

PRODUCT INFORMATION

Chemical Resistance of Duropal Laminates



High-pressure laminates with melamine surfaces are predestined for areas with high hygiene standards. Because they are distinguished by being easy to clean, maintain, and disinfect. They are hygienic, environmentally friendly, nontoxic, and food safe. Besides, they are also very robust and durable.

CLEANING & DESINFECTION

Duropal laminates are highly resistant to most chemicals and disinfectants. This allows for regular and thorough cleaning which, for example, supports the hygiene schedules applicable on site.

The cleanability and good disinfectability is supported by the fact that laminates are made of duroplast resins which create a stable, resistant and reactivatable material. In addition, the surface is completely sealed, which means that it is free of pores. Dirt and germs cannot settle on it sustainably.

There is variety of surface disinfectants available on the market which differ distinctively in their ingredients, their modes of action and application, for example, as far as their frequency of use and surface retention times are concerned.

Duropal laminates are resistant to disinfectants based on:

- Alcohols : e.g. ethanol 70%
- Aldehydes: e.g. Formalin 1% und 5%
- Phenols: e.g. p-chloro-m-cresol 0.3%

In the event that other chemicals than those mentioned here and in the following are supposed to come into contact with Duropal laminate, the compatibility of each must be tested individually.

STAIN RESISTANCE ACC. TO EN 438:2016

The applicable product specification for high-pressure laminates describes the method according to which the properties stain resistance of laminate surfaces are tested by means of an exposure various substances. The surface is brought into contact with substances which they might be exposed to in daily use. The duration and conditions of this contact is specifically defined for each single substance.

Table 1:

Stain-producing substances	Exposure time
Group 1 <ul style="list-style-type: none"> • Acetone • Other organic solvents • Toothpaste • Hand cream • Urine • Alcoholic beverages • Natural fruit and vegetable juices • Lemonade and fruit drinks • Meats and sausages • Animal and vegetable fats and oils • Water • Yeast suspension in water 	16 h
<ul style="list-style-type: none"> • Salt (NaCl) solutions • Mustard • Lyes, soap solutions • Cleaning solution consisting of: <ul style="list-style-type: none"> • 23 % dodecylbenzene sulfonate • 10 % alkyl aryl polyglycol ether • 67 % water • Commercial disinfectants • Stain or paint removers based on organic solvents • Citric acid (10% solution) 	
Group 2 <ul style="list-style-type: none"> • Coffee (120g of coffee per litre of water) • Black tea (9g of tea per litre of water) • Milk (all types) • Cola beverages • Wine vinegar • Alkaline-based cleaning agents (to 10% concentration with water) • Hydrogen peroxide (3% solution) 	16 h
<ul style="list-style-type: none"> • Ammonia (10% solution of commercial concentrate) • Nail varnish • Nail varnish remover • Lipstick • Water colours • Laundry marking inks • Ball point inks 	
Group 3 <ul style="list-style-type: none"> • Sodium hydroxide (25% solution) • Hydrogen peroxide (30% solution) • Concentrated vinegar (30% acetic acid) • Bleaching agents and sanitary cleaners containing them • Hydrochloric acid based cleaning agents ($\leq 3\%$ HCl) • Acid-based metal cleaners • Iodine • Hair colouring and bleaching agents 	10 min
<ul style="list-style-type: none"> • Shoe polish • Boric acid • Lacquers and adhesives (except fast curing materials) • Amidosulfonic acid descaling agents ($< 10\%$ solution) • Mercurochrome® (2,7-dibromo-4-hydroxymercurifluoresein, disodium salt) • Acetonitrile • Trifluoroacetic acid (TFA) 	

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At the end of the exposure time the laminate surface is washed off and examined for traces that remain on the surface:

- Grade 5: No visible damage/alteration.
- Grade 4: Minor alteration/damage of gloss level and/or color which is only visible under certain viewing angles.
- Grade 3: Moderate alteration/damage of gloss level and/or color.
- Grade 2: Significant alteration/damage of gloss level and/or color.
- Grade 1: Surface alteration/damage and/or blistering.

Please refer to the respective technical data sheet in order to look up the grade of stain resistance that applies to a specific Duropal product.

CHEMICAL RESISTANCE

Application in laboratory settings puts high demands on the resistance of surfaces, as the latter often come into direct contact with a great diversity of chemical substances.

