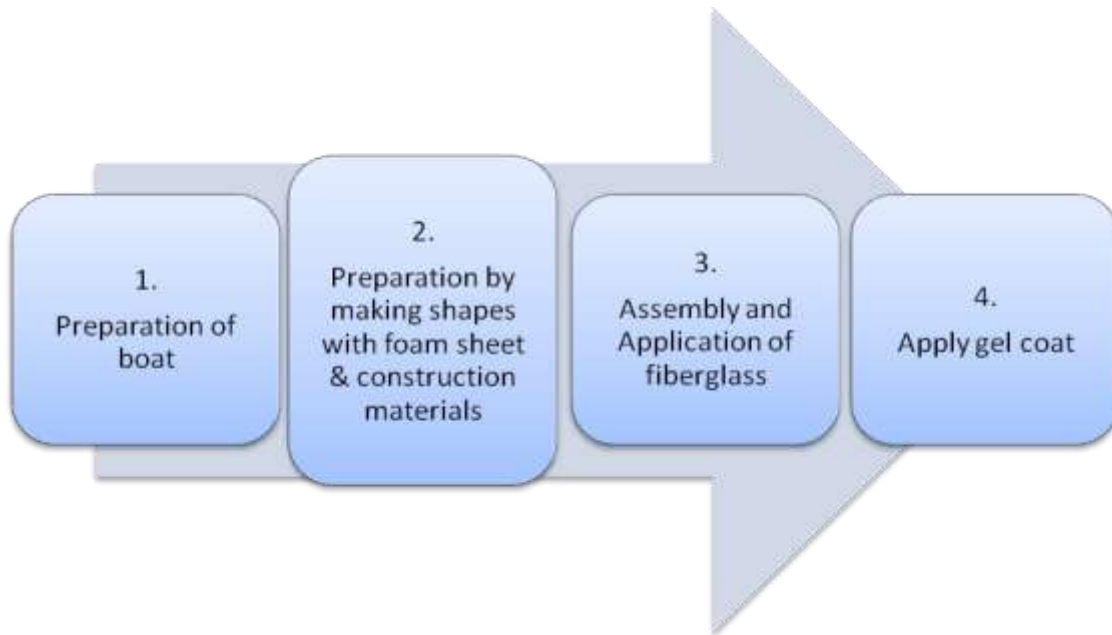
- 2- Sheets plywood (3/4 inch, 48x96)
- 20-G clamps
- 4-3x4x10
- 2-Aborite
- 2-2x3x16 (for separator cut it in two, 2 x 1 1/2")
- 2-Rods for the knots
- 24 knots +24 balts+24 washers
- 8-Cuclin ϕ 1/2x 1 1/2

Cost for one boat (\$1USD=\$2.6882XCD)

- Material = app \$2,800XCD
- Foam sheet x 2 =\$300XCD
- Total for one boat cost= app \$3,100XCD

The main cost is resin. If you reduce the use of resin, the cost will be reduced as significantly as less than \$2,000XCD

3. ICE MAKING PROCESS



Remember!

Working with fiberglass is easy if you plan, prepare and cut all materials properly. Time spent in preparing all materials before the application of resin to the fiberglass mat will guarantee a better and safer product in the end. So you will not need to grind, cut or reshape the fiberglass after construction. Preparation is the key for a smooth operation and less waste of time and materials.

3.1 Preparation of the Boat, Clean Up





Remove any dust, fish slime or fishing gear, and properly wash the entire boat with soap. This is to allow for the collection of grinding dust to be used as filler.



Decide the position and size of the box required. Clearly mark and grind off all gel coat or paint from areas selected for bonding the ice box to the hull of the vessel.

Note: Wear proper protective clothing, a mask (or respirator) and goggles to prevent health risks from fiberglass dust.



Properly grind surfaces for firm and long lasting adhesion of applied fiberglass to the boat.



Before washing, collect and keep the fine fiberglass dust in a plastic bag, this can be used for filler at a later stage.

Wash and dry the boat!



Clean the surface with acetone. A clean surface without dust or grease makes the fiberglass adhere easily and bond stronger.

Thoroughly clean the grinded surfaces with acetone. This prepares the grinded surface for a better bond and a clean finish.

3.2 Preparation by Making the Ice Box's Shape with Foam Sheet.

Make the ice box's shape from foam sheet

- Accurately measure and cut pieces for the bottom, sides, and top (cover) of the ice box



Cut fiberglass mat, small, medium and large pieces for application to the foam sheets' corners or edges.



(If you wish, you may apply fiberglass on the foam prior to the assembly. This process may help you save time and give better finished look for your ice box.)

1-2. Preparation by Making the Ice Box's shape using foam sheet.



Cut the foam sheet to the required shapes and assemble the Ice Box's shape. Foam should be put on all areas to ensure proper insulation.

