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NMAI GOOD TIPS: APPLICATION AND BULKING OF CYCLODODECANE, AND MASS PRODUCTION OF SUPPORTS

Rachael Perkins Arenstein, Norine Carroll, Jennifer French, Emily Kaplan, Angela Yvarra McGrew, Ashley McGrew, Leslie Williamson

1. Introduction

The Conservation Staff at the National Museum of the American Indian has compiled several recommendations for the application and bulking of Cyclododecane, and for the mass production of easy object supports.

The section on cyclododecane lists tools that have been tested in the NMAI lab, with guidelines for determining which tool may be suitable for either pinpoint control or for covering larger surface areas. Bulking the cyclododecane with Japanese tissue paper or cellulose pulp is recommended for filling large, gaping joins or spaces.

The sections on easy object supports show and explain designs for economical beanbags, specialized trays with corresponding inserts, and rings for supporting round-bottomed ceramics. These archival supports are suitable for use when moving objects from location to location, or for permanent re-housing.

[Editor's note: For this volume, the tips have been reformatted (with the approval of NMAI) as a single document, with two lists of suppliers: one for cyclododecane and one covering all the supports. The tips are also available from the OSG website in the original format as individual handouts (<http://aic.stanford.edu/conspec/osg/info.htm>)].

2. Application and Bulking of Cyclododecane

Cyclododecane, a wax-like volatile cyclic alkane, has been used successfully to temporarily stabilize some of our most friable ceramics. Unlike many waxes, cyclododecane cools quickly, leaving little working time. The application tools shown in Figure 1 may assist in quickly placing the material where it is needed.

2.1 Tools for Application

A. Disposable glass pipette. This is our most frequently used tool, available from most scientific supply companies. It can be placed directly on the hotplate to clear a blockage. The pipette can also be used to fill the tjanting tool and batik ball (see below).

B. Metal dropper. Although the metal works well to retain the heat, the dropper is a little too small to work with comfortably.

C. Three-piece turkey baster. The metal tip keeps the cyclododecane from pouring out. The large size allows enough wax to be drawn up to easily cover a large area.

D. Thermal syringe jacket. This is used with an Englebrecht WZII control unit. The heated jacket keeps the wax molten at about 58° C, however, it can be difficult to refill the syringe.

E. Batik ball. This and the tjanting tool are designed for the controlled application of wax to fabric. Used with the Englebrecht WZII control unit, the batik ball is easy to fill with the glass pipette, and flow is controlled by the angle at which the tool is held. The batik ball allows for pinpoint control, and holds enough wax to be able to work efficiently.

F. Electric tjanting tool. This tool comes with its own regulator. The flow is controlled by lifting the pin in the reservoir. Unfortunately, the reservoir is small and must be frequently refilled. A blockage can be cleared with a pin or other thin sharp object, Care must be taken not to damage the hole, which could prevent the pin from operating properly.

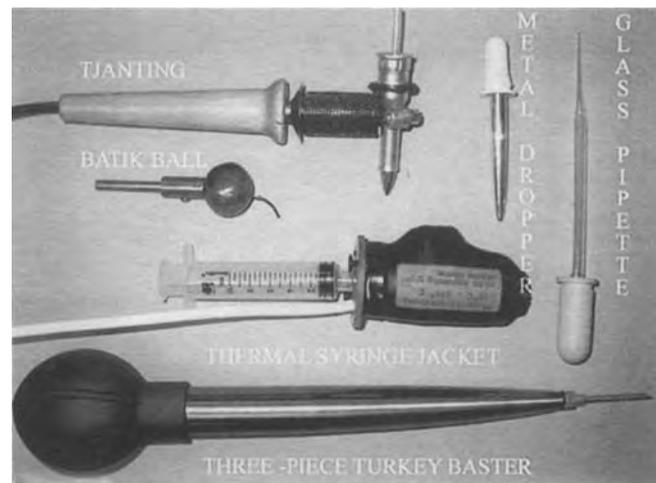


Figure 1. Application tools for cyclododecane.

