

## 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 disinfectability 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.

## 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	Bacillof 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 Sporicidal 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 Ltd.	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

Schülke & Mayr GmbH	mikrozyd® 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
<b>Group 1</b> <ul style="list-style-type: none"> <li>• Acetone</li> <li>• Other organic solvents</li> <li>• Toothpaste</li> <li>• Hand cream</li> <li>• Urine</li> <li>• Alcoholic beverages</li> <li>• Natural fruit and vegetable juices</li> <li>• Lemonade and fruit drinks</li> <li>• Meats and sausages</li> <li>• Animal and vegetable fats and oils</li> <li>• Water</li> <li>• Yeast suspension in water</li> </ul>	16 h
<ul style="list-style-type: none"> <li>• Salt solutions (NaCl)</li> <li>• Mustard</li> <li>• Lyes, soap solutions</li> <li>• Cleaning solution consisting of: 23 % dodecylbenzene sulfonate 10 % alkyl aryl polyglycol ether 67 % water</li> <li>• Commercial disinfectants</li> <li>• Stain or paint removers based on organic solvents</li> <li>• Citric acid (10% solution)</li> </ul>	
<b>Group 2</b> <ul style="list-style-type: none"> <li>• Coffee (120g of coffee per litre of water)</li> <li>• Black tea (9g of tea per litre of water)</li> <li>• Milk (all types)</li> <li>• Wine vinegar</li> <li>• Alkaline-based cleaning agents (to 10% concentration with water)</li> <li>• Hydrogen peroxide (3% solution)</li> </ul>	16 h
<ul style="list-style-type: none"> <li>• Ammonia (10% solution of commercial concentrate)</li> <li>• Nail varnish</li> <li>• Nail varnish remover</li> <li>• Lipstick</li> <li>• Water colours</li> <li>• Laundry marking inks</li> <li>• Ball point inks</li> </ul>	

<b>Group 3</b> <ul style="list-style-type: none"> <li>• Sodium hydroxide (25% solution)</li> <li>• Hydrogen peroxide (30% solution)</li> <li>• Concentrated vinegar (30% acetic acid)</li> <li>• Bleaching agents and sanitary cleaners containing them</li> <li>• Hydrochloric acid based cleaning agents (<math>\leq 3\%</math> HCl)</li> <li>• Acid-based metal cleaners</li> <li>• Iodine</li> <li>• Hair colouring and bleaching agents</li> </ul>	<ul style="list-style-type: none"> <li>• Soot suspension in paraffin oil (shoe polish replica)</li> <li>• Boric acid</li> <li>• Lacquers and adhesives (except fast curing materials)</li> <li>• Amidosulfonic acid descaling agents (<math>&lt; 10\%</math> solution)</li> <li>• Mercurochrome (2,7-dibromo-4-hydroxymercurifluorescein, disodium salt)</li> </ul>	10 min
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## 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  $\geq 16$  hours:

Substances not causing any alteration on laminate surfaces	
<b>A</b>	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>B</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 $KAl(SO_4)_3$	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 $NH_4Cl$	<b>C</b>
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 $C_{12}H_{22}O_{11}$

