

# Thermoplastic flanges by David A. Chasis

**F**langing is the system of choice when joining thermoplastics to dissimilar piping systems. In addition, flanging is the third most popular thermoplastic joining system after solvent cementing and heat-fusion systems.

There are several inherent advantages of using a flanged piping system:

- *Can disassemble and assemble.* With solvent cementing and heat-fusion joints, once the joint is made, the only way to “unmake” the joint is to cut the joint out of the system and start again. Flanged systems can be assembled and disassembled infinitely.

- *Easy to fix leaks.* If there is a leaking flanged joint, usually tightening up the flange bolts or replacing a defective gasket handles 95 percent of field problems. Also, a flanged system simplifies isolating a piping system for maintenance or field repairs.

- *Can join dissimilar piping materials.* With standard flanges adhering to ANSI/ASME B16.5 bolt-patterns and dimensions, thermoplastic piping systems are easily flanged to other piping systems.

- *Can prefabricate a system for field installation.* When field conditions are a concern and/or skilled installers are scarce,

prefabricating a flanged system in a controlled environment and with skilled workers can be a boon for many field installations.

- *Ideal for large diameter pipe sizes.* When installing piping systems 8-inches and larger in diameter, it would be advisable to consider a flanged system due to the ease of installation. This joining system is also extremely useful when installing complex piping systems in confined spaces in which positioning cumbersome joining tools are a hassle or impossible.

The concerns in using a flanged system are:

- Gaskets and bolting hardware are of different material composition than thermoplastics and could be susceptible to chemical attack.

- Flanged systems are limited to 150-psi pressure rating (more on this subject later).

- This joining system cannot be buried directly in earth bearing soils due to the point loading of flange connections.

- Flanging is dimensionally less compact than other piping systems.

There are three types of flanges for use in joining thermoplastic piping systems — solid one-piece, van-stone and blind. Most flanges up to 12-inch in diameter are injection molded. Flanges larger than 12-inch diameter are fabricated from sheet stock and other piping materials. Except for blind flanges, the flange hub end-connections are configured as either socket or spigot. The spigot flange is designed for butt fusion or for insertion into a fitting socket (very useful when flanging valves or fittings). The socket flange is designed for joining using solvent cementing or socket fusion. Van-stone flanges are of a two-piece design in which the bolting ring is allowed to rotate independently of the hub, greatly simplifying the bolting process. Blind flanges “dead-end” or cap a piping system and are removable for future piping continuations.

As mentioned earlier, thermoplastic flanges, like other ASTM F 1970 designated products such as unions and valves, are limited to a 150-psi working pressure rating at ambient temperature by flange manufacturers. In the last decade, several manufacturers of unions and ball valves, by changing designs, have increased the pressure ratings of their products to 235-psi or 16 bars (1 bar = 1 atmosphere =

PVC blind flange.



14.7-psi). With the increase in pressure capabilities of those engineered products, thermoplastic flanges is the limiting factor in establishing maximum working pressure of any piping system in which they are installed.

Still, if one looks at the use of the 150-psi rating designation as described by ANSI and ASME, it is clear that the 150-pound designation is a “class” rating describing the size-configuration and geometry of the flange and does not define the flange’s working pressure capabilities. For example, a class 150-psi steel flange at ambient temperature has a listed working pressure of 285-psi, and a class 300-psi steel flange at ambient temperature has a working pressure of 740-psi. Presently, there is an action plan now underway by the TIPS (Thermoplastic Industrial Piping Systems) product line committee of the PPA (Plastic Pipe & Fittings Association) to test flanges manufactured by TIPS member companies as well as testing new gasket technologies to decide if increased working pressure ratings of thermoplastic flanges are justified. If the tests show positive results, TIPS will aggressively pursue working with all thermoplastic flange manufacturers in changing industry standards through committees of the ASTM and ASME.

Flanging will continue to be extensively used in thermoplastic piping systems and often, when conditions demand, will be the joining system of choice. ■

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PVC socket (one-piece) flange.



PVC spigot van-stone (two-piece) flange.