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PRODUCT INFORMATION

Resistance to disinfectant, stain resistance and chemical resistance of Duropal Laminates

RESISTANCE TO DISINFECTANT

Duropal laminates display high resistance to disinfectants. This permits a regular and thorough cleaning in accordance with applicable hygiene regulations.

The ease-of-cleaning and good disinfectibility is favoured by the fact that laminate surfaces consist of thermosetting resin which form a stable, resistant and a material beyond reactivation. The surface is also completely closed i.e. free of pores, which means that dirt and germs cannot settle permanently.

The test of disinfectant resistance is carried out analogously to the determination of stain resistance according to EN 438-2. The surface is brought into contact with different substances, the duration and conditions of contact are specified in the standard for each substance.

At the end of the recommended exposure time, which is 16 hours for disinfectants, the laminate surface is washed up and examined for permanent traces on the surface. The results are categorised into five grades:

Level 5:	No visible change
Level 4:	Slight change of gloss level and/or colour which is only visible under certain viewing angles
Level 3:	Moderate change of gloss level and/or colour
Level 2:	Clear change of gloss level and/or colour
Level 1:	Damage of the surface and/or blistering

If other disinfectants than those listed below are intended to come into contact with Duropal laminates, their compatibility must be checked in each individual case.

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Pfleiderer Lab Test Assessments:

Manufacturer	Product	Concentration	Level
B. Braun SE	Helipur 1l	4 %	5
B. Braun SE	Melsept® SF	2 %	5
BODE Chemie GmbH	Dismozon® plus	0,8 % 1,2 %	5
BODE Chemie GmbH	Bacillol AF	100 %	5
clinell	UNIVERSAL WIPES	100 %	5
Dr. Johnson´s	Sterilising Fluid, highly concentrated	2,2 %	5
Dr. Nüsken Chemie GmbH	NÜSCOSEPT	4 %	5
DR. SCHNELL GmbH & Co. KGaA	FOROL fruit Universalreiniger	2 %	5
DR. SCHNELL GmbH & Co. KGaA	FLOORTOP Hochleistungs-Wischpflege	10 %	5
DR. SCHNELL GmbH & Co. KGaA	DESIFOR PROTECT	1 %	5
Dr. Schumacher GmbH	OPTISEPT®	4 %	5
Dr. Schumacher GmbH	Ultrasol® F	3 %	5
ECOLAB	Brial TOP SCHONREINIGER	5 %	5
ECOLAB	Desguard 20	0,5 %	5
ECOLAB	Desguard 20	3 %	5
ECOLAB	Incidin™ Active	2 %	5
ECOLAB	Incidin™ OxyWipe NG	100 %	5
ECOLAB	Incidin™ Plus	8 %	5
ECOLAB	Incidin™ Pro	4 %	5
ECOLAB	Incidin™ Pro	100 %	5
ECOLAB	Incidin™ Rapid	0,5 %	5
ECOLAB	Incidin™ Rapid	2 %	5
ECOLAB	Klercide Sporicidial Active	100 %	5
ECOLAB	Klercide Low Residue Quat	100 %	5
ECOLAB	Klercide 70/30 IPA	100 %	5
ECOLAB	Klercide Neutral Detergent	100 %	5
KESLA HYGIENE AG	Wofasteril®	1 %	5
KESLA HYGIENE AG	Wofasteril® Kombiverfahren – Wofasteril und Alcapur	2 %	5
Lysoform Dr. Hans Rosemann GmbH	Amocid®	5 %	5
Lysoform Dr. Hans Rosemann GmbH	Clorina®	3 %	5
Lysoform Dr. Hans Rosemann GmbH	Trichlorol®	5 %	5
Lysoform Dr. Hans Rosemann GmbH	Aldasan® 2000	4 %	5
Lysoform Dr. Hans Rosemann GmbH	Lysoformin® Plus	2%	5
MENNO CHEMIE-VERTRIEB GmbH	NEOPREDISAN 135-1	2 %	5
PAUL HARTMANN AG	Dismozon plus	0,8 % 1,2 %	5
PAUL HARTMANN AG	Kohrsolin FF	3 %	5
Redditch Medical Ldt.	InSpec™ HA	100 %	5
Sanosil AG	SanoClean AR	100 %	5
Schülke & Mayr GmbH	antifect® extra	0,7 % 2,5 %	5
Schülke & Mayr GmbH	desmanol® care	100 %	5
Schülke & Mayr GmbH	mikrozid® AF wipes	100 %	5
Schülke & Mayr GmbH	mikrozid® sensitive wipes premium	100 %	5

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Schülke & Mayr GmbH	mikrozid® universal wipes	100 %	5
Schülke & Mayr GmbH	perform®	3 %	5
Schülke & Mayr GmbH	pursept® AF	2 %	5
Schülke & Mayr GmbH	terralin® PAA	8 %	5
Schülke & Mayr GmbH	quartasept® plus	1,5 % 100 %	5
Tristel GmbH	JET by Cache	100 %	5
Weita AG	Weitaclean ECOLINE E6	50 % 100 %	5

None of the tested disinfectants led to a change in the Duropal laminate.

