WATERLOX COATINGS CORPORATION
9808 MEECH AVENUE · CLEVELAND, OHIO 44105
PHONE: 216.641.4877 · FAX: 216.641.7213
www.waterlox.com • e-mail: info@waterlox.com

Technical Discussion on Hardwood Flooring and Wood Trim Finishes

Polyurethane Coatings

Definition: A thermoplastic polymer produced by the condensation reaction of a polyisocyanate and a hydroxyl containing material.

Uses in Coatings: Air-dry or baking enamels and clears for wood, metal, plastic. Polyurethanes are used for floor coatings, furniture, cabinetry and wood trim.

Properties: Excellent hardness, gloss and abrasion resistance. Good adhesion to various substrates. Resistant to impact, weathering, acids and alkalis; attacked by aromatic and chlorinated solvents. Tend to harden and become brittle at low-temperatures. Polyurethanes for wood substrates are generally modified with vegetable oils (linseed, soya, etc.) to increase flexibility and enhance adhesion.

Advantages: Fast-dry, excellent hardening and scratch resistance, quick obtainment of physical properties.

Disadvantages: Requires abrasion (sanding and screening) of surface when applying multiple coats and re-coating. Little, if any penetration of wood fibers (surface coating only). When failure occurs, the entire film requires removal from the substrate prior to re-finishing (poor spot refinishing characteristics).
Aging causes brittleness and separation from substrate; as well as a decrease in flexibility and impact resistance. Most urethanes are extended with linseed oil, which yellows over time. Plastic-like film appearance on wood.

Conversion Varnishes

Definition: Consist of a two-part resin system (short or medium oil alkyd and a reactive or amino-resin; for example: urea-formaldehyde or melanine-formaldehyde) that is externally catalyzed with an acid catalyst.

Uses in coatings: Floor coatings, furniture, cabinetry, wood trim, and kitchen cabinetry. Conversion varnishes are used for other wood or metal substrates that are stable (little to no flexing).

Properties: Excellent hardness, gloss and abrasion resistance. Good solvent and food staining resistance.

Advantages: Fast-dry, excellent hardening, scratch and chemical resistance, and quick obtainment of physical properties.

Disadvantages: Generally, poor flexibility often requires a primer when applied to wood substrates. Requires considerable abrasion (sanding and screening) of surface when applying multiple coats and re-coating. Little, if any penetration of wood fibers (surface coating only). Aging causes brittleness and separation from substrate; as well as a decrease in flexibility and impact resistance. When failure occurs, the entire film requires removal from the substrate prior to re-finishing (poor spot refinishing characteristics). Plastic-like film appearance on wood.

Should not be used on long expanses of wood where flexing or expansion and contraction occur due to brittleness of finish; which will cause cracking and splitting, and lifting of the finish.

Oil Finishes

Definition: Formulations are based on oils derived from the seeds of linseed flax, soybeans, tung trees, oiticicia trees, etc. (vegetable oils).

Use in Coatings: Clears or enamels for wood and metal. Oil finishes are used on floors cabinetry, wood moldings and furniture.

Properties: Medium hardness, high gloss, medium abrasion resistance, excellent water resistance and flexibility. Some resistance to alkali and acids.

Advantages: Superior penetration of wood substrates resulting in excellent adhesion, flexibility and resistance to chipping, peeling or delamination. Requires NO sanding while applying multiple coats for adhesion. Accentuates rich patina of wood.

Disadvantages: Long dry-times. Poor scratch resistance, yellowing of film upon aging (linseed oil). Poor solvent and chemical resistance. Will water spot. Requires periodic recoating due to surface oxidation.

Waterlox Tung Oil Finishes

Definition: Waterlox finishes are varnishes based on tung oil. Opposed to an oil-finish – which is either a single oil or blend of oils; varnishes consist of blending and co-reacting an oil with other modifying resins to enhance film properties and performance. Waterlox co-reacts Tung oil with phenolic resin. Phenolic resin is an aromatic organic compound that attaches itself directly onto the molecular chain of the Tung oil. Phenolic resins (sometimes regarded as epoxies) have superior chemical, fingerprint, solvent, food, alkali, acid, water and alcohol resistance.

The result of combining Tung oil (which inherently posses excellent water resistance, due to the double bond characteristics of its molecular chain) with phenolic resin yields a film that is comparable with polyurethanes, conversion varnishes, and other synthetic coatings for chemical resistance, with the added benefit of having excellent flexibility, substrate penetration, re-coatability and non-yellowing properties.
Varnishes formulated in this manner will never chip, crack or peel and will remain elastic (flexible) over extended periods of time.

Use in Coatings: These coatings are used for flooring, wood paneling, kitchen cabinetry, countertops, furniture, and anywhere a flexible- water resistant coating is required, unaffected by temperature and humidity fluctuations.

Disadvantages: Long dry-times, slower obtainment of properties 7 – 14 days.

Advantages: Superior penetration of wood substrates resulting in excellent adhesion, flexibility and resistance to chipping, peeling or delamination. Requires NO sanding while applying multiple coats for adhesion. Accentuates rich patina of wood. Modification with phenolic resin enhances chemical and solvent resistant properties equal to synthetic finishes.

Spot refinishing requires no sanding and unlike oil finishes the film does not oxidize, therefore, no periodic recoating is necessary. Non-yellowing due to the absence of linolenic acid, which is found in most other vegetable oils.