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Backing Boards for Paintings on Canvas – Canadian Conservation Institute (CCI) Notes 10/10



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Introduction

All paintings should have backing boards as a preventive conservation measure. Installing a sealed backing board on an auxiliary support (stretcher or strainer) will:

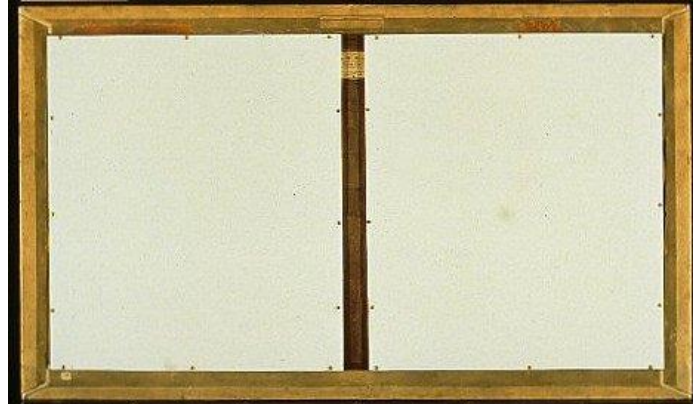
- protect the painting from mechanical damage (e.g. puncture and tear) from behind
- prevent dirt and debris from falling between the lower bar of the auxiliary support and the canvas
- buffer fluctuations in relative humidity (RH) by enclosing the back of the painting (e.g. reduce the risk of cracking caused by RH fluctuations [day–night cycles] and by low RH conditions)
- decrease the painting's response to shock (e.g. reduce the risk of cracking if the painting is dropped)
- reduce the vibration of the canvas in transit
- block airborne pollutants that can damage and thus weaken canvas supports
- discourage the practice of attaching labels to, or writing on, the back of the canvas

In order to fulfill these functions, the backing board must be strong, rigid and preferably lightweight. In Canadian winters, when there is a high risk of low RH conditions in centrally heated buildings, the backing board should have low permeability to moisture and be sealed against the back of the auxiliary support to reduce air infiltration and the resulting fluctuations in RH. The board can also be used in combination with a hygroscopic material capable of absorbing and releasing moisture (Figure 1).

The humidity protection afforded by the backing board is greatly enhanced if the painting is framed behind glass or an acrylic sheet (e.g. Plexiglas). Such protection is necessary if there is the risk that the RH could fall below 30% (Michalski 2004). The glazing will provide additional protection against day–night environmental cycles and can provide long-term protection over many weeks to years depending on the choice of glazing, backing board and sealing materials, as well as on the presence of cracks or leaks. Vibration of the canvas under normal handling conditions will also be reduced if the frame includes glazing (glass or acrylic sheet). The Canadian Conservation Institute (CCI) can provide more information on suitable enclosed frame designs for specific paintings.



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Figure 1a. Backing board secured to reverse of auxiliary support with screws and cup-washers.



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Figure 1b. Backing board (in two sections) secured to reverse of auxiliary support. An auxiliary support with a central cross bar allows the backing board to be cut and secured in smaller sections.

Please note: This Note has been written for the Canadian climate. In climates or locations where there are periods of prolonged dampness, backing boards could increase the risk of mould. In sustained periods of dampness (e.g. dry days and damp nights over 80% RH for more than 30 days), the risk of mould can be reduced by using a plastic board as well as by making ventilation holes in the backing board, thus reducing the average RH in the enclosed space. (In such an environment, the risk of high RH is reduced if you avoid hanging the work of art on exterior walls.) Extreme dampness requires different measures (Michalski 2004).

Materials

Some plastic boards and hardboards are recommended materials for backing boards. Each has advantages and disadvantages.

Plastic boards, such as corrugated twinwall polyethylene sheets (Coroplast or Hi-Core), are lightweight, moderately strong and rigid, and allow minimal moisture diffusion. A clear acrylic sheet can also be used as a backing board. This material allows any labels, inscriptions or other items of interest on the back of the painting to remain visible. These boards protect against short-term environmental changes (e.g. day–night cycles), reducing both the rate and extent of fluctuations. Since they are not hygroscopic, the boards will not absorb or release water vapour in response to environmental conditions.

Tests have indicated that synthetic boards combined with a hygroscopic material, such as a sheet of 4-ply matboard, will provide additional control of the RH within the space that is enclosed by the painting and the backing board. This hygroscopic layer will release moisture as required in response to environmental conditions, thereby helping prevent the low RH conditions that are detrimental to the painting's paint, ground and size layers.