Duropal laminates are resistant to organic solvents. Cleaners like acetone and substances like vinegar, coffee and blood do not leave any residues on the surface. Neither can diluted alkali or acid solutions harm the laminate surface if the permissible exposure times are observed. However, caution is advised in case of strong dyes or strong oxidizing agents.

As the properties and the composition of chemicals may not always be known, it is categorically advisable to remove chemical substances from the decorative laminate surface without delay.

The substances mentioned in Table 2 do not cause any damage to melamine surfaces even after a prolonged exposure time (16 hours):

Table 2:

Substances not causing any alteration on laminate surfaces	
A	Amides RCONH ₂
Acetic acid CH ₃ COOH	Amines (any)
Acetic acid ethyl ester CH ₃ COOC ₂ H ₅	Ammonia NH ₄ OH
Acetic acid iso-amyl ester CH ₃ COOC ₅ H ₁₁	Ammonium chloride NH ₄ CL
Acetone CH ₃ COCH ₃	Ammonium sulphate (NH ₄) ₂ SO ₄
Alcoholic beverages ROH	Ammonium thiocyanate NH ₄ SCN
Alcohols (any) ROH	Amyl acetate CH ₃ COOC ₅ H ₁₁
Aldehydes RCHO	Amyl alcohol C ₅ H ₁₁ OH
Alum solution KAl(SO ₄) ₃	A-naphthole C ₁₀ H ₇ OH
Aluminium sulphate Al ₂ (SO ₄) ₃	A-naphthylamine C ₁₀ H ₇ NH ₂

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Arabinose C ₅ H ₁₀ O ₅	Fructose/Galactose C ₆ H ₁₂ O ₆
Ascorbic acid C ₆ H ₈ O ₆	G
Asparagine C ₄ H ₈ O ₃ N ₂	Gelatin
Aspartic acid C ₄ H ₇ O ₄ N	Glacial acetic acid CH ₃ COOH
B	Glucose C ₆ H ₁₂ O ₆
Barium chloride BaCl ₂	Glycerine CH ₂ OH CHOH CH ₂ OH
Barium sulphate BaSO ₄	Glycocoll NH ₂ CH ₂ COOH
Benzaldehyde C ₆ H ₅ CHO	Glycol (any) HOCH ₂ CH ₂ OH
Benzene C ₆ H ₆	Graphite (carbon) C
Benzidine NH ₂ C ₆ H ₄ C ₆ H ₄ NH ₂	Gypsum CaSO ₄ 2H ₂ O
Benzoic acid C ₆ H ₅ COOH	H
Blood group test Sera	Heptanol C ₇ H ₁₅ OH
Boric acid H ₃ BO ₃	Hexane C ₆ H ₁₄
Butyl acetate CH ₃ COOC ₄ H ₉	Hexanol C ₆ H ₁₃ OH
Butyl alcohol C ₄ H ₉ OH	Hydrogen peroxide 3% H ₂ O ₂
C	Hydroquinone HOC ₆ H ₄ OH
Cadmium acetate Cd(CH ₃ COO) ₂	I
Cadmium sulphate CdSO ₄	Ink
Calcium carbonate CaCO ₃	Inorganic salts and their mixtures (Exceptions: s. Table 3)
Calcium chloride CaCl ₂	Inositol C ₆ H ₆ (OH) ₆
Calcium hydroxide Ca(OH) ₂	Isopropanol C ₃ H ₆ OH
Calcium nitrate Ca(NO ₃) ₂	K
Calcium oxide CaO	Ketones (any) RCOR
cane sugar C ₁₂ H ₂₂ O ₁₁	L
Carbolic acid C ₆ H ₅ OH	Lactic acid CH ₃ CHOHCOOH
Carbol-xylene C ₆ H ₅ OH-C ₆ H ₄ (CH ₃) ₂	Lactose C ₁₂ H ₂₂ O ₁₁
Cement	Levulose C ₆ H ₁₂ O ₆
Chloral hydrate CCl ₃ CH(OH) ₂	Lead acetate Pb(CH ₃ COO) ₂
Chlorobenzene C ₆ H ₅ Cl	Lead nitrate Pb(NO ₃) ₂
Cholesterol C ₂₇ H ₄₅ OH	Lithium carbonate Li ₂ CO ₃
Citric acid C ₆ H ₈ O ₇	Lithium hydroxide up to 10% LiOH
Cocaine C ₁₇ H ₂₁ O ₄ N	M
Copper sulphate CuSO ₄	Magnesium carbonate MgCO ₃
Cresol CH ₃ C ₆ H ₄ OH	Magnesium chloride MgCl ₂
Cresylic acid CH ₃ C ₆ H ₄ COOH	Magnesium hydroxide Mg(OH) ₂
Cyclohexane C ₆ H ₁₂	Magnesium sulphate MgSO ₄
D	Maltose C ₁₂ H ₂₂ O ₁₁
Digitonine C ₅₆ H ₉₂ O ₂₉	Mannite C ₆ H ₁₄ O ₆
Dimethylformamide HCON(CH ₃) ₂	Mannose C ₆ H ₁₂ O ₆
Dimethyl sulfoxide (CH ₃) ₂ SO	Mercury Hg
Dioxane C ₄ H ₈ O ₂	Meso inosite C ₆ H ₆ (OH) ₆
Dulcitol C ₆ H ₁₄ O ₆	Methanol CH ₃ OH
F	Methylene chloride CH ₂ CL ₂
Formaldehyde HCHO	Mineral oils
Formic acid up to 10% HCOOH	

