

Processing Guidelines for Water-based Furniture Paints

Film formation

For ADLER Aqua furniture paints, polyurethane and polyacrylate based synthetic resins finely dispersed in water are used as binding agents. For emulsion paint of this type, trouble-free film formation is only possible if a certain minimum working temperature is maintained. It is essential for the temperature to be above the minimum film formation temperature (MFT) of the emulsion paint concerned.

A minimum paint, object and room temperature of + 15°C is required. Paint films produced at lower temperatures show poorer mechanical and chemical resistance; In certain circumstances, even cracking may occur.

For a satisfactory application of water-based furniture paint, working environments must be heated when it is cold outside.

Glueing

Veneers must be glued on professionally and with appropriate care. Due to the swelling behaviour of the veneer, water-based paints do not conceal any glueing mistakes, as solvent-based paints can to a certain extent.

Waterproof glues of Stress Group D3 in accordance with EN 204 (previously B3 in accordance with DIN 68602) have proven satisfactory in practical use.

If veneers such as beech, pear, service tree, cherry etc. are glued onto chipboard using urea formaldehyde resin glue, then it is essential for the glue powder to be completely dissolved in the glue paste and for controlled quantities to be applied (guide value 100-130 g/m²). If this is not adhered to, film-formation flaws (formation of white specks) can occur when water-based paints are used.

Wood sanding

Water-based wood paint – similarly to water-based wood stains – lead to increased raising of the wood fibres.

Therefore and in spite of their excellent body, these paints are not suitable for use in a one-time application.

It is of particular importance to execute any wood grinding diligently. Especially for solid oak, watering followed by grinding is necessary before applying the base coat.

Accentuation of the wood grain

Due to their chemical composition, water-based furniture paints have different wetting behaviour on wood compared to solvent-based furniture paints. Compared to solvent-based paints and depending on the type of paint, low to medium accentuation is obtained on wood, but the natural colour tone of the wood is often maintained.

Particularly on dark surfaces, a formulation of lower degree of gloss than G50 should not be used for the first coat.

Exceptions: brightening or “natural effect” finishes.

If the wood surface is stained before painting, the final appearance is equivalent to conventional solvent-based paints. This is due to slight etching of the stain layer on the one hand and to the high transparency of modern water-based paint systems on the other hand. This method is recommended especially for dark woods, where a stronger accentuation of the wood grain is usually desired.

Wood stains

Solvent-based wood stains can usually be top coated with water-based paints (e.g. ADLER Spritzbeize [*spray wood stain*] 10901 ff, ADLER Rustica 10401 ff).

Water-based wood stains which are highly soluble when coated with water-based paints are not suit-

able for this type of application because speckled and hazy stain finishes may occur, especially with strong colour shades.

If runs of stained paint occur on vertical surfaces, these flaws cannot be corrected anymore.

Special types of water-based stains are particularly suited for painting with water-based paint (e.g. ADLER Aqua-Positiv 13001 ff, ADLER Aqua-Classic 13301 ff, ADLER Aqua-Style 13831 ff, ADLER Aqua-Neoantik 14471 ff). Details can be found in the product data sheets.

Water-soluble wood extractives

Certain species of wood (e.g. oak, ash, certain exotic species of wood, etc.) contain water-soluble wood extractives that are activated by the application of water-based paints. Depending on the origin of the wood, discoloration of varying intensity may occur (e.g. greenish cast in case of oak), if the coated surfaces are exposed to daylight. Therefore, we recommend pre-priming with ADLER PUR-Primer 25291 when coating oak and other wood species which contain these extractives (pls. refer to data sheet).

For pre-insulating opaque pigmented paints, special products are available such as ADLER Aqua-Isolfüller (*isolating filler*) white 31009 (pls. refer to data sheet).

Lightfastness

Due to the binding agents used, water-based paints form paint films resistant to yellowing. However, these paint films are also very translucent, so the wood surface is exposed to a greater light impact than if solvent-based paints are used.

It is therefore standard procedure for a number of water-based paints to contain UV filters which give the wood surface – and any stain finish which might be used – good protection against light and prevent premature yellowing or bleaching. Specific information is provided in the technical data sheets for the individual paints.

Light-sensitive types of wood which tend to bleach, e.g. cherry, should always be stained with a water-based wood stain (e.g. with ADLER Aqua-Classic 13301 ff) before being coated with paint. In addition,

the topcoat can be slightly tinted with a colour batch (ADLER Aqua-Tint 89051 ff).