Hardboard (tempered; at least 3 mm [1/8 in.] thick), such as Masonite, is strong, rigid and hygroscopic. If hardboard with only one smooth side is used, place the smooth side away from the canvas and consider coating the outside face and edges of the hardboard with three layers of an acrylic emulsion (latex) paint. Alternatively, MarvelSeal (an aluminized polyethylene and nylon barrier film), ironed onto the reverse of the hardboard without tearing the film, will reduce moisture permeability. Such modifications may only be worthwhile, however, when the painting is framed behind glazing.

The disadvantages of using hardboard are its weight, which rules it out for large paintings, and its tendency to expand and contract with changes in humidity. Also, the RH conditions in the enclosed space will tend to follow changes in ambient conditions more quickly than if corrugated plastic board were used. During periods of dampness, hardboard can also increase the risk of mould by drying out slowly and creating higher than average RH at the painting. However, if the painting stays in a controlled environment (e.g. Level AA or Level A; see CCI Note 10/4 [Environmental and Display Guidelines for Paintings](#)), an existing hardboard backing board can remain on the painting.

Other boards are available, but most have major disadvantages. For example, chipboard should not be used because its components may emit some vapours that can degrade some materials.

With or without glazing, the best backing board materials in order of their performance in buffering RH fluctuations are:

- corrugated twinwall plastic sheet (e.g. Coroplast or Hi-Core) with a 4-ply matboard liner
- corrugated twinwall plastic sheet alone (e.g. Coroplast or Hi-Core)
- acrylic sheet (e.g. Plexiglas)
- hardboard (tempered; at least 3 mm [1/8 in.] thick) (e.g. Masonite)

There are other alternatives and methods to improve the performance of some boards, particularly when the painting is further protected with glass or acrylic glazing on the front. For technical questions related to these recommendations, please [contact the Canadian Conservation Institute](#).

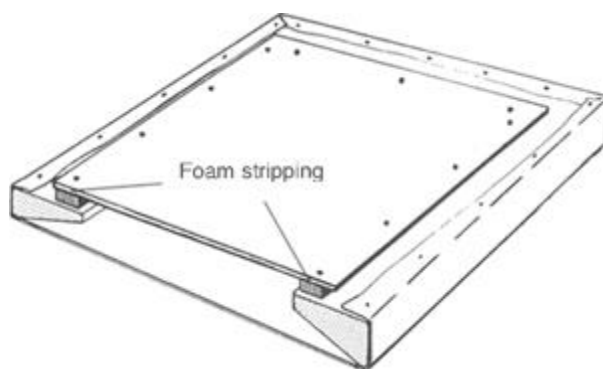
Sealing the backing board to the auxiliary support is an important step, especially in the Canadian climate (Figure 2). Using foam stripping between the backing board and the auxiliary support is one method of reducing air leakage and creating a beneficial micro-environment between the canvas back and the backing board.

Suitable foam products are available in sheets or in strips. Self-adhesive foam products, such as weather stripping, are very convenient to use. Non-adhesive foam sheets (about 6 mm [1/4 in.] thick), cut into strips about 1 cm (3/8 in.) wide and attached to the board using double-sided adhesive tape or an acrylic adhesive can also be used.

The specific foam products listed in this Note are closed-cell foams. They conform well to irregular surfaces and provide an efficient seal. It is important that the foam retains its elasticity over time so that it maintains its sealing ability. When analyzed by CCI, these foams were found to be composed of chemically stable compounds. Refer to the **Suppliers** section for more information.

Screws and washers used to apply backing boards should be corrosion resistant. Brass, stainless steel, zinc or chrome-plated screws and washers are best. No. 5 or 6 screws are recommended for most paintings. Although the screw length depends on the thickness of backing board material(s), it is generally not necessary to penetrate the auxiliary support more than 0.5 cm (3/16 to 1/4 in.).

For plastic boards, use cup-washers with the screws. For attaching hardboard or acrylic backings, use a fender-washer with an outside diameter of at least 1.8 cm (3/4 in.) and an inner diameter to fit the screw being used. The necessity for the fender-washer will be described later.



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Figure 2. Foam stripping adhered to the backing board forms a seal between the backing board and the auxiliary support (cross-section view).

