



ROYALÉ TOUCHE

ROYALE TOUCHE TECHNICAL GUIDE



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PREFACE

This document is intended to provide a general understanding of High-Pressure Laminates, its composition, properties, types and relevant international standards. It provides information on working methods with thin HPL (0.8, 1- & 1.25-mm thickness), as well as some good practice recommendations for its use.

The advice and recommendations have an advisory nature only.

If you need more information or have a specific question, please contact Royale Touche customer care.



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1. INTRODUCTION TO HPL – HIGH PRESSURE LAMINATES

1.1 WHAT IS HPL

Decorative High-Pressure Laminates (HPL), as defined by the European and international standards for HPL, EN 438 and ISO 4586, are high-density panels ($\geq 1350 \text{ kg/M}^3 \text{ CBM}$), finished and ready for use, which have exceptional mechanical strength, physical strength and chemical resistance are easy to work and simple to maintain.

Royale Touche HPL sheets are made of several layers of cellulose fibre material impregnated with thermosetting resins and then simultaneously subjected to both pressure ($>7 \text{ MPa}$) and heat ($140 / 150^\circ \text{C}$) in special presses, for a fixed time, which varies depending on the type of laminate.

This process creates a stable, inert, homogeneous, non-porous and high-density material, with physical and chemical properties that are totally different from those of its original ingredients. In addition, given its very low permeability, HPL acts as a barrier against the possible emission of formaldehyde and other volatile substances (VOCs) from any timber substrates it is applied to.

1.2 COMPOSITION

HPL panels are made exclusively of cellulose-based materials (60-70%) and thermosetting resins (30-40%). They can have decorative finishes on one or both sides.

The different layers that HPL panels comprise of are as follows:

(a) Overlay (tissue paper)

A highly transparent paper, which makes the laminate surface abrasion and scratch resistant.

(b) Barrier paper

Increases hiding power, good colour depth for Décor Design and Solid colours. Used only with printed patterns.

(c) Decorative paper

External paper, with no chlorides.

These are coloured or patterned and give the laminate its aesthetic appearance.

(d) Kraft paper

“The heart” of HPL. This paper, mostly brown in colour, is the core of high-pressure laminate.



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1.3 FIELDS OF APPLICATION

Today, thanks to its particular properties, HPL is widely used in various interior/ external applications. Its excellent mechanical and physical performance and toughness make high-pressure laminate one of the most popular materials in interior design, from wall cladding to flooring and from suspended ceilings to furnishing accessories and furniture.

In particular, due to its hygienic qualities and ease of maintenance, it has always been widely used in interiors and spaces that require special attention to hygiene, such as hospitals, laboratories, restaurants etc.

Royale Touche offers materials and solutions for many applications (see table). Some collections, such as Royale Touche for Kitchen and Royale Touche for Retail & Contract have been specially designed to respond to the specific requirements for particular purposes.

Applications

Walls Partitions Ceilings Doors	Floors Staircases Furniture Chairs	Tables Worktops Counters Bathrooms	Showers Bookcases Display units Shop fitting
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Market Sectors

Design Furniture



Office



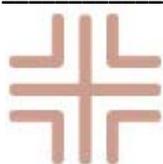
Retail & Contract



Lifts



Healthcare & Wellness



Kitchen



Marine



Hospitality & Restaurants



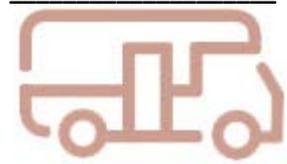
Street Furniture



Education



Transport



Residence





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1.4 HOW TO SELECT LAMINATE

Sample used in catalogues are texture and colour indicatives only. The small pieces of laminates in the catalogue may look entirely different in full size sheet. Hence, end users are requested to visit the nearby gallery (experience centre) for final selection.

