

BEYOND



THE BRUSH

A COMPLETE HANDBOOK TO UNDERSTANDING AND USING ARTIST CANVAS

Fredrix[®]

SERVING ARTISTS AROUND THE WORLD SINCE 1868



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INTRODUCTION

Fredrix® was founded in 1868 by E. H. Friedrich. Although, he spent much of his time on trains and coaches drumming up business, he was much more than a salesman. He was a businessman, a chemist, an inventor, an innovator and he was the first in America to manufacture artist canvas for the trade.



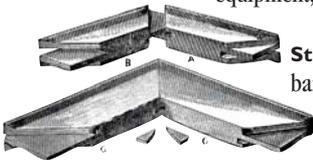
Although the art of manufacturing artist canvas has changed since the 1800's, the product we make today is very similar to the canvas we made over 100 years ago. The name was changed (Friedrichs to Fredrix), but our mission has not. Whether your choice is a machine primed canvas with universal acrylic gesso or a hand primed canvas with natural glue sizing and oil based ground, you can trust Fredrix® to provide you with the highest quality products in the widest possible variety available at the most affordable prices. Only Fredrix® offers you the greatest artist canvas values, whether it is your first painting or your highest commissioned artwork to date.

Fredrix® innovations such as; acid free canvas, synthetic fiber canvas, synthetic/natural blended canvas, tongue & groove stretcher strips, gallery style pre-stretched canvas and our newest innovation, Fredrix® PrintCanvas™, the canvas you can print on, are all the result of our efforts to help individual artists fulfill their unique artistic expressions.

Some examples of our products and innovations are listed here:

Raw Canvas— Fredrix® shops all over the world to find the finest artist grade cottons, linens and blends, which are all woven to our rigid specifications.

Priming—All of our coatings are specially formulated to complement and enhance the unique inherent characteristics of the natural fibers as well as to protect the canvas fibers against acidic deterioration with a buffered neutral PH sizing. Most of our canvases are machine primed using state-of-the-art industrial equipment, but we still prime many of our canvases the old fashioned way... by hand!



Stretcher Bars—All of our pre-stretched canvases are mounted on stretcher bars made from kiln dried SPF grade lumber and feature the unique Fredrix® interlocking tongue and groove design, which was first developed by our founder, E.H. Friedrich, in 1875.

Archival Quality—Your creative efforts deserve the very best. Only Fredrix® Artist Canvas can display this Archival Seal. It's your guarantee that the masterpiece painted today will be a masterpiece for generations to come.



To ensure the best overall painting performance and long term archival quality, choose the only canvas that has stood the test of time... Fredrix® Artist Canvas... Since 1868, over 130 years.

For more information about Fredrix® products visit our websites:
For Fredrix® Artist Products—www.fredrixartistcanvas.com
For Fredrix® PrintCanvas™ Products—www.fredrixprintcanvas.com
For Fredrix® Floorcloth Products—www.fredrixfloorcloths.com

SIZING, PRIMERS & GESSO GROUNDS

- Acrylic Gesso Pigment (titanium dioxide) and calcium carbonate mixed with acrylic polymer emulsion.
Acrylic gesso contains both the ground and sizing together. Suitable for flexible supports.
- Acrylic Ground Also known as Acrylic Gesso.
- Acrylic Sizing Acrylic Polymer Emulsion. Used alone or prior to applying acrylic gesso to seal canvas.
- Ground A material that prepares the surface upon which paint will adhere. Can be a compound of binder and pigment, but can also be just binder as in acrylic grounds.
- Oil Ground Pigment (titanium dioxide or white lead) mixed with binder (linseed oil).
- Oil Paint Sizing Commonly known as “animal skin glue”. Applied to linen canvas, when oil based ground will be painted on top to protect canvas from the acidic qualities of the linseed oil in oil paint.
- Priming, Primer The preparation of a surface upon which to paint, using a sizing and ground. Acrylic Gesso is an Acrylic Primer. Animal skin glue followed by an oil-based Ground is an Oil Paint Primer.
- Sizing/Size Seals, protects and makes canvas less absorbent. Provides receptive surface for the Ground.
- True Gesso A sizing made of animal glue and inert pigment such as whiting. Used for hundreds of years in preparing wood panels for tempera and oil painting. Not suitable for flexible supports (canvas).

CANVAS TERMINOLOGY

- Canvas A tightly woven fabric often used as a substrate for painting.
- Canvas Weight The weight of a square yard of raw canvas usually stated in ounces, prior to priming.
- Count Number of yarns in warp and weft per square inch.
- Loomstate Raw canvas with no modifiers or additives.
- Picked Hand process of removing irregular and nubby yarns from raw canvas.
- Plied Yarn Twisting together of yarns into a single braid.
- Pumiced Hand process of rubbing raw or sized linen with pumice stones to achieve a smoother texture.
- Strike-Through Ground and/or sizing penetrating through into the back of the canvas.
- Substrate/Support Surface upon which any paint is applied (canvas, paper, wood, etc.)
- Texture The pattern of woven canvas modified by the degree of coarseness and uniformity of yarns.
- Tooth The abrasiveness of the surface (canvas, paper, ground) in terms of coarseness and porosity.
- Warp Yarns running the length of the canvas.
- Weft Yarns running the width of the canvas.

TYPES OF CANVAS

- Cotton Canvas Most popular artist grade canvas. Suitable for oil and acrylic paint.
- Cotton Duck The most popular canvas. A closely woven plain weave using medium to heavyweight yarns where the warp is woven in pairs, giving the canvas a flat appearance.
- Double Primed (DP) Two coats of gesso, producing a smoother surface that is better for portrait or airbrush techniques. Smoother and stiffer than single primed canvas. All Fredrix® machine primed canvas is DP.
- Jute Canvas A coarse canvas, suitable for mural and general use. Less archival than cotton or linen.
- Linen Canvas The most permanent, strong and beautiful canvas material with the highest perceived value.
- Osnaburg Cotton canvas made of single yarns and generally of lesser quality than duck.
- Polyflax® Fredrix® trademark for 100% synthetic fiber artist canvas primed with acrylic ground.
- Single Primed (SP) One coat of gesso. More flexible than DP canvas. Occurs in Fredrix® hand-processed canvas.
- Synthetic Canvas Most uniform in texture, exceptionally strong and long lasting. Does not impart as much aesthetic or perceived value as linen or cotton canvas.
- Universal Primed Primed canvas made from acrylic polymers that accept oil, acrylic or alkyd paints.

CANVAS

Thousands of years before the development of what we now refer to as “artist’s canvas”, linen and cotton were being used in a wide variety of formats and functions.

Egyptian Mummies

Flax was first cultivated in the Nile Delta 10,000 years ago. When mummification was developed in Egypt approximately 3000 B.C., linen was used to wrap around the deceased body. Linen, provided by the family of the deceased, was soaked in herbs and ointments. The archival quality of linen fibers together with Egypt’s dry climate have enabled the linen to survive in good condition for almost 6000 years.