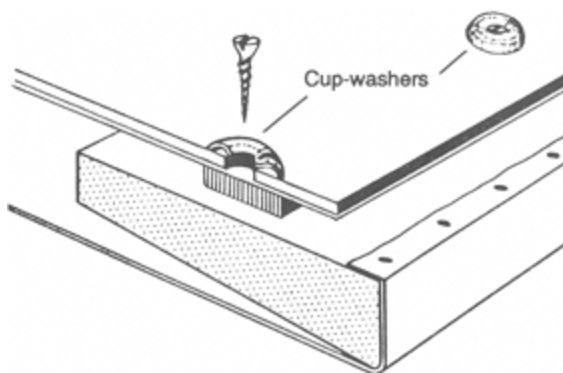
Attaching corrugated plastic backing boards

Cut the board to the required size, allowing sufficient room for the weather stripping and attachment screws. (In most cases, the backing board extends beyond the inner edges of the auxiliary support by at least 2 to 4 cm [approx. 3/4 to 1 1/2 in.]).

Large pieces of corrugated plastic sheeting (Coroplast, Hi-Core)—for example, pieces larger than 120 by 120 cm (4 by 4 ft.)—tend to be slightly floppy. For large paintings, cut the board into sections that correspond to the partitions created by the cross bar(s) of the auxiliary support (Figure 1b). Smaller sections are stiffer and will better reduce damage due to vibration and shock.

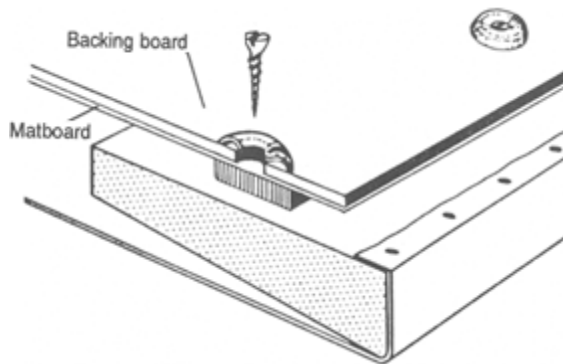
On the backing board, mark the position of the screws at a distance of 1 to 2 cm (3/8 to 3/4 in.) from the edge of the board. To avoid splitting the wood of the auxiliary support, do not place screws closer than 1 cm (3/8 in.) to its edges. The screws should be positioned at intervals of 10 to 25 cm (approx. 4 to 8 in.). As well, the board should not have a tendency to bow or lift between screws. Avoid placing the screws directly over the corner or cross bar joints of the auxiliary support or in the area of tongue-and-groove or lap joints at the corners or cross bars.

Apply the foam stripping to the inside face of the backing board, centred under the markings for the holes. If possible, when the board is in place, the foam stripping should touch the wood auxiliary support, and not the canvas folded over the back, to form a more effective seal. Using an awl, make holes for the screws through both the board and the stripping. Bring the board to the painting and attach it to the auxiliary support with No. 5 or 6 screws of appropriate length and with cup-washers, ensuring that there is firm and continuous contact between the foam and the auxiliary support, but ensuring that the foam is not tightly compressed (Figure 3).



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Figure 3. Corrugated twinwall plastic backing board with foam stripping attached to the auxiliary support with a No. 5 or 6 screw and a cup-washer (cross-section view).

Alternatively, a 4-ply matboard liner placed on the inside face of the plastic board will provide additional buffering for the enclosed space. The matboard is cut to the same size as the backing board. In this case, the foam stripping should be applied to the matboard. Once again, use an awl (away from the painting) to make holes through the plastic board, matboard and foam stripping. The two boards are held together once they are screwed to the auxiliary support (Figure 4). However, some strips of double-sided tape between the two boards could help reduce the risk of the matboard falling loose and hitting the painting when the backing board is removed at a later date.



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Figure 4. Corrugated twinwall plastic backing board with foam stripping and a matboard liner attached to the auxiliary support with a No. 5 or 6 screw and a cup-washer (cross-section view).

Attaching hardboard or acrylic backing boards

Please note: Never drill holes into the auxiliary support.

In an area isolated from the painting, prepare the hardboard backing as follows.

Cut the board to the required size as outlined above for plastic boards. Do not use sheets larger than about 70 by 90 cm (28 by 36 in.). Larger boards could warp, are very heavy, and the forces set up by the board expanding and contracting could distort the auxiliary support attached to the backing board.

On the backing board, mark the position of the screws at a 2 to 3 cm ($\frac{3}{4}$ to $1\frac{1}{4}$ in.) distance from the board's edge. As mentioned earlier, the screws should be positioned at least 1 cm ($\frac{3}{8}$ in.) from the edges of the auxiliary support. The screws should be placed at intervals about 25 cm (approx. 10 in.) apart. Avoid placing the screws directly over the corner or cross bar joints of the auxiliary support or in the area of tongue-and-groove or lap joints at the corners or cross bars.