(a) CHARACTERISTICS OF LAMINATES

Like wood, a Decorative High-Pressure Laminate (HPL) has grain direction, and, its dimensional behaviour is similar to that of wood. When humidity in the atmosphere changes, width of the laminate undergoes greater dimensional change than the length by a ratio of approximately 2:1. When the humidity decreases, laminate sheet contracts and when the humidity increases, laminate sheet expands.

(b) VARIATION IN SAME DESIGN ACROSS THE LENGTH

This happens mainly with wood and abstract designs to achieve the look of natural design. Secondly, technical point of view the design paper is never aligned as 8X4 standard cut size. This can be achieved at a very high production cost and time, but it is not practical. If all the sheets have exactly the same design pattern, the application of these laminate sheets will give an artificial look rather than replicating the feeling the natural designs of wood, stone, etc.

USE OF LAMINATE

Laminates are meant for indoor purpose only unless it is specified by manufacturer to use externally.



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2. TRANSPORT AND STORAGE

2.1 TRANSPORT

Laminates can be transported rolled up or laid flat.

When rolled up, the decorative surface must remain on the inside. For laminates that are being transported in rolls, please ensure that the rolled-up cylinder is at least 550 mm to 600 mm in diameter.

Tie the roll using good quality material, ensuring that the material used to tie the roll is applied at least at 3 points that are equally close to the end of the roll. A foam or an insulating pad can be used between the ties and the laminate.

Sleeve – Use cardboard sleeve at extreme ends to protect edges.

We recommend that laminate sheets over 1 mm are transported flat, instead of being rolled up.

(a) HANDLING

Laminate sheets should be handled carefully at all times to avoid damage to the product, especially the edges. The decorative faces may get damaged on sliding over other surfaces, including other laminate sheets. Therefore, sliding the sheets is not recommended, the sheets need to be lifted instead.

We recommend the use of two workmen to lift the sheet, especially if the sheets are sized over 3.5 feet. Always ensure the workmen walk at a steady pace, holding the sheet along its length with decorative finish towards workman's body. Allow for limited slack only, as excessive bowing can strain the surface of the laminate.

Never allow the laminates to touch the ground or the walls while they are being carried.

If forklifts and similar mechanized vehicles are used to load or unload a vehicle, ensure that the pallets are clean and structurally sound.

(b) STORAGE

2.2 HORIZONTAL STORAGE

Laminate sheets should be stacked in pairs, in a back-to-back configuration. The sheet at the bottom of the stack must be placed with the decorative face downwards, and a flat, protective board placed below it.

The top most sheet of the stack should preferably be placed with the decorative side downwards. Additionally, a similar-sized board may be placed over the topmost sheet, to maintain a uniform pressure on the underlying sheets and prevent any warpage in bulk stock.

2.3 VERTICAL STORAGE

If space constraints don't allow for horizontal storage, laminates may be stacked at an angle close to the perpendicular with 60°-70° with whole surface area resting against a rigid support. A heavy board should be used on the free end to prevent any slippage and damage.



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WORKING WITH HPL

3.1 PRE-CONDITIONING FOR FABRICATION

The most important factor in achieving stability when working with Royale Touche HPLs is during the fabrication preparation; it is always recommended to acclimatize Royale Touche HPLs within the same area as the substrates it will be bonded to.

It is recommended to store Royale Touche HPL sheets at site as follows:

- (a) Stack the sheets horizontally and flat in a face-to-face manner at a temperature range between 23° and 30°C and at a humidity between 45%- and 65%.
- (b) The stacking must be done at least 4" above the ground on a board which covers the entire surface area of the sheet. Use sufficient and uniform supports under the board to prevent bending of sheets.
- (c) Never stack the sheets in direct contact with any type of floor.
- (d) The use of a cover board over the top sheet to keep it flat is recommended.
- (e) It is preferable to cover the sheets stack by a thick plastic sheet.

If horizontal storage is not possible, or only where small stocks of Royale Touche HPL sheets are kept, these can be stacked on edge in slightly inclined (80° or thereabouts) vertical racks with support over the entire surface. A cover board should be used to prevent slipping.