Carbolic acid C <sub>6</sub> H <sub>6</sub> O	<b>L</b>
Carbol-xylene C <sub>6</sub> H <sub>5</sub> OH-C <sub>6</sub> H <sub>4</sub> (CH <sub>3</sub> ) <sub>2</sub>	Lactic acid C <sub>3</sub> H <sub>6</sub> O <sub>3</sub>
Cement	Lactose C <sub>12</sub> H <sub>22</sub> O <sub>11</sub>
Chloral hydrate C <sub>2</sub> H <sub>3</sub> Cl <sub>3</sub> O <sub>2</sub>	Laevulose C <sub>6</sub> H <sub>12</sub> O <sub>6</sub>
Chlorobenzene C <sub>6</sub> H <sub>5</sub> Cl	Lead acetate Pb(C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>2</sub>
Cholesterol C <sub>27</sub> H <sub>46</sub> O	Lead nitrate Pb(NO <sub>3</sub> ) <sub>2</sub>
Citric acid C <sub>6</sub> H <sub>8</sub> O <sub>7</sub>	Lithium carbonate Li <sub>2</sub> CO <sub>3</sub>
Cocaine C <sub>17</sub> H <sub>21</sub> NO <sub>4</sub>	Lithium hydroxide up to 10% LiOH
Copper sulphate CuSO <sub>4</sub>	<b>M</b>
Cresol C <sub>7</sub> H <sub>8</sub> O	Magnesium carbonate MgCO <sub>3</sub>
Cresylic acid CH <sub>3</sub> C <sub>6</sub> H <sub>4</sub> COOH	Magnesium chloride MgCl <sub>2</sub>
Cyclohexane C <sub>6</sub> H <sub>12</sub>	Magnesium hydroxide Mg(OH) <sub>2</sub>
<b>D</b>	Magnesium sulphate MgSO <sub>4</sub>
Digitonine C <sub>56</sub> H <sub>92</sub> O <sub>29</sub>	Maltose C <sub>12</sub> H <sub>22</sub> O <sub>11</sub>
Dimethylformamide C <sub>3</sub> H <sub>7</sub> NO	Mannite C <sub>6</sub> H <sub>14</sub> O <sub>6</sub>
Dimethyl sulphoxide C <sub>2</sub> H <sub>6</sub> S	Mannose C <sub>6</sub> H <sub>12</sub> O <sub>6</sub>
Dioxane C <sub>4</sub> H <sub>8</sub> O <sub>2</sub>	Mercury Hg
Dulcitol C <sub>6</sub> H <sub>14</sub> O <sub>6</sub>	Meso inositol C <sub>6</sub> H <sub>6</sub> (OH) <sub>6</sub>
<b>E</b>	Methanol CH <sub>3</sub> OH
Ethyl acetate C <sub>4</sub> H <sub>8</sub> O <sub>2</sub>	Methylene chloride (Dichloromethane) CH <sub>2</sub> CL <sub>2</sub>
<b>F</b>	Mineral oils
Formaldehyde CH <sub>2</sub> O	Mineral salts (exception see: Table 3)
Formic acid up to 10% HCOOH	<b>N</b>
Fructose/Galactose C <sub>6</sub> H <sub>12</sub> O <sub>6</sub>	Nail varnish
<b>G</b>	Nail varnish remover
Gelatine	Nickel sulphate NiSO <sub>4</sub>
Glacial acetic acid / acetic acid CH <sub>3</sub> COOH	Nicotine C <sub>10</sub> H <sub>14</sub> N <sub>2</sub>
Glucose C <sub>6</sub> H <sub>12</sub> O <sub>6</sub>	<b>O</b>
Glycerine C <sub>3</sub> H <sub>8</sub> O <sub>3</sub>	Octanol (octyl alcohol) C <sub>8</sub> H <sub>18</sub> O
Glycocoll C <sub>2</sub> H <sub>5</sub> NO <sub>2</sub>	Oleic acid C <sub>18</sub> H <sub>34</sub> O <sub>2</sub>
Glycol (any) HOCH <sub>2</sub> CH <sub>2</sub> OH	Olive oil
Graphite (carbon) C	<b>P</b>
Gypsum CaSO <sub>4</sub> 2H <sub>2</sub> O	Paraffin C <sub>n</sub> H <sub>2n+2</sub>
<b>H</b>	Paraffin oil
Heptanol C <sub>7</sub> H <sub>15</sub> OH	Pentanol C <sub>5</sub> H <sub>12</sub> O
Hexane C <sub>6</sub> H <sub>14</sub>	Percaulic acid HCLO <sub>4</sub>
Hexanol C <sub>6</sub> H <sub>13</sub> OH	Phenol & phenol derivatives C <sub>6</sub> H <sub>6</sub> O
Hydrogen peroxide 3% H <sub>2</sub> O <sub>2</sub>	Phenolphthalein C <sub>20</sub> H <sub>14</sub> O <sub>4</sub>
Hydroquinone C <sub>6</sub> H <sub>6</sub> O <sub>2</sub>	p-Nitrophenol C <sub>6</sub> H <sub>4</sub> NO <sub>2</sub> OH
<b>I</b>	Potassium aluminium sulphate KAl(SO <sub>4</sub> ) <sub>2</sub>
Ink	Potassium bromate KBrO <sub>3</sub>
Inorganic salts and their mixtures	Potassium bromide KBr
Inositol C <sub>6</sub> H <sub>12</sub> O <sub>6</sub>	Potassium carbonate K <sub>2</sub> CO <sub>3</sub>
Isopropyl C <sub>3</sub> H <sub>8</sub> O	Potassium chloride KCl
<b>K</b>	Potassium hexacyanoferrate K <sub>4</sub> Fe(CN) <sub>6</sub>
Ketones (any) RCOR	Potassium hydroxide(potash lye) up to 10% KOH

