



# Conservation Framing of Artworks on Paper



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# INTRODUCTION

## **What is the difference between standard picture framing and conservation framing?**

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Two artworks, one framed in the standard commercial way and the other framed to conservation standards, may look exactly alike when they are picked up from the picture framer. But the difference will become apparent in time.

In standard commercial picture framing practice, the main purpose of the mount and frame is to enhance the appearance of the artwork. Much thought may go in to the style, colour and proportions of the frame and mount, but the materials and techniques used may actually cause harm to the artwork over time.

Inferior quality matboard and backing board is chemically unstable and will tend to deteriorate relatively quickly. As this deterioration progresses, the matboard will become brittle, discoloured and increasingly acidic. This in turn can promote the deterioration of the artwork with which it is in contact. Inappropriate adhesives may become irreversible or cause discolouration and staining of the artwork. Improper mounting techniques may lead to physical damage such as distortion, cockling or tears. Many works of art on paper have been irreparably damaged by inappropriate and poor quality framing.

## **Conservation Framing**

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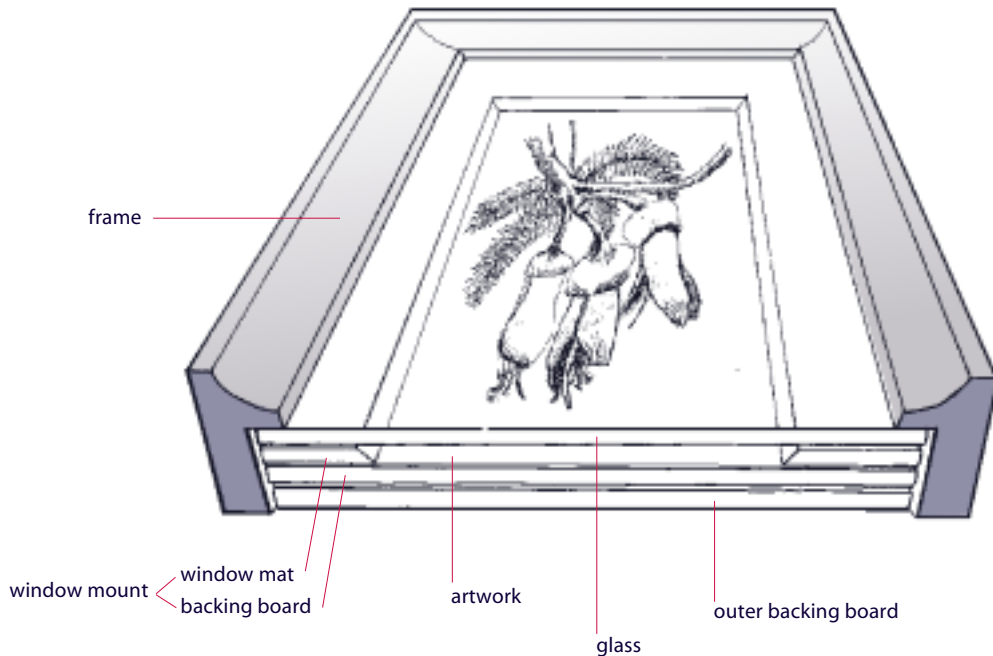
In conservation picture framing, the protection and long-term preservation of the artwork are as important as the final appearance of the framed work. The materials and methods used have been developed based on conservation principles and have stood the test of time.

All framing materials in direct contact with the artwork (such as matboard and adhesive) must be of conservation quality. Conservation quality materials have been analysed and tested by conservation professionals and have been found to be physically and chemically stable. Also, the methods used to mount the artwork must be non-invasive, reversible and in no way cause harm or stress to the artwork.

Conservation framing is more expensive than standard framing because the materials used are of higher quality and the methods used for mounting may be more time consuming. But for artworks on paper, including photographs and documents which are valuable, historically important or particularly well loved, the expense is well worth it.

Depending on where you live in New Zealand, it may be difficult to find a picture framer who offers a conservation framing service. A local museum or art institution may be able to recommend a framer with whom they are familiar. The National Preservation Office / Te Tari Tohu Taonga at the National Library may also be able to help you locate a conservation framer in your area.

# STRUCTURE OF THE MOUNT AND FRAME



**In traditional picture framing, there are several standard components which make up the framed picture:**

## **Window Mount**

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- The window mount is made up of a window mat and a backing board
- The window mat visually enhances the appearance of the artwork and provides an air space between the surface of the artwork and the inside of the glazing
- The backing board provides a support layer to which the artwork can be attached

## **The Frame**

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- As well as having an aesthetic function, the frame provides the overall structure and strength

## **The Glazing**

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- The glazing can be either glass or acrylic sheet (such as Perspex)
- It seals the frame at the front and protects the surface of the artwork

## **The Outer Backing Board**

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- The outer backing board protects the back of the mount and closes the back of the frame