Since the nature and composition of disinfectants are generally not known, it is advisable to remove these substances after the recommended exposure time has been reached. For said reasons a general release of disinfectants is not possible.

Therefore, before first use, a test is advisable at a non-visible point.

STAIN RESISTANCE

The test for stain resistance is carried out in the same way as the test for disinfectant resistance in accordance with EN 438-2. The procedure and evaluation of results can be found in the previous section. The substances and respective exposure times are part of the table below.

For the degree of stain resistance of Duropal products, please refer to the respective technical data sheet.

Stain-producing substances		Exposure time
Group 1 • 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	• Salt solutions (NaCl) • Mustard • Lyes, soap solutions • Cleaning solution consisting of: 23 % dodecylbenzene sulfonate 10 % alkyl aryl polyglycol ether 67 % water • Commercial disinfectants • Stain or paint removers based on organic solvents • Citric acid (10% solution)	16 h
Group 2 • Coffee (120g of coffee per litre of water) • Black tea (9g of tea per litre of water) • Milk (all types) • Wine vinegar • Alkaline-based cleaning agents (to 10% concentration with water) • Hydrogen peroxide (3% solution)	• Ammonia (10% solution of commercial concentrate) • Nail varnish • Nail varnish remover • Lipstick • Water colours • Laundry marking inks • Ball point inks	16 h

Group 3 • 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 (≤ 3% HCl) • Acid-based metal cleaners • Iodine • Hair colouring and bleaching agents	• Soot suspension in paraffin oil (shoe polish replica) • Boric acid • Lacquers and adhesives (except fast curing materials) • Amidosulfonic acid descaling agents (< 10% solution) • Mercurochrome (2,7-dibromo-4-hydroxymercurifluoresein, disodium salt)	10 min

CHEMICAL RESISTANCE

Duropal laminates are resistant to most chemicals. However, some chemicals can affect the surface. The decisive factors are the concentration of the chemical, the pH value, the exposure time and the temperature.

Since the nature and composition of chemicals are not always known, they must always be removed immediately from the decorative laminate surface.

The substances listed in the following table do not lead to any change in the melamine surface even after a longer exposure time ≥ 16 hours:

Substances not causing any alteration on laminate surfaces	
A	Asparagine $C_4H_8N_2O_3$
Acetic acid CH_3COOH	Aspartic acid $C_4H_7NO_4$
Acetic acid iso-amyl ester $C_7H_{14}O_2$	**B**
Acetone C_3H_6O	Barium chloride $BaCl_2$
Alcohols (any) ROH	Barium sulphate $BaSO_4$
Alcoholic beverages ROH	Benzaldehyde C_7H_6O
Aldehydes RCHO	Benzidine $NH_2C_6H_4C_6H_4NH_2$
Aluminium sulphate $Al_2(SO_4)_3$	Benzoic acid $C_7H_6O_2$
Alum solution $KAI(SO_4)_3$	Benzene C_6H_6
Amides $RCONH_2$	Blood/Blood Group Test Sera
Amines (any)	Boric acid H_3BO_3
4-Aminoacetophenone C_8H_9NO	Butylacetat $C_6H_{12}O_2$
Ammonia NH_3	Butyl alcohol $C_4H_{10}O$
Ammonium chloride NH_4CL	**C**
Ammonium sulphate $(NH_4)_2SO_4$	Cadmium acetate $Cd(CH_3COO)_2$
Ammonium thiocyanate NH_4SCN	Cadmium sulphate $CdSO_4$
Amylacetat $C_7H_{14}O_2$	Calcium carbonate $CaCO_3$
Amyl alcohol $C_5H_{12}O$	Calcium chloride $CaCl_2$
a-Naphthol $C_{10}H_8O$	Calcium hydroxide $Ca(OH)_2$
a-Naphtylamine $C_{10}H_9N$	Calcium nitrate $Ca(NO_3)_2$
Arabinose $C_5H_{10}O_5$	Calcium oxide CaO
Ascorbic acid $C_6H_8O_6$	Cane sugar $C_{12}H_{22}O_{11}$