2.2 Bulking Up the Cyclododecane

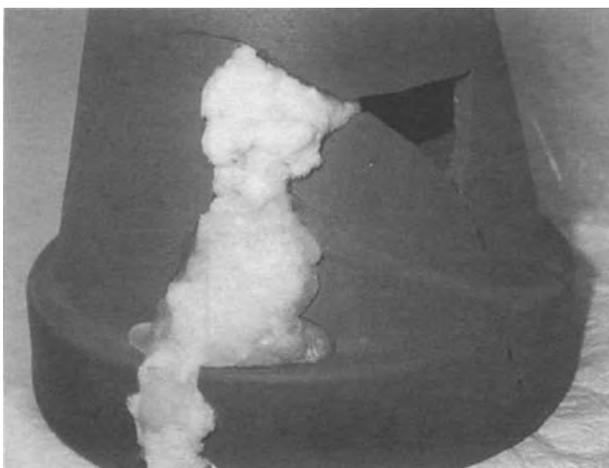


Figure 2. Gap filling with paper pulp.

Cyclododecane will go further if large gaps are filled with another material and then covered with the melted wax. In the example pictured in Figure 2, the gap has been filled in with cellulose pulp. A very large archaeological ceramic vessel with numerous gaping joins was prepared for packing by filling the space with rolls of Japanese tissue paper, set in place with the cyclododecane. When the wax has sublimated the fill material can be removed using fingers or tweezers. A bulking agent will slow the sublimation process of the cyclododecane.

3. Mass Production of Supports: Bead Bumper

These supports were designed to help move small objects and to easily count large numbers of beads. These supports are used as tray inserts by NMAI but could also be used as permanent liners for shelving and drawers.

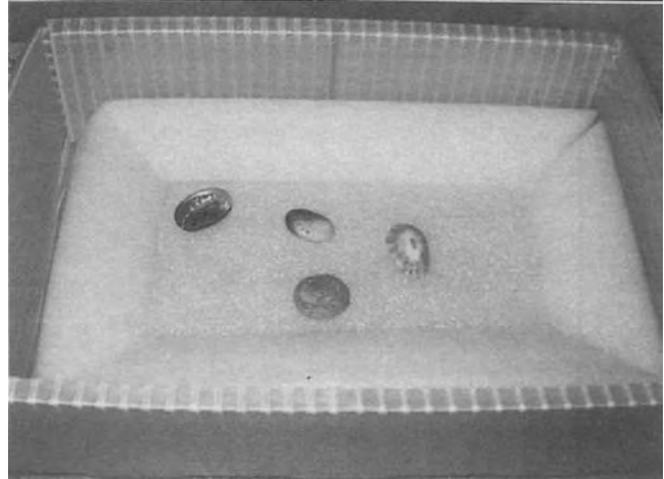


Figure 3a (left), b (right). Bead bumpers used as tray inserts.

3.1 Materials

1/8" Ethafoam sheet, Tri-Rod foam, foam knife, glue gun.

3.2 Instructions (see Fig. 4)

1. Cut the foam sheet to the size of the base.
2. Cut a piece of Tri-Rod foam the same length as the perimeter of the base.
3. Using a foam knife, make angled cuts part way through the foam in three places corresponding to the dimensions of the base; bevel the ends so that they fit together at a right angle. A jig (shown in Fig. 4) can be constructed to enable several pieces of rod to be notched at the same time.
4. Cut the rod lengthwise in half; each rod will make two bumpers.
5. Glue the flat side of the Tri-Rod down onto the Ethafoam sheet. Apply the glue close to the inner edges to prevent anything from slipping underneath