Note: The picture shows that there is no need to put a piece of foam sheet on the bottom of the boat, where there's already foam.



Cut a top for the ice box and ensure that the space for the attachment of the cover/lid is adequate and appropriately located for ease of inserting and removing fish from the box.



E.g. Measuring a large sheet of fiberglass mat.

Front; small-cut fiberglass.



General use of fiberglass mat should be cut by hand, so that the mat can bond easily to the foam sheet and boat.

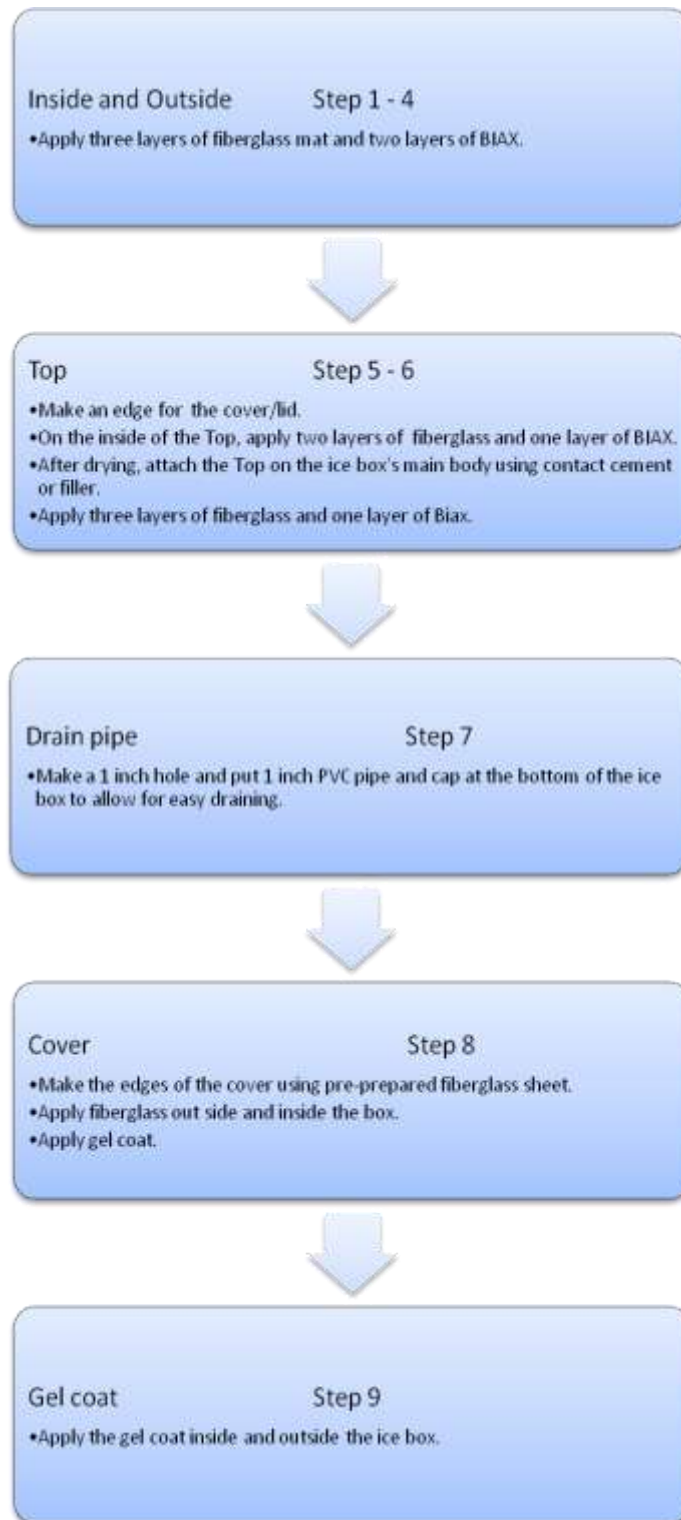
Use a knife or scissors **ONLY** for BIAx.

Option: Before assembling the materials, you may apply fiberglass mat on a wider area of each foam sheet on your work table. This process makes you work easier and faster, and makes the box stronger.



After the application of fiberglass and resin, it will be necessary to smooth out the surfaces by applying a light sanding to the surface in order to remove fiberglass needles or sharp edges and points.

3.3 Assembly and Application of Fiberglass & Resin



Inside and outside work



(Step 1.)

Inside work. (Application of fiber and resin)
Coat the foam sheets with resin and attached the first layer of fiberglass. Coat the attached fiberglass with resin and proceed to overlay with a layer of BIAx. Apply resin to the BIAx and press with a steel roller to compact and remove trapped air. Continue to overlay the fiberglass and BIAx repeating the above steps to the desired thickness and strength.



(Step 2.)

