

This bulletin will provide a comparison of filament wound fittings and flanges with compression (gunk) and contact molded fittings flanges. We will review the advantages of filament wound fittings and flanges, and why the fittings and flanges that Industrial Fiberglass Specialties provides represents the customer's "Best Buy".

### **Compatible with the pipe - equal chemical resistance:**

The filament wound fittings we produce have the same corrosion liner and exterior protection as the corresponding pipe. Compression molded fittings do not have this superior corrosion barrier. Fittings fabricated from pipe having secondary miter and butt joints are an invitation to corrosion attack. Our smooth radius elbows do not have these secondary welds. So called "hand layup" fittings can be produced with similar liners, but have other limitations discussed below.

### **Thermal Compatibility:**

Since filament wound pipe and fittings are similar in construction, their performance under thermal cycles will be more compatible than when molded and hand layup fittings are used. This means that there will be less tendency for failure of joints due to radial stresses caused by differential expansion or contraction of the bell and spigot. Such stresses are particularly detrimental to long term performance under temperature cycles. Filament wound fittings and flanges, for example, are the standard, and in fact the only type of fiberglass fittings and flanges used for the very demanding service of steam condensate piping. (Military Specification MIL-P-28584A)

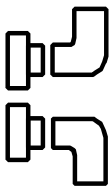
### **Built-in Toughness:**

Filament wound fittings and flanges are reinforced with continuous rovings oriented for optimum performance in handling internal pressure. This gives the fitting or flange "toughness", and accounts for their ability to withstand vibration and pressure surges. Other types of fittings either contain seams or joints within the part, or are made with short non-continuous fiber reinforcements. Field experience has demonstrated that these other types of fittings lack the toughness of the filament wound fittings and flanges.

### **Safe Mode of Failure:**

No one wants a piping part to fail. But plant accidents do happen. Someone drops a wrench, someone catches a pipe with a fork lift, someone forgets to vent the air out of a line while filling, etc. Filament wound parts typically fail, when over-stressed or damaged, by gradual fracturing of the resin matrix between fibers. This leads to porosity or small localized leaks.

Literally thousands of tests have shown that it is almost impossible to rupture the continuous glass filaments of a properly made filament wound fitting or flange. Molded and hand layup fittings and flanges, however, can and typically do fail catastrophically. Imagine the damage that can be done in a crowded plant environment if a pipe fitting should "let go" all at once.



Past experiments conducted with rubber bag liners within filament wound fittings to prevent porosity have shown that about twice as much pressure is required to rupture the glass filaments as is required to cause fracturing of the resin matrix. This inherent safety, and increased safety factor, is why the U. S. Nuclear Regulatory commission specifies filament wound fittings and flanges in their Regulatory Guide 1.72.

### **Flexibility under bending and misalignment loads:**

The U. S. Navy has conducted grueling long-term tests to evaluate the ability of different types of fittings and flanges to absorb bending and misalignment deformations without rupture. These tests verified the Navy's field experience - which indicated that filament wound fittings and flanges are superior to all other types of FRP pipe fittings and flanges. Because of this confidence in filament wound fittings and flanges, they are now mandated for service aboard ship (reference MIL-P-24608-SH).

The U. S. Air Force and U. S. Navy have established MIL-P-22245A and MIL-P-29206 specifications for FRP pipe, fittings, and flanges for high pressure jet fuel service. Again, the tests required of pipe, fittings, and flanges under this specification are very demanding and severe. No fittings and flanges, other than filament wound, have ever been qualified under this specification.

### **Why Industrial Fiberglass Specialties?**

As you can see a very strong case can be made for filament wound fittings and flanges. So the next question is: Why Industrial Fiberglass Specialties?

We, the Industrial Fiberglass Specialties Group of companies, are among just a very few basic manufacturers of filament wound fittings and flanges. Our experience with filament wound fittings and flanges goes back over 30 years. We are a basic OEM supplier of filament wound FRP fittings and flanges to many other manufacturers and/or their distributors. Just as our customers build on their experience and know-how, Industrial Fiberglass has its wealth of experience and know-how to insure our customers receive their "Best Buy" in FRP composite pipe, fittings, and flanges.