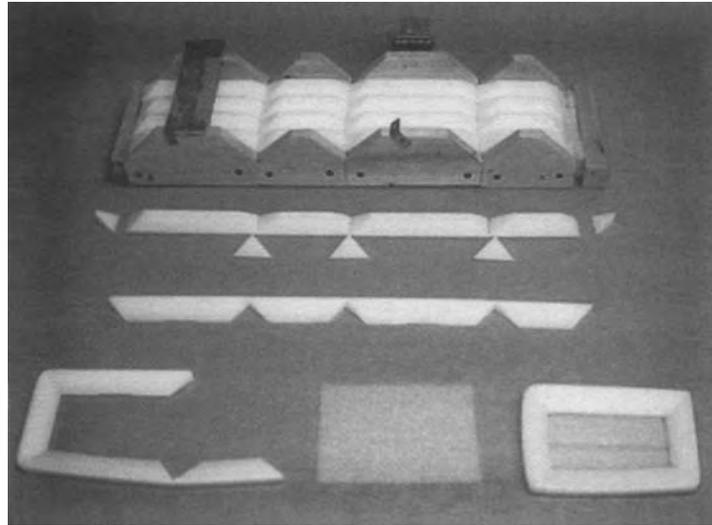


Figure 4. Construction of bead bumpers.

4. Mass Production of Supports: Bead Counter

4.1 Materials

Cardboard, 1/4" Volara, 1" diameter pipe sharpened at one end, hot melt glue and glue gun, screws, board.

4.2 Instructions (see Figs. 5 and 6)

1. Cut a piece of cardboard for the base in the size you require.
2. Cut the 1/4" Volara the same size as the cardboard, and secure the edges with hot melt glue.
3. Using a pattern, cut evenly spaced circles through the Volara with a 1" diameter pipe sharpened at one end.
4. Cut 1/8" Volara slightly bigger than the size of the board.
5. Place a drop of hot melt glue onto the cardboard through each hole in the 1/4" Volara. Place the 1/8" Volara sheet on top and apply pressure. This is most successful with a tool such as the screw press, shown in Figure 6, which is designed to make a depression in each pre-cut hole.
6. To finish the tray glue a trim of 1/4" backer rod around the edges to prevent any beads or other small objects from rolling off.

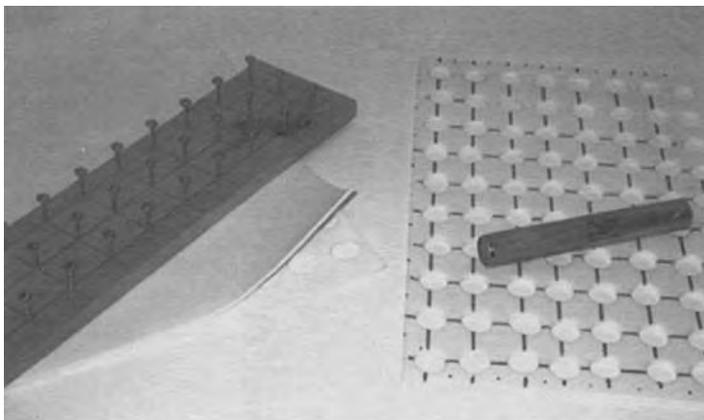


Figure 5. Manufacture of bead counter. To the right are the pattern and the sharpened pipe. To the left, the screw press used to apply pressure after applying the glue.

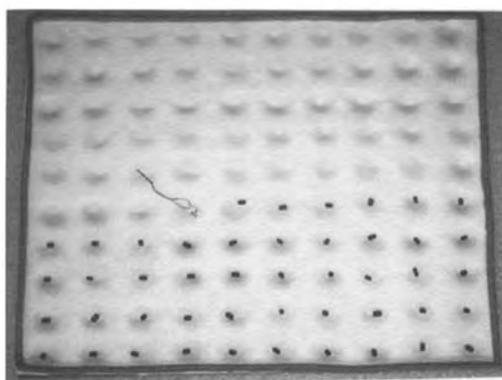


Figure 6. Completed bead counter.

5. Mass Production of Supports - Bean Bags

Leather or fabric-covered lead shot beanbags are a luxury, but a lighter-weight, less expensive alternative can be made using Tyvek filled with polypropylene pellets. They can be made any shape and size, including squares, circles and long “snakes”. They are flexible and versatile supports.



Figure 7. Beanbags of different shapes used in trays to cushion and separate objects.



Figure 8. Beanbag used as a support for a pot.

5.1 Materials

Soft Tyvek, resin pellets, polyethylene bags, sewing machine or heat sealer.

