

# CORROSION RESISTANT PLASTIC INFORMATION

## These Materials Are Offered By Delta Controls

### GENERAL USAGE

Delta Controls offers many of its instruments and controls with plastic solid or laminated components. These modern materials have many advantages over older metal and ceramic technologies. Increased corrosion resistance, longer service life, and lower manufacturing costs are prime examples.

### PVC (Polyvinyl Chloride)

PVC is the most commonly specified and used plastic material. It has been successfully used in piping systems for over 30 years. It handles a great variety of services; some typical ones are: municipal water lines, plating systems, irrigation distribution, and deionized water. This material is generally quite strong and very corrosion resistant. It withstands chemical attack from most acids, many alkalies, salt water, chlorinated water, turpentine, and crude oil. It is rapidly attacked by polar solvents (MEK and other ketones), and aromatic hydrocarbons. PVC shows heat deflection at 180°F (85°C). Its use as a plant piping material is generally limited to operating temperatures between 20°F and 140°F (5 to 60°C).

### PP (Polypropylene)

PP is polyolefin material with good resistance to organic solvents as well as to most acids and bases. The ability to withstand both solvents and corrosion make it useful for handling crude oil, plant recycle waste, and other services which contain mixtures of solvents, oils and corrosive chemicals. Its usage is normally limited to temperatures between -10°F and 200°F (-20 to 95°C).

### RUBBER ("O" Rings and Gaskets)

Buna-N (or Nitrile) is a general use rubber for services up to 225°F (110°C). Silicon rubber is a heat resisting elastomer suitable for steam and similar services up to 400°F (205°C). Viton<sup>®</sup> is a fluorocarbon elastomer with excellent chemical resistance to 500°F (260°C). Kalrez is a perfluoroelastomer with superb chemical resistance to 600°F (315°C).

### PVDF (Polyvinylidene Fluoride)

Kynar (PENNWALT trademark) is a strong, tough, and abrasion resistant thermoplastic. It is chemically inert to most strong acids, and alkalies. It is suitable for handling halogens, such as bromine and chlorine, either wet or dry. Other services include butyl acetate, carbon disulfide, 50% chromic acid, formic acid, and 70% nitric acid. It is not suitable for solvents such as acetone, ethyl acetate, and methyl ethyl ketone. PVDF shows heat deflection at 350°F (175°C). It should not be used in piping systems at temperatures higher than 280°F (140°C) or lower than -40°F (-40°C).

### PTFE (Polytetrafluoroethylene)

PTFE displays excellent corrosion resistance. It is chemically inert to almost all acids, bases, and solvents. A notable exception is the alkali metal sodium. PTFE cannot be joined to itself or other materials by welding or gluing. It is soft, easy to abrade, and cold flows readily. The primary use for this material is in seals, as a process equipment liner, and as an "anti-stick" coating. Its useful temperature range extends from -450°F to +500°F (-230 to 260°C).

### EPOXY (Two Part Resins)

Epoxy resins are a blend of materials that strongly bond to other materials, and are set by a catalyzed chemical reaction. The resulting hard amorphous mass is strong,, highly corrosion resistant, and operates over a wide range of temperatures. Pure resins usually serve as high quality glues. Glass fibers and other filaments bonded together with epoxy resins are used to produce process piping systems which operate from -20°F to +300°F (-28 to 148°C). This material handles most acids, bases, and solvents; examples are food and urea.

### Protective Encapsulants

Epoxies, Urethane, and Silicon Rubber are useful to protect field mounted electronic circuitry from moisture, corrosion, and vibration. These materials are also used to encapsulate most Intrinsically Safe transmitters.

# GENERAL PLASTIC PIPING INFORMATION

## PLASTIC PIPING STANDARDS

**Flange Dimensions and Drilling:** ANSI #B16.5  
**PVC Pipe and Fittings:** ASTM #D1784  
**PP Pipe and Fittings:** ASTM #D2146  
**Potable Water Plastic Pipe:** NSF Standard #14  
**Tensile & Flexural Strength:** ASTM #D259 & D638  
**Chemical Resistance Testing:** ASTM #D543

## OPERATIONAL RATINGS

### Maximum Operating Pressure (PSIG @ °F)

TEMP °F	PIPING SYSTEM AND FLANGE MATERIAL			
	PVC	PP	PVDF	EPOXY + FIBERGLASS
100	150	150	150	150
110	135	140	150	150
120	110	130	150	150
130	75	118	150	145
140	50	105	150	140
160	NS	80	135	130
180	NS	50	115	120
200	NS	10	100	110
250	NS	NS	50	90
280	NS	NS	25	80
300	NS	NS	NS	50

The values shown above are non-shock and are typical for 150# class plastic piping. "NS" means not usually suitable.

## NPT & WELDED CONNECTIONS

**Thread Shape** is NPT in accordance with ANSI B1.20.1 (same as steel). Use a good grade of PTFE thread sealing tape. 1 to 1-1/2 turns beyond finger tight is usually adequate for sealing; over tightening will damage the thread.

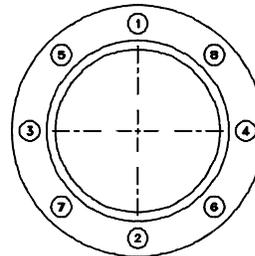
**Epoxy Glass** materials are joined with epoxy glue.

**PVC** material is joined by solvent welding or by heat welding (special cases).

**PP & PVDF** materials are joined by heat welding.

## FLANGE MAKEUP

1. The 150# flange has already been joined to the pipe or in line mounted device.
2. The piping run must be straight so as to avoid stress due to misalignment. Piping must also be supported and secured to prevent misalignment which can cause damage to the flange under operating conditions.
3. Align the flange bolt holes and install the rubber gasket into position between the flange faces.
4. Insert all of the bolts; install flat washers on both sides, and run the nuts in finger tight.
5. Make sure that the flange faces are aligned and are not separated by an excessive distance.
6. Tighten the bolting by turning the nuts diametrically opposite each other in sequence. Nut tightening must be done with a torque wrench. Complete torquing should be done in four stages. A quarter of the total torque shown below should be added each time the sequence shown below is repeated. Uniform torquing will minimize gasket leaks.



This shows the recommended tightening sequence of the flange bolts (lubricate threads)

FLANGE SIZE	RECOMMENDED TOTAL TORQUE	
	FT/LBS	KG-MTR
1/2" to 1-1/2"	10-15	1.4 - 2.1
2" to 2-1/2"	20-25	2.8 - 3.5
3" & 4"	25-30	3.5 - 4.1
6"	35-40	4.8 - 5.5
8"	45-50	6.2 - 6.9
10"	60-70	8.3 - 9.7



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