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BEVA® 371 Heat-Seal Adhesive

Gustav Bergers Original Formula, 40%

A heat-seal adhesive for the lining of paintings, developed by prof. Gustav Berger in 1970 and universally known with the name BEVA® 371. Inasmuch as its formula has been copied and not always manufactured with the purest ingredients and without strict adherence to the original formula, professor Berger, in order to prevent any misunderstanding, has renamed his adhesive *Gustav Bergers Original Formula® 371*.

BEVA® 371 (Berger ethylene vinyl acetate) is a product based on ethylenevinylacetate, paraffin, ketone resin, 40% solids content in aliphatic and aromatic solvents.

The main application is the hot lining of paintings by using a vacuum hot table (or lining iron and vacuum), but it is also used for fixing minor flakes, for facings and for any kind of temporary or definitive sizing intervention.

Reference

These instructions are based on relevant publications regarding the many uses of BEVA® 371, as well as a visit to Gustav Berger's conservation studio to observe his methods. These instructions are for guidance purposes only, as adequate testing should precede all application to determine proper use of the productions mentioned.

Work with all BEVA® adhesives should be performed in a well ventilated area, as solvent vapors may be hazardous to ones health and pose risk of combustion.

1. Preparation of the Adhesive

From a fresh can of BEVA® 371, remove about one pint and add about the same volume of VM&P Naptha or xylene (if you want to retard drying,) or a mixture of both, making it a 37% solution of solid resin to solvent. Cover this container but do not close it, then warm in a double boiler or glue pot until the solution is clear and liquid. Stir occasionally.

In this form, BEVA® 371 is the standard adhesive for lining, and can be applied to both the old canvas and the new support. The most suitable manner of application is with a medium nap paint roller. The roller may be immersed into the can, or the pan often sold with the paint roller may be used. When through, the excess BEVA® 371 in the roller may be squeezed back out into the can, the roller removed from its holder, and immersed in a well-covered jar of naptha until needed again. If frequently used, the roller might be kept moist and pliable by wrapping it in thin Mylar. There is virtually no waste; even the contents of the storage jar can later be used for facings.

2. Preparation of the Painting

The painting is prepared for lining, as might be required in each case, performing one or all of the following operations, usually in the order listed below:

- "Face" painting, if necessary.
- Remove painting from stretcher and flatten tacking edges.
- Reattach loose paint (if necessary, consolidate entire painting) using BEVA® of your preferred product. (1)
- Join all tears and fill losses (2). If losses were poorly filled before, the old varnish must be removed, and the fillings corrected.
- Re-varnish painting for protection.
- Place painting, face-down on a board covered with silicone-coated paper. Tape tacking edges to board so painting will not move. Level the back of the painting carefully with a scalpel, shaving off all protruding knots, burls and ridges of canvas weave. Do not sand it. Remove all loose glue.
- Correct deformations in the plane of the painting by vapor treatment.
- Depending on the desired degree of penetration, either coat the back of the painting with BEVA® 371, or spray with an 8-10% solution of BEVA® 371 in naptha and/or toluene (1:3 or 1:4.) Allow to dry overnight.

It is best to perform all operations with BEVA® 371 at the end of the day so as not to remain exposed to the solvent fumes too long.

3. Preparation of the Lining Fabric

Some of the steps in the preparation of the painting require time to dry. These pauses may be used to prime the lining fabrics with a spray coating of either BEVA® 371 or BEVA® D-8.

Gustav Berger uses the following lining laminate:

- A sandwich layer of fine, flexible Dacron-polyester (the finer and more regular the weave the better.)
- A Mylar interleaf (optional.)
- A backing fabric.

While the sandwich layer and the backing fabric may be prepared in large sheets well ahead of time, stored indefinitely, and cut to size when needed, the Mylar interleaf should be made as the very last step before the actual lining.

4. Preparation of the Sandwich Layer and the Backing Fabric

The fine polyester fabric is lightly tacked to a large strainer and then sprayed with a thin solution of BEVA® 371 of BEVA® D-8 from both sides, then left to dry.

The backing fabric is prepared in a similar fashion, except that spraying with BEVA® is done on one side only, the side which will be attached to the laminate.

5. Preparation of the Interleaf

A piece of heavy Mylar (5-7 mil. thick) is cut about 2-3 inches larger than the painting, to serve as an interleaf. It provides the lining with sufficient stiffness to resist deformation, and it forms a good moisture barrier.

The cut piece is lightly tacked to a board, and covered with silicone coated paper. The interleaf is coated with a continuous coat of BEVA® 371. Since Mylar does not absorb any BEVA®, this coat dries in about 15 minutes. The Mylar is then inverted, and the reverse coated with BEVA® 371.

The dry Mylar is placed on a carefully cleaned cardboard. The painting is placed on top of it, face up. The outline of the painting is marked on the Mylar with a felt tip pen. The painting is removed, and an additional line is marked within the outline, about 1/8" inside the borders.

The interleaf is cut along the inside line to be smaller than the painting. Because paintings are often irregular, it is better to cut the Mylar with scissors. This should be done immediately preceding lining, in order to prevent contamination of the Mylar.

