Seals Application Controls Hazardous Leaks at Nuclear Power Plant

By Jim Shackelford, Sales Consultant for Control and Power, Flaretite Seals

On a recent Sunday, I received an urgent telephone call from a customer, the maintenance manager of a large nuclear power-generating plant in our area. He said that after scheduled maintenance, they were in the process of bringing one of their turbine units back on line and had discovered a great many leaks with the compression tube fittings in the electric hydraulic control (EHC) hydraulic system. The EHC system regulates the speed of the steam turbine, which drives the electrical generator. He asked me to survey the situation and recommend replacement fittings to stop the leaks.

That afternoon, I met with plant maintenance personnel charged with repairing the system. This was a very serious problem. Although the leaks were small, the aggressive phosphate-ester hydraulic fluid can be dangerous, is harmful to humans, and was leaking in a critical containment area. Attempting to stop the leaks, they had re-torqued each fitting without success. Adding to the problem, their scheduled maintenance downtime was due to expire shortly. Additional days of downtime would cost the company millions in lost revenue.

To correctly identify the problem, I "suited up" in protective clothing and entered the containment area to inspect the leaking fittings. The fittings had been installed when the plant was built more than 35 years ago. Close inspection revealed that the fittings were not tube compression but 37 degree flared fittings mated with 316 stainless steel tubing. Sizes ranged from 3/8" through 2" tube diameters. Standard practice would require cutting out the old fittings and re-tubing the system. This option was rejected due to time constraints and the excessive costs involved.

Now that I knew we were dealing with flare fittings and not compression tube, I showed the customer a Flaretite seal and recommended their installation. First, their engineering department had to ensure that the seal would not comprise the system in any way.

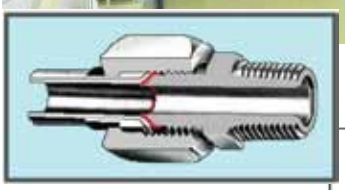
After first contacting Vito Accetta at Flaretite for a recommendation, the original equipment manufacturer was contacted, and approval from their environmental department was required. Only then could the seals be approved for installation. To match the existing metallurgy, 316 stainless steel seals were chosen. Plain seals, without coating, were selected to minimize the potential of radiation degradation of the Loctite sealant polymer. The patented sealing rings of the seal were deemed adequate to seal the leaks without the necessity of the coating, which is typically applied to the seals. The permanent "Leak-free" nature of the seal added to their appeal.

The seals were ordered and arrived the next day. We spent the next few days breaking loose all the connections and installing the seals. To further ensure that each seal was properly installed, open-ended Torqtite wrenches were utilized to torque all the various sized fittings to the exact fitting manufacturer's torque recommendation.

This was a huge undertaking because the several hundred fitting connections were 10 to 20 feet from the floor, requiring scaffolding and awkward working positions in the 100+ degree temperature and high humidity containment area. Our protective suits just added to the misery.

Finally, the system was refilled with hydraulic fluid and pressurized. To our dismay, several fittings were still leaking. Re-inspection showed that these particular fittings were missed during the torquing sequence. Simply applying the wrench to the leaking fittings and torquing to the required value stopped each leak. The seals worked perfectly. The maintenance personnel were impressed and quite pleased at this simple fix and the ease of adding a seal to their existing fittings. No fittings had to be replaced, and no tubing needed to be cut, reflared, or replaced.

Figure 1: Steam Turbine Electrical Generator



← Figure 2: Typical Flare Fitting with Seal Installed

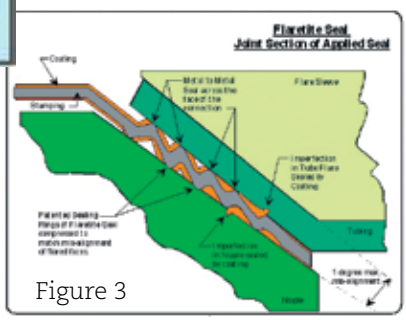


Figure 3

For more information, contact Jim Shackelford at Control & Power, Inc., 2720 7th Avenue South, Birmingham, AL 35233; or Vito Accetta at Flaretite, Inc. by phone: 810-750-4140 or e-mail: vito.accetta@flaretite.com.