Leak Testing the New Gas Fittings, Transition Fittings and Plugs for the TRT Barrel Modules

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In the course of module installation, it is necessary to disconnect the active gas lines at the outside surface of the tension plate. The module is mounted in the space frame and the gas lines, as well as other services, are connected thereafter. The connection consists of two mating parts, one built into the tension plate called the gas fitting, and the other, connected directly to a thin-wall PEEK tube, called the transition fitting. The original design of the gas fittings resulted in parts that have already been built into all modules constructed until now; that is, into about half of the projected final number of modules.

The parts were not completely successful, however, because there were often leaks in the joints. This was due partly to tolerance build-up and partly to sub-optimal design. The parts were redesigned in a number of details to improve the gas seal and the design was recently submitted to the manufacturer (Trigon). A new part called the plug was also designed and submitted. It is made of ultem and is used to cover the unused active gas fittings on the modules. Some of the new parts have arrived and we have tested four samples of each.

Each of the four sample gas fittings was glued into one end of a cylindrical plastic adapter. A standard compression fitting was threaded into the other end and connected to a gas supply. The threaded end of the gas fitting was accessible in this arrangement and we successively screwed in plugs and transition fittings and checked for leaks with a Matheson leak detector with microliter/second sensitivity. The pressure was 5 psi. At this pressure, leaks would emit approximately a 20 times larger volume than at a typical chamber pressure. The plugs, made of ultem and incorporating a screwdriver slot, were easy to seal. It took only a small torque to make a leak tight seal. The stainless steel transition fittings needed to be tightened with pliers, because of their smooth surface. (The open end of the transition fittings was filled with glue for this test.) None of the joints leaked when they were tightened down.

The new transition fittings and plugs were also tested in the older gas fittings. It was not always possible to make a leak tight joint to the old gas fittings. As it was screwed in, the transition fitting or plug would become tighter and bind but not seat firmly. The ultem plug was especially troublesome because it could bind so tightly that it wouldn’t come out again. The screwdriver slots could break before enough force could be applied for removal. This is at least partially because of the rough surface finish in the older gas fittings. The smooth stainless steel finish of the transition fittings keeps them from binding. Thus we may need stainless steel plugs at least for the modules with the older gas fittings.