5.2 Instructions (see Figs. 9 a-d)

1. Wash the Tyvek in the washing machine on a warm cycle, then dry on a low heat setting.
2. Cut the Tyvek to size.
3. With the slick side facing in, sew or heat seal 3 of the 4 sides together, then turn inside out. The slick side should then be facing out.
4. If using a sewing machine, fill the bag $\frac{1}{2}$ to $\frac{2}{3}$ full and sew the 4th side closed.
5. As heat-sealed seams have proven to be weaker than sewn ones, if using a heat sealer it is recommended that the pellets be placed first into a polyethylene liner bag, which can be heat-sealed closed. Small holes should be made in the plastic bag to let the air out, making the bag to be more flexible. The liner bag with pellets can then be placed inside the Tyvek bag.

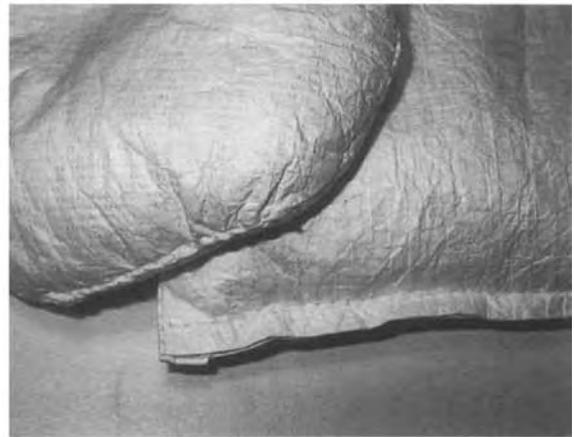
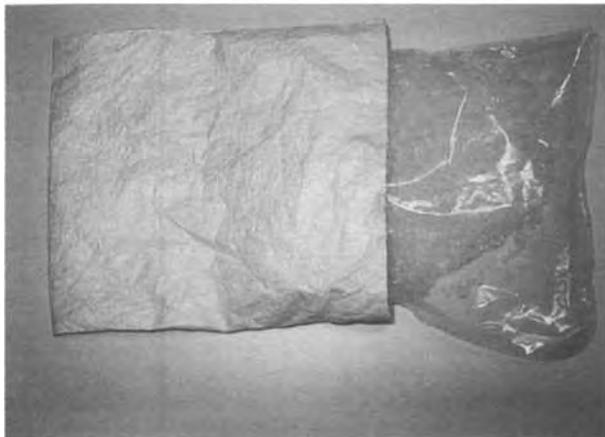


Figure 9 a-d. Construction of beanbags: sewing and turning, filling, inserting a liner, the 4th side closed.

6. Mass Production of Supports: Pot Rings

Custom sized pot rings can be easily made with backer rod and twill tape, or Tri-Rod and glue.



Figure 10. Custom sized pot ring.

6.1 “Hotdog” Backer Rod Rings

The technique is named for the way the twill tape is inserted into a groove in the foam. It works well for shallow baskets and pots.

6.1.1 Materials

Backer rod, Ethafoam, twill tape, foam knife.

6.1.2 Instructions (see Figs. 11 a-d)

1. Cut a length of backer rod foam; bevel the edges (Fig. 11a).
2. With a foam knife, slice a groove in the foam and insert a piece of twill tape (Fig. 11b).
3. Pull tight and tie (Figs. 11 c, d).