# THE WINDOW MOUNT

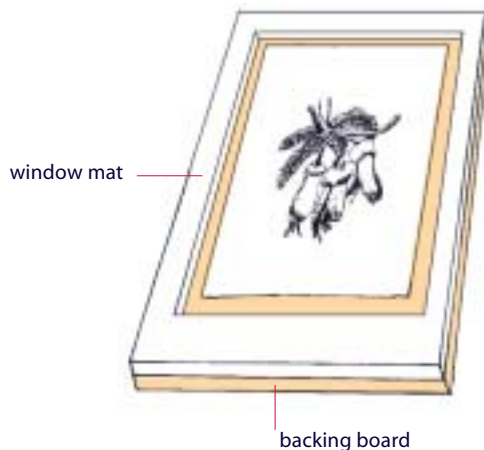
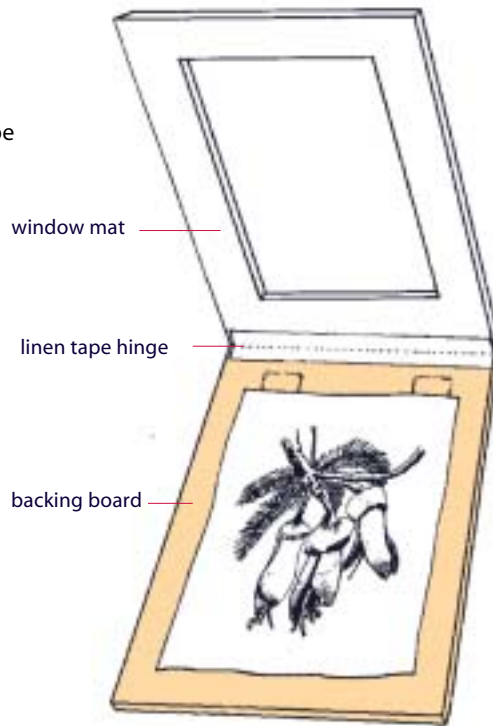
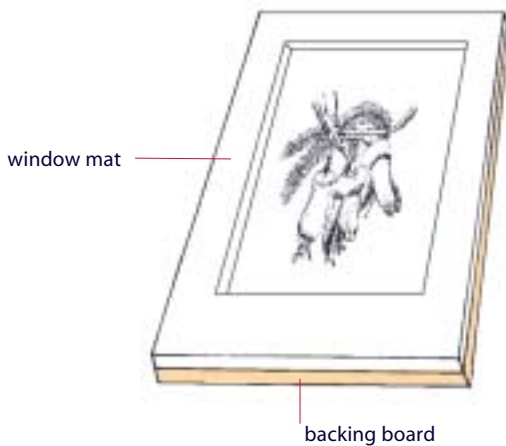
The window mount is a protective housing for the artwork which fits into the frame opening. It is made up of 2 pieces of matboard. The upper piece of matboard has an aperture cut out of the centre and is called the **window mat**. The lower matboard is called the **backing board**.

The window mat and backing board are hinged together along one side with gummed linen tape so the mount can be opened as shown.

The outer dimensions of the window mount must be larger than the artwork. There must be room around the edges of the artwork so that

the paper has room to expand in conditions of high relative humidity\*.

The **window mat** serves an aesthetic function by framing the image and covering the edges of the paper. It can be used to hide untidy borders or the rough edges of the paper.



Alternatively, the aperture can be cut larger than artwork so that the entire sheet of paper is on display. This is called **float mounting**.

**The window mat also has a very important conservation function. It provides an air space between the surface of the artwork and the inside surface of the glass.**