Sheets as well as substrate should be allowed to acclimatize and stabilize in the same environment before fabrication for a minimum of three days.



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3.2 TYPICAL TROUBLE SHOOTING MECHANISMS

(a) CHIPPING

HOW TO CUT LAMINATES

Most of the conventional tools, machines and methods used in the fabrication are common for laminate also, but some additional techniques are needed to take advantage of the full potential.

1. All saw blades and router bits used for cutting should be Tungsten Carbide tipped and must be sharp to avoid chipping while cutting.

Feed rate should be slow and tool speed should be high.

2. The circular cutting saw should be Diamond or Tungsten Carbide tipped. The number of teeth and speed must be chosen according to the machine design.

3. Use of a sacrificial panel is essential below the laminate.

4. The sheets require fine finishing after cutting.

5. For hand cutting use a fine-toothed saw, support the sheet well on both sides of the cut to prevent tearing.

6. Cutting laminates on a laminate splitter is not recommended

(b) STRESS CRACKING

1. In conditions of low humidity caused by central heating or of localised heating by radiator grilles or hot air vents, shrinkage may occur which can result in cracks from high stress points such as sharp internal corners or chipped edges.

2. At the time of bonding on ply surfaces the chance of dimensional movements are possible because of Manual work.

3. Main Reason for development of the stress cracking is the use of contact adhesive.

To reduce the risk of stress cracking, the following measures should be taken:

- 1.** Internal corners of apertures and cut-outs must always be smoothly radiused to as large a radius as possible. The minimum radius is 5mm, but this should be increased for apertures with large side lengths.
- 2.** If sharp internal corners are required as a design feature, these should be formed by butt-joining panels, and not by right-angled cut-outs.
- 3.** All cut edges should be smooth, with no chipping.
- 4.** The use of contact adhesives should be avoided, particularly where the ambient conditions in the final installation are warm and dry
- 5.** Where contact adhesive is used (particularly when hand applied), panel widths should not exceed 600mm.
- 6.** Always cut laminate sheets across the parallel lines of sanding because the dimensional movement is twice in width as compared to length.
- 7.** The laminate should be pre-conditioned in temperature/humidity conditions similar to those of the final installation for at least three days prior to bonding. This is particularly important if the laminate has a high moisture content following storage or transport in high humidity conditions.
- 8.** Drilled holes for fixing screws etc. should be oversized to ensure that fixings do not impinge on the edge of the laminate.
- 9.** The panels should be fixed firmly to prevent any bending or twisting which may cause stress.
- 10.** Laminates are made from papers, and change in extreme weather conditions cause them to expand and contract, leading to cracks. The moisture content of the laminate is lowest compared to other material like Ply, MDF, etc, that's why increase in temperature causes higher contraction on this material compared to laminate and the place where bonding is not proper the cracks are developed.
- 11.** Maintain 2 mm gap where the two laminates are glued to avoid the cracks because of stress of Expansion. To maintain the same level of moisture content of laminate and substrate (Ply and MDF), keep them at site for minimum 48 hrs before installation.
- 12.** Keep Laminate flattened and pressed between two ply boards.
- 13.** Do not leave uneven and unsmooth corners, to accomplish this always use sharp blades (saw) to cut the laminates.
- 14.** When there is a cut angle of 90 degree on laminates, it is highly prone to cracks, to avoid, drill 3mm holes at four angles and rub them with sand paper.
- 15.** Hammering iron nails on laminates causes cracks because of high pressure avoid hammering and go for drilling.

(c) AIR BUBBLES, IMPROPER BONDING, WARPAGE

It is a known fact that climate and environmental factors affect the behaviour of all types of Decorative Laminates (HPL). Hence, different issues may be reported during different seasons.

The fabricator will have to be cautioned to observe the possible reasons and adhere to recommendations listed here and follow them implicitly in order to avoid failures. Also, a concise pasting sequence, which would provide as helpful guidance, is given at the end of this customer support information.