Shroud of Turin

The world’s most famous piece of linen is the Shroud of Turin. It bears the ventral and dorsal image of a crucified man, that many believe to be Jesus of Nazareth. The shroud is 3½’ x 14½’, with a weave pattern of herringbone twill that weighs 8 ounces per square yard. While carbon dating done in 1988 has indicated that the age of the shroud is medieval in origin, others believe that it is the burial cloth of Jesus and is 2000 years old. Questions of its authenticity aside, the Shroud of Turin serves as an excellent example of the archival qualities of linen.

Wood Panel Paintings

Medieval wood paintings were primarily done for churches throughout Europe from the 10th to 14th centuries. Detailed instructions for Florentine artists, from the early 15th century, for the making and preparation of wood panels can be found in Cennino Cennini’s “The Handbook of Crafts”. The wood should be fine grained, free of blemishes and thoroughly seasoned by slow drying. The surface is prepared with layers of clean white linen strips soaked in gesso.

Wood offered a surface that could be cut and constructed to any size or format, and could be transported from the artist’s studio to the site of installation. However, wood is organic, and unless properly sealed is susceptible to damage by out-gassing, weather, insects and age. All of these components are evident in medieval wood paintings: cracking, warping and even termite damage. Wood may also contain excessive amounts of oils, sap and moisture, which can adversely affect the surface of the wood and the paint upon that surface. Wood also has the disadvantage of dramatically increasing in weight as the size is increased.

Tapestries

Tapestries are highly decorated pieces of woven fabric meant to be hung from a wall or placed on a piece of furniture. By 2000 BC tapestries, using loom technology dominated Peruvian and Andean textiles. In 15th century Europe, tapestry imagery used many of the same concerns of three dimensional space and naturalistic detail that are seen in Flemish paintings. However, the technique of weaving placed a limitation on artistic freedom, and the entire process made them very expensive, with only a few able to afford them. In addition, the dyed fabric is very susceptible to pollutants from the environment, such as smoke, dirt and dust.

Venetian Painting

The use of large canvas paintings instead of frescoes for wall decoration developed in Venice in the early 15th century. These first paintings were done with tempera paint on linen. Most were decorations for private homes or inexpensive substitutes for tapestries. Canvas paintings were considered less important and less expensive than frescoes until Venetians began to exploit the technique of painting with oils on canvas in the late 15th century.

Oil paint, with its binder of linseed oil, is relatively flexible and could stand the stress of a flexible support, such as linen canvas, whereas tempera paint could not.

The Switch From Tempera to Oil Paint

Paintings on canvas allowed greater flexibility to artists, who could complete the work in their studios and then carry the rolls of canvas to the location where they were to be installed. Pigments were being ground much finer than the earlier panel paintings, and the coarse Venetian canvas was sealed and made smooth with a prime coat of lead white. The flexibility of the canvas support, together with the radiance and depth of oil color pigments, made oil paintings on canvas the preferred medium.

Linen and the Development of Oil Paint

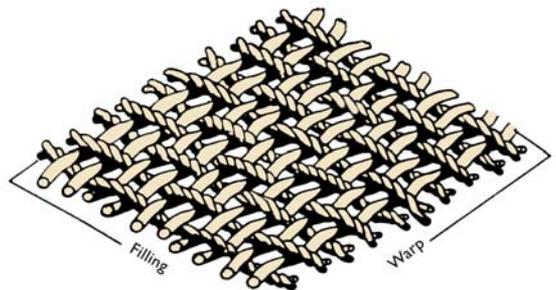
By the 15th century, Belgium was the leading center for the growing of flax. Growing flax and the advanced technology of weaving linen among Flemish mills, made linen canvas readily available and inexpensive. The flax plant is also the source of linseed oil, which is the binder for oil paints.

WHAT IS CANVAS?

Canvas is a term applied to tightly woven fabrics, usually cotton or linen that are used for sails, tents, awnings and paintings. The archival necessity of paintings dictate that canvas used for painting be of the highest quality material. Canvas comes in a wide variety of textures, qualities and dimensions. It can be chosen for a specific effect desired in a given painting such as: an extra smooth surface for detailed portraiture, a bold texture for impasto, or an abrasive “toothy” surface to enhance adhesion for collage.

The Structure of Canvas

The weave of canvas goes in two directions. The yarns running the length of the canvas are referred to as the “warp”. The yarns running across the width of the canvas are referred to as the “weft or filling”. The strength of the canvas is based on yarn thickness, closeness of construction, and fiber quality as indicated by its tensile strength.



Loomstate Canvas

During the spinning and weaving of canvas production, stresses are placed on the canvas fibers that stretch them beyond their natural dimensions. “Woven canvas is referred to as “loomstate” and only in this state can it be made into artist canvas. When wet (during sizing or priming), the canvas reverts to its natural state by pulling back to the relaxed fiber dimension (it shrinks). The term “shrink” in a woven canvas refers to the ability of the fibers to return to their normal relaxed state when subjected to moisture. It is the potential shrink in an artist canvas that keeps it taut on the stretcher frame through constant changes in temperature and humidity.

Pre-Shrunk Canvas

A canvas that has been pre-shrunk is normally unsuitable as an artist canvas, because it has lost the ability to shrink. Pre-shrunk or chemically treated canvas tends to sag during periods of high humidity. This constant movement can affect adhesion of both the ground and paint that is on the canvas. You can accidentally create a pre-shrunk canvas by painting or staining an un-mounted raw canvas with a water-based paint. This causes the canvas to shrink irregularly. When later mounted on a stretcher frame, the canvas will always sag, showing puckers and tight spots.

TYPES OF CANVAS MATERIAL

For more information on the different types of Fredrix® Canvas, please refer to the Fredrix® Website: www.fredrixartistcanvas.com

Linen Canvas

Growing

The Phoenicians introduced flax to Europe and the quality varies according to soil and weather conditions. Ireland, Poland, Hungary, Romania and Russia produce linen of varying qualities. However, Belgium is the leader, in growing and producing the finest quality flax and artist grade linen. The goal of harvesting and processing flax is to obtain flax seeds and fibers. The fibers are attached to the hollow woody core of each plant. Flax fibers are 36" in length, compared to 1" cotton fibers, which gives it superior strength. They are round and uniform, rather than flat ribbon-like cotton fibers, which gives linen a bold texture that can be seen and felt through layers of paint.



Egyptian wall drawing showing the hand pulling of flax.
Flax in Flanders Throughout the Centuries, by Bert Dewilde.



Emiel Claus. *Pulling Flax*. Oil on linen canvas
Flax in Flanders Throughout the Centuries, by Bert Dewilde.



Originally done by hand, today it is done by machines.
Flax in Flanders Throughout the Centuries, by Bert Dewilde.