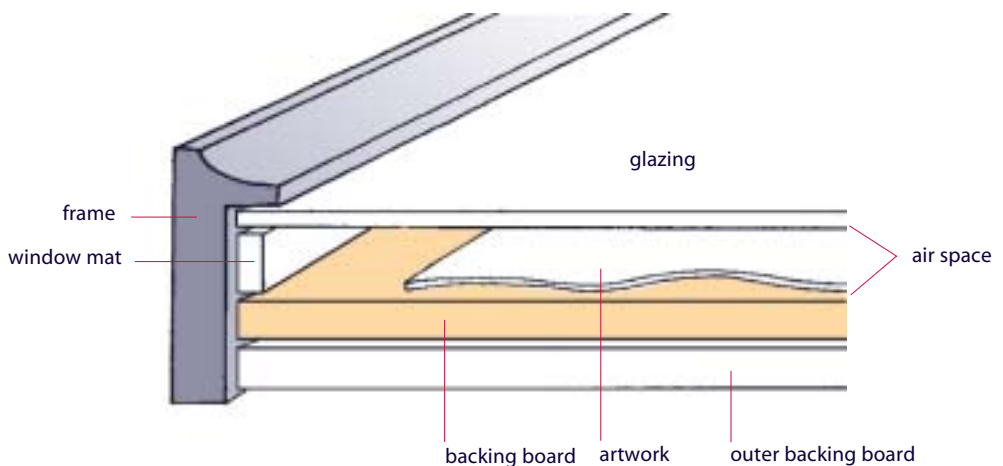
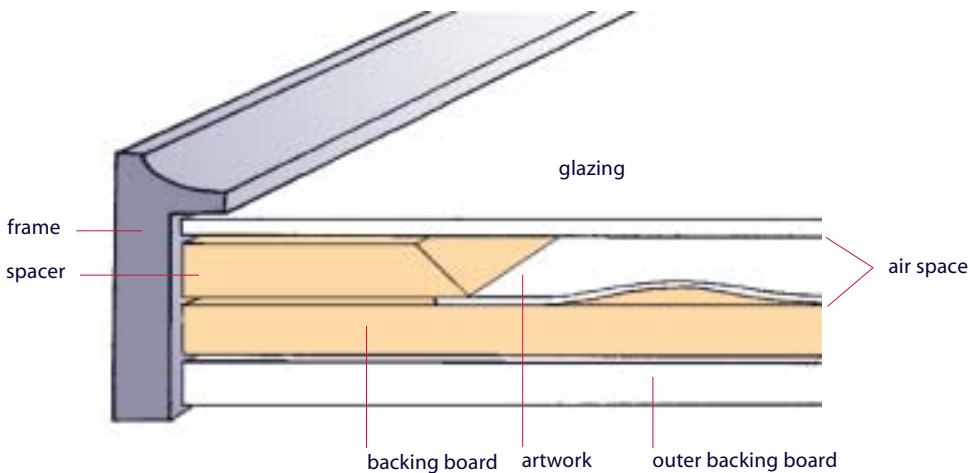
In conditions of high humidity, or when the temperature drops significantly, water vapour within the sealed confines of the frame can condense on the inner surface of the glass. (Think of the morning condensation on your windows.) This moisture facilitates the growth of mould within the frame. If the artwork is in direct contact with the inside of the glass it can be damaged by mould or, in extreme cases, water stained.

The depth of the airspace provided by the window mat will be equal to the thickness of the matboard. Normally 4-ply matboard is used, but in some cases (such as with a cockled

artwork or a thick collage-type work) a thicker matboard may be required to construct the window mat. Eight ply matboard is available or a thicker board can be made up from several layers of 4-ply matboard.

**Alternatively, the air space can be formed by placing a spacer into the rebate\* of the frame to hold the mounted artwork away from the glazing.** This technique can be used in conjunction with a window mat or when the artwork is float mounted without a window mat.

Larger artworks may have more extreme undulations in the paper and an even deeper air space may be required. For oversize contemporary works, a "box" frame is often preferred. This is a frame with a very deep profile which allows the artwork to be held well back from the inside of the glass.



## MATBOARD

Matboard (sometimes also called mountboard) is used to construct the window mount and is available in several grades:

### Standard Matboard

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**Standard matboard is not used in conservation framing.** It may be identical in appearance to high quality board when it is new, but it does not age well.

Standard matboard is made up of a cardboard core which is faced on the front and back with a paper layer. The paper on the outer surfaces may be of good quality, but the interior layers of this board are made from *groundwood pulp*\* which contains *lignin*\*. Lignin is chemically very unstable and causes the matboard to become more and more acidic over time. *Acidic*\* matboard becomes brittle and discoloured and is the cause of *matburn*\* and other types of staining and discolouration to the artwork. Standard matboard is the least expensive grade of matboard.

### Conservation Board / Purified Woodpulp Matboard /

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This board is also made from wood pulp, but the lignin and any other impurities present in the pulp are removed by chemical processing. The fibre which remains is called alpha cellulose and it is relatively pure and stable. Conservation board is described as being lignin-free\* and its stability is usually maximised by the addition of a calcium carbonate buffer.\*

Conservation board is a good quality board and is approved for conservation mounting and framing.

### Museum Board / Ragboard

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Museum board (also called ragboard) is the best quality matboard available. It is made from 100% cotton fibres. Cotton is a source of very pure cellulose and contains no lignin or other impurities. It has excellent long-term stability and is used exclusively for matting and storage in all major museums and art galleries.

Museum board is available with and without an alkaline buffer.

It is the more expensive than conservation board because cotton is more expensive than wood pulp, but it has the best long-term stability and is used exclusively for matting and storage in all major museums and art galleries.

**If you do not ask the picture framer for conservation quality framing, standard matboard will be used to mount the artwork.**

## Some Terms Commonly Used to Describe Matboard

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Manufacturers of matboard use various terms to promote their products. Some of these terms can be confusing or misleading:

### **acid-free**

This over-used term is not very useful as an indicator of long-term stability. It means that, at the time of manufacture, a pH test of the matboard would have given a neutral reading of pH 7. However, the term “acid-free” is meaningless if the matboard contains unstable materials such as unpurified wood pulp or other additives or impurities. Because unstable materials are chemically reactive and tend to become increasingly acidic over time, an aged piece of “acid-free” matboard could actually be quite acidic.

### **lignin-free**

This term is more useful in defining the stability of a matboard. By using cotton fibres (which do not contain lignin) or by chemically removing the lignin from wood pulp through chemical processing, a much higher quality matboard is produced. Lignin-free matboard is usually buffered with an alkaline salt which helps to give it even greater long-term stability.