6. Assembling the Laminate

The vacuum hot-table is carefully cleaned. It must be remembered that the vacuum table accentuates every unevenness, be it on the table or within the laminate. Therefore, each layer of the laminate should be carefully inspected for impurities before being put for lining. The following steps should be taken:

- Cover the table with a sheet of Mylar, about 1-1.5 mil thick. This instead of silicone coated paper which seldom lies flat on the hot table (experienced practitioners can easily dispense with this step, since there is practically no danger from the BEVA penetrating the backing fabric, if properly prepared.)
- Place backing fabric on the Mylar or hot table, with the side which was sprayed with BEVA face up.
- Put dry, precut interleaf on top of the backing fabric, and align carefully with the threads of the backing fabric.
- With a tacking iron press down lightly two adjacent corners of the interleaf to the backing fabric to make sure it will stay in the aligned position.
- Pit sandwich layer on top of the interleaf. With a pencil or chalk mark the continuation of the outlines of the interleaf on the sandwich layer. Starting from the center, smoothen it lightly with both hands.
- While the painting is still on a board, cut the four corners of the tacking margins, so that the painting can be aligned with the outlines marked on the sandwich layer (if trimming of the tacking margins is unacceptable, register marks can easily be drawn to show the exact position of the corners.)
- Place painting on the sandwich layer face-up and align it with the help of the register marks. Press down lightly to attach the layers in perfect alignment.
- Put "breathers" around the edges of the painting.
- Do not start heating up the table immediately. This permits you to check the laminate once more, this time under pressure. It also assures better evacuation of the air which might otherwise be hampered once the different layers fuse together.
- Heat table until surface temperature of the painting reaches 1500F (650C) in all parts of the painting. At least five paper thermometers should be used for each thermal blanket heating the table, one in each corner and in the center. Do not rely on electronic thermostats and/or contact thermometers alone.
- Allow to cool slowly, under pressure, to at least 85-900F. The latest stress measurements carried out by Russell and Berger has shown rapid cooling to be stressful to paintings.

Please note that the assembly of the fabrics in the above described laminate has been worked out to alternate a porous layer with a non-porous one in order to assure a good evacuation of air and a proper distribution of pressure within the laminate. This process permits lowering the vacuum pressure to a minimum, although a stronger vacuum often assures a better looking lining. Also note that with the above arrangement the use of a membrane is not absolutely required. Consequently, the vacuum can be arranged to join the layers of the laminate without applying pressure to the face of the painting. In addition, alternating porous and non-porous layers facilitates the reversibility of the laminate.

Miscellaneous Uses

Facings: Thin BEVA® 371 with VM&P naphta (1:1). Because BEVA will stick to a wet surface, wet-strength tissue may be placed in the usual manner for a facing, and wetted and tamped into the roughest surface with a soft brush. The BEVA facing mixture can then be rolled or brushed immediately over the wet facing. Do not go over areas of drying BEVA a second time, as the facing paper may lift. Process as required on hot table between sheets of silicone paper, when dry.

Blisters: Prepare a mixture of BEVA 1:4 or 1:3 with VM&P naphta. This may be flowed into cracks and crevices of the paint, or injected under the paint layer, warm. Let dry 24 hours, cover with a small piece of silicone paper and flatten with a tacking iron. Blisters may be faced, if required.

Removal of Facings: Spray or flow VM&P naphta over sections about one foot square at a time, and cover with a piece of Mylar, and warm slightly for two or three minutes. Facing will then peel directly off. Alternate method. Cover faced painting with a piece of newsprint (one foot square) and wet will with naphta. Proceed as above. Facing should peel off attached to the newspaper. Clean face of painting with naphta, removing all traces of BEVA.

Vapor Treatment: To flatten heavily cupped or deformed paint films, vapor treatment is best performed before BEVA is applied. This treatment is not without hazard, and requires extensive study and experience (1,2,3).

Fixing Minor Flakes: Lightly transfer 1:3 BEVA-naphta mixture, preferably warm, from paint of brush to edges of flaked paint, which will immediately draw around and under the flakes. Cover with facing paper and press down to remove excess BEVA which might form a ridge under the paint. This precaution is important in interlayer delamination or on non-absorbing grounds. Allow to dry 24 hours. Cover with a piece of silicone paper and flatten with a tacking iron.

Important Note: It is imperative to employ silicone paper above and below all work whether linings or small tacking jobs. BEVA will stick to Teflon coated irons, Mylar, and everything that is not silicone coated. Never use BEVA directly when mounting a painting on any hard, inflexible support. Always put a piece of fine fabric on the solid support first.

Removal of a BEVA Lining: To remove a BEVA lining, place the painting on the hot table, apply (by brush or spray) VM&P naphta to the back of the lining and cover with a sheet of Mylar. The hot table should be preheated to about 1200F. Wait about five minutes and test to see if the lining can be peeled. If not, repeat the above process. When BEVA has been softened to the proper degree, the lining will release without stress to the old canvas. If the painting is large, this may be done in sections.

References:

1. G.A. Berger, "Consolidation of Delaminating Paintings", Reprints to the ICOM meeting in Zagreb (1978)
2. G.A. Berger, "Heat-Seal Lining of a Torn Painting with Beva® 371", Studies in Conservation 20, No. 3 (1975)
3. G.A. Berger, "More Unconventional Treatments for Unconventional Art", Studies in Conservation 35, No. 1 (1990)
4. G.A. Berger, "Unconventional Treatments for Unconventional Paintings", Studies in Conservation 21, No. 3 (1976)

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