Harvesting

To preserve the full potential of each plant, flax is pulled out of the ground. In this way, the maximum length of fiber is obtained.



Deseeding of flax using a ripple comb. Egyptian tomb wall drawing.
Flax in Flanders throughout the centuries by Bert Dewilde.

Deseeding

The flax seed, also called linseed, must be removed from the stalk. Linseed is later used to produce linseed oil, oil paint and oil varnishes.

Retting

The seeds are removed, and plants are left on the field to be exposed to the elements. Dew Retting decomposes the adhesion of the flax fiber within the woody core through bacteria. It is a controlled rotting of the flax stalk. If left undisturbed, the flax would start to rot and it would become useless. In the past, flax fibers were submerged in the river Lys or in water tanks. Today Water Retting is rarely used because of cost and pollution.



Albert Caulet. *Flax Retting*, Detail. Oil on Canvas, 1925
Flax in Flanders throughout the centuries by Bert Dewilde.



The retting process finished, bundles of flax are stood upright to dry, then retied and taken to be scutched, where rollers crush the straw, separating the soft flax fibers from the harsh straw.
Flax in Flanders throughout the centuries by Bert Dewilde.

Braking

The woody central core is broken into small pieces called shives. Egyptians laid the retted flax stalk on a stone and beat it with a mallet. Variations of this method were used up until the industrial revolution.



Brakers at work on the farm.
Calendar plate from the Mayer-Van den Bergh Breviary,
16th century. *Flax in Flanders throughout the centuries* by Bert Dewilde.

Scotching

This removes broken fragments of the woody core (shives) that remain after Braking, without damaging the flax fibers. In the Middle Ages this was done by beating out the shives using a stick and later a blade.



Women braking and scotching flax. German Engraving.
Flax in Flanders throughout the centuries by Bert Dewilde.

Today, flax plants are passed through rollers and turbines in order to separate the fibers from the wood and the highest quality fibers from the shorter fibers.



Stripping and Combing

The fibers are cleaned, combed and processed into long silk flax strands before being spun and woven. *Flax in Flanders throughout the centuries* by Bert Dewilde.

Spinning and Weaving

The fibers are twisted together to obtain a yarn. Finer yarns are generally spun with water (wet spun) and the coarser yarns are dry spun.

Attributes

Linen is traditionally the preferred fabric of painters. It offers the artist the most permanency, strength and beauty of any canvas material.

- It is the most durable fabric to paint on. It's warp and weft threads are equal in weight and strength, making it less susceptible to expansion and contraction due to moisture
- The irregular character of the weave can be seen through layers of paint, imparting a sense of depth to the finished painting.
- It retains its natural oils over time, preserving fabric flexibility.
- May be primed with oil-based or acrylic grounds. For oil-based grounds, you must first apply a proper glue sizing.



Raw Linen

Linen, gessoed and painted

Cotton Canvas

Growing

Cotton has been cultivated for over 8,000 years. After the cotton plant blooms the pod enlarges into a cotton boll. Approximately two months later it is ready to harvest. After cleaning, the seed is removed and later crushed to obtain cottonseed oil. The best grade, "Sea Island", is long staple cotton of high fiber strength and uniformity. Lesser qualities range from shorter staple "Pima" to "middling" and down to part waste, which contains a high "trash" content of seed and other impurities.



Today, cotton is entirely machine harvested in the U.S. where stripper harvesters remove the cotton boll from the plant.



The cotton lint is baled, and classified according to fiber strength, staple length, length uniformity, grade and fineness.

Processing

After preliminary processing, the fibers are spun or twisted into strands of various thicknesses. Twisting increases the yarns strength. Plied yarns (two yarns twisted together into a single braid) are stronger than two single yarns of the same total thickness.

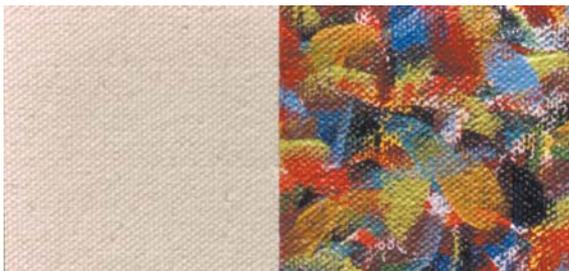


The yarns are then woven into fabric.

Attributes

Cotton is the most popular artist grade canvas fabric.

- Cotton fibers stretch more than linen, allowing for a tighter mounted canvas with less straining. As a stretched canvas size increases, the weight of the cotton canvas should increase to make up for what it is lacking in fiber strength.
- Cotton canvas can be primed with oil based or acrylic grounds (acrylic gesso).



Cotton

Cotton, gessoed and painted

Synthetic canvas

Processing

Synthetic canvas is often woven using yarns extruded into continuous filaments. For weaving artist canvas, it is better to use yarns made by spinning short fibers in much the same manner as for processing natural fiber yarns.

Fredrix® Polyflax® Synthetic Canvas

Attributes

- First commercial synthetic fiber artist canvas.
- Yarns spun in same manner as cotton and linen.
- Immune to bacteria, mildew and air pollutants.
- Less sensitive to dimensional change from weather.
- Uniform in texture, it stretches much like linen.
- Permanency similar to artist grade acrylic paints.
- Can also be made blended with fine artist quality cotton or other yarns.



Synthetic gessoed

Synthetic painted

Fredrix® PrintCanvas™

In addition to fine artist canvas, Fredrix® manufactures a full range of canvas that you can print on. This printable canvas is similar to artist canvas, but has an ink-receptive topcoat.

Fredrix® PrintCanvas™ is available in sizes from 8½"x 11" Sheets (for desktop printing), all the way up to 100yd. rolls for grand format printing. The product range includes canvas for offset lithographic printing, desktop inkjet printing, large and grand format printing, serigraphic printing, giclée printing, and more. For more information refer to the Fredrix® Website at www.fredrixprintcanvas.com.



Desktop printing on 11" x 17" size Fredrix® PrintCanvas™

HOW TO CHOOSE A CANVAS

Linen vs Cotton

Linen should be selected when the artist:

1. Desires the highest archival quality and high perceived value.
2. Can afford the expense of linen.
3. Needs artwork to have the added perceived value of linen.

Raw vs Pre-Primed

Raw Canvas is selected when the artist:

1. Needs total control of stretching and priming
2. Has the time, technical ability and expertise to stretch and personally prime the canvas correctly.

Size of Painting

The larger the size of the painting the heavier the weight of canvas needed.

- 10 oz. and 12 oz. cotton is recommended for canvas sizes 48" and larger.
- 10 oz. linen is recommended for canvas sizes 48" and larger.

Oil or Acrylic Paint

- Oil paint may be painted on any canvas primed with oil ground, or acrylic ground.
- Acrylic paint may only be painted on a canvas primed with acrylic ground (or acrylic gesso).
- Oil and acrylic paint may be painted on both linen and cotton canvases.