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Mineral salts (Exceptions: s. Table 3)	Sodium hydrogen carbonate NaHCO ₃
N	Sodium bisulfite NaHSO ₃
Nail polish	Sodium hydroxide up to 10% NaOH
Nail polish remover	Sodium hyposulphite Na ₂ S ₂ O ₄
Nickel sulphate NiSO ₄	Sodium nitrate NaNO ₃
Nicotine C ₁₀ H ₁₄ N ₂	Sodium phosphate Na ₃ PO ₄
O	Sodium silicate Na ₂ O ₃ Si
Octanol (octyl alcohol) C ₈ H ₁₈ O	Sodium sulphate Na ₂ SO ₄
Oleic acid CH ₃ (CH ₂) ₇ CH:CH(CH ₂) ₇ COOH	Sodium sulphide Na ₂ S
Olive oil	Sodium sulphite Na ₂ SO ₃
P	Sodium tartrate Na ₂ C ₄ H ₄ O ₆
P-aminoacetophenone NH ₂ C ₆ H ₄ COCH ₃	Sodium thiosulfate Na ₂ S ₂ O ₃
Paraffin oil	Sorbitol C ₆ H ₁₄ O ₆
Paraffin C _n H _{2n+2}	Starch
Pentanol C ₅ H ₁₂ OH	Stearic acid C ₁₇ H ₃₅ COOH
Percaulic acid HClO ₄	Styrene C ₆ H ₅ CH:CH ₂
Phenol & phenolic derivatives C ₆ H ₅ OH	Sugar and sugar derivatives H ₂₂ O ₁₁
Phenolphthalein C ₂₀ H ₁₄ O ₄	Sulphur S
p-Nitrophenol C ₆ H ₄ NO ₂ OH	T
Potassium chloride KCl	Talcum Mg ₃ [Si ₄ O ₁₀ (OH) ₂]
Potassium hydroxide up to 10% KOH	Tannin C ₇₆ H ₅₂ O ₄₆
Potassium iodate KIO ₃	Tartaric acid C ₄ H ₈ O ₆
Potassium nitrate KNO ₃	Tetrachloromethane CCl ₄
Potassium Sodium tartrate KNaC ₄ H ₄ O ₆	Tetrahydrofuran C ₄ H ₈ O
Potassium sulphate K ₂ SO ₄	Tetralin C ₁₀ H ₁₂
Potassium tartrate K ₂ C ₄ H ₄ O ₆	Thiourea NH ₂ CSNH ₂
Potassium aluminium sulphate KAl(SO ₄) ₂	Thymol C ₁₀ H ₁₄ O
Potassium bromate KBrO ₃	Toluene C ₆ H ₅ CH ₃
Potassium bromide KBr	Trehalose C ₁₂ H ₂₂ O ₁₁
Potassium carbonate K ₂ CO ₃	Trichloroethylene C ₂ HCl ₃
Potassium hexacyanoferrate K ₄ Fe(CN) ₆	Tryptophan C ₁₁ H ₁₂ O ₂ N ₂
Propanol C ₃ H ₇ OH	Turpentine
1,2-Propylenglycol CH ₃ CHOHCH ₂ OH	U
Pyridine C ₅ H ₅ N	Urea solution CO(NH ₂) ₂
R	Uric acid C ₅ H ₄ N ₄ O ₃
Raffinose C ₁₈ H ₃₂ O ₁₁ 5H ₂ O	V
Rhamnose C ₆ H ₁₂ O ₅ H ₂ O	Vanillin C ₈ H ₈ O ₃
S	W
Salicylic acid C ₆ H ₄ OHCOOH	Water H ₂ O
Salicylic aldehyde C ₆ H ₄ OH CHO	X
Sodium acetate CH ₃ COONa	Xylene C ₆ H ₄ (CH ₃) ₂
Sodium carbonate Na ₂ CO ₃	Z
Sodium chloride NaCl	Zinc chloride ZnCl ₂
Sodium citrate Na ₃ C ₆ H ₅ O ₇ 5H ₂ O	Zink sulfate ZnSO ₄
Sodium diethyl barbiturate NaC ₈ H ₁₁ N ₂ O ₃	