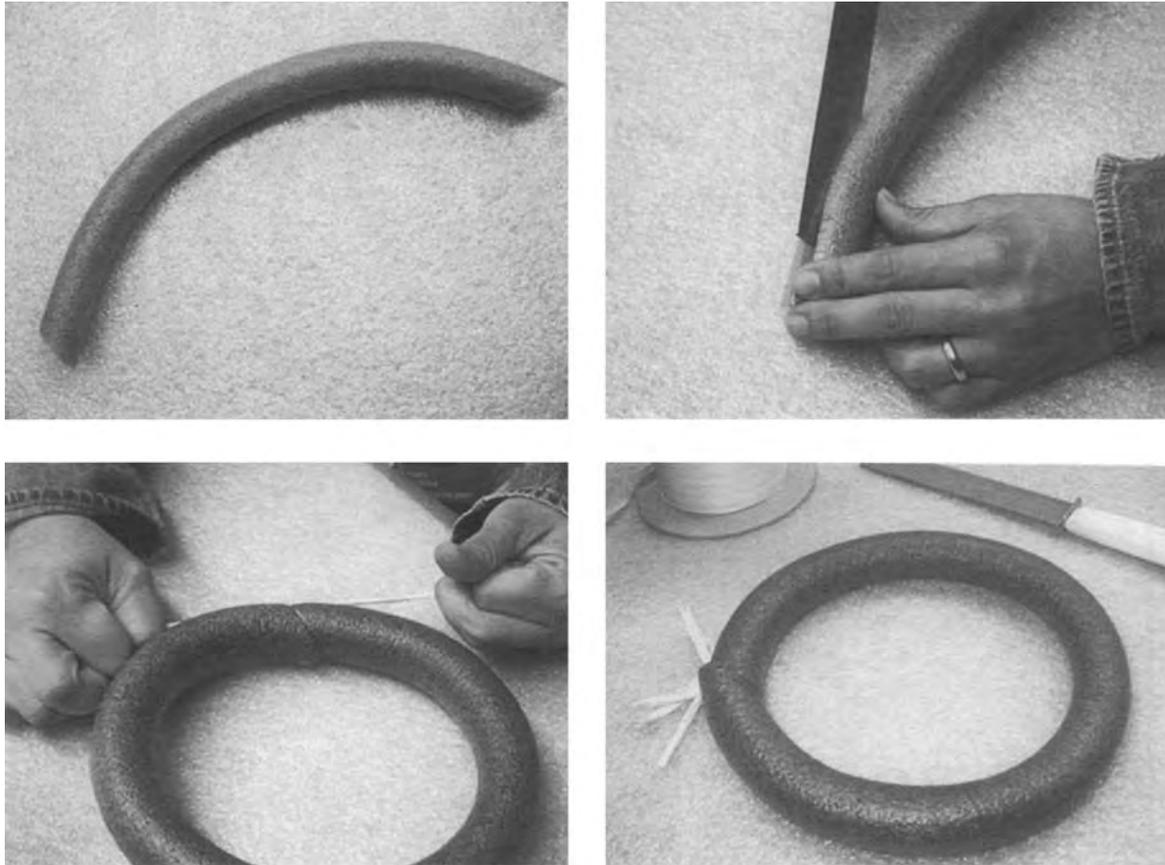


Figure 11a-d. Construction of backer rod rings: cutting the backer rod, cutting a groove in the rod for the twill tape, pulling the tape to close the circle, finished ring.

6.2 Tri-Rod Rings

This technique takes advantage of the natural angle of the rod to ensure surface contact with the pot.

6.2.1 Materials

Tri-Rod foam, foam knife, glue gun, stretch wrap.

6.2.2 Instructions (see Figs. 12 a-d)

1. Cut a length of Tri-Rod.
2. With a foam knife cut out triangular wedges, evenly spaced. Cut almost to the edge, but not all the way through (Figs. 12a, b).
3. Press the tip of the glue gun into one end of the foam to create a small pocket, and fill the pocket with glue (Fig. 12c).
4. Bind with stretch wrap to hold the ends together while they set (Fig. 12d).