Art Technique

Each artist decides which canvas best suits his or her needs. Generally, an extra smooth surface is good for detailed portraiture and a rougher texture is good for a bold impasto technique. Fredrix® has over 50 styles of roll canvas in linens, cottons and blends with various textures and weights.

To help you choose the best canvas to fit your individual needs, visit our website at www.fredrixartisticcanvas.com, or go to your favorite art supply store.

SIZING, GROUND & PRIMER

Sizing	Seals and protects the canvas and provides a receptive surface for the ground to adhere. Does not necessarily provide a barrier coating to prevent strikethrough, although a good sizing will help in that respect.
Oil Paint Sizing	Animal glue. Applied to linen when oil based ground will be applied on top to protect it from the acidic nature of oil paint.
Acrylic Sizing	Acrylic Polymer Emulsion. Used alone or prior to applying acrylic gesso to seal canvas.
Ground	A material that prepares the surface upon which paint will adhere.
Oil Ground	Pigment (titanium dioxide or white lead) mixed with linseed oil.
Acrylic Ground	Also known as Acrylic Gesso.
Primer	Contains both Sizing and Ground. Sizing seals the support. Ground provides a surface to paint on. Acrylic gesso is an acrylic primer. Animal skin glue followed by oil-based ground is an oil paint primer.
Acrylic Gesso	Pigment (titanium dioxide) and calcium carbonate mixed with acrylic polymer emulsion. Acrylic gesso contains both the ground & sizing together (Acrylic Primer).

The proper size ground and primer are essential for achieving a long lasting painting. A painting is not done on a support (canvas); it is done on the size, ground or primer that has been applied to the canvas.

Whether to use a size, ground or primer, and what type to use is determined by:

1. The type of surface they will be applied to.
2. The type of paint and techniques to be applied to the surface. For example, if an acrylic staining technique is to be used on canvas, then the canvas would be left raw, without any sizing, ground or primer applied.

History of Oil Sizing & Grounds

By the 15th century, wood panels were being sealed with linen soaked in an oil-based ground. When linen canvas supplanted wood panels as the preferred substrate, a similar procedure was used to seal and prepare the canvas for painting.

It was found that linen painted with oil paint deteriorated over a period of time, unlike linen that had not been painted with oil paint. Direct contact between linseed oil and linen fiber was determined to be harmful to the canvas as the linen became brittle and weak prematurely. These early failures were caused by linoleic acid in the linseed oil attacking the cellulose fibers of the linen canvas. Sizing (sealing) the linen canvas with gelatin or animal glue before it came in contact with oil paint extended the life of the canvas.

Sizing was also used to stiffen linen canvas, so tempera and oil paints, which are hard and brittle, were less susceptible to cracking. These sizings were also water-soluble and variations in humidity and temperature caused the sizing to swell with moisture and become more flexible, which caused the tempera and oil paint on top to crack and flake off. You can observe these hairline cracks in old master paintings, such as Velasquez, Carravaggio and Rembrandt.

History of Acrylic Sizing & Grounds

In 1955 the first commercially available artist grade acrylic paints were developed. While the adhesive qualities of these paints were excellent, adhesion to oily surfaces was not, and the existing brands of artist canvases were all made with oil-based grounds.

In order to overcome this adhesion problem, acrylic sizings and primings were developed to accept both oil and acrylic paints. Although these acrylic based formulas are often referred to as "gessos", they are not true gessos in the purist sense. Acrylic grounds or primers are flexible and suitable for use on both canvas and rigid substrates. True gesso — made from animal hide glue and a pigment such as whiting is unsuitable for use on canvas.

Priming with Acrylic Gesso vs Oil-Based Ground

- Acrylic Gesso is flexible, resists cracking and yellowing and is more permanent than oil-based ground. Oil-based grounds can yellow and crack.
- Acrylic Gesso penetrates into and preserves the canvas. Oil-based grounds do not.
- Acrylic Gesso has greater adhesion.
- Acrylic Gesso is more versatile than oil-based ground. Acrylic and oil paints can be painted over acrylic gesso. Acrylics cannot be painted over oil.
- Acrylic Gesso can be applied to raw canvas, and non-oily surfaces such as wood, paper, plaster, concrete.

Oil paints adhere to acrylic gesso because of the porosity of acrylic gesso and the canvas texture. It is not advisable to paint oil paint over a thick, smooth acrylic paint surface, especially when the canvas texture has been completely covered over.

-sizing and priming the canvas

Fredrix® Oil Hand Primed Linen

For step-by-step instructions refer to:
PRIMING CANVAS WITH ACRYLIC GESSO and
PRIMING CANVAS WITH GLUE SIZING & OIL-BASED GROUND.

Reasons for sizing and priming a canvas	Benefit to Artist
Prevent deterioration of canvas	Painting will last longer.
Paint absorbs into the ground and primer, not canvas fibers.	Greater control of brush marks and painting techniques.
Reduce the canvas texture and prevents strike through.	Fine detail brush mark techniques are easier.
Provide a white or colored background upon which to paint.	Greater color luminosity.

Artist Hand Priming

Artist hand priming allows the artist to have ultimate control over the final surface. However, without proper technique and materials an improperly sealed surface can result, affecting the archival permanence of the canvas and the luminosity of the colors.

Hand Priming with Oil-Based Ground

Priming a canvas with oil-based sizing and ground is a two-step process.

1. The sizing is applied.
2. The ground is applied.

Oil-Based Ground can only be painted over with oil-based paints.

Hand Priming with Acrylic Sizing and/or Acrylic Gesso

A canvas may be prepared using acrylic sizing or acrylic gesso in two ways.

1. Acrylic sizing is applied to raw canvas (1st step), followed by acrylic gesso (2nd step). The sizing seals the canvas and evens out irregularities within the weave, allowing for a more even coat of acrylic gesso on top. Usually one coat of acrylic gesso is needed.
2. Acrylic gesso is applied to raw canvas. Two coats are usually needed.

Acrylic gesso provides a flexible, non-yellowing ground with excellent tooth for proper paint adhesion. It not only seals and protects the substrate (i.e. canvas), but also provides a ground that will readily accept the application of paint.

A high quality gesso such as Fredrix® Premium Gesso is recommended for best overall performance. Lower quality gessos may use plasticizers and fillers affecting flexibility, paint adhesion and may require extra coats for proper coverage.

Fredrix® Mural Width Canvas

Mural width canvas (84" and wider) is primed by hand. Cotton and poly/cotton blends are primed by machines. The technique of priming mural canvas is similar to that of standard width hand priming, except that a bridge (see pg.10) is needed to prime the center of the canvas, as it is not possible to reach the full width from the sides of the stretching frame.



Raw linen is tightly stretched on a frame that exerts a uniform pressure under constant temperature and humidity control.