Potassium iodate KIO <sub>3</sub>	Starch
Potassium nitrate KNO <sub>3</sub>	Stearic acid C <sub>18</sub> H <sub>36</sub> O <sub>2</sub>
Potassium sodium tartrate KNaC <sub>4</sub> H <sub>4</sub> O <sub>6</sub> * 4H <sub>2</sub> O	Styrene C <sub>8</sub> H <sub>8</sub>
Potassium sulphate K <sub>2</sub> SO <sub>4</sub>	Sulphur S
Potassium tartrate C <sub>4</sub> H <sub>4</sub> K <sub>2</sub> O <sub>6</sub>	<b>T</b>
1,2-Propanediol C <sub>3</sub> H <sub>8</sub> O <sub>2</sub>	Talk Mg <sub>3</sub> Si <sub>4</sub> O <sub>10</sub> (OH) <sub>2</sub>
Propanol C <sub>3</sub> H <sub>7</sub> OH	Tannin C <sub>76</sub> H <sub>52</sub> O <sub>46</sub>
Pyridine C <sub>5</sub> H <sub>5</sub> N	Tetrachloromethane CCl <sub>4</sub>
<b>R</b>	Tetrahydrofuran C <sub>4</sub> H <sub>8</sub> O
Raffinose C <sub>18</sub> H <sub>32</sub> O <sub>16</sub>	Tetralin C <sub>10</sub> H <sub>12</sub>
Rhamnose C <sub>6</sub> H <sub>12</sub> O <sub>5</sub>	Thiourea CH <sub>4</sub> N <sub>2</sub> S
<b>S</b>	Thymol C <sub>10</sub> H <sub>14</sub> O
Salicylaldehyde C <sub>7</sub> H <sub>6</sub> O <sub>2</sub>	Toluene C <sub>7</sub> H <sub>8</sub>
Salicylic acid C <sub>7</sub> H <sub>6</sub> O <sub>3</sub>	Trehalose C <sub>12</sub> H <sub>22</sub> O <sub>11</sub>
Sodium acetate C <sub>2</sub> H <sub>3</sub> NaO <sub>2</sub>	Trichloroethylene C <sub>2</sub> HCl <sub>3</sub>
Sodium carbonate Na <sub>2</sub> CO <sub>3</sub>	Tryptophan C <sub>11</sub> H <sub>12</sub> N <sub>2</sub> O <sub>2</sub>
Sodium chloride NaCl	Turpentine
Sodium citrate C <sub>6</sub> H <sub>5</sub> Na <sub>3</sub> O <sub>7</sub>	<b>U</b>
Sodium diethyl barbiturate NaC <sub>8</sub> H <sub>11</sub> N <sub>2</sub> O <sub>3</sub>	Urea solution CO(NH <sub>2</sub> ) <sub>2</sub>
Sodium hydrogen carbonate NaHCO <sub>3</sub>	Uric acid C <sub>5</sub> H <sub>4</sub> N <sub>4</sub> O <sub>3</sub>
Sodium hydrogen sulphite NaHSO <sub>3</sub>	<b>V</b>
Sodium hydroxide up to 10% NaOH	Vanillin C <sub>8</sub> H <sub>8</sub> O <sub>3</sub>
Sodium hyposulphite Na <sub>2</sub> S <sub>2</sub> O <sub>4</sub>	<b>W</b>
Sodium nitrate NaNO <sub>3</sub>	Water H <sub>2</sub> O
Sodium phosphate Na <sub>3</sub> PO <sub>4</sub>	Wine acid C <sub>4</sub> H <sub>6</sub> O <sub>6</sub>
Sodium silicate Na <sub>2</sub> SiO <sub>3</sub>	<b>X</b>
Sodium sulphate Na <sub>2</sub> SO <sub>4</sub>	Xylene C <sub>8</sub> H <sub>10</sub>
Sodium sulphide Na <sub>2</sub> S	<b>Z</b>
Sodium sulphite Na <sub>2</sub> SO <sub>3</sub>	Zinc chloride ZnCl <sub>2</sub>
Sodium tartrate Na <sub>2</sub> C <sub>4</sub> H <sub>4</sub> O <sub>6</sub>	Zinc sulfate ZnSO <sub>4</sub>
Sodium thiosulfate Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub>	Zinc chloride ZnCl <sub>2</sub>
Sorbitol C <sub>6</sub> H <sub>14</sub> O <sub>6</sub>	