Patination

By tinting ADLER Patinabeize colourless 10310 with ADLER Solva-Tint colour batches, patina stains can easily be produced which are very well suited to the patination of water-based paint surfaces. Detailed information is given in the ADLER Patinabeize colourless 10310 [*patina stain*] data sheet

Compatibility

Water-based wood paints must not be mixed with conventional solvent-based paints and/or thinners because they are incompatible with one another in liquid form and pinholing will occur immediately.

Application equipment

In principle, only non-corrosive work equipment should be used for working with water-based paint. In practice, it has proven worthwhile to have a separate spraying device available for the application of water-based paints.

If solvent-based paints have previously been used in the application equipment (spray guns, pouring machines etc.) then it must be thoroughly cleaned before using a water-based wood paint. It is advisable to first rinse out the equipment with nitro and then with acetone. Then, it should be washed with tap water until all solvent residues have been removed.

If solvent-based products are to be used again after working with water-based paints, then the cleaning procedure should be carried out in reverse order (1st water, 2nd acetone, 3rd nitro or PUR thinner).

Working conditions

For compressed air sprayers, a 1.7 to 2.0 mm nozzle is recommended for clear coats and a 2.0 mm nozzle for highly pigmented fillers. A spraying pressure of approximately 2.5 - 3.5 bar should be set.

For airless and airmix spraying, nozzle sizes between 0.23 and 0.33 mm (0.009 - 0.013 inches) are used.

Airless spraying: Material pressure: 100 to 120 bar
Airmix spraying: Material pressure: 60 to 90 bar

Atomising pressure: 1 to 2 bar

In practice, the use of pre-atomiser nozzles has proven to be best. When using these nozzles, the pressure can usually be lowered a little. In spite of this, there is better atomisation of the sprayed material and the spray patterns are soft and completely stripe-free.

As with all painting work, the most important requirement for achieving good results is that the application equipment is in perfect condition. Faulty packing of airless pumps or material pressure that is too low can lead to blistering.

Amount applied

The usual amount of water-based furniture paint is between 110 and 130 g/m² per application. For fine-porous wood such as walnut, mahogany or Tanganika, we recommend adding 20 to 25 % ADLER Aqua-Fluid 80044 to the paint to avoid pinholing or pitting, and thinner application at quantities of approx. 2 x 80 g/m². To obtain full surfaces with these woods, the pores should be closed by priming with approx. 150 g/m² and applying a top coat with 130 g/m², with the addition of 5 - 10 % water.

If matt (degree of gloss G30) or dull matt (degree of gloss G10) surfaces are required, we recommend priming with the corresponding products at a higher degree of gloss (G50 or G70). This ensures the best possible transparency in spite of the low degree of surface gloss.

Intermediate grinding

In general, water-based wood paints have very good grindability. Usually, intermediate grinding is carried out with a 280 – 320 grain.

Due to the thermoplasticity of water-based wood paints, care should be taken to avoid sanding pressure that is too high (and consequently a rise in temperature).

Drying

High air humidity (above 60 % relative humidity) and low temperatures (below 20 °C) prolong the drying time significantly!

Adequate removal of water vapour emitted during drying is necessary to ensure good, thorough drying of water-based paint surfaces. Drying tunnels or drying rooms with efficient ventilation are required for this purpose.

For stacking painted work pieces after drying, spacers from PE foam padding cut into strips are very suitable.

We recommend using PE hose to cover the support rods of rack drying trolleys. PVC hose is unsuitable for freshly painted surfaces due to its plasticizer content. The same applies if conveyor belts are used in the dryers etc.

Sealing profile

It is necessary to use sealing profiles (e.g. for internal doors) which are compatible with acrylic paint.

Cleaning

The application equipment should be rinsed well with tap water immediately after finishing the work. To remove the dried-on residue of water-based paint, we recommend ADLER Aqua-Cleaner 80080 (diluted with water 1:1).

With more severe soiling, overnight soaking is advisable. The soaked water-based paint residue can then be easily removed with a grinding fleece (e.g. Scotch-Brite by 3M).

It is recommended that work equipment is subsequently cleaned with acetone because then the equipment dries quickly and is ready for other uses.

Spray stands

Both dry spray stands and water-washed spray stands are suitable for processing water-based wood paints.

For wet separation, a suitable circulating water treatment system is necessary (proper anti-adhesion and flocculation of the input material). This requires expenditure on technical equipment.

A coagulant which is suitable for the water-based paint processing must be used.