The basic fact is that as humidity rises there is an absorption of moisture by HPL as well as the substrates like plywood, particle board etc. The absorption in a substrate is higher than HPL in all cases. At a later date, the substrate tends to stabilize itself and shed the excess moisture. Due to this behaviour the following complications can arise on the bonded assemblies:

For better bonding remove chemical residue from ply surface with light sanding. This helps in proper bonding with mica and avoids the complications of bubble.

Note:

In case of more than 80% humidity avoid bonding, but if it is inevitable use synthetic rubber-based adhesive containing solvents.

CAUSES AND RECOMMENDATIONS TO AVOID BUBBLES.

PROPER LEVELLING OF BOTH THE SURFACES TO BE BONDED:

The surfaces to be bonded should be properly levelled, free from oil/grease/dust and excess moisture. For best results roughen the surfaces to be bonded.

- 1. UNIFORM COAT OF ADHESIVE ON BOTH THE SURFACES.**
Apply adhesive in uniform coat over both the surfaces to be bonded.
- 2. APPLY SUFFICIENT PRESSURE WHILE BONDING.**
Hand rolling should be done from the centre to the edges to ensure the removal of all air bubbles. The edges should be rolled twice.
- 3. FOLLOW THE GUIDELINES BY ADHESIVE MANUFACTURER.**
- 4. IDEAL TEMPERATURE FOR BONDING OF SURFACES IS ABOVE 21*c**
- 5. AVOID BONDING OF SURFACE WHERE HUMIDITY IS TOO HIGH (≥80%)**
- 6. ADHESIVE NOT STIRRED THOROUGHLY**
The adhesive should be stirred thoroughly before use. This is particularly necessary with large containers.
- 7. FIELD BONDING OF OVERSIZED SHEETS**

It is recommended that the maximum sheet size used for vertical field application be limited to 610 X 2400 mm (2 X 8 feet).

(d) SCRATCHES AND COLOUR FADING.

SCRATCHES

Avoid scrubbing with mechanical agents (for example - abrasive, pads scouring powder and chemicals like toilet cleaners/drain cleaners / Hydrogen peroxide/ Chlorine bleach).

Avoid uses of knives or any other sharp objects directly on the surfaces of laminates.

Use Better quality mica manufactured using chemical reagents and quality tissue paper. This gives better protection against scratches.

To avoid the scratches during transportation and fabrication insist for laminate sheet covered with Plastic film / Paper.

COLOUR FADING

Ultra Violet Radiation in the light cause's colour fading and the reason is low quality ink used for printing the design papers (With less than 7 blue wool scale inks are considered as low-quality ink)

Polishing of laminates causes permanent damage on the laminate surface.