The surface is inspected for weaving imperfections, which are hand picked clean. Aligning the individual yarns closes in any resulting holes.



The surface is inspected for weaving imperfections, which are hand picked clean. Aligning the individual yarns closes in any resulting holes.

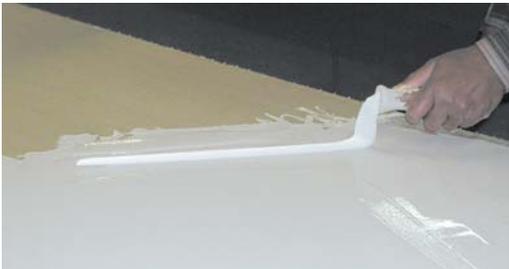


Using spatula-shaped knives, an animal glue size is applied, with a fungicide for protection against mildew and bacteria.

Fredrix® Oil Hand Primed Linen (cont.)



The canvas is hand pumiced before and after the sizing is applied to insure a smooth uniform surface that brings out the full beauty and natural texture of the canvas.



The primer of white lead or titanium pigment ground in linseed oil is applied using rounded edge blades.



If a smoother surface is required (i.e. Portraiture Canvas), the canvas is re-primed with a second coat.



A moving bridge is used to help craftsman reach across the canvas. The horizontal position prevents the sizing from running down vertically and congealing at the bottom.

Commercial Machine Priming

Machine Acrylic Priming

The required hand inspection of high quality linen canvas, together with oil grounds drying by oxidation (a slow process), prevents the machine priming of oil grounds. Chemical driers would have to be used and they do not contribute to the integrity of the ground.

Since acrylic ground dries rapidly, it is possible to machine prime the canvas. Fredrix® has developed a proprietary process especially designed for making artist canvas. This process utilizes sophisticated and digitally monitored coating equipment to apply the ground. Depending on the style, the canvas may receive up to 4 applications to achieve the desired feel and texture.

The final weight of a primed canvas is determined by the absorbency and openness of the weave of the raw canvas. Although a canvas may feel heavy, it may be because of the weight of the priming and not the weight of the canvas material. The weight of a canvas is the raw fabric weight before priming.



The raw canvas is unwound from a mill roll and passed over a rotating brush to remove foreign objects, while a sanding roller smooths out any unevenness in the weave.



Sizing is applied on the coating table and then metered to the desired coating weight. The canvas is stretched flat and enters the drying chamber.



Fredrix® has equipment capable of coating canvas up to 144" wide.

Double & Triple Priming

Canvases are double and triple primed in order to achieve the desired smooth surface. This makes for a smoother canvas, not necessarily a better canvas. Smoother surfaces are usually preferred for portraiture, airbrush or fine detail work. Although additional applications may be desirable, they result in a canvas that is less flexible, more difficult to stretch and more prone to cracking. Keep this in mind when stretching your own canvas.

Absorbency of Primed Canvas

A canvas ground must provide a receptive surface for paint adhesion. The weave of the canvas does provide some mechanical adhesion, but the binder in the paint must penetrate into the ground for permanent paint adhesion. However, if the ground is too absorbent it may cause too much paint to be absorbed into the binder and result in loss of paint body and luster.

Decreasing Absorbency and Tooth of Primed Canvas

Oil Ground: Apply with a lint free cloth or brush a wash of linseed oil over oil or acrylic ground prior to painting. Thin the linseed oil 50/50 with mineral spirits or turpentine and test before adding more linseed oil. Allow to dry for 24-48 hours.

Acrylic Gesso: Adding an acrylic medium will decrease absorbency and tooth while increasing the flexibility of acrylic gesso.

Increasing Absorbency and Tooth of Primed Canvas

Oil Paint: Remove excess oil residue of ground by wiping with lint free rag soaked in mineral spirits. If pigment appears on rag, stop. Further removal may affect cohesion of ground.

Acrylic Gesso: Adding 10-25% acrylic modeling paste or Fredrix® powdered marble to acrylic gesso will increase absorbency and tooth. As more modeling paste or marble is added, the brittleness and inflexibility of the gesso is increased.

CANVAS SUPPORTS

For more information on the different types of Fredrix® Canvas Rolls, Pre-stretched Acrylic Primed Canvas, Shaped Canvas, Canvas Pads and Canvas Panels, refer to the Fredrix® Website at www.fredrixartistcanvas.com

Canvas Rolls

Raw canvas offers the artist complete control of the stretching and priming process. It enables the artist to create a painting of any size or shape. Because of shipping costs, the larger the stretcher frame, the more economical it may be to purchase raw canvas, stretcher strip lengths, and gesso. Fredrix® makes over 50 different types and styles of unprimed and primed canvas available on rolls.

Pre-Stretched Acrylic Primed Canvas

Pre-stretched canvas offers the artist a ready to use stretched and primed canvas that is professionally constructed and prepared.

Fredrix® Medium Texture Duck (Red Label)—Acid free, double primed with acrylic gesso on medium weight, medium texture cotton duck canvas.

Fredrix® Ultra-Smooth Portrait Grade (Blue Label)—Acid free, triple primed with acrylic gesso on medium weight Polyflax®/cotton blend canvas.

Fredrix® Pure Linen (Green Label)—Acid free, double primed with acrylic gesso on medium weight linen canvas for oil or acrylic painting.

Fredrix® Creative Edge®—Acid free, double primed with acrylic gesso cotton canvas. A durable vinyl spline holds the canvas snugly in place providing a clean, staple-free edge that may be painted. Available in both heavy duty and standard type stretcher strips.

Fredrix® GalleryWrap®—Acid free, double primed with acrylic gesso cotton canvas. Heavy gallery style stretcher strips with canvas stapled on back, enabling all four edges to be painted and allowing a gallery style installation (without picture frame).

Fredrix® Heavy Duty—Acid free, double primed with acrylic gesso on heavy weight canvas (cotton or linen). Stapled on back, enabling all four edges to be painted for a gallery style installation (without picture frame). It is our finest pre-stretched artist canvas, made especially for the professional artist.



Fredrix® Pre-stretched Artist Canvas

Mounted or Shaped Canvas (Ovals and Rounds)

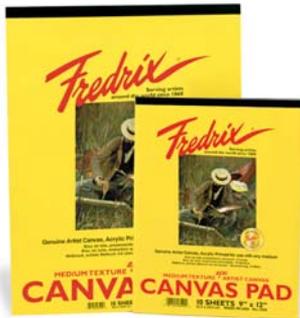
Creating shaped and dimensional canvases usually requires that the artist either hire a woodworker or have available to them a well-equipped wood shop. Fredrix® Canvas offers pre-made, mounted and primed canvases. They are available in oval, round, and three-dimensional oval and round shapes called Convexo®.