For overspray quantities of less than 100 kg per day, dry separation may be preferred for cost reasons.

A: 55374 EWC: 140603

Automatic spraying device

Various paint recovery systems are now available for automatic spraying devices (doctor-blade roller-systems, ring doctor blades, cross-band systems etc.) which are suitable for water-based paints

With separation systems, dry separation is the mainly used method, but water separation is also used.

Explosion protection

The flash point of most water-based paints is above 55 °C, and, accordingly, compliance with explosion protection regulations in painting rooms is not required.

Since it is possible that solvent-based thinners will be used for cleaning purposes or alcohol-based products, (flash point below 21 °C) may be worked with in the future, we recommend that electrically operated equipment in painting rooms and the lighting are always installed with explosion protection provided.

Disposal

Water-based paint residues and the related cleaning water must not be disposed of directly into the sewage system under any circumstances; instead, just as is the case with paint sludge, they must be promptly transferred from waste water treatment plants to a special waste collection service for proper disposal.

Water-based paint residues and sludge from waste water treatment plants must be collected separately from other waste and in accordance with the Abfallverzeichnisverordnung [Ordinance on the Waste Catalogue] BGBl. [Federal Gazette] 570/2003, identified with the Schlüsselnummer [Key Numbers] indicated below and disposed of accordingly: (A = Austria and/or EWC = European waste catalogue)

Water-based paint residues and similar waste
A: 55503 EWC: 080115

Cleaning water contaminated with water-based paint

Mud cake and/or sludge from treatment of water-based paints and/or cleaning water (waste treatment plant, flocculation)

A: 94801 EWC: 060502

After consulting the competent waste disposal operator, water-based and solvent-based paint particles from a dry spraying booth can be disposed of as commercial waste.

Storage

Due to their chemical composition and their high flash points, water-based paints are not subject to the Verordnung über brennbare Flüssigkeiten – VbF [Ordinance on Combustible Liquids], BGBl. [Federal Gazette] No. 240/1991. Electrical installations in store rooms should nevertheless be executed in Protection Class IP 54.

The floors of store rooms must be liquid-tight because water-based paints are, in most cases, allocated to Wassergefährdungsklasse [Water Hazard Class] 1 (WGK 1); Authorisation of the store room by the Bezirkshauptmannschaft [chief local government office] is necessary.

During storage, water-based furniture paints have to be protected against frost. The average shelf life is 6 to 9 months.

Health protection

When working with water-based paints, similar work safety measures as for solvent-based paint systems must be observed. Inhalation of paint aerosols – irrespective of whether from solvent-based or water-based paints – must be avoided. This can be ensured by proper use of a dust mask (Combination filter at least A2/P2 – EN 141/EN 143).

The residual solvents (under 10 % by weight) which are used in water-based wood paints usually have a very low MAK [maximum workplace concentration] value. However, due to its low vapour pressure, when processing this paint properly, it is not possible to reach solvent concentrations in the air which would be toxicologically harmful.

This is certainly a decisive advantage in comparison to solvent-containing paint systems, for which compliance with the MAK value is always a major problem.

During grinding works use at least dust filter P2 as personal protective equipment to protect of grinding and wood dust. We recommend using dust filter P3 for hardwood (e.g. beech, oak). The priority is to implement technical exhaust ventilations.

Residual emissions from paint films

Even paint films on furniture which has been freshly painted with water-based paints always contain a low proportion of residual solvents ("filming agent"). These are usually given off into the ambient atmosphere during the first months of use and are responsible for the "new furniture smell".

How long it takes until the low concentrations of residual solvents disappear depends on the local conditions and, particularly, on the airing habits of the user. Solvent concentrations in the room can certainly be initially detected but, due to their low concentration, represent no danger to the health of occupants.

The quantity of residual solvents initially included in a paint film is highly dependent on the processing conditions. The residual solvent content is low if the

application quantities given in the technical data sheets are observed and the coated surfaces are dried with intermediate drying times (e.g. drying overnight at room temperature 20°C with good ventilation).

The following factors delay the release of solvents:

- High layer thickness of the individual paint coats
- Short interim drying times
- Low room temperature during application and drying
- Low air circulation rates with low fresh air share during drying
- Quick reassembly after coating

In order to keep residual solvent contents as low as possible and in order to avoid complaints based on odour from residual emissions, we recommend to openly store the painted parts before assembly and erection for 5 to 7 days in a well ventilated room at room temperature (approx. 20°C).

Please refer to our information in the technical data sheets and in the safety data sheets.