S. No.	Type of complaint	Possible reasons	Recommendations
	Air bubbles on bonded assembly	<p>Improper drying of the glue either on the HPL or on the substrate or both</p> <p>Wet Substrate or moisture absorbed by substrate</p> <p>Field bonding of oversized sheets</p> <p>Non uniform pressure applied for bonding</p> <p>Less gap between bonded panels to accommodate expansion</p> <p>Surfaces are not cleaned properly before bonding</p>	<p>Drying time of the glue varies depending on the temperature and humidity prevailing at the location. Always ensure that the glue is applied on HPL first followed thereby on the substrate. The bonding can be done when the adhesive does not transfer to a paper in a touch test. Over drying or under drying of the glue must be prevented.</p> <p>Substrate would absorb moisture during monsoon and pushes the HPL to form bubbles while losing the same over a period of time. Ensure that the substrate is dried sufficiently (by using a hot air blower if required) before applying the glue.</p> <p>The maximum size of the sheet used for vertical bonding at field must be limited to 610mm x 2440mm. Larger panels must be fabricated at workshops and installed to avoid occurrence of air bubbles</p> <p>After aligning the glue applied HPL to the glue applied substrate, the contact can be made while applying uniform pressure. Work on the bonded surface to apply uniform pressure to ensure full contact. Pressure should be applied first in the middle portion of the assembly and work towards the edges to avoid air trapping. The edges must be pressed twice.</p> <p>In many cases of vertical field bonding of assemblies, there is a need to fix a support board in contact with the HPL to hold it in contact and pressure till bonding is completely achieved.</p> <p>Sufficient spacing is required between panels to allow for movement and expansion.</p> <p>Clean the surfaces thoroughly</p>
	Improper bonding of HPL to substrate	<p>Improper conditioning of the HPL and the Substrate</p> <p>Improper practices</p> <p>Foreign particles entrapped while bonding</p> <p>Non uniform glue line</p> <p>Adhesive condition</p>	<p>Allow both HPL and substrate to acclimatize for 48 hours at the location where bonding or fabrication is taking place. There must be proper air circulation at the location.</p> <p>Ensure complete bonding of the HPL to the substrate, especially in the edges by adopting correct practices suiting the environment and location.</p> <p>Thoroughly clean the substrate and the sanded side of the HPL to remove any trapping of foreign particles</p> <p>Ensure that the glue line in the bonded assembly is uniform by adopting correct practices</p> <p>The gluing temperature of the adhesive must be at least 27°C and must be thoroughly stirred before use.</p>
	Warp of the HPL	Top few sheets in the stack or storage area warp	<p>Ensure storage of HPL horizontally with the top sheet turned décor face down.</p> <p>Place a caul board or a thick board like plywood or particle board to prevent warpage of HPL</p> <p>Rotate the sheet stack to ensure older sheets are taken to use first.</p> <p>Never store the HPL in contact with floor. Always use a raised full-size support</p> <p>However, a warped laminate can always be taken for bonding unless the warp is so high that handling itself becomes very difficult. Warp in HPL prior to bonding is not a cause for warp in the finished panel.</p>

4. ADHESIVES AND SUBSTRATES

4.1 ADHESIVE TYPES AND CHARACTERISTICS (TABLE)

A general guideline about adhesives used for bonding HPLs to different substrates is given below. The end user is, however, advised to check with the manufacturing specification of the adhesive while making the choice of application. The choice of adhesive is based upon the service for which the assembly is intended and upon the bonding facilities available.

Type of Adhesive	Urea/Melamine Urea-Formalin system	Resorcinol-Formalin system	Epoxy systems	Polyvinyl Acetate based (PVAc)	Contact Adhesives	Hot Melt Adhesives
Description	These are rigid thermosetting adhesives. Curing is by polymerization when the recommended amount of catalyst is added to the resin. The rate of cure rapidly increases by the application of heat.			Aqueous emulsion adhesives which cure by dispersion of the solvent. Available in both single and double part (catalysed) varieties.	Poly-chloroprene based adhesives. Available in solvent or water-based types. Also available with and without hardener.	Available in pellet or cartridge form.
Information on typical application and features of the adhesive	Used in flat lamination, hot or cold pressed to bond laminates to most wood based substrates. Melamine/Urea is useful for bonding to moisture resistant core materials.	Used in flat lamination, hot or cold pressed to bond laminates to moisture resistant wood based substrates, some flame retardant substrates and non-combustible substrates. Satisfactory bonds are produced at low pressure.	Used in flat lamination, hot or cold pressed to bond laminates to metal substrates after initial priming. Requires only low pressure.	Used in flat lamination, hot or, more usually, cold pressed to bond laminates to most wood based substrates. Also used for producing postformed components. Requires only low pressure. Easy wash down of equipment and removal of glue spillage.	Used for both flat bonding and postforming. Can be used to bond laminates to a wide variety of substrates. Bond occurs when both coated surfaces are brought into contact. Requires only momentary but high uniform pressure. Can be applied by spray (hot or cold) or by hand application with serrated spreader. Useful for on-site works.	Used exclusively for edge bonding applications. Will begin to soften under moderately elevated temperatures. Should not be used to edge materials for use near hot surfaces.
Information on gap filling properties	Poor gap filling properties but gives a good	Good gap filling properties.	Excellent gap filling properties.	Poor gap filling properties.		
	Bond at relatively low pressures.					
Information on telegraphing with the adhesive			Minimal telegraphing due to high solids content (lack of shrinkage).	Requires carefully controlled glue spread to avoid	Minimal telegraphing providing laminating pressure is not excessive and glue-line is kept free from debris.	

