



"QUALITY BY DESIGN"

PVC VALVE REFERENCE MATERIAL

Key to Abbreviations

ABS	Acrylonitrile Butadiene Styrene
CPVC	Chlorinated Poly Vinyl Chloride
CR (Neoprene)	Chloroprene Rubber
EPDM	Ethylene Propylene Rubber
FPM (Viton)	Fluorine Rubber
GF	Glass Fiber
MP	Mineral Powder
NBR	Nitrile Butadiene Rubber
NR	Natural Rubber
NSF	National Sanitation Foundation
PC	Polycarbonate
PE	Polyethylene
PP	Polypropylene
PTFE	Polytetrafluoroethylene
PVC	Poly Vinyl Chloride
PVDF	Poly Vinylidene Fluoride
SBR	Styrene Butadiene Rubber
SUS	Steel Special Use Stainless
UPVC	Unplasticized Poly Vinyl Chloride
VP	Valve Plastic

Reference Range of Temperature

Material	Abbreviation	General chemical resistance	Max. Service temperature	
			Continuous	Short hours
Rigid Polyvinyl Chloride (Rigid PVC)	PVC	Resistant against most of acids, alkalis and salts of high to low concentration level. However, the material tends to be attacked by some chemicals- such as aromatic hydrocarbon, ketones, esters and chlorinated hydrocarbon.	5°C ~ 50°C	60°C
Heat-resistant Rigid Polyvinyl Chloride (Heat-resistant PVC)	CPVC	Resistance properties are nearly the same as rigid PVC. Having a high heat-resistance, this is serviceable in the temperature range higher than the former's.	0°C ~ 90°C	100°C
Polypropylene	PP	Not stable against strong acids such as concentrated nitric acid and chrome acid mixture, but this is resistant against other acids, alkalis and salts. Resistant against many organic solvents (specifically the solvent with active group), but tends to be attacked by chlorine-containing solvents, aliphatic series and aromatic hydrocarbon.	0°C ~ 90°C	100°C
Vinylidene Fluoride	PVDF	Highly resistant up to a high temperature range against ordinary acids & salts and organic chemicals, but broken down by fuming sulfuric acid and strong basic amines. Also, the use conditions with ketone, amide, ester, organic solvent and alkali are limited.	-20°C ~ 150°C	150°C
Ethylene Propylene Rubber	EPDM	Provided with an excellent ozone-resistance and chemical-resistance. Comparatively resistant against ketone and ester, but less resistant against aromatic & aliphatic families, and gasoline and oil.	-10°C ~ 130°C	150°C
Polytetrafluoroethylene (Trade name, Teflon®)	PTFE	Resistant against ordinary acid and alkali, and not dissolved nor changed by ordinary solvent medium. Attacked by melted alkali metal and in high temperature, by fluorine and chlorine trifluoride.	-20°C ~ 250°C	300°C
Fluororubber (Trade name, Viton®)	FPM	Most chemical-resistant among all rubber families. Has a good resistance against strong oxidizing acid such as concentrated sulfuric acid and nitric acid; resistant against aliphatic and aromatic families and oils, but attacked by ketones, ammonia anhydride, concentrated caustic soda, etc.	-5°C ~ 150°C	200°C

Chemical Resistance of Material

Chemicals	Concentration (%)	Temperature (°C)	Material						
			PVC	CPVC	PP	PVDF	PTFE	EPDM	FPM
Sodium chloride	Saturated Water Solution	40	⊙	⊙	⊙	⊙	⊙	⊙	⊙
		60	⊙	⊙	⊙	⊙	⊙	⊙	⊙
		80	⊙	⊙	⊙	⊙	⊙	⊙	⊙
Hydrochloric acid	35	40	⊙	⊙	⊙	⊙	⊙	⊙	⊙
		60	○	⊙	○	⊙	⊙	○	⊙
		80	○	○	○	⊙	⊙	○	⊙
Caustic soda	50	40	⊙	⊙	⊙	○	⊙	⊙	×
		60	⊙	⊙	⊙	△	⊙	○	○
		80	⊙	○	○	×	⊙	△	○
Chromic acid	20	40	⊙	⊙	×	⊙	⊙	○	⊙
		60	○	⊙	○	⊙	⊙	×	○
		80	○	○	○	⊙	⊙	○	○
Acetic acid	50	40	○	○	○	⊙	⊙	○	○
		60	△	△	△	⊙	⊙	○	○
		80	×	×	○	⊙	⊙	△	○
Soda hypochlorite	13	40	⊙	○	△	⊙	⊙	×	○
		60	○	○	○	⊙	⊙	○	○
		80	○	○	○	×	⊙	○	○
Nitric acid	50	40	○	○	⊙	⊙	⊙	×	○
		60	○	△	△	⊙	⊙	○	△
		80	×	△	×	⊙	⊙	○	×
Toluene		40	×	×	△	⊙	⊙	×	○
		60	○	○	×	○	⊙	○	○
		80	○	○	○	△	⊙	○	○
Hydrogen sulfide	Aqueous Solution	40	⊙	⊙	⊙	⊙	⊙	⊙	⊙
		60	⊙	⊙	⊙	⊙	⊙	○	○
		80	⊙	⊙	⊙	⊙	⊙	○	○
Sulfuric acid	90	40	○	○	⊙	⊙	○	⊙	
		60	○	○	○	⊙	△	○	
		80	○	○	○	⊙	×	○	

⊙	Not affected	△	Slightly affected but serviceable
○	Negligibly affected	×	Not serviceable

PVC VALVES APPENDIX B