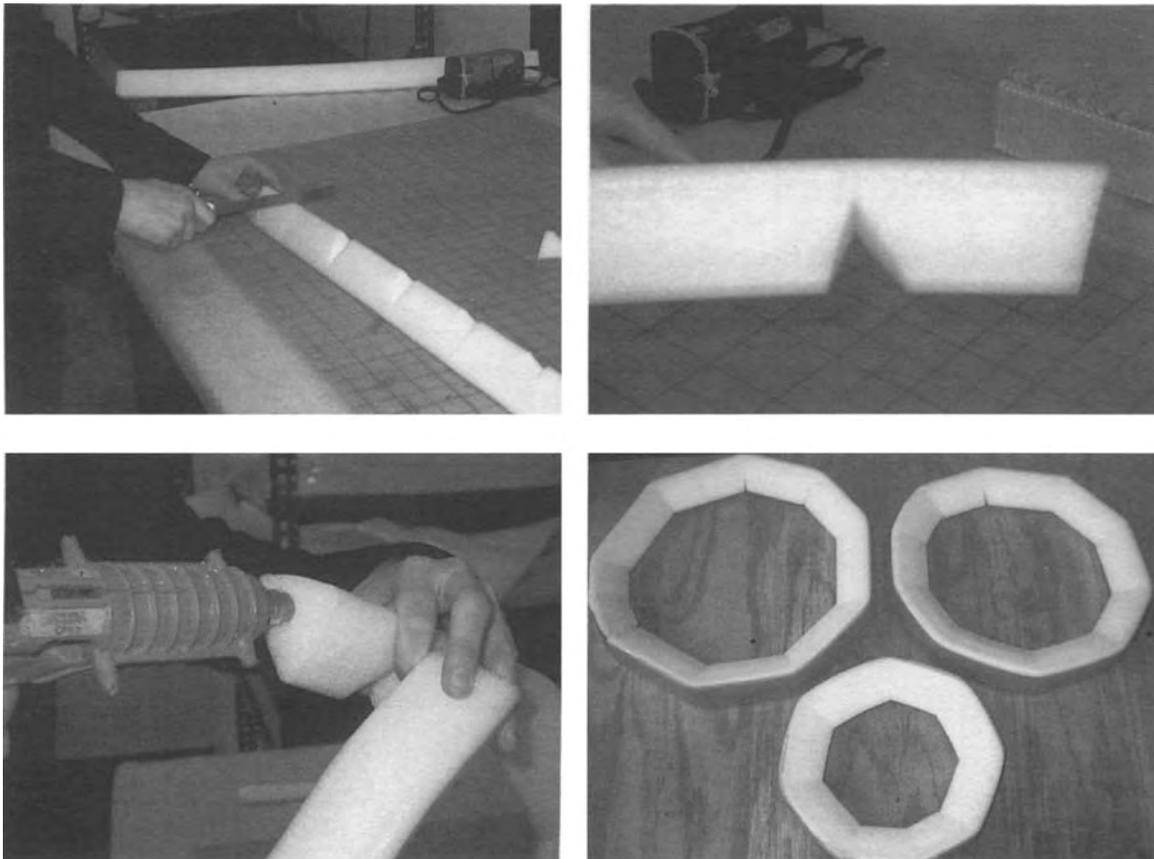


Figure 12 a-d. Construction of Tri-Rod rings: cutting the notches, notch cut in foam, applying the glue, wrapping with stretch wrap while glue sets.

Suppliers: Cyclododecane

Baster set, stainless steel with injector needle: \$7.99 from Bed Bath and Beyond, (www.bedbathandbeyond.com).

Cellulose SS122 filter pulp (manufactured by Schleicher and Schnell Microscience, Inc.): 500cc for \$10.23, from Fisher Scientific Co., Tel (800)766-7000, (www.fishersci.com).

Cellulose powder CF-11 (manufactured by Whatman): 500g for \$65.60, from Fisher Scientific.

Cyclododecane (cyclic hydrocarbon solid $C_{12}H_{24}$): 500g for \$25, 1 kg for \$45 from Kremer Pigment, 228 Elizabeth Street, New York, NY 10012, Tel (800) 995-5501, (212) 219-2394, Fax (212) 219-2395, (www.kremer-pigmente.de)

Electric tjangting tool and regulator: Product No: ETJ, \$59.95 from Dharma Trading Company.

Engelbrecht WZII control unit and heat spatula arm: \$310 for unit, \$44 for heat spatula arm from Kolner L.L.C., 23 Grant Avenue, New Providence, N.J. 07974, Tel (718) 802-1659.

Syringe thermal jacket for use with the Engelbrecht WZII Unit and heat spatula arm: 5ml size for \$250, 10ml for \$276 and 15ml for \$303; uses 0.4 x 25 mm needle; unit heats contents of syringe to $58^{\circ}C \pm 5^{\circ}$. Available from Kolner L.L.C.