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Carbolic acid C_6H_6O	**L**
Carbol-xylene C_6H_5OH-$C_6H_4(CH_3)_2$	Lactic acid $C_3H_6O_3$
Cement	Lactose $C_{12}H_{22}O_{11}$
Chloral hydrate $C_2H_3Cl_3O_2$	Laevulose $C_6H_{12}O_6$
Chlorobenzene C_6H_5Cl	Lead acetate $Pb(C_2H_3O_2)_2$
Cholesterol $C_{27}H_{46}O$	Lead nitrate $Pb(NO_3)_2$
Citric acid $C_6H_8O_7$	Lithium carbonate Li_2CO_3
Cocaine $C_{17}H_{21}NO_4$	Lithium hydroxide up to 10% LiOH
Copper sulphate $CuSO_4$	**M**
Cresol C_7H_8O	Magnesium carbonate $MgCO_3$
Cresylic acid $CH_3C_6H_4COOH$	Magnesium chloride $MgCl_2$
Cyclohexane C_6H_{12}	Magnesium hydroxide $Mg(OH)_2$
D	Magnesium sulphate $MgSO_4$
Digitonine $C_{56}H_{92}O_{29}$	Maltose $C_{12}H_{22}O_{11}$
Dimethylformamide C_3H_7NO	Mannite $C_6H_{14}O_6$
Dimethyl sulphoxide C_2H_8OS	Mannose $C_6H_{12}O_6$
Dioxane $C_4H_8O_2$	Mercury Hg
Dulcite $C_6H_{14}O_6$	Meso inosite $C_6H_6(OH)_6$
E	Methanol CH_3OH
Ethyl acetate $C_4H_8O_2$	Methylene chloride (Dichloromethane) CH_2CL_2
F	Mineral oils
Formaldehyde CH_2O	Mineral salts (exception see: Table 3)
Formic acid up to 10% HCOOH	**N**
Fructose/Galactose $C_6H_{12}O_6$	Nail varnish
G	Nail varnish remover
Gelatine	Nickel sulphate $NiSO_4$
Glacial acetic acid / acetic acid CH_3COOH	Nicotine $C_{10}H_{14}N_2$
Glucose $C_6H_{12}O_6$	**O**
Glycerine $C_3H_8O_3$	Octanol (octyl alcohol) $C_8H_{18}O$
Glycocoll $C_2H_5NO_2$	Oleic acid $C_{18}H_{34}O_2$
Glycol (any) $HOCH_2$ CH_2OH	Olive oil
Graphite (carbon) C	**P**
Gypsum $CaSO_4$ $2H_2O$	Paraffin C_nH_{2n+2}
H	Paraffin oil
Heptanol $C_7H_{15}OH$	Pentanol $C_5H_{12}O$
Hexane C_6H_{14}	Percaulic acid $HCLO_4$
Hexanol $C_6H_{13}OH$	Phenol & phenol derivatives C_6H_6O
Hydrogen peroxide 3% H_2O_2	Phenolphthalein $C_{20}H_{14}O_4$
Hydroquinone $C_6H_6O_2$	p-Nitrophenol $C_6H_4NO_2OH$
I	Potassium aluminium sulphate $KAI(SO_4)_2$
Ink	Potassium bromate $KBrO_3$
Inorganic salts and their mixtures	Potassium bromide KBr
Inositol $C_6H_{12}O_6$	Potassium carbonate K_2CO_3
Isopropyl C_3H_8O	Potassium chloride KCl
K	Potassium hexacyanoferrate $K_4Fe(CN)_6$
Ketones (any) RCOR	Potassium hydroxide(potash lye) up to 10% KOH

