

## Technical information, May 2005

# Vivak<sup>®</sup> & Axp<sup>®</sup> Chemical resistance

### General chemical behaviour :

The chemical resistance of Vivak<sup>®</sup> and Axp<sup>®</sup> depends on the concentration of the substance, the temperature, the contact time and the internal tension level of the polycarbonate sheet due to fabrication etc.

Several types of damage can arise, sometimes more than one at the same time.

### Dissolving / Swelling

Low-molecular, aromatic, halogenated and polar components migrate into the plastic. The damage can range from a sticky surface to complete dissolving.

### Stress cracking

Some chemicals migrate to a minor extent and in very low quantity into the surface, and lead to relaxation of tensions in the material. This results in stress cracking, which can be optically disturbing. Because of increased notch occurrence, some mechanical properties are negatively influenced. Stress cracking is usually easy to see in transparent sheets.

### Molecular reduction

Some properties of materials are determined by the molecular weight. If a substance initiates a molecular reduction through a chemical reaction, the impact resistance and elastic properties of the material will be influenced. Electrical properties are almost not influenced, thermal properties are only slightly influenced by the molecular weight.

### Examples

Solvents / not resistant to	Chloroform Tetrahydro furane
Swelling agents	Benzene Acetone
Not influenced by / resistant to	diluted mineral acids, many organic acids, oxidizing or reducing agents, neutral and acid salt solutions, many fats, waxes and oils

In the following table you can find the resistance of Vivak<sup>®</sup> and Axp<sup>®</sup> to chemicals and several other substances.

The test results have been obtained at samples with low internal tensions, which have been stored during 6 months in the substance at a temperature of 20°C, without any mechanical load.

Apart from the nature of the substances, the chemical resistance is also depending on the concentration of the substance, the temperature during the contact, the contact time and the internal tension of the tested specimen.

This means that our products can be resistant to a number of chemicals for short contacts, but are not resistant in case of long exposure, such as performed in these tests.

Therefore, it is always recommendable to execute a test in the actual application conditions, if these differ from the test environment described above.

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The tested substances have been chosen in function of their importance in several areas. In a lot of cases it is possible to deduct results to other, chemically comparable, substances, even if these have not been tested.

Our UV-protected materials (Vivak<sup>®</sup> UV) are slightly more sensitive to chemicals in comparison to the unprotected materials, but in general the results shown in the table still comply.

### Legend

Explanation of the symbols: + resistant  
 O partially resistant  
 - not resistant

The results shown in the sections 2 upto 6, and especially the commercial products marked with ®, are based on a one-time test.

Changes in the composition by the producers of these substances can influence the product properties.

1. Chemicals		
Medium:	Vivak <sup>®</sup>	Axp <sup>®</sup>
Acetic acid, up to 10%	+	+
Acetone	-	-
Ammonia	-	-
Ammoniacal liquor	-	-
Ammonium chloride, saturated aqueous solution		+
Benzene	-	-
Benzyl alcohol		-
Butane (liquid or gaseous)		+
Butanol		+
Carbon tetrachloride	-	+
Caustic soda		-
Chloroform		-
Chromic acid, 20% in water	+	
Citric acid	+	+
Copper sulphate, saturated aqueous solution		+
Cyclo hexanol		+
Dibutyl phtalate (plasticizer)		+
Diethylene glycol	+	+

Medium:	Vivak <sup>®</sup>	Axp <sup>®</sup>
Diethylether		
Dimethyl formamide	-	-
Dinonyl phtalate (plasticizer)		+
Diocetyl phtalate (plasticizer)		+
Ethyl acetate	-	O
Ethyl alcohol, 96% pure	+	+
Ethyl ether		-
Ethylene chloride	-	
Ethylene glycol	+	+
Ethylene oxide		+
Formaline, 10%		+
Formic acid, 30%		+
Gasoline		+
Glycerine		+
Glycol		+
Heptane		+
Hexane	+	+
Hydrochloric acid, 20%	+	+
Hydrochloric acid, concentrated	-	-
Hydrofluoric acid, 5%		+

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Medium:	Vivak <sup>®</sup>	Axp <sup>®</sup>
Hydrogen peroxide, 30%		+
Isopropyl alcohol	+	+
Lactic acid, 10% in water		
Magnesium chloride, saturated aqueous solution		+
Mercuric chloride, saturated aqueous solution		+
Mercury		+
Methanol	+	+
Methyl amine		
Methyl ethyl ketone		-
Nitric acid, 10%	+	+
Nitric acid, 10-20%	O	
Nitrobenzene		-
Pentane		+
Perchloroethylene		-
Petroleum ether (free from aromatics)		+
Phenol	-	-
Potassium cyanide		+
Potassium hydroxide (caustic potash)		-
Propionic acid, 20%		+
Sodium carbonate, saturated aqueous solution	+	+
Sodium chlorate, saturated aqueous solution	+	+
Sodium hydroxide solution		-
Sodium hypochloride, 5% in water	+	+
Spirit, pure	+	
Sulphuric acid, 50%	+	+
Sulphuric acid, conc.	-	-
Tartaric acid, 10%		+
Tetrachloroethane		O
Toluene	-	+
Trichloroethylene		O
Water	+	+
Xylene		+

Medium:	Vivak <sup>®</sup>	Axp <sup>®</sup>
<b>2. Desinfectants</b>		
Hydrogen peroxide		+
Spirit, pure	+	+

<b>3. Nutrition list</b>		
Linseed oil	+	+
Salad oil	+	+
Vinegar	+	+
Water	+	+

<b>4. Wash and cleaning agents</b>		
Green soap	+	+
Household soap	+	+

<b>5. Technical oils</b>		
Baysilon <sup>®</sup> silicone oil	-	-
Brake fluid (ATE)	O	O
Calciumsoap fat	+	+
Camphor oil	+	+
Diesel oil	-	-
Lubricant based on nafta	+	+
Lubricant based on paraffin	+	+
Lubricant R2 Darina <sup>®</sup>	+	+
Mobil Spezial Oil 10 W 30 <sup>®</sup>	+	+
Silicone oil	-	-
Sodium soap fat	+	+
Turpentine surrogate	+	+

<b>6. Miscellaneous</b>		
Gasoline, normal	-	
Gasoline, super	-	
Kerosene	+	
Oleic acid	+	+
Soap suds	+	+

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