



Conserve O Gram

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How to Make a Paper Board Crate

Crates and boxes for shipping museum objects can be made from a variety of materials. Polyethylene, wood and cardboard are three of the most prevalent materials. The crate must be strong enough to ensure the contents are safe during handling and shipping. The more often a crate is used, the stronger it must be. If a crate is repeatedly used, then the materials used to construct it should be able to withstand shock, vibration and mishandling. When a crate is only used once or twice, it can be made from materials that are more easily worked. Use archival quality materials that come into contact with the museum object.

Materials Needed to Make the Crate

Crate Walls. These will be fabricated from one of the following and should be cut with a band saw, bench saw or a sharp knife

- **350 Board** – this is tri-walled cardboard made of three layers of corrugated cardboard adhered to a 5/8" approximate thickness. It is not an archival grade board. This provides a very strong crate.
- **Honeycomb central core panel** - has each face of the board covered with cardboard and contains a central core of honeycomb board. The panel is 1/2" thick. An archival grade of this type of panel uses the brand name Tycore.
- **Foam cored boards** - are clay-coated boards bonded to a rigid extruded polysty-

rene core. They are not archival and not as strong as either the honeycomb central core panels or the tri-walled cardboard.

Adhesive. Hot melt adhesive is the most convenient material to use for the rapid and strong construction of the paper board crates. Choose a hot melt adhesive with the longest "open" time possible to provide flexibility during construction. "Open" time refers to the length of time the adhesive is tacky and workable providing an adequate bond.

- Low melt adhesive such as 3M Products 3792LM is a clear adhesive. It has an open time of about 40 seconds.

Skid Materials. These are needed to create a pedestal that raises the crate off the floor. These are essential to allow the crate to be lifted with a forklift or pallet jack.

- **Rough cut lumber** - this can be 4" x 4" or 2" x 4"

Filament adhesive tape. This is 2" wide, high performance, pressure sensitive, filament reinforced tape used to adhere the top of the crate in place.

Calculate the Crate Size

Determine the outside dimensions for the crate. If double boxing, calculate the size of the inner crate by this method. Calculate the outer crate dimensions (using the exterior size of the

interior crate as the object size) and eliminate the allowances for bubble wrap.

Table 1. Determining Crate Size

	Length	Width	Height
Size of the object	32"	29"	14"
Allow 2" for tissue and bubble wrap on each side	4"	4"	4"
Allow 2" for urethane foam padding on each side	4"	4"	4"
Sub total	40"	37"	22"
Allow 5/8" for the depth of the board on each side	1-1/4"	1-1/4"	1-1/4"
Total outside crate dimension	41-1/4"	38-1/4"	23-1/4"

Cut Boards to Size

Using the examples shown in Table 1:

- Cut one top and one bottom board of the same size. These are cut using the total length and width dimensions of the crate. (41-1/4" x 38-1/4")
- Cut two side wall boards of the same size. The sidewalls sit on the crate bottom board and are covered by the lid so do not need the two allowances. These boards are cut using the sub total height and the sub-total length dimensions. (40" x 22")
- Cut two end wall boards of the same size. The end walls sit on the crate bottom board and are covered by the lid so do not need the two allowances. These boards are cut using the sub total width and the sub-total height dimensions. (37" x 22")
- Cut two crate skid feet of the same size. These are placed on the bottom of the crate to lift it above floor level for use of a

pallet jack or forklift. The two skids need a minimum of 28" between them. (4" x 4" x 38-1/4")

Assemble the Crate

- Place the crate bottom board on a flat surface. Mark placement lines for the skids. Run a large quantity of hot melt adhesive on the skid and then place the skid on the bottom board at the marked area. When the adhesive has dried, turn the board over. Use nails or screws to reinforce the bond of the skids to the bottom board.
- With the skids on the under side, run a bead of adhesive on the crate bottom board along one of the outside edges. Position a side board in place and hold for a few seconds until the glue reaches a hardened state. (Scrap of heavy board can be set at a right angle to support the side wall board until it dries.) Repeat for the second side wall.
- Test fit the end panels to verify the accuracy of their cuts. To adhere the end wall in place, run a bead of glue along the crate bottom and along the inside edge of the two sidewalls. Place the end panel in position. Use masking tape to hold all boards in position while the adhesive solidifies. Repeat with the other crate end. To strengthen the crate, run a bead of glue along all seam joins.
- Cut urethane foam padding to fit the interior of the crate. Place the bubble-wrapped object in the crate. The urethane foam liner dampens the shock and vibrations experienced by the wrapped object. Use sheets of it to hold the wrapped object in place within the crate. If the wrapped object can move in any direction, use additional foam to secure the position.
- Place the crate lid on top of the crate and

secure it in place with 2" wide pressure sensitive filament tape. Place one or two strips of tape in place at the center point of each of the four sides. Then complete the taping. The tape should run from the top of the crate over the joining edge and down the crate sides approximately 6 to 8 inches. The tape should overlap making a completely sealed edge.

- Indicate which end it up with an up arrow and note the contents are fragile in large letters.
- Mark a dotted line with a permanent marker on the upper surface to alert the recipient to the preferred opening procedure. Using this method to open the crate allows for reuse.

For additional information, see COG 17/3.

Selected Sources

McMaster – Carr
6100 Fulton Industrial Blvd. SW
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www.mcmaster.com/

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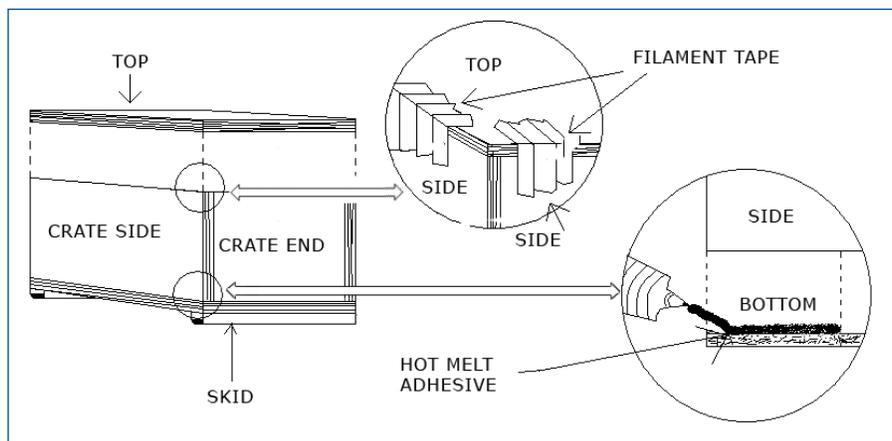


Figure 1. Paper Board Crate

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