Type of Adhesive	Urea/Melamine Urea-Formalin system	Resorcinol-Formalin system	Epoxy systems	Polyvinyl Acetate based (PVAc)	Contact Adhesives	Hot Melt Adhesives
Typical curing times for the adhesives	Cure time typically 1 to 3 hours at room temperature depending on hardener system.	Cure time typically 5-8 hours at room temperature.	Wide range of room temperature cure times depending on hardener	Fast curing at Room temperature giving quick press turn round (20-40 minutes).	Should only be used in warm dry conditions.	
Typical Temperature Resistance	Up to 120°C.	Up to 150°C.	Up to 100°C.	Standard up to 80°C Catalysed up to 120 °C	Standard up to 60°C Catalysed up to 100 °C	Up to 50°C.
Typical EN 204 Durability class	D3 – D4	D4	D4	D2 – D3	D1-D2	D1

4.2 SUBSTRATE TYPES AND CHARACTERISTICS (TABLE)

Royale Touche HPLs, up to a thickness of 2.0mm, are surfacing materials that are essentially required to be bonded to a substrate. Thus, the bonded assembly acquires the necessary structural rigidity for further fabrication. While there are plenty of choices in Royale Touche HPL ranges that would match the end user's requirements, following overview of substrates is provided for general understanding. The end user, however, is advised to check with detailed intrinsic properties of the substrate of choice while finalizing its fitness for use.

The basic purposes of substrates are:

- To support the laminate
- To resist bonded assembly from warping
- To satisfactorily meet the performance criteria like moisture/humidity resistance, good screw holding capacity, mechanical strength and many such application aspects.

Particleboard, Medium or High-Density Fiberboards are commonly used substrates across the globe due to ease of availability, variety of sizes and thicknesses and since they possess the degree of rigidity needed to support the laminate and offer a suitable face for bonding. Plywood and Chipboards are also used in certain geographies as substrates for furniture.

It is essential that the surface of the substrate should be sufficiently smooth to prevent the transfer of surface undulations through to the decorative laminate surface (commonly known as telegraphing).

The dimensional movement of these substrates are similar to HPLs. Plywood, steel, aluminum, fiber reinforced plastic (FRP) may be used in some applications, but their dimensional movement is significantly different than high-pressure decorative laminate. This may result in potential panel warpage, stress cracking, and open seams and certain field related issues.

This is the reason; we recommend to use the best quality substrates.

Plaster board, Gypsum board, plaster, concrete, and similar materials are not recommended for bonding with HPLs because their internal bond strength is not sufficient for this application.

Certain industrial applications call for specialized substrates such as mineral boards, metal sheets, honeycomb cores and plastic foams, and these will require special bonding and fabrication techniques.

The commonly used substrates and their overview are listed below:

Aspects	Plywood	MDF	Particle Board
Substrate construction and production method	Plywood is an engineered wood product made up of sheets of wood veneer. These veneer layers are impregnated with resins and are pressed and bonded together to obtain a consolidated board.	MDF is an engineered wood composite made up of wood fibers. Because the MDF is composed of small wood fibers, there is no visible wood grain, rings, or knots.	Particle board is a wood product made by heat pressing resin coated wood chips, sawmill shavings, or even sawdust and resin together.
General Advantages	<ul style="list-style-type: none"> • Available in various thicknesses • Strong Material • Less Susceptible to Water Damage • Stainable and Paintable • Holds Screws Well • Possible to Purchase with Low or No VOCs. 	<ul style="list-style-type: none"> • Low Cost • Very Smooth, No Splinters • Easy to Paint • Easy Cutting • Denser and Stronger than Particle Board • Composed of Small Wood Fibres So There is No Wood Grain 	<ul style="list-style-type: none"> • Low Cost • Light-Weight • Perfect for Ready-Made Furniture
General Disadvantages	<ul style="list-style-type: none"> • More Expensive • Have to Finish Edges Because Layers Show • Plywood Often Splinters • Difficult to Cut 	<ul style="list-style-type: none"> • MDF is Dense, making it Heavy • Cannot Be Stained • Can Dull Blades Quickly 	<ul style="list-style-type: none"> • Low Strength - Cannot Support Heavy Loads • Not as Eco-Friendly as Wood Furniture • Expands or Discolors Due to Moisture
Fire rating	Substrates are made available in flame-retardant grades, which can be used to produce composite panels conforming to various fire performance requirements of Transport, Building or Furniture guidelines and respective regulations. Fire rated substrates are essentially bonded to Fire rated HPLs to conform to the fire rating specifications of the respective regulations		
Information about uses and end product features	High grades can be used for cabinets and shelving.	Generally denser than plywood, the substrate is a stronger material for building.	Most home and commercial builders use OSB particle board for floor and wall bases.
	Those with narrow core strips, less than 10mm in width and edge glued, are excellent substrates for decorative laminates for cabinetry and high-class carcass work.	Provides an excellent surface for HPL bonding, and its excellent machining properties allow finely moulded and smooth edge finishes. Primarily used in furniture cabinet work, post forming etc., where its properties are well suited to the needs of these industries	



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5. MAINTENANCE AND CLEANING OF HPL

5.1 MAINTENANCE

HPL surface should be cleaned regularly but does not require any special maintenance, just a damp cloth with warm water or mild detergents is enough. Almost all normal household cleaning products or disinfectants are tolerated perfectly well, as long as they are not abrasive or highly alkaline.

The table below shows the cleaning products and methods best suited to different type of dirt.

5.2 RECOMMENDATIONS FOR CLEANING THE SURFACE OF HPL FOR INTERIOR PRODUCTS

Type of dirt	Recommended cleaning product and method of application
Syrup, fruit juice, jam, spirits, milk, tea, coffee, wine, soap and ink.	Water with a sponge
Animals and vegetable fats, sauces, dry blood, dry wine and spirits, eggs.	Cold water with soap or household detergent with a sponge.
Smoke, gelatine, vegetable and vinyl based glues, organic waste, gum arabic.	Hot water with soap or household detergent with a sponge
Hairspray, vegetable oil, wax, foundations and greasy make-up, residual solvent marks.	alcohol, acetone with a cotton cloth
Nail polish, spray lacquer, linseed oil	Acetone with a cotton cloth
Synthetic oil paints	Trilene nitro based solvent with a cotton cloth
Neoprene glues	Trichloroethane with a cotton cloth
Traces of silicone	Wooden or plastic scraper, taking care not to scratch the surface
Lime deposits	Detergents containing low percentages of citric or acetic acid (10% max.)

5.3 GENERAL PRECAUTIONS

- For best results in cleaning HPL, it is important to remember certain precautions: Although very durable, the surface of HPL must still never be treated with products containing abrasive substances, abrasive sponge so run suitable products, such as sand paper or steel wool.
- Products with a high acid or very alkaline content should be avoided because they can stain the surface.
- When using solvents, the cloth used must be perfectly clean so as not to leave marks on the HPL surface. Any streaks can still be removed by rinsing with hot water and drying.

Avoid furniture polishes and wax-based cleaners in general, because they tend to form a sticky layer on the dense HPL surface, to which the dirt adheres.

LOW QUALITY PLYWOOD

- Low quality plywood is not calibrated; this causes variation in thickness and subsequently improper bonding with the laminates.
- Low quality resins used to manufacture ply to bring down the cost causes improper bonding.
- Low quality manufacturer of ply wood uses D2/ D Face causes bubble formation after bonding the laminates.
- Ply face will leave the bonding and subsequently will affect the finished furniture.