Batik ball, for use with the Engelbrecht WZII Unit and heat spatula arm: \$40 from Kolner L.L.C.

Glass pasteur pipettes, disposable, borosilicate glass: 5 3/4", 250 for \$17.88 from Fisher Scientific, Tel (800) 766-7000, (www.fishersci.com)

Metal batik dropper pen: \$2.99 each from Dharma Trading Company; Tel (800) 542-5227, (www.dharmatrading.com)

Suppliers: Object Supports

Bags, polyethylene: available from Associated Bag Company, 400 West Boden Street, Milwaukee, WI 53207, (www.associatedbag.com).

Foam rod, circular, polyethylene: available from Kenseal Construction Products Corp., 10501 Tucker Street, Beltsville, MD 20705, Tel (301) 595-4044, Fax (301) 595-3261; also from Nomaco, 501 NMC Drive, Zebulon, NC 27597, Tel (800) 345-7279, Fax (919) 269-7936, (www.nomaco.com)

Foam rod, triangular ("Tri-Rod" brand): available from Granite State Log Homes, 773 Tenney Mountain Highway, Plymouth, NH 03264, Tel (603) 536-4949 or (800) 585-9605, Fax (603) 536-2980, (www.granitestateloghomes.com)

Foam sheet, polyethylene (Dow Ethafoam): available from Rempac Foam Corporation, 61 Kuller Road, P.O. Box 2585, Clifton, NJ 07015, Tel (973) 881-8880, Fax (973) 881-9368, (www.rempac.com).

Foam sheet, polyethylene (Volara brand): available from Reilly Foam, 1101 Hector Street, Conshohocken, PA 19428, Tel (900) 603-FOAM or (640) 834-1900, Fax (610) 834-0769, (www.reillyfoam.com).

Heat sealer: Impulse Autosealer (foot operated single element horizontal sealer): 12" - 24" seal, \$292.13 to \$407.14, from McMaster Carr, P.O. Box 440, New Brunswick, NJ 08903-0440, Tel (732) 329-3200, Fax (732) 329-3772, (www.mcmastercarr.com).

Hot melt glue gun, low temperature (Polygun LT, manufactured by 3M), and low temperature glue sticks (ethylene vinyl acetate copolymer, 3M #3792 LMQ): available from Tape Systems, Inc., 460 East Sandford Blvd., Mount Vernon, NY 10550, Tel (914) 668-3700, Fax (914) 668-3987, (www.tapesys.com).

Knives, food service: 6" produce knife (square-tipped) \$14.02, 8" fillet knife (pointed-tip) \$17.70, from McMaster Carr, P.O. Box 440, New Brunswick, NJ 08903-0440; Tel (732) 329-3200, Fax (732) 329-3772, (www.mcmastercarr.com).

Resin pellets, polyethylene or polypropylene: available from PolyOne Distribution. Contact Joan Barton, sales representative, (845) 566-3896, (joanbarton@polyone.com)

Stretch wrap, polyethylene: available from Preferred Plastics, P.O. Box 657, Nutley, NJ 07110, Tel (973)759-1510.

Tab and slot trays: manufactured and sold by Coroplast, 700 Vadnais, Granby, Quebec, J2J 1A7, Tel (800) 361-5150, Fax (450) 378-0835.

Tubing, polyethylene: available from Westlake Plastics Company, West Lenni Road, P.O. Box 127, Lenni, PA 19052, (www.westlakeplastics.com).

Twill tape: unbleached 100% cotton tape available from University Products, 517 Main Street, P.O. Box 101, Holyoke, MA 01041-0101, Tel (800) 442-7276, Fax (800) 532-9281, (www.universityproducts.com)

Bleached and unbleached cotton tape also available from McMaster Carr, P.O. Box 440, New Brunswick, NJ 08903-0440, Tel (732) 329-3200, Fax (732) 329-3772, (www.mcmastercarr.com).

Tyvek (high density spunbonded olefin sheet, #1443R, manufactured by DuPont): available from Material Concepts, Inc., 7701 State Road, Suite A, Philadelphia, PA 19136, Tel (215) 338-6515, (www.materialconcepts.com).

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