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Potassium iodate KIO_3	Starch
Potassium nitrate KNO_3	Stearic acid $C_{18}H_{36}O_2$
Potassium sodium tartrate $KNaC_4H_4O_6 * 4H_2O$	Styrene C_8H_8
Potassium sulphate K_2SO_4	Sulphur S
Potassium tartrate $C_4H_4K_2O_6$	**T**
1,2-Propanediol $C_3H_8O_2$	Talk $Mg_3Si_4O_{10}(OH)_2$
Propanol C_3H_7OH	Tannin $C_{76}H_{52}O_{46}$
Pyridine C_5H_5N	Tetrachloromethane CCl_4
R	Tetrahydrofuran C_4H_8O
Raffinose $C_{18}H_{32}O_{16}$	Tetralin $C_{10}H_{12}$
Rhamnose $C_6H_{12}O_5$	Thiourea CH_4N_2S
S	Thymol $C_{10}H_{14}O$
Salicylaldehyde $C_7H_6O_2$	Toluene C_7H_8
Salicylic acid $C_7H_6O_3$	Trehalose $C_{12}H_{22}O_{11}$
Sodium acetate $C_2H_3NaO_2$	Trichloroethylene C_2HCl_3
Sodium carbonate Na_2CO_3	Tryptophan $C_{11}H_{12}N_2O_2$
Sodium chloride NaCl	Turpentine
Sodium citrate $C_6H_5Na_3O_7$	**U**
Sodium diethyl barbiturate $NaC_8H_{11}N_2O_3$	Urea solution $CO(NH_2)_2$
Sodium hydrogen carbonate $NaHCO_3$	Uric acid $C_5H_4N_4O_3$
Sodium hydrogen sulphite $NaHSO_3$	**V**
Sodium hydroxide up to 10% NaOH	Vanillin $C_8H_8O_3$
Sodium hyposulphite $Na_2S_2O_4$	**W**
Sodium nitrate $NaNO_3$	Water H_2O
Sodium phosphate Na_3PO_4	Wine acid $C_4H_6O_6$
Sodium silicate Na_2SiO_3	**X**
Sodium sulphate Na_2SO_4	Xylene C_8H_{10}
Sodium sulphide Na_2S	**Z**
Sodium sulphite Na_2SO_3	Zinc chloride $ZnCl_2$
Sodium tartrate $Na_2C_4H_4O_6$	Zinc sulfate $ZnSO_4$
Sodium thiosulfate $Na_2S_2O_3$	Zinc chloride $ZnCl_2$
Sorbitol $C_6H_{14}O_6$	

The following substances may only be used for a short time, maximum 10 to 15 minutes. During this time, the surface must be wiped with a wet cloth and then rubbed dry.

Substances causing laminate surface damage after prolonged exposure	
Aluminium chloride $AlCl_3$	Fuchsine $C_{19}H_{19}N_3O$
Amidosulfonic acid NH_2SO_3H	Hydrochloric acid up to 10% HCl
Ammonium hydrogen sulphate NH_4HSO_4	Hydrogen peroxide 3-30% H_2O_2
Arsenic acid up to approx. 10% H_3AsO_4	Inorganic acids up to 10%
Crystal Violet (Gentian Violet) $C_{25}H_{30}ClN_3$	Iodine I_2
Dyeing and bleaching agents	Lithium hydroxide over approx.. 10% LiOH
Ferric chloride $FeCl_2$	Mercuric di-chromate $HgCr_2O_7$
Ferrous chloride $FeCl_3$	Methylene Blue $C_{16}H_{18}N_3SCl$
Formic acid up to 10% HCOOH	Millon's reagent OHg_2NH_2Cl

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Nitric acid up to 10% HNO_3	Potassium permanganate $KMnO_4$
Oxalic acid $C_2H_2O_4$	Silver nitrate $AgNO_3$
Picric acid $C_6H_3N_3O_7$	Sodium hydrogen sulphate $NaHSO_4$
Phosphoric acid up to 10% H_3PO_4	Sodium hydroxide over 10% NaOH
Potassium chromate K_2CrO_4	Sodium hypochlorite (chlorine bleach) NaOCl
Potassium di-chromate $K_2Cr_2O_7$	Sodium hypochlorite (chlorine lye) NaOCl
Potassium hydrogen sulphate $KHSO_4$	Sublimate solution $HgCl_2$
Potassium hydroxide over 10% KOH	Sulphuric acid up to 10% H_2SO_4
Potassium iodide KI	

The chemicals listed in the table below cause irreversible laminate surface damages. Any contact, even short-term, must therefore be avoided!

Substances causing irreversible laminate-surface damage	
Adhesives (chemically hardened)	Hydrogen bromide* HBr
Amidosulfonic acid* NH_2SO_3H	Inorganic acids*
Aqua regia* HNO_3 + HCl = 1:3	Nitric acid* HNO_3
Arsenic acid H_3AsO_4	Phosphoric acid* H_3PO_4
Chrome sulphuric acid* $K_2Cr_2O_7 + H_2SO_4$	Hydrofluoric acid* HF
Formic acid* HCOOH	Sulfuric acid* H_2SO_4
Hydrochloric acid* HCl	

* in concentrations over 10%

The influence of aggressive gases can have a negative effect on the optical appearance of Duropal laminate surfaces, but their functionality is generally not negatively affected.

Substances causing laminate-surface damage	
Bromine Br_2	Nitrous fumes NO_x / N_xO_y
Chlorine Cl_2	Sulphur dioxide SO_2
fuming acids	

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