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title: Relining the Menagerie van Prince Willem V

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abstract: The treatment of five large-scale paintings by Dutch artist Aart Schouman (1710–1792) from the series The Menagerie van Prince Willem V is discussed. The paintings are part of the collection of Huis ten Bosch, The Hague. They were rediscovered in the 1970s and subsequently wax-resin lined. Display environments over 30 years caused structural deformations to develop. The current treatment consisted of the removal of this wax-resin lining, tear-mending, and the application of an innovative cold-lining support with an integrated glass-fiber interleaf.

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# <A-head> Historical Background

The Menagerie van Prince Willem V consists of five large-scale paintings by Dutch artist Aart Schouman (1710–1792) ([**fig. 53.1**](fig-53-1)). Prince Willem V van Oranje-Nassau (1748–1806) commissioned the series for his private chambers in the Stadhouderlijk Kwartier, The Hague. The continuous landscapes depict Prince Willlem’s private collection of exotic animals. Transferred to Palace Huis ten Bosch at an unknown date, they languished rolled up and folded in the attic until their rediscovery in 1975.[[1]](#endnote-1) In the same year the paintings were restored by Nico van Bohemen Sr. and team, and then installed in the palace.

Unfortunately, little documentation of the 1975 treatment remains, but luckily one of the restorers, Nico van Bohemen Jr., could be interviewed as part of the current project and was happy to answer our questions.[[2]](#endnote-2) He had treated the paintings under the supervision of his father, Nico van Bohemen Sr., who was a successful self-taught restorer in The Hague. Van Bohemen Jr. recalled that the Schouman paintings were wax-resin lined using a mixture of raw yellow beeswax and powdered resin and were lined on a vacuum hot table face down on top of a sheet of Melinex.

As the paintings were larger than the table, they had to be lined in sections. The middle section was ironed by hand. The wax-resin adhesive was warmed and brushed onto both the reverse of the original canvas and onto the lining canvas.[[3]](#endnote-3) The content of the wax-resin adhesive was confirmed. Fourier transform infrared spectroscopy–attenuated total reflectance (FTIR-ATR) analysis carried out in 2015 by Ana Pereira indicated the presence of beeswax and natural resins, most likely elemi and colophony.

# <A-head> 2015–2016 Treatment

By 2015 planar distortions in the supports and the degradation of the restoration materials applied in the 1970s dictated that retreatment was required. The structural stability and aesthetic appearance of the paintings had been greatly impacted. Two types of planar deformation were present: bulges caused by the weight of the lining and creep due to the temperature sensitive adhesive, as well as slight lifting along the fold lines, caused by insufficient adhesion.

That same year, the Palace Huis ten Bosch underwent extensive renovation and Schouman’s paintings were sent to Stichting Restauratie Atelier Limburg (SRAL) for treatment. Considering the paintings’ size and their display within a historic building without environmental control, the decision to reline was crucial to improve stability and flexibility and to prevent long-term deformations from recurring. Recent research shows that wax-resin lined paintings are heat and moisture sensitive ({{Andersen et al. 2014}}). A cold-lining system practiced at SRAL using an acrylic dispersion was chosen, as it would avoid the use of heat, moisture, and excessive pressure during lining. [[4]](#endnote-4) This system also allowed the needs of each individual painting within the series to be accommodated.[[5]](#endnote-5)

The lining adhesive was rolled rather than sprayed on to the lining support. This also facilitated the use of a glass-fiber interleaf material, which added stiffness to the lining system while minimizing the addition of weight. This lining system is approximately 570 g lighter per square meter than the 1970s wax-resin lining. In addition, a weaker application of adhesive was used between the glass-fiber interleaf and the original canvas - compared to that between the interleaf and lining fabric—to facilitate future reversibility, if necessary.[[6]](#endnote-6)

## <B-head> *Lining Adhesive*

The lining adhesive consisted of 70% Dispersion K 360 (pH adjusted with ammonium hydroxide), 30% Plextol D540, thickened with Rohagit SD 15, all v/v. Plextol acrylic dispersion products have been used for lining since the 1970s, and extensive research has established their aging properties ({{Down 1996}}; {{de Witte, Florquin, and Goessens-Landrie 1984}}; {{Mehra 1984}}). However, these products are subject to market influences and, thus, since the product formulations and availability have changed, the reported results may no longer be valid for products mentioned in this essay.[[7]](#endnote-7)