Canvas Pads

Canvas pads offer the artist a convenient, inexpensive surface to paint on. *Paper "Canvas" Pad*—Paper that has been embossed with a canvas "texture". Very limited. Does not hold paint well. Buckles and tears easily. Not recommended.

Synthetic "Canvas" Pad—A synthetic material that has been embossed with a canvas "texture". Very limited. Acrylic paints do not bind properly. Buckles easily. Not recommended.

Real Canvas Pad—100% real canvas. Archival. Holds acrylic and oil paint. Very versatile. Can be mounted or stretched onto stretcher bars before or after painting. Fredrix® Real Canvas Pads are available in four different sizes: 9" x 12", 12" x 16", 16" x 20" and 18" x 24".



Fredrix® Canvas Pads

Canvas Panels

Canvas panels offer the artist an inexpensive, portable canvas to paint on. Canvas panels are not archival and are not recommended for permanent artwork. They are mounted onto heavy cardboard backing with glue. The glue and cardboard are acidic and may eventually affect the color of the painting after a number of years depending on stored conditions. Fredrix® Canvas Panels come in a variety of sizes from 3" x 5" to 24" x 36".



Fredrix® Canvas Panels

MOUNTING CANVAS

For step-by-step instructions refer to:

HOW TO MOUNT CANVAS ONTO A STRETCHER FRAME

The primary purpose in mounting canvas is to provide a firm and resilient surface for the paint. The canvas should be taut on the stretcher frame without the need for being pegged out (keyed out) or re-stretched. While it is easier to mount and stretch raw canvas, a canvas may be mounted onto a stretcher frame after priming or painting.

- Cotton is easier to stretch properly than linen or synthetic.
- The less paint a canvas has on it, the easier it is to mount tightly on the frame.
- Unprimed canvas will stretch more than a painted canvas.
- When mounting, leave enough excess canvas around the frame to allow for possible future remounting.

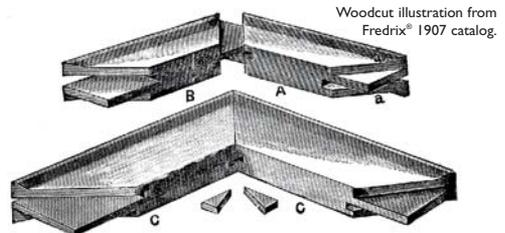
Cracking of Ground at Edge of Stretcher Bar Frame

An oil ground canvas is more likely to show cracks at the edge of the stretcher frame after stretching than an acrylic gessoed canvas. Although acrylics are more flexible, in cold conditions they become less flexible. An acrylic gessoed canvas should sit in room temperature for several hours prior to stretching.

Cracking of the gesso has little effect on the strength or permanency of the canvas, and can be touched up with a compatible paint. This will not adversely affect the canvas fibers, since the canvas should retain its protective sizing even when the priming cracks.

Strength of Stretcher Bar Wood

The size and strength of wood needed for the stretcher bar will vary according to the type and size of canvas.



Woodcut illustration from Fredrix® 1907 catalog.

Standard stretcher strips—American type.

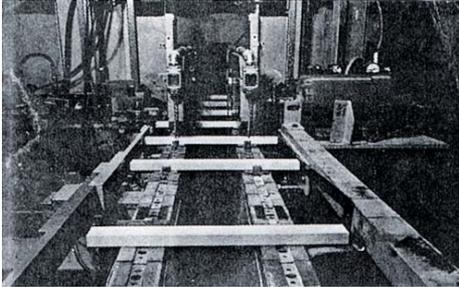
Introduced by E.H. Friedrichs in 1875 and universally produced around the world.

- Standard stretchers for small cotton canvases are not strong enough for large linen canvases.
- Strength of wood varies according to type and thickness of wood.
- Cross bracing is suggested for standard stretcher strip frames, 24" x 36" and larger.
- Cross bracing is suggested for heavy duty stretcher strip frames, 36" x 36" and larger.
- Corner bracing will keep the frame square, but it will not prevent warping or twisting of the frame due to inadequate frame strength.
- Standard stretcher strips are not guaranteed against twisting or warping for lengths of 36" or larger. Therefore, Fredrix® Heavy Duty Professional stretcher strips are recommended where quality is a concern.

The strength of the stretcher frame is especially important when stretching raw linen. During the drying of water-based sizing, canvas will shrink and may bend or break the stretched frame if the wood is not strong enough. Some raw linen may sag after acrylic gesso has dried. It may be necessary to re-stretch the canvas or, if the sagging is slight, peg out the corners.

Stretcher Bar Manufacturing

Fredrix® uses only SPF Kiln Dried lumber which is precision molded in defect free, knot-free lengths on state of the art computer driven milling machines.



Entering position of stretcher strip tenoner machine.



Finished stretcher strips.

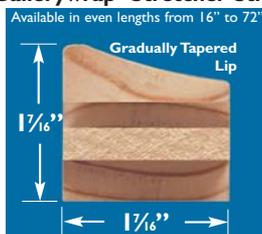
Standard Stretcher Strip



Heavy Duty Stretcher Strip



Gallerywrap® Stretcher Strip



MOUNTING CANVAS TO RIGID SUPPORTS

Selecting the mural surface

Environmental exposure and the type of surface the canvas will be mounted to are important aspects to consider when selecting the mural surface. Mounting a canvas to rigid surfaces such as wood, interior walls or exterior walls all present different variables.

False and Separate Walls

The best support for a mural painting is a false wall erected in front of an existing wall.

- Eliminates the dangers inherent in expansion and contraction of plaster and masonry.
- Protects against cracking, peeling and water damage that can occur in exterior walls.
- Allows for easy removal of the mural.
- Allows the artist to paint the mural in the studio, and adhere it to the false wall on location.

Existing Wall

- Surface must not contain moisture or get wet from moisture being absorbed from behind the wall. Canvas may separate from the wall or paint may peel away from the surface of the canvas.
- Surface must be free of any previous oils or silicones. Paints and oils can be removed with the proper solvents or by sand blasting.

Preparation of Surfaces

- Fill in and smooth any cracks or uneven surfaces with concrete filler or other appropriate filler.
- Remove all existing oil paint or any peeling paint.
- Remove all grease, wax or oil from surface.
- Remove all loose particles.
- Sand existing acrylic paint.
- Remove mold or mildew with stiff brush and scrub with 1 part bleach and 3 parts water. Rinse twice with warm water and allow to fully dry.

Adhesion to Wall

Applying liquid based products to the canvas may result in minor distortions, shrinkage or buckling. Therefore, it is recommended that you experiment with a piece of painted canvas. There are a number of adhesive products available:

- McDonald® Lamin-All® Adhesive (mfg. by Fredrix®)
- High quality wall paper adhesive
- Pressure sensitive adhesive

Surface	Preparation
Bare Wood New Sheetrock	Remove sawdust or sheetrock dust. Apply an acrylic primer or wall sizing.
Bare Metal	Remove grease, dirt or solvents. Abrade surface.
Bare Masonry	Must be dry and cured.
Painted Wood, Painted Masonry	Remove loose material. Sand or strip paint.
Painted Metal	Remove grease, dirt and solvents. Abrade surface.

