

NIBCO CHEMICAL RESISTANCE GUIDE FOR VALVES & FITTINGS

INTRODUCTION

This chemical resistance guide has been compiled to assist the piping system designer in selecting chemical resistant materials. The information given is intended as a guide only. Many conditions can affect the material choices. Careful consideration must be given to temperature, pressure and chemical concentrations before a final material can be selected.

Thermoplastics' and elastomers' physical characteristics are more sensitive to temperature than metals. For this reason, a rating chart has been developed for each.

MATERIAL RATINGS FOR THERMOPLASTICS & ELASTOMERS

Temp. in °F	= "A" rating, maximum temperature which is recommended, resistant under normal conditions
B to Temp. in °F	= Conditional resistance, consult factory
C	= Not recommended
Blank	= No data available

MATERIAL RATINGS FOR METALS

A	= Recommended, resistant under normal conditions
B	= Conditional, consult factory
C	= Not recommended
Blank	= No data available

Temperature maximums for thermoplastics, elastomers and metals should always fall within published temp/pressure ratings for individual valves. **THERMOPLASTICS ARE NOT RECOMMENDED FOR COMPRESSED AIR OR GAS SERVICE.**

This guide considers the resistance of the total valve assembly as well as the resistance of individual trim and fitting materials. The rating assigned to the valve body plus trim combinations is always that of the least resistant part. In the cases where the valve body is the least resistant, there may be conditions under which the rate of corrosion is slow enough and the mass of the body large enough to be usable for a period of time. Such use should always be determined by test before installation of the component in a piping system.

In the selection of a butterfly valve for use with a particular chemical, the liner, disc, and stem must be resistant. All three materials should carry a rating of "A." The body of a properly functioning butterfly valve is isolated from the chemicals being handled and need not carry the same rating.

THERMOPLASTICS & ELASTOMERS

ABS — Acrylonitrile Butadiene Styrene Class 4-2-2 conforming to ASTM D1788 is a time-proven material. The smooth inner surface and superior resistance to deposit formation makes ABS drain, waste, and vent material ideal for residential and commercial sanitary systems. The residential DWV system can be exposed in service to a wide temperature span. ABS-DWV has proven satisfactory for use from -40°F to 180°F. These temperature variations can occur due to ambient temperature or the discharge of hot

liquids into the system. ABS-DWV is very resistant to a wide variety of materials ranging from sewage to commercial household chemical formulations. ABS-DWV is joined by solvent cementing or threading and can easily be connected to steel, copper, or cast iron through the use of transition fittings.

CPVC — Chlorinated Polyvinyl Chloride Class 23447-B, formerly designated Type IV, Grade 1 conforming to ASTM D-1784, has physical properties at 73°F similar to those of PVC, and its chemical resistance is similar to or generally better than that of PVC. CPVC, with a design stress of 2000 psi and maximum service temperature of 210°F, has proven to be an excellent material for hot corrosive liquids, hot or cold water distribution, and similar applications above the temperature range of PVC. CPVC is joined by solvent cementing, threading or flanging.

PP (Polypropylene) — Type 1 Polypropylene is a polyolefin, which is lightweight and generally high in chemical resistance. Although Type 1 polypropylene conforming to ASTM D-2146 is slightly lower in physical properties compared to PVC, it is chemically resistant to organic solvents as well as acids and alkalis. Generally, polypropylene should not be used in contact with strong oxidizing acids, chlorinated hydrocarbons, and aromatics. With a design stress of 1000 psi at 73° F, polypropylene has gained wide acceptance where its resistance to sulfur-bearing compounds is particularly useful in salt water disposal lines, crude oil piping, and low pressure gas gathering systems. Polypropylene has also proved to be an excellent material for laboratory and industrial drainage where mixtures of acids, bases, and solvents are involved. Polypropylene is joined by the thermo-seal fusion process, threading or flanging. At 180°F, or when threaded, PP should be used for drainage only at a pressure not exceeding 20 psi.

PVC — Polyvinyl Chloride Class 12454-B, formerly designated Type 1, Grade 1. PVC is the most frequently specified of all thermoplastic materials. It has been used successfully for over 30 years in such areas as chemical processing, industrial plating, chilled water distribution, deionized water lines, chemical drainage, and irrigation systems. PVC is characterized by high physical properties and resistance to corrosion and chemical attack by acids, alkalis, salt solutions, and many other chemicals. It is attacked, however, by polar solvents such as ketones, some chlorinated hydrocarbons and aromatics. The maximum service temperature of PVC is 140°F. With a design stress of 2000 psi, PVC has the highest long-term hydrostatic strength at 73°F of any of the major thermoplastics being used for piping systems. PVC is joined by solvent cementing, threading, or flanging.

PVDF (Polyvinylidene Fluoride) — KEM-TEMP (KYNAR®) is a strong, tough and abrasion-resistant fluorocarbon material. It resists distortion and retains most of its strength to 280°F. It is chemically resistant to most acids, bases, and organic solvents and is ideally suited for handling wet or dry chlorine, bromine and other halogens. No other solid thermoplastic piping components can approach the combination of strength, chemical resistance and working temperatures of PVDF. PVDF is joined by the thermo-seal fusion process, threading or flanging.

EPDM — EPDM is a terpolymer elastomer made from ethylene-propylene diene monomer. EPDM has good abrasion and tear resistance and offers excellent chemical resistance to a variety of acids and alkalis. It is susceptible to attack by oils and is not recommended for applications involving petroleum oils, strong

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Ronald C. Merrick



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