Dispersion K 360 is too soft, sticky, and flexible to make a satisfying lining adhesive alone. Combining it with Plextol D540, which has a higher molecular weight and an accordingly higher glass transition (Tg) temperature, achieves the desired stiffness of the lining adhesive. The ratio of the two acrylic dispersions is 70:30 (v:v). Adding an emulsifier, Rohagit SD 15 (also a polymethacrylic acid), increased the viscosity of the mixture, thus improving application properties and preventing impregnation of the lining adhesive into the original canvas and the lining fabric during the reactivation process. The pH of the adhesive mixture was raised to 7 using ammonium hydroxide (NH4OH).

## <B-head> *Interleaf Fabric*

Glass-fiber fabric was selected for its high tensile strength, dimensional stability, low moisture absorption, and high resistance to solvents and chemicals, all of which contribute to its great durability ({{Boissonas 1961}}). It is also lightweight and provides extra strength without introducing additional tension, weight, or thickness to the new lining system ({{Boissonas 2003}}). Glass-fiber fabrics use bundles of monofilament glass threads to create the weave. This woven textile does not have a nap, and a nap cannot be created without disrupting the weave draft. The lining adhesive mixture, therefore, is best applied by rolling it onto the stretched fabric. This produces an even, textured surface, promoting adhesion. The moisture content is then allowed to evaporate. The dried adhesive produces a soft and elastic film, which encases the interleaf material and is stiff enough to prevent creep formation ({{Seymour and van Och 2005,| 99}}). This fabric is available in widths of up to 90 cm; bands of the prepared material were used.

## <B-head> *Lining Fabric*

A spun-yarn polyester fabric was considered a good lining fabric due to its availability in a wide loom width, its low crease potential, dimensional stability, and high abrasion-resistance properties ({{Young and Jardine 2012|, 251}}). Trevira CS was selected due to its built-in flame resistance. The Trevira CS fabric has a modified polyester molecule, which means it is permanently flame retardant, which is an important feature considering the paintings’ unconditioned, historic-home environment.[[8]](#endnote-8) To ensure sufficient bonding with the impregnated glass-fiber interleaf, a solution of 20% Plextol D540 and 20% Dispersion K 360 diluted with 60% distilled water, was brushed onto the stretched fabric.

## <B-head> *Lining Table*

A stiff, solid support was desired during the lining process to assist in mitigating the planar distortions present in original support. As a conventional low-pressure table would have been too small, a makeshift, adaptive lining table was constructed ([**fig. 53.2**](fig-53-2)). The lining table described is an adaptation of the low-pressure envelope used in the mist-lining process. Vinyl flooring was laid on the wooden floor, creating a firm, smooth surface with sufficient cushioning for any painted impasto areas. This was covered with a thick plastic sheet (punctured with holes), which was pulled taut to extend beyond the vinyl and secured to the floor with tape to prevent movement. This plastic sheet creates the lower side of the lining table. A piece of open-weave cotton cheesecloth was placed over this plastic sheet to increase airflow within the lining envelope.

Lengths of plastic PVC tubing were connected together using 90-degree elbows to create a peripheral ring slightly smaller than the plastic sheeting described above. A T splitter was included on one side, which connected to a motor (a vacuum cleaner). Small holes were drilled into the inner side of the pipes to facilitate air extraction from within the lining envelope. The pipes were shrouded with an open-weave fabric (cheesecloth) to prevent the upper plastic from closing off these holes. The lining envelope is completed using a single piece of (green) lightweight, polyethylene foil, which is placed on top, sealing the system. A motor controlled with an inverter[[9]](#endnote-9) was used to draw air through the tubing, maintaining an even, low air pressure. The holes punched into the lower plastic sheet ensure that the upper, more flexible plastic foil conforms to the surface topography of the vinyl or the material within the envelope.

## <A-head> Relining

To begin the relining, the green foil was rolled back; the painting was placed face down on the lining table; the stretcher, old lining fabric, and adhesive were removed; and holes and tears in the canvas were secured. The tears were mainly butt-joined using Beva 371 as the adhesive. Bridging glass-fiber strips were applied over the tear for additional support and adhered using Beva 371.