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Some chemicals might cause damage to melamine surfaces depending on their pH value, exposure time, and temperature. The following substances must therefore be allowed to act for only a short period of time, at maximum for 10 to 15 minutes. In this time, the surface must first be wiped clean with a moist cloth and then wiped dry.

Table 3:

Substances causing laminate surface damage after prolonged exposure	
Aluminium chloride AlCl_3	Millon's reagent $\text{OHg}_2\text{NH}_2\text{Cl}$
Amidosulfonic acid $\text{NH}_2\text{SO}_3\text{H}$	Nitric acid up to 10% HNO_3
Ammonium hydrogen sulphate NH_4HSO_4	Oxalic acid COOH COOH
Arsenic acid up to approx. 10% H_3AsO_4	Phosphoric acid up to 10% H_3PO_4
Crystal violet (Gentian violet) $\text{C}_{25}\text{H}_{30}\text{N}_3\text{Cl}$	Picric acid $\text{C}_6\text{H}_2\text{OH}(\text{NO}_2)_3$
Dyes and bleaching agents	Potassium chromate K_2CrO_4
Ferric chloride FeCl_2	Potassium di-chromate $\text{K}_2\text{Cr}_2\text{O}_7$
Ferrous chloride FeCl_3	Potassium hydrogen sulphate KHSO_4
Formic acid up to 10% HCOOH	Potassium hydroxide over 10% KOH
Fuchsine $\text{C}_{19}\text{H}_{19}\text{N}_3\text{O}$	Potassium iodide KI
Hydrochloric acid up to 10% HCl	Potassium permanganate KMnO_4
Hydrogen peroxide 3-30% H_2O_2	Silver nitrate AgNO_3
Inorganic acids up to 10%	Sodium hydrogen sulphate NaHSO_4
Iodine I_2	Sodium hydroxide over 10% NaOH
Lithium hydroxide over approx.. 10% LiOH	Sodium hypochlorite (chlorine bleach) NaOCl
Mercuric di-chromate HgCr_2O_7	Sulphuric acid up to 10% H_2SO_4
Methylene Blue $\text{C}_{16}\text{H}_{18}\text{N}_3\text{ClS}$	

The chemicals listed in Table 4 cause irreversible laminate surface damage. Any contact, no matter how brief, should therefore be avoided.

Table 4:

Substances causing irreversible laminate-surface damage	
Adhesives (chemically hardened)	Hydrochloric acid* HCl
Amidosulfonic acid* $\text{NH}_2\text{SO}_3\text{H}$	Hydrofluoric acid* HF
Inorganic acids* eg	Hydrogen bromide* HBr
Aqua regia* $\text{HNO}_3 + \text{HCl} = 1:3$	Nitric acid* HNO_3
Arsenic acid H_3AsO_4	Phosphoric acid* H_3PO_4
Chrome sulphuric acid* $\text{K}_2\text{Cr}_2\text{O}_7 + \text{H}_2\text{SO}_4$	Sulfuric acid* H_2SO_4
Formic acid* HCOOH	

* in concentrations over 10%

AGGRESICE GASES

Aggressive gases might take an negative effect on the optical appearance of Duropal laminate surfaces. Normally, however, their functional characteristics will not be affected.

Table 5:

Substances causing laminate-surface damage
Acid fumes
Bromine Br ₂
Chlorine Cl ₂
Nitrous fumes NO _x / N _x O _y
Sulphur dioxide SO ₂

PM HPL/elements

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