### **buffered**

This term means that a small amount of alkaline salt (usually calcium carbonate) has been added to the pulp during the manufacture of the matboard. Because this salt is alkaline, the pH measurement of a buffered board will be slightly alkaline, usually around pH 8. This “alkaline reserve” buffers (helps to neutralise) any acidity that is present, either in the matboard, from atmospheric pollutants or from the artwork itself. But each calcium carbonate molecule can only neutralise a certain amount of acidity and there are a limited number of calcium carbonate molecules present. If the matboard contains unpurified wood pulp or other unstable substances, the deterioration process will eventually exhaust/deplete the buffering capability of the alkaline salt and the board will slowly become acidic.

Note: Non-alkaline (unbuffered) matboard is often recommended for alkaline sensitive materials, such as silver gelatin photographs and some printing methods.

## ATTACHING THE ARTWORK TO THE MOUNT

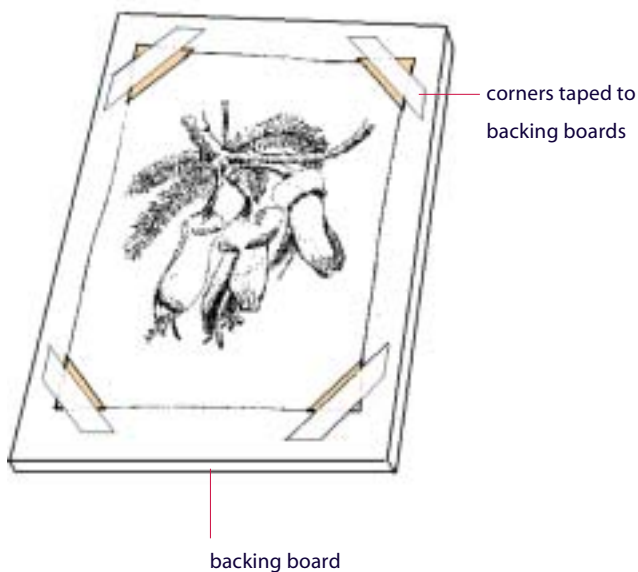
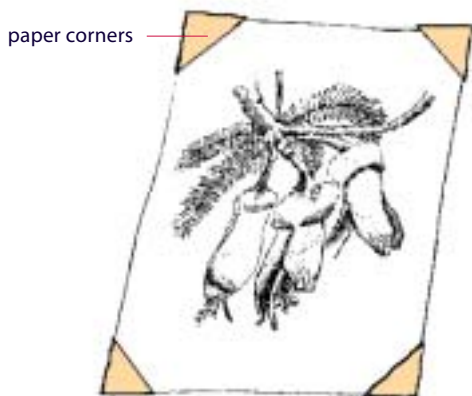
The work of art is attached to the backing board either with **paper corners** or with **paper hinges** along the upper edge. The advantage of both these methods is that there is minimal interference with the artwork and if properly done, the artwork is held securely without any physical stress. The artwork is allowed to expand and contract during changes in relative humidity and can be safely and easily released from the mount if this is necessary in the future.

No artwork should ever be glued down directly onto a backing board. Photographs are often drymounted\* or adhered onto backing boards with spray adhesive. None of these commercial mounting products should ever be used on valuable paper objects.

### Paper Corners

If the artwork has a border area beyond the image, it can often be attached to the backing board with paper corners. These are constructed by folding archival\* paper into corner pockets which work in the same way as photocorners. The corners of the artwork rest inside the paper corners, which are in turn taped to the mount board with gummed linen or paper tape. The paper corners are not visible when the work is matted as they are hidden under the window mat.

The advantage of this method is that there is no need to adhere anything directly to the artwork and it is therefore completely reversible. However if the work is to be float mounted or the border areas are narrow or non-existent, hinges must be used instead of corners. If possible, photographs should always be mounted with corners.



## Hinges

Hinges are adhered to the reverse upper edge of the artwork with a stable, reversible adhesive such as starch paste or methylcellulose\* paste. They should be made from a good quality paper, such as Japanese paper which is stable, strong and lightweight.