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 <sub>3</sub>	Fuchsine C <sub>19</sub> H <sub>19</sub> N <sub>3</sub> O
Amidosulfonic acid NH <sub>2</sub> SO <sub>3</sub> H	Hydrochloric acid up to 10% HCl
Ammonium hydrogen sulphate NH <sub>4</sub> HSO <sub>4</sub>	Hydrogen peroxide 3-30% H <sub>2</sub> O <sub>2</sub>
Arsenic acid up to approx. 10% H <sub>3</sub> AsO <sub>4</sub>	Inorganic acids up to 10%
Crystal Violet (Gentian Violet) C <sub>25</sub> H <sub>30</sub> ClN <sub>3</sub>	Iodine I <sub>2</sub>
Dyeing and bleaching agents	Lithium hydroxide over approx.. 10% LiOH
Ferric chloride FeCl <sub>2</sub>	Mercuric di-chromate HgCr <sub>2</sub> O <sub>7</sub>
Ferrous chloride FeCl <sub>3</sub>	Methylene Blue C <sub>16</sub> H <sub>18</sub> N <sub>3</sub> SCI
Formic acid up to 10% HCOOH	Millon's reagent OHg <sub>2</sub> NH <sub>2</sub> Cl

Nitric acid up to 10% HNO <sub>3</sub>	Potassium permanganate KMnO <sub>4</sub>
Oxalic acid C <sub>2</sub> H <sub>2</sub> O <sub>4</sub>	Silver nitrate AgNO <sub>3</sub>
Picric acid C <sub>6</sub> H <sub>3</sub> N <sub>3</sub> O <sub>7</sub>	Sodium hydrogen sulphate NaHSO <sub>4</sub>
Phosphoric acid up to 10% H <sub>3</sub> PO <sub>4</sub>	Sodium hydroxide over 10% NaOH
Potassium chromate K <sub>2</sub> CrO <sub>4</sub>	Sodium hypochlorite (chlorine bleach) NaOCl
Potassium di-chromate K <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub>	Sodium hypochlorite (chlorine lye) NaOCl
Potassium hydrogen sulphate KHSO <sub>4</sub>	Sublimate solution HgCl <sub>2</sub>
Potassium hydroxide over 10% KOH	Sulphuric acid up to 10% H <sub>2</sub> SO <sub>4</sub>
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 <sub>2</sub> SO <sub>3</sub> H	Inorganic acids*
Aqua regia* HNO <sub>3</sub> + HCl = 1:3	Nitric acid* HNO <sub>3</sub>
Arsenic acid H <sub>3</sub> AsO <sub>4</sub>	Phosphoric acid* H <sub>3</sub> PO <sub>4</sub>
Chrome sulphuric acid* K <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub> + H <sub>2</sub> SO <sub>4</sub>	Hydrofluoric acid* HF
Formic acid* HCOOH	Sulfuric acid* H <sub>2</sub> SO <sub>4</sub>
Hydrochloric acid* HCl	

\* in concentrations over 10%

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

Substances causing laminate-surface damage	
Bromine Br <sub>2</sub>	Nitrous fumes NO <sub>x</sub> / N <sub>x</sub> O <sub>y</sub>
Chlorine Cl <sub>2</sub>	Sulphur dioxide SO <sub>2</sub>
fuming acids	

## PM HPL / Elements / Lacquered boards

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