Bands of glass-fiber interleaf were laid onto the painting’s reverse, slightly overlapping one another ([**fig. 53.3**](fig-53-3)). The lining fabric was then rolled out on top of the interleaf, and the green foil repositioned ([**fig. 53.4**](fig-53-4)).[[10]](#endnote-10) Before relining proceeded, a dry run ensured that the air would be evacuated quickly and evenly, and any irregularity in the structure was evaluated using raking light.

The activation of the adhesive bonding the lining canvas to the interleaf and the interleaf to the original support was done in situ. The dry adhesive was reactivated using solvent vapors: xylene and ethanol (30:70). Cheesecloth was chosen as a carrier for the vapors due to its ability to absorb polar solvents easily. The solvent delivery cloth measured slightly larger than the surface area of the applied adhesive. The cloth was rolled into a tight bundle and wrapped with cling film (Saran wrap). A precalculated amount of solvent was then injected (75–80 ml per m2), and the roll was clamped for several hours to guarantee an even distribution of the solvents within the roll. At that point, the roll was unwrapped and placed quickly (to reduce evaporation loss) on top of the prepositioned, lining canvas. A string was attached to each corner of the solvent delivery cloth before it was folded, rolled, and wrapped to help speed distribution over the reverse.

To ensure the tightest possible contact between lining fabric and cheesecloth, the green foil was re-positioned and the motor activated (50 mbar). After approximately 20 minutes, the motor was deactivated and the cheesecloth replaced with a heavy woolen fabric to absorb any excess solvent vapors present within the envelope, thus accelerating the bonding process. The package was then recovered with the green foil, and the motor was reactivated (110 mbar) (figure 54.5). After about two hours the motor was switched off and the upper foil was removed to allow the remaining solvent vapors to evaporate.[[11]](#endnote-11)

# <A-head> Conclusion

The treatment was designed to be both lasting and reversible. Relining with an acrylic adhesive mixture and glass-fiber interleaf provided a lighter, more rigid alternative to traditional lining systems and excluded the use of heat, moisture, or excess pressure. Developing this kind of treatment was possible by building on the experience of other large-scale lining projects undertaken at SRAL and can be used as a paradigm for the treatment of similar paintings ({{Schlotter 2009}}).

# <A-head> Acknowledgments

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# <A-head> Notes

1. This is probably the only set of Schouman’s wall hangings still remaining in the Netherlands ({{Bol 1991: 9}}). [↑](#endnote-ref-1)
2. Interview with Nico van Bohemen Jr., November 28, 2015, Stichting Restauratie Atelier Limburg (SRAL) archives, unpublished audio file. For transcription see {{Barbosa et al. 2015}}. [↑](#endnote-ref-2)
3. For treatment steps other than the lining interventions, see {{Barbosa et al. 2015}}. [↑](#endnote-ref-3)
4. The cold-lining practiced was developed under Jos van Och’s expertise and is inspired by the mist-lining system. [↑](#endnote-ref-4)
5. For a detailed description see {{Seymour and Och 2005}}. [↑](#endnote-ref-5)
6. For treatment steps other than lining see {{Barbosa et al. 2015}}. [↑](#endnote-ref-6)
7. For example Plextol D360 is no longer available; it has been replaced by Dispersion K 360. Plextol D540 was discontinued after this project was completed. [↑](#endnote-ref-7)
8. See <https://www.trevira.de/en/trevira-cs/how-trevira-cs-works>. [↑](#endnote-ref-8)
9. Fuji electric inverter FVR 022 K7S-7EX. This instrument allowed the team to measure the pressure within the lining envelope. [↑](#endnote-ref-9)
10. For large paintings, it is more practical to attach the interleaf to the lining canvas first (with a trowel) before aligning both to the reverse of the painting. [↑](#endnote-ref-10)
11. Three paintings (*Birds I, Birds II,* and *Mammals*) were lined with the technique described. The remaining two (*Rodents* and *Deer*) are much smaller, so the lining technique was adapted accordingly. The materials used were the same. For a detailed description see {{Barbosa et al. 2015}. [↑](#endnote-ref-11)