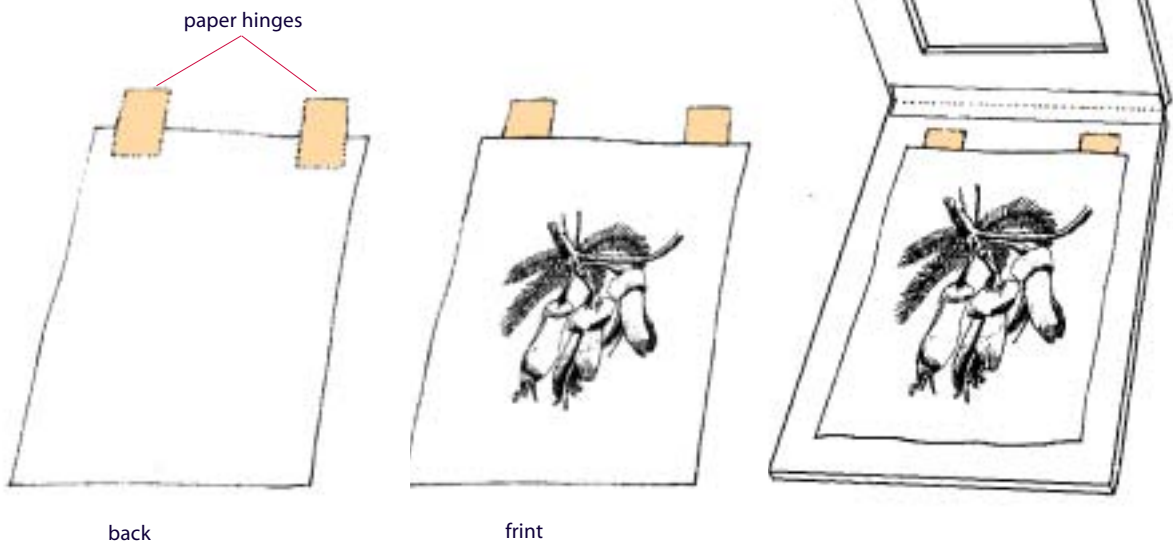
The extending upper portions of the hinges are then adhered to the backing board and the artwork hangs from the hinges. Two hinges are usually sufficient for small artworks but larger works will require 3 or more hinges.

Depending on the desired visual result and the type of paper used to create the artwork, there are many variations to this technique, but the materials used should always be of conservation quality.

**Gummed paper and linen tapes should not be used to attach artworks onto the mount.**

The gum adhesive yellows in time, causes staining and can become difficult to remove.

**Sticky tapes such as Sellotape should never be used, either for mending or mounting artworks. There is no pressure sensitive tape which is acceptable for conservation mounting.** There are several so-called "archival" pressure sensitive tapes on the market but they are not recommended for use with valuable paper items.



# THE FRAME

The choice of a picture frame is ultimately an aesthetic one, based on personal taste or the desire to frame the work in a historically appropriate style. Whether you are purchasing a new frame or re-using an old one, there are certain requirements which a frame must fulfil in order that a conservation standard of framing can be achieved.

- **The frame needs to be structurally stable and robust** enough to provide adequate support to the work. The mitre joints at the corners must be firmly pinned and glued. There should be no movement at the corners.
- **The rebate must be deep enough** to easily accommodate the total thickness of the glazing, window mat or spacer, backing board and outer backing board. Excess depth is better than too little.
- **The size of the frame opening must be larger than the outer dimensions of the mounted artwork.** The mount should fit

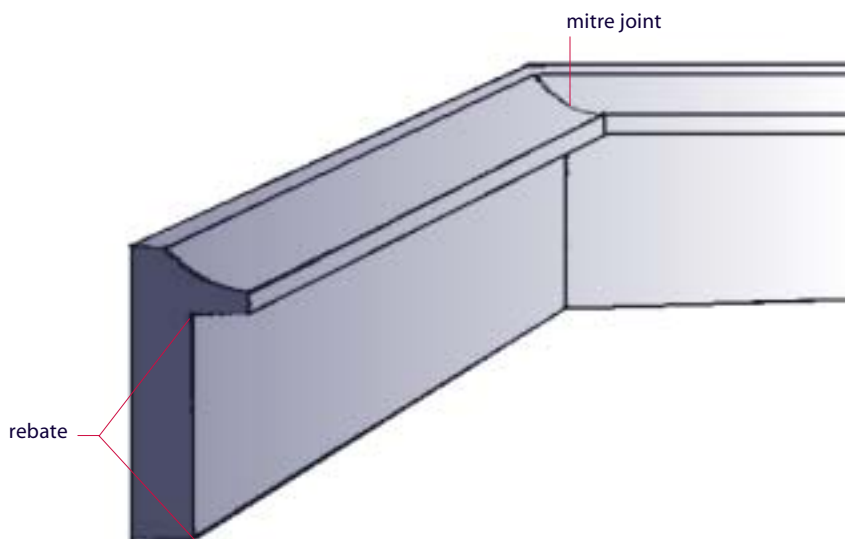
easily into the frame opening. If the mount fits too snugly it may become warped and distorted in time. Obviously, an artwork should **never** be trimmed or folded to fit into a frame.

- It is recommended that the rebate be sealed with a vapour barrier (such as aluminium tape) to prevent organic acid vapours from the wood from affecting the mount and artwork.

## Re-using old frames

If an old frame is to be re-used, it should be examined in light of these criteria and modified if necessary. If the frame is structurally sound but the rebate is not deep enough, the framer can often modify the frame by building it up on the reverse.