HOW TO MOUNT CANVAS ONTO A STRETCHER FRAME

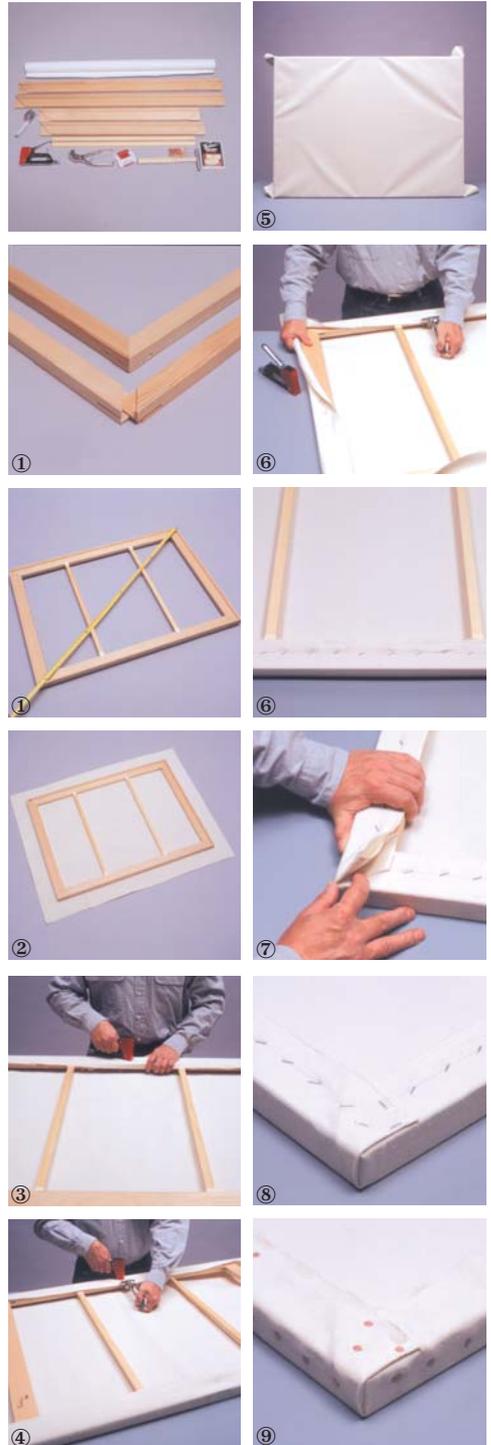
Materials Needed

- Primed or Unprimed Cotton or Linen Canvas
- Canvas Pliers and Ruler
- Heavy Duty Staple Gun or Magnetic-Head Tack Hammer
- $\frac{3}{8}$ " Stainless Steel Heavy Duty Staples or Copper Tacks
- Fredrix® Stretcher Strips: 2 equal horizontal & 2 equal vertical sizes.

1. Assemble frame by fitting together tongue and groove ends of stretcher strips. Check the squareness of the frame by measuring across the diagonal corners so that both are equal. Attach cross bracing if needed.
2. Cut canvas 4" longer on all four sides than assembled stretcher frame. Center the canvas face down, on a clean flat surface. Align stretcher frame with the vertical and horizontal weave of the canvas.
3. Fold one side of canvas over longer stretcher strip and drive a staple into the center of the back of the stretcher strip (for clean edge), flush with wood.
4. Go to opposite side. Grip canvas with canvas pliers (with left hand for right handed person) and stretch tight, until a straight crease is formed running across the canvas. Maintain tension and drive staple (with right hand for right handed person) into the center of back of stretcher strip, flush with wood. If staples are not flush with wood, maintain tension with pliers and hammer staple until flush with wood. Do not overstretch. (Unprimed canvas may go out of alignment or damage stretcher frame when canvas shrinks during priming.)
5. Stretch and attach canvas to the centers of adjacent stretcher strips in the same manner. Canvas will now have a diamond shaped wrinkle.
6. Drive in staples every $1\frac{1}{2}$ " - 2", moving outward from the center, alternately switching to opposite sides. Drive in one staple to the left and right of center, then go to opposite side and repeat. Then go to adjacent sides and repeat. Work from the center toward the corners. Pull tightly, using canvas pliers, but not so much that it will wrinkle canvas between staples. First pull tightly towards you, then with other hand pull at right angle, towards corner, for an even stretch in both directions, then staple.
7. Stop 3" from corners. For rectangular stretcher frames, adjust stapling so that you arrive 3" from each corner at the same time. Double fold canvas at corners, so that final fold lines up with edge and staple through folded canvas into back of frame while exerting finger tension.
- 8-9. Fold the excess canvas to the back of the frame and staple or tack to allow for remounting in the future. If the canvas is trimmed flush with the frame, remounting to same size is more difficult.

HELPFUL HINTS

- Staples are easier to mount canvas with than tacks.
- Staples adhered to back of stretcher strips result in the most evenly mounted canvas and a clean edge. Inexperienced use of tacks may cause puckers and ripples.
- Photographs Step 8 shows using staples into back of stretcher strip. Step 9 shows using tacks into edge of stretcher strip.
- It is easier to stretch unprimed canvas than primed canvas.
- If wrinkles and ripples occur in stretched unprimed canvas, remove staples or tacks in affected area and re-stretch affected area. Avoid using pegs (keys) to take out wrinkles of unprimed stretched canvas. It may throw frame out of square or damage the canvas. Pegs are used to tighten slightly sagging canvas after being sized, primed or painted.
- Small indentations and small ripples in stretched unprimed canvas may even out during priming, when the canvas shrinks.
- Indentations and ripples occur due to uneven tension between staples or tacks. Pull canvas horizontally toward corners during stretching; Step 6.
- Larger stretcher frames require heavier duty stretcher strips. If the stretcher frame is not strong enough it can break or warp during sizing or priming of canvas.
- Fredrix® Standard Stretcher Strip frames 24" x 36" and larger may require cross bracing. Fredrix® Gallerywrap™ or Heavy Duty Stretcher Strip frames 36" x 36" or larger may require cross bracing.



PRIMING CANVAS WITH ACRYLIC GESSO

Materials Needed

- Fredrix® Acrylic Gesso
- Fredrix® Unprimed Cotton or Linen Canvas
- Fine Grit Sandpaper
- Brush, Paint Pad, Squeegee or Painting Knife

Thinning

- If a thinner gesso is desired, it may be thinned with up to 25% water without adversely affecting performance.
- For increased adhesion and flexibility thin with equal parts water and acrylic matte medium.
- Diluting for brush or roller application is not necessary.

