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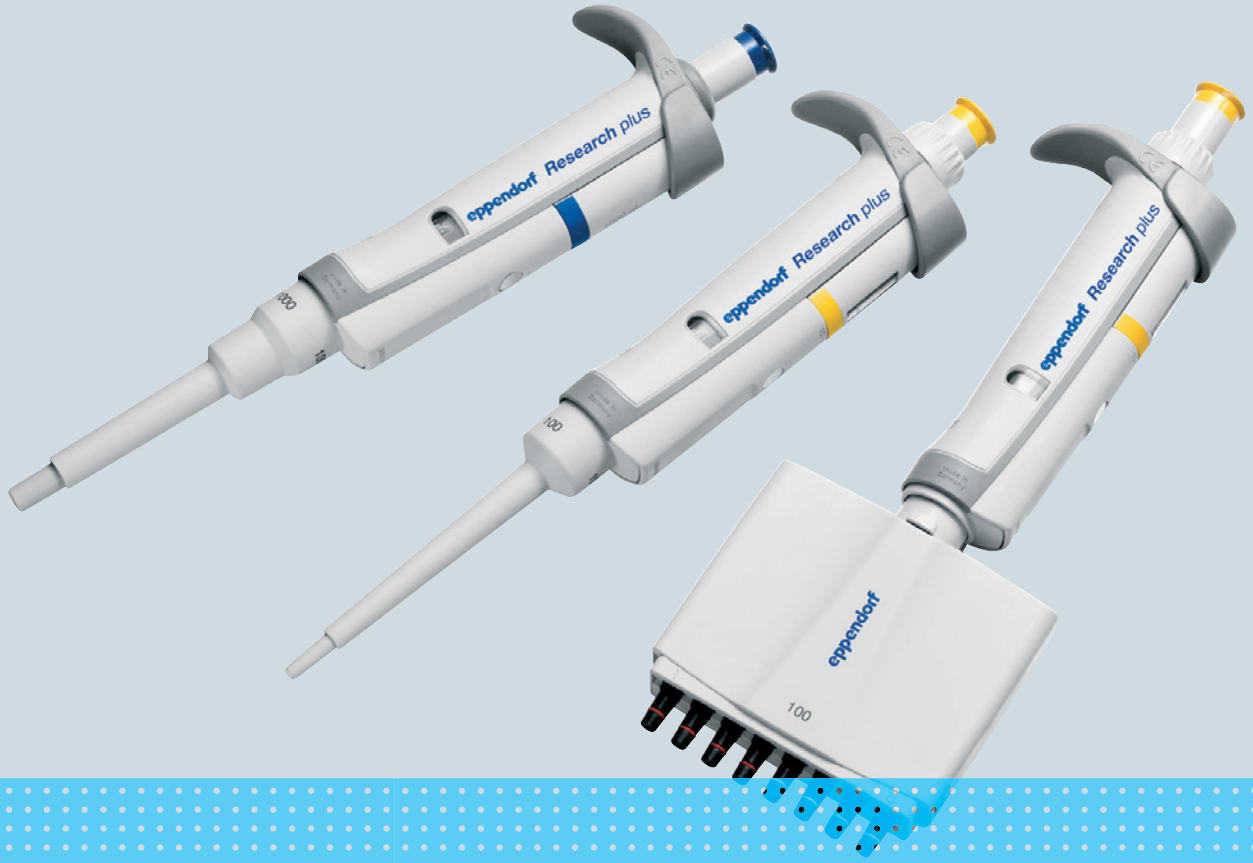

Eppendorf Research® plus

Chemical Resistance

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1 General conditions of the resistance tests

The resistance data listed in the following tables is derived from the storage of the test material in the corresponding liquid for 24 hours. These only apply to handling and cleaning at ambient temperature.

The information about the chemical resistance only refers to the used plastics of the instrument. These plastics have been improved to enhance the standard properties of the corresponding plastic. Therefore, the data in the following tables does not necessarily apply to plastics with the same abbreviations that are used in other products.