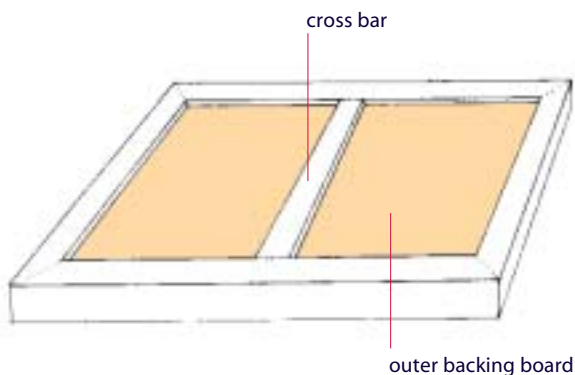
**Check for borer activity.** If there are signs of active borer, the frame may require fumigation. If the borer damage is extensive, the wood may be severely weakened and it would be unwise to reuse the frame.



## Framing Oversize Artworks

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A large artwork requires a frame with a solid, heavy profile (cross-section). The frame must be dimensionally stable, and not flex or distort when handled. If the profile is too narrow the frame may twist when handled, which may cause the glass to break or the mitres to loosen or come apart. Very large frames should have **crossbars** added to the reverse for added reinforcement and stability. Aluminium sectional frames are not suitable for large works. Standard picture framing glass is 2 mm thick but for safety reasons, large oversize works may require thicker glass or an acrylic sheet.



## Glazing

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Although oil paintings are usually framed without glass, framed artworks on paper should always be glazed, either with glass or acrylic sheet. Glazing protects the vulnerable surface of the artwork from dust, dirt and accidental surface damage. The glazing also encloses the interior of the frame to form a microclimate which provides some protection to the artwork against fluctuations in the ambient humidity and temperature.

The glass should fit easily into the frame opening. If it fits too tightly, any flexing of the

frame while it is being handled can put stress on the glass and cause it to crack.

## UV Filtering Glass

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Artworks on paper are particularly vulnerable to *light damage*\*. Prolonged exposure to light can cause deterioration which can result in visual changes such as the fading of the media and discolouration of the paper.

All light causes deterioration but the most damaging wavelengths are in the *ultraviolet*\* region of the light spectrum. Ultraviolet light is high energy and are therefore the most potentially damaging component of light. Daylight and many fluorescent lights are high in UV content. Regular glass filters out the lower energy UV light, but not the higher energy wavelengths.

Special **UV filtering picture framing glass** is available which absorbs and removes all of the UV wavelengths from the ambient light which passes through it.

**Non-reflecting glass** with an etched surface on one side is not recommended for conservation framing. Reflection is reduced when the etched surface is placed in direct contact with the artwork. For reasons already stated, this is not acceptable in conservation framing.

## Acrylic Sheet

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Acrylic sheet, such as Perspex, can be used instead of glass but it tends to scratch easily and can be difficult to clean. Because it is lightweight and cannot shatter, it is often used by art galleries for extremely large works or artworks on loan which need to be transported.

Because it generates a static charge, acrylic sheet should not be used to frame works with powdery or friable media such as chalk pastel or charcoal. Loose particles of media can be attracted to the surface of the Perspex and pulled away from the paper support.

## Outer Backing Boards

When the mounted artwork has been placed into the frame, an outer backing board is added over the back of the mount. The purpose of this extra backing board is to protect the back of the mount and hold it in place within. It also provides added rigidity and closes off the back of the frame.

The outer backing board should be made from a stable and rigid material. Acid-free corrugated board, corrugated polyethylene board or foam-core board faced with acid-free paper are all suitable for use as outer backing boards.

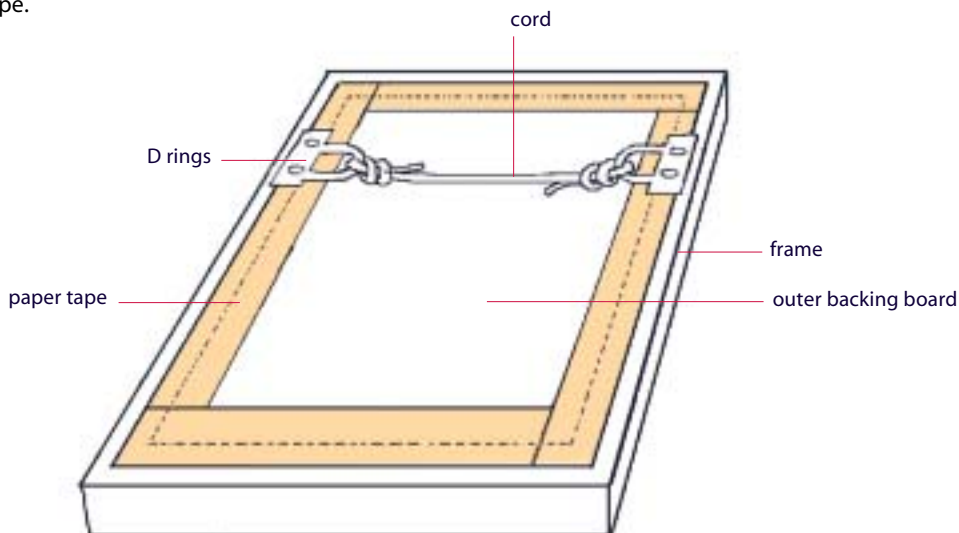
The outer backing board is held in the frame with non-corroding staples or fasteners. To prevent dust, dirt and insects from entering through the back of the frame, the gap between the edges of the backing board and the frame rebate should be sealed with strips of paper tape.