Single vs. Multiple Coats

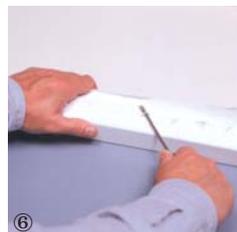
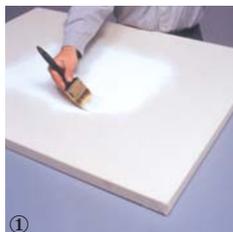
- For Cotton Duck canvas, one layer of gesso may be adequate, but pinholes or uncovered areas may occur. Two coats are recommended. A second layer evens out and produces a smoother surface. Three coats results in even less texture.
- Two layers are recommended if oil paint is to be used over acrylic gesso.

Application

1. Using a half-circular motion, apply gesso with a large gesso brush, painting knife, squeegee or house paint pad to stretched unprimed canvas. Brush gesso into weave of the canvas from center - outward - then sides - then overlap on the backside, covering the staples and cut canvas edges. Clean up with warm water.
2. Let dry. Canvas will tighten during gessoing, and will relax slightly when fully dry.
3. Lightly sand with fine grit sandpaper. Apply second layer. Let dry.
4. Repeat light sanding. Let dry 24 hours before painting.

Sagging and Wrinkles after Gessoing

5. If small ripples or indentations occur, dampen the affected area with a damp sponge (do not saturate). Let dry in a well-ventilated area.
 6. Large wrinkles should be removed by using canvas pliers and re-stretching the affected area, or the entire canvas if necessary.
- Avoid using pegs (keys) to take out wrinkles of unprimed stretched canvas. It may throw frame out of square or damage canvas. Remove staples or tacks in affected area and re-stretch the wrinkled portion. Pegs are used to tighten slightly sagging canvas after it has been sized or gessoed.



PRIMING CANVAS WITH GLUE SIZING & OIL-BASED GROUND

Materials

- Fredrix® Unprimed Linen Canvas
- Brush or Palette Knife
- Fredrix® Glue Sizing (stock# 4403)
- Fredrix® Titanium Oil Priming (quart# 4402) or Gesso Ground (2 pounds# 4412) plus linseed oil
- Fine Grit Sandpaper
- Duel Filter Respirator
- Mineral Spirits

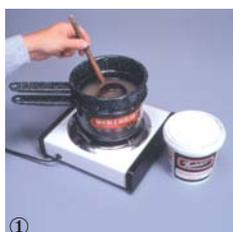
Sizing: Animal Hide Glue

1. Stir 1 oz. glue into 12 fluid ozs. of water. Heat mixture in a double boiler to a temperature of about 160°F until thoroughly dissolved. Do not boil or overheat.
2. Apply as a liquid with a brush or palette knife into weave of the canvas from the center outward, then sides, then overlap on the backside, covering the staples and cut canvas edges. Sizing should penetrate into the fibers of the canvas. A thin solution is preferable rather than a thick coating that would stiffen the canvas and obscure the texture.
3. Let canvas dry. Then sand with fine sandpaper.
4. Canvas will tighten during sizing and will relax slightly when dry. Re-stretch or peg out before priming if sagging is excessive.

Ground: Oil Priming (titanium) or Gesso Ground in linseed oil

5. Apply the Oil Priming (titanium) or Gesso Ground/linseed oil mixture as in Step #1, PRIMING CANVAS WITH ACRYLIC GESSO. (See label directions for preparing the Gesso Ground/linseed oil mixture.) Clean up with mineral spirits.
6. Let dry completely. Lightly sand with fine grit sandpaper.

** Use respirator while sanding and cleaning. Avoid contact with skin.*



HELPFUL HINTS

Sagging and Puckers in a Stretched Canvas

Remove the tacks or staples in the area of the problem (or if need be all the way to the corner) and re-stretch the canvas. For small puckered spots, take a damp cloth and lightly wet the back of the canvas in the area of the pucker and allow to dry. If pucker remains, the canvas should be re-stretched.

Wrinkles

Wrinkles in unprimed and primed canvas can usually be pulled out with a little extra effort when stretching.

Wrinkles in unprimed canvas can be removed prior to stretching by steam ironing.

Texture of Prime Linen Canvas

Because of the nature of the flax fiber and the weaving process, linen yarns may vary as much as 200% in diameter in one spindle and there is no predicting how this variance will show in the fabric (random bumps, lines, etc.). Most surface irregularities are part of the linen surface construction and its character.

Edge Cracks When Stretching Primed Canvas

Primed canvases have a tendency to crack under strong stretching tension when pulled over a sharp edge, especially as they age. Cracking is more pronounced with oil primed canvas than acrylic primed.

Oil Painting on Acrylic Gessoed Canvas

In most cases it is OK to apply oil paint over completely dry acrylic gessoed canvas. The texture of the canvas and the calcium carbonate in the acrylic gesso allow the oil paint to adhere and absorb into the acrylic gesso. If the acrylic gesso becomes slick it might adversely affect adhesion of the oil paint. Apply a light wash of 1 part linseed oil and 1 part mineral spirits over the surface. Let dry 24 hours.

Oil Painting over Acrylic Paint

In most cases it is OK to apply oil paint over completely dry acrylic paint. The adhesion is physical and not chemical. If the acrylic paint is not completely dry, the moisture trapped in the acrylic paint will adversely affect adhesion. If the acrylic paint is thick and eliminates the texture of the canvas, the surface will become slick, and adhesion will be adversely affected. To increase adhesion in this scenario, apply a light wash of 1 part linseed oil and 1 part mineral spirits over the surface. Let dry 24 hours. Note: acrylic paint should never be applied over oil paint.

Oily or Dull Oil Primed Canvas

An oily or dull oil primed canvas might adversely affect paint adhesion. Before painting, wipe the surface with a lint free cloth saturated with mineral spirits. If the problem persists, wipe the surface lightly with a 50/50 mix of linseed oil and mineral spirits and allow it to dry at least 24 hours.

Washes or Veils

When applying washes of oil paints to an acrylic gessoed canvas, seal the canvas prior to application with mixture of 1 part linseed oil and 1 part mineral spirits. Apply in a very thin film with either a brush or a lint free cloth. Let linseed oil dry for 48 hours.

Rolling Canvas

Make sure paint is completely dry. Oil paint: 6 months; Acrylic paint: 1-2 weeks. Roll canvas around a large diameter cylinder. Always roll painting side face out. Do not place regular paper over the painted surface. Use glassine paper. Note: acrylic paint will permanently stick to itself in hot weather.

Storing Stretched Canvas

Store in vertical position. If stored horizontally, canvas will sag over time. Avoid leaning canvases upon each other. If canvases must lean upon each other, lay same size canvases face to face or back to back.

If stored face to face, place glassine paper between canvases. If canvases are different sizes, place a sheet of cardboard between the canvases.



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