As only the pipette tip comes into contact with the liquid during proper handling, aggressive liquids can be carefully used for a limited time. This limited time is reduced for aggressive liquids with a high vapor pressure. For liquids with high vapor pressure, gases enter the instrument during dispensing. The piston movement also encourages the formation of aerosols. The gases or aerosols may condense at various locations. Materials may be damaged if this condensate remains in the instrument for a longer period of time. After aggressive chemicals have been used, the lower part must be ventilated, and cleaned if necessary.

2 Materials used

The following materials used in the device are important for the user:

Assembly	Material
External surfaces of the upper part	• Improved polypropylene (PP) • Polycarbonate (PC) • Polyetherimide (PEI) • Foil
Viewing window	• Polycarbonate (PC)
Exterior and interior of lower parts	• Improved polypropylene (PP) • Polyvinylidene fluoride (PVDF) • Polyetherimide (PEI) • Polyphenylene sulfide (PPS) • Polyetheretherketone (PEEK) • Polytetrafluoroethylene (PTFE) • Ethylene propylene diene rubber (EPDM) • Silicone • Steel (stainless steel and spring steel)

Pipette tip	Material
epT.I.P.S.	• Polypropylene (PP)
epDualfilter T.I.P.S. filter	• Polyethylene (PE)

3 Evaluation criteria

In this document, the following evaluation criteria for resistance are defined.

Symbol	Resistance	Explanation
■■■	Resistant	The chemical can be used.
■■	Limited resistance and/or suitable for limited use	The chemical can be used for a limited period of time. If the chemical has not been removed from the surface or the lower part after the liquid has been used (observe condensation!), subsequent damages are possible.
■	Increased risk and/or increased wear	The chemical can only be used with utmost caution. If handled improperly, the chemical must be removed immediately because subsequent damages can occur quickly. Wear parts may need to be exchanged earlier than normal.

4 Chemical resistance

4.1 Acids and alkalines

Name	Concentration	PP	PEI	PPS	PVDF	PC	PEEK	EPDM	Silicone	Steel
Ammonia solution	25 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Ammonia solution	2 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Acetic acid	96 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Acetic acid	12 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Caustic soda	40 %	■■■	■■■	■■■	■■■	■■	■■■	■■■	■■■	■■■
Caustic soda	20 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Caustic soda	4 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Perchloric acid	10 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Phosphoric acid	85 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Nitric acid	65 %	■■[2]	■■[2]	■■[2]	■■■	■■[2]	■■■	■■■	■[3]	■■
Nitric acid	6 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■[3]	■■■
Hydrochloric acid	32 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■[3]	■[1]
Hydrochloric acid	3.6 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■[1]
Sulfuric acid	95 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■[3]	■■■
Sulfuric acid	16 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Trichloroacetic acid	40 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■[3]	■■■
Trichloroacetic acid	10 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■[3]	■■■
Trifluoroacetic acid (TFA)	100 %	■■■	■[3]	■■■	■■■	■[4]	■■■	■■■	■[3]	■■■
Trifluoroacetic acid (TFA)	10 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■

[1] Corrosion at the tip cone (stainless steel) if the hydrochloric acid is not removed after incorrect dispensing. With 32% hydrochloric acid and higher concentrations of hydrochloric acid, corrosion occurs at the piston spring made of spring steel and at other inner parts after very intensive and long use.

[2] Discoloration; this does not affect functioning.

[3] Silicone o-rings and wear parts made of PEI have to be replaced in shorter intervals than usual.

[4] Careful working is necessary to avoid causing damage to the viewing window.