## Hanging Hardware

The frame is finished on the reverse with the appropriate hanging hardware. Hanging devices should be strong, securely attached and in proportion to the size and weight of the framed picture.

Screw eyes may be adequate for small frames but D-rings, attached to the frame with screws, are recommended for medium to large works. For the safety of the artwork as well as the viewer, very large or heavy frames should be fitted with cleats or extra heavy D-rings.

Synthetic hanging cord (such as nylon) or metal wire should be used rather than natural fibre cord, which can deteriorate over time and break under the weight of the frame.



# RE-FRAMING A PREVIOUSLY FRAMED ARTWORK

Before removing or replacing an old frame or mount, there are a number of things which should be considered:

- **An old picture frame may have special value if it is unique or if it is the original frame.** The choice of frame may have been made by the artist. It may even have been created by the artist specifically for that artwork. Artist's frames are sometimes crude and roughly made, and may have a hand painted finish. These frames should never be replaced as they are an integral part of the artwork. In order to determine whether a frame is original it may be necessary to do some research or consult with an art historian or curator.
- **Historical frames are sometimes glazed with old glass.** This glass is typically wavy in appearance and may contain air bubbles and other imperfections. This glass is valuable and should be retained.
- **Before removing an old mount or backing board, check for the presence of any documentary information relating to the artwork.** There may be framer's stamps, gallery and exhibition labels or handwritten inscriptions present. Apparently irrelevant notations can sometimes contain information about the history of the work which may be important in the future for helping to establish its provenance\*. Be sure to discuss the presence of any documentary information with the framer. These pieces of information should be retained and kept with the artwork. The entire mount can be saved or the old labels can be removed and incorporated into the new mount or frame.

## Unframing a picture

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Unframing an artwork is often straightforward, but the previous framer may have mounted or framed the work in an unusual way.

**It is recommended that you let your picture framer do the unframing** because without the proper tools it is easy to cause damage to the artwork. The framer will have an assortment of tools for removing the backing board and dismantling the mount. Also, they will be familiar with the various techniques used in the past to assemble mounts and picture frames.

Once the work is unframed, things that were not previously evident may be uncovered.

You may discover that the window mat has been solidly glued over the edges of the artwork or that it has caused staining or matburn\*. The artwork may be glued onto a brittle discoloured cardboard backing which has caused staining or discolouration to the artwork. A brittle mount may have partially broken, causing physical damage to the artwork. There may be mould or insect damage present.

**In cases like these, it may be necessary to seek the advice of a paper conservator.** The old mount material may need to be removed in order to stabilise the artwork before it is provided with a new conservation mount.

# HANGING AND ONGOING MAINTENANCE

## Environmental Concerns

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Artworks on paper are vulnerable to damage caused by environmental factors. Heat, moisture and light are all agents of deterioration which will promote and accelerate the ageing process.

- Select the display positions for your pictures carefully. The best walls on which to display artworks are interior walls. Exterior walls, especially south facing walls, tend to hold moisture, either from the weather or from rising damp. Dampness in the wall can cause the formation of a humid microclimate behind a framed work and this can lead to mould growth or the promotion of foxing\* stains in the paper. Obviously, damp humid areas such as kitchens and bathrooms are not good display areas.
- If an exterior wall cannot be avoided, the backing board should be made from a moisture impermeable material, such as corrugated polyethylene. Alternatively, the outer backing board can be covered with a sheet of heavy Mylar.
- To help minimise the chance of a microclimate forming behind a frame on the

wall, small bumpers can be placed at the reverse corners of the frame to hold it slightly away from the wall. Small plastic bumpers with self adhesive backings are commercially available. You can also attach slices of cork to the reverse corners of the frame.

- Artworks should never be exposed to bright or direct sunlight, even if they are framed with UV filtering glass. Remember that all light (not just UV light) causes damage. Closing curtains or blinds when a room is not in use can help to reduce light damage, as will turning off lights when they are not required.

## Installation

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- When installing a framed artwork, the hanging cord should be hung from picture hooks or J-hooks rather than just straight nails. Hang the cord from two hooks, spaced well apart on the wall. This is a more stable configuration than a single hook and the frame will tend to stay square on the wall.
- All hanging hardware and cords must be strong and secure. With large or heavy frames, cleats should be used instead of hanging cord. These hook directly onto screws or J-hooks which have been screwed into the wall. If the frame is being hung on plasterboard, hollow wall anchors or plasterboard fasteners should be used to hold the screws in place.