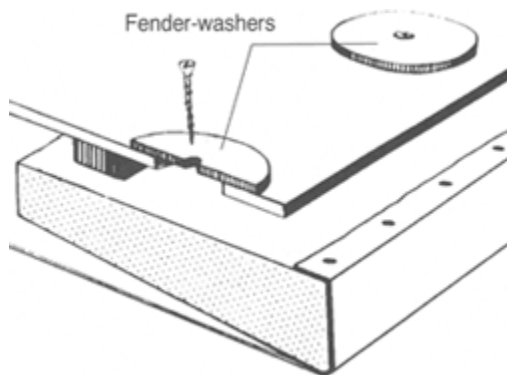
Drill holes in the backing board only, about 1.5 cm ($\frac{1}{2}$ in.) in diameter, at the previously marked positions. A $\frac{1}{2}$ in. drill bit, with a reduced shank of $\frac{3}{8}$ in., will have to be obtained from a specialty tool supplier to fit the hand drills that are commonly

used. For backing boards smaller than 60 by 60 cm (24 by 24 in.), a 7 mm (1/4 in.) hole should be satisfactory.

Attach the foam stripping to the inside face of the backing board, preferably close to, but just inside, the line of prepared holes.

To improve the moisture impermeability of the hardboard, coat the outside face and edges with three layers of an acrylic emulsion paint (latex) or attach a vapour barrier such as MarvelSeal to the outside of the board.

Carry the clean, prepared board to the painting and attach it to the auxiliary support with fender-washers and No. 6 screws of appropriate length (usually 1/2 to 3/4 in. depending on thickness of materials used) (Figure 5). The screws should float in the centre of the 1.5 cm (1/2 in.) holes and should hold the washers firmly, but not tightly. This technique allows the board to expand and contract with little effect on the auxiliary support.



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Figure 5. Hardboard backing board attached with a No. 6 screw and a fender-washer (cross-section view).

Suppliers

Note: The following information is provided only to assist the reader. Inclusion of a company name in this list does not in any way imply endorsement by the Canadian Conservation Institute.

Acrylic sheet (e.g. Plexiglas):
Plastics distributors

Corrugated twinwall plastic (polyethylene) board (e.g. Coroplast, Hi-Core):
Plastics distributors

For specific distributors, contact:

[Coroplast Limited](#)

800-361-5150

or

[Matra Plast Industries \(Hi-Core\)](#)

514-836-7071

Hardboard (tempered; at least 3 mm thick) (e.g. Masonite):
Building supply stores

Foam stripping (self-adhesive weather stripping; or foam strips attached with double-sided tape or white glue):

[RCR Climaloc](#), heavy-duty, self-adhesive, waterproof, cat. #CF12005 (white)

or

hardware stores (quote catalogue number)

Fine-celled, crosslinked, closed-cell foams cut into strips and attached with double-sided tape or white glue (e.g. Volara, Minicel, Plastozote). Foams containing crosslinked polyethylene (PE), crosslinked polyethylene vinyl acetate (PEVA) copolymer or a high grade, ether-type polyurethane foam would be suitable to use as a backing board seal.

Packaging suppliers, plastics suppliers

Please note: Other foams are suitable, but they have not been tested for conservation purposes. Also, even though a polymer is stable, it is difficult to know what materials have been included in the product during its manufacture. CCI analysis of a small group of self-adhesive products revealed the foams to be composed of ethylene propylene diene monomer (EPDM) rubber, crosslinked polyethylene (PE), crosslinked polyethylene vinyl acetate (PEVA) copolymer with various amounts of vinyl acetate and a high grade, ether-type polyurethane foam. All are suitable for this purpose except EPDM rubber. Although some grades are suitable, most EPDM rubbers are cured with sulfur-containing components and are known to outgas or "fog." Some silicone extrusions would also be suitable; however, some products contain free silicone oils, which should be avoided.

Double-sided tapes (e.g. Scotch Brand 415 tape or 465 transfer tapes):
Stationery suppliers
Conservation suppliers

Screws and cup-washers:
Hardware stores

Flat fender-washers (Paulin W-94 3/16 in. inner diameter, 3/4 in. outer diameter, or a comparable zinc or chrome-plated brand):
Hardware stores or specialty industrial suppliers

[Legere Industrial Supplies](#)

613-829-8010

MarvelSeal (aluminized plastic barrier film that can be heat-sealed to wood):
Archival suppliers

Matboard (4-ply):
Local art and drafting stores or framing shops

Mylar:
Plastics distributors

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