4.2 Organic solvents

Name	Concentration	PP	PEI	PPS	PVDF	PC	PEEK	EPDM	Silicone	Steel
Acetone[2]	–	■■■	■■■	■■■	■■■	■[4]	■■■	■■■	■■■	■■■
Acetonitrile	–	■■■	■■■	■■■	■■■	■[4]	■■■	■■■	■■■	■■■
Dichloromethane (methylene chloride)	–	■■■	■[3]	■■■	■■■	■[4]	■■■	■■[2]	■■■	■■■
Diethyl ether	–	■■■	■■■	■■■	■■■	■[4]	■■■	■■[2]	■■■	■■■
Dimethyl sulfoxide (DMSO)	10 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Dimethyl sulfoxide (DMSO)	50 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Dimethyl sulfoxide (DMSO)	100 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Acetic ether[1]	–	■■■	■■■	■■■	■■■	■[4]	■■■	■■[2]	■■■	■■■
Ethanol (denatured)	96 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Formaldehyde	37 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Isoamyl alcohol	–	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Isopropanol	–	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■	■■■
Methanol	–	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Petroleum ether	–	■■■	■■■	■■■	■■■	■■■	■■■	■■[2]	■■[2]	■■■
Phenol (water saturated)	–	■■■	■[3]	■■■	■■■	■[4]	■■■	■■■	■■■	■■■
Carbon tetrachloride	–	■■■	■■■	■■■	■■■	■[4]	■■■	■■[2]	■■■	■■■
Toluol	–	■■■	■■■	■■■	■■■	■[4]	■■■	■■[2]	■■■	■■■
Trichloromethane (chloroform)	–	■■■	■[3]	■■■	■■■	■[4]	■■■	■■[2]	■■■	■■■
Xylol	–	■■■	■■■	■■■	■■■	■[4]	■■■	■■[2]	■■[2]	■■■

[1] Wiping can attack the colored printing.

[2] Absorption of solvent on contact; temporary swelling behavior; thoroughly ventilate the lower part after prolonged use.

[3] Wear parts made of PEI have to be replaced in shorter intervals than usual.

[4] Careful working is necessary to avoid causing damage to the inspection windows and, occasionally, the printing as well.

4.3 Cleaning agents and disinfectants

Name	Concentration	PP	PEI	PPS	PVDF	PC	PEEK	EPDM	Silicone	Steel
Biocidal ZF	–	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Cidex Activated Dialdehyde Solution (aldehyde-based)	–	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
COUNT-OFF Liquid Concentrate	–	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■	■■■
COUNT-OFF Surface Cleaner	–	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■	■■■
Dismozon pur (peroxide-based)	4 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
DNA *AWAY*	–	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■
DNA-Erase	–	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■	■■■
Ethanol	70 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Helipur (phenol-based)	6 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Hexaquart S (QAV-based[1])	5 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Hi-TOR Plus (QAV-based[1])	–	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Isopropanol	70 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■	■■■
Korsolex basic (aldehyde-based)	5 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Meliseptol (alcohol-based)	–	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Sodium hypochlorite	4 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
RNase AWAY	–	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
RNase Exitus plus	–	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■	■
Sterillium (alcohol-based)	–	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Hydrogen peroxide	35 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■

[1] Based on a quaternary ammonium compound

4.4 Saline solutions, buffers, wetting agents, oils and other solutions

Name	Concentration	PP	PEI	PPS	PVDF	PC	PEEK	EPDM	Silicone	Steel
Caesium chloride	Saturated	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
EDTA[1] (pH 8)	1.8 g/L	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Ficoll (polysaccharide)	1.077 g/L	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Formamide	50 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Glutaraldehyde	25 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Glycerol	50 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Guanidinium thiocyanate	4 mol/L	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Mineral oil	–	■■■	■■■	■■■	■■■	■■■	■■■	■■[2]	■■■	■■■
Sodium acetate (pH 5.2)	2 mol/L	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Sodium dodecyl sulfate (SDS, sodium lauryl sulphate)	1 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Paraffin oil	–	■■■	■■■	■■■	■■■	■■■	■■■	■■[2]	■■■	■■■
TRIS buffer (pH 7.5)	1 mol/L	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Triton X-100	1 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Tween 20	1 %	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■
Water	–	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■	■■■

[1] Eethylenediaminetetraacetate, ethylenediaminetetraacetic acid, (ethylenedinitrilo)tetraacetic acid, $C_{10}H_{16}N_2O_8$

[2] EPDM shows swelling behavior with extended contact with the oils. With correct dispensing, contact is impossible.

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