## Housekeeping

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- Check the reverse side of picture frames periodically. Be sure that the cord is in good condition and that the hanging hardware is secure. Check for signs of insect activity. Check that the backing board is securely in place and that the dust seal is intact.
- To clean the glass, spray glass cleaner onto a cleaning cloth and wipe the glass. Do not spray the cleaner directly onto the glass as it may run down into the rebate and stain the mount or the artwork. To protect its surface coating, UV filtering glass should only be cleaned with the special cleaning solution provided by the glass manufacturer.
- Take a good quality, detailed photograph of the artwork for future reference and store it in a safe place. Some kinds of damage such as discolouration or staining occur very slowly and may go undetected. Every 6 months or so, compare the photograph with the original to check for any signs of change in the original.
- In the event of a burglary, the photograph will be useful to both the insurance assessors and the police.

## Security

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- If security is an issue, security hardware is available. There are several simple screw-type fastening devices which make it difficult to remove the frame from the wall. Ask your picture framer what is available.

# GLOSSARY

## acidic

A description of substances or materials that are acid-forming, that is; capable of forming acid in the presence of moisture.

When acid is present in cellulosic materials such as paper or board, it catalyses the breakdown of the cellulose molecule, causing the paper to become increasingly brittle and discoloured. As time goes by, deterioration continues and the degree of acidity increases.

This acidic board or paper will affect other materials in contact with it, causing a chain reaction of increasing acidity and accelerated deterioration.

Conditions of high temperature and humidity will accelerate this chemical reaction.

## alkaline

The opposite of acidic. The pH scale goes from 1 (very acidic) through to 7 (neutral) to 14 (very alkaline).

1	2	3	4	5	6	7	8	9	10	11	12	13	14
very acidic		acidic			neutral			alkaline			very alkaline		

## archival

A material which is physically and chemically stable with good long term ageing properties can be described as archival. The term is used to describe paper products which have been specifically manufactured for use with collection materials. Archival paper and board are used to construct folders, boxes and other storage enclosures.

## drymounting

Drymounting is a method used to mount primarily photographic prints onto a backing board, but is also sometimes used to mount artworks on paper. Drymount "tissue" is a glassine-type paper with a heat activated adhesive layer on both sides. It is placed between the photograph and the backing board. This assembly is then placed into a heat press to melt the adhesive and adhere the layers together.

## foxing

This term refers to the small reddish brown coloured stains which often form in paper. Though this phenomenon is complex and not fully understood, high humidity and the quality of the paper are both factors which are linked to the development of foxing stains.

## groundwood

Groundwood is the type of pulp used to make newsprint and other ephemeral paper products. It is made from wood chips which are finely ground and then made into a pulp. None of the lignin or other impurities are removed so paper made from groundwood is unstable and discolours very quickly when exposed to light and high temperatures and humidity.

### **light damage**

Light causes permanent and irreversible damage to many kinds of artwork. Media such as watercolour, gouache and coloured dyes (colour photographs, coloured pencils, felt markers and inks, dyed paper) are extremely sensitive to light and will fade rapidly. Any paper containing lignin will become brittle and discoloured when exposed to light for extended periods of time. Light levels should be kept to a minimum and exposure time should be reduced as much as possible. The ultraviolet component of light should be excluded either through the use of filters or, if possible, by changing the light source.

### **lignin**

Lignin is a complex and highly unstable component of many plant fibres. It is the “glue” within the plant cell walls which gives the plant strength and rigidity. Paper containing lignin degrades and discolours very quickly, especially when exposed to light, heat and moisture.

### **matburn**

This is a type of staining found on artworks which have been mounted for prolonged periods of time in acidic window mats. This staining is a kind of “chemical burn” to the artwork, caused by the acidity in the cardboard core of the matboard. It appears as a brown stain around the periphery of the image, corresponding to the cut edge of the window mat aperture.

### **methylcellulose**

Methylcellulose is a derivative of cellulose which is used as an adhesive for paper. It is water soluble and forms a stable and easily reversible adhesive.

### **provenance**

Provenance refers to the history of the work since its creation.

### **rebate**

The inside edge of the frame opening is called the rebate.

### **relative humidity**

Relative humidity, given as a percentage, describes the amount of water vapour in the air relative to the maximum amount of water which the air could hold (i.e.  $\hat{}$  if the air was saturated) at that temperature. Temperature and relative humidity are integrally related. In a closed system, a rise in temperature will cause a fall in the relative humidity and vice versa.

Hygroscopic materials such as paper are constantly and continuously trying to stay in equilibrium with the humidity levels in the surrounding air. In humid conditions, paper takes in water molecules. This causes the paper to expand. In dry conditions, water molecules are released back into the air resulting in contraction. This pattern of expansion and contraction closely follow any fluctuations in the ambient relative humidity.

### **ultraviolet (UV) light**

Ultraviolet light and visible light are components of the electromagnetic spectrum. Because the ultraviolet wavelengths are high energy wavelengths, they are capable of causing damage to many organic materials by promoting various chemical reactions.



*Te Tari Tohu Taonga*

National Preservation Office

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For further information contact the  
National Preservation Office  
Te Tari Tohu Taonga  
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PO Box 1467  
Wellington 6001  
Tel: (04) 474 3000

**For information on conservators, see the  
website of The New Zealand Professional  
Conservators' Conservators Group:**  
<http://www.conservators.org.nz>