Corners and joints
To ensure proper strength at the corners and joints, apply small pieces of fiberglass to overlap the edges by 3 to 4 inches with successive layers to a minimum of three layers.

Remember before apply fiberglass, always apply resin first and then fiberglass.



(Step 3.)

Smoothing Surfaces
After the application of fiberglass and resin, it will be necessary to smooth out the surfaces by applying a light sanding to the surface in order to remove fiberglass needles or sharp edges and points.



(Step 4.)

Applying large pieces of fiberglass

Note: Again! Before applying the mat, please do not forget apply resin. The image on the left shows that there is no resin applied around the corners nor the side walls, so do it before applying the mat.



After internal surfaces are covered by fiberglass mat, apply BIAx.



Ditto.

TOP



(Step 5.)
Preparation for the Top

Cut out the top according to the design of the ice box. Use contact cement to place the pieces of foam sheet for the edge of the cover/lid. This is the upper side, where the cover/lid will sit.



Ensure that the edges are even and leveled.



Inside the Top, apply two layer of fiberglass and one layer of BIAX.

The cover can be further strengthened by applying a few ribs to eliminate springing.



(Step 6.)

Attaching the Top

Place the Top on the ice box, then use contact cement and/or filler for closing the gap if necessary.

First trim the edges (left image), apply the layers of fiberglass and BIAX as in step 1 and 2 above. Ensure that the joints are adequately overlaid to obtain the desired strength and prevent breaking during use.



Trimming the edge can be done before placing the Top on the ice box.



Finished top after three layers.

	<p>Application of BIAx.</p>
	<p>ditto</p>
	<p>Use filler for strengthening the edge of the cover and the edge of applied BIAx.</p>
<p>Drain</p>	
	<p>(Step 7.) Attaching the Drain plug</p> <p>Locate the lowest point of the ice box and drill a hole at the desired location to fit the drain plug. Fix the PVC drain plug to this hole using the previously prepared mix of resin and the grinding dust. (see II-1)</p>



PVC 1 inch pipe drain; inside view.



Outside view, with screw cap.



Apply gel coat.



ditto

Cover



(Step 8.)
Making a cover/lid

Check the size of the cover. Allow for a minimum overlapping of the cover edge strips (3-5mm).



For the cover edge, cut the piece of flat fiberglass sheet prepared (two layers with resin). We'll call this "X".

Attach the cover edges (X) to the cover/lid using contact cement or filler



Here is the bottom view.

Use filler if necessary to fill any gaps.



After cutting out excess X, apply fiberglass on the corners. This will bind the edges (X) to the cover/lid.



Apply 2-3 layers of fiberglass mat to tie X to the cover/lid.



On the top of the cover/lid, apply 2-3 large layers of fiberglass mat, ensuring that the edges (X) are covered.

Here is the top view.



Finally, apply BIAx on the top side of the cover.

Apply Gel Coat



(Step 9.)
Apply gel coat

Mix equal portions of resin and gel coat in sufficient quantities for complete application to the ice box. After thoroughly mixing, remove small quantities for application within a short amount of time. Add hardener and apply with a roller or spray gun.







E.g. Another cover view; upside down.

Built-in Ice Box for your fishing vessel! Finish Product!



4. FOAM SHEET MAKING

How to make a foam sheet MOLD, and Foam Sheet!	
	<p>(Step 1.) Apply contact cement evenly on Aborite.</p>
	<p>(Step 2.) Apply contact cement evenly on the 3/4 inch Plywood.</p> <p>Allow the contact cement applied to the Aborite and plywood to dry so that it does not stick to your hand when touched.</p>
	<p>(Step 3.) After about 15 min., depending on the ambient temperature, the surfaces should be ready for bonding. Stick them together by hammering, but ensure that Aborite is properly aligned to the plywood to avoid errors.</p>
	<p>Two sheets of plywood attached with Aborite should be prepared.</p>



(Step 4.)

Attach to the plywood 1½” separator for adjusting the foam sheet’s thickness around the edges of one of the plywood sheets.

Cut out some spacer using ½” PVC for gaging the thickness of the foam sheets.



(Step 5.)

Accurately measure and mark out the locations on the support posts (3’x4” wood) and the plywood where bolt holes are to be inserted.

Align the two sheets of plywood and the support posts together in preparation for the drilling of the holes.

When drilling the holes through the plywood, do it from the Aborite side, not from Plywood side, to prevent Aborite from breaking.



(Step 6.)

Before the assembly of the mold, apply grease onto the Aborite surface, separators, and spacers.

Note: For first time use of the mold, please apply two or three coats of grease to prevent it from sticking.



Apply grease evenly on another side of Aborite.



(Step 7.)

Assemble the pieces by inserting and fastening the bolts to the plywood and support posts. Ensure that a spacer is inserted into the bolts to keep the plywood sheets separated. Using 20 G clamps, fasten all edges of the mold to compress and secure the Plywood. Screw the Plywood, if necessary. The liquid foam expands when it forms, and is compressed. Therefore, securing the Plywood is crucial to prevent liquid from escaping.



Bolts for fastening the mold and a spacer for separating plywood.



Use two washers, small and big.



(Step 8.)

Prepare half a gallon of Liquid foam A, each into two buckets and the same amount of liquid B, each into two other recipients or buckets.

You will need two people to mix liquid A and B for each bucket.

Synchronizing the mixing liquid foam by two people is critical. Pour liquid B into A, and **mix well** for about 5 seconds.



Immediately pour the mixture into the mold and QUICKLY cap the entrance.

Bucket A and the funnel (if used) should be washed with water immediately for use next time.



(Step 9.)

Allow the foam in the mold to set for 30 min in a standing position before removing the foam sheet from the mold.

It is easier to take the foam out while it is still warm and not too hard.



(Step 10.)

Unfasten the bolts and G-clamps, and remove the set foam sheet. Be careful not to damage the sheet.

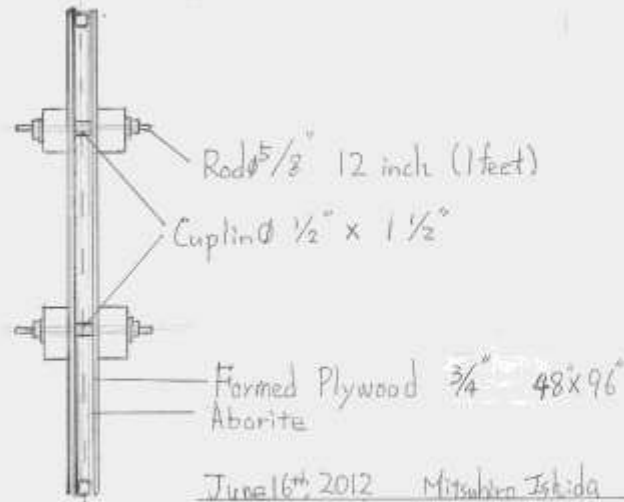
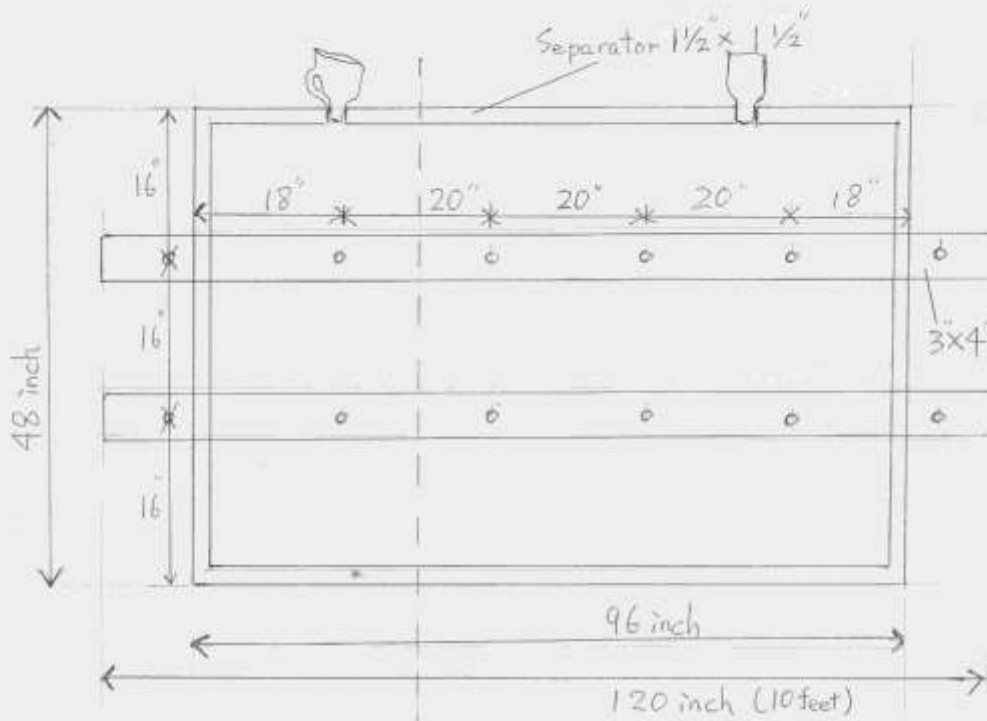


(Step11.)
Use a scraper to remove any remaining foam that is stuck to the Aborite surface before next use.



Cut the foam sheet as desired.
Generally, two foam sheets are enough for an ice box.

Mold for foam formed sheet



5. WORK TABLE



A comfortable table helps you work better and easier.



For Resin



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