

# Bellows seal valves control hazards

*Changeover from packed valves prevents leaks, fugitive emissions and reduces maintenance.*

compounds were prone to packing gland leaks and fugitive emissions. Positive containment and control of these hard-to-handle products was achieved by retrofitting the process with bellows seal valves.

Many reactions and blending operations in the Multi-Products Department are carried out under vacuum. Steam siphons are used to draw the vacuums and bellows seal valves have replaced packed valves on the process lines to eliminate recurring steam leaks.

In the Surfactant Department, a pharmaceutical grade base for a detergent requires that valves keep the base from leaking as well as

**Bellows seal valves have made possible tremendous savings in manhours and materials.**

preventing the ingress of harmful bacteria from the atmosphere. The process involves temperatures up to 400 F and pressures to 275 psi.

Packed valves formerly used in the application were adversely affected by constant cycling of the temperatures and by the pressurization and depressurization of the valves. After repeated cycling of temperatures and pressures, the material used in the chevron-type packings suffered a significant "set" or loss of elasticity, resulting in problems.

The changeover to bellows seal valves on priority 1 products continues. Cavacini explains that the plant maintains a stock of bellows seal valves in 1/2, 3/4 and 1 inch sizes and installs them in place of packed valves that fail. To date more than 100 valves have been replaced.

**Safety and savings**

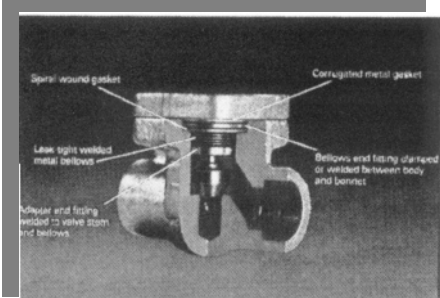
Cavacini reports that not only have bellows seals been a major reason for the plant's excellent record for clean, safe operation, but they have also made possible tremendous savings in manhours and materials.

The plant has eliminated the constant checking of packed pumps, as well as tightening of glands and replacement of packings and stuffing boxes. Service life of valves has been dramatically extended. Most of the valves installed in the changeover 6 years ago are still in service, whereas the packed valves required replacement on an average of every 1-1/2 years.

Says Cavacini: "It's an investment in quality and reliability that's paid off many times over in trouble-free performance."

*Bellows seal valves are a product of*

**EAGLE AMERICA, INC.**



**Figure 1. The design of the bellows seal valves makes them inherently leak-tight.**

- The Rohm & Haas plant in northeast Philadelphia maintains stringent measures for the protection of its personnel and the environment throughout its operations. All chemicals of a carcinogenic nature and those hazardous to humans or the environment are classified as "priority I" products and extreme care is taken to keep them contained at all times.

The company manufactures a variety of chemicals, which are sold to an industry-wide market. Some 100 different products include agrichemicals, oil additives, ion-exchange resins and ingredients for floor waxes.

**Plant-wide upgrading**

About 6 years ago the company initiated a program to upgrade all valves used on priority 1 products throughout the plant's 5 departments. The action was triggered by recurring problems with conventional packed valves in use. A potentially dangerous situation had been created by leaking packing glands on chlorine valves used in a processing operation.

The distributor for a valve company that regularly serviced the plant was consulted and recommended Class 300 pound ANSI carbon steel bellows seal valves. He pointed out that a metal bellows, which acts as the primary stem seal (Fig. 1) makes the valves inherently leak- by blocking the passage of fluids in or out.

Rohm & Haas Piping Supervisor, John Cavacini, agreed to make the changeover to the bellows seal valves on the chlorine application. The leakage of chlorine was eliminated and when several other changeovers to bellows seal valves were equally successful, Cavacini began a systematic replacement of packed valves on priority 1 products with bellows seal valves.

The next problem area was the powerhouse, which supplies steam to the entire plant and where packing failures had been rampant. The Mechanical Department was forced to constantly "doctor" packed valves because any appreciable leak required unscheduled shutdown of a boiler unit, resulting in loss of power to the plant.

The 1-inch valves used on the gauge lines for water/steam drum level on the 3 boiler units were especially critical. Leaks in these lines not only could cause incorrect readings in water level, but could also activate the high limit control, triggering a false "trip" and system shutdown. A switch was made to bellows seal valves during scheduled shutdown. periods and all leakage problems were eliminated.

Equally serious and dangerous was the situation created when an oil heating unit was installed. Packed valves used in the ultra- unit were virtually inaccessible for periodic tightening of glands. When packed valves on the steam lines of the unit used to preheat fuel oil began to leak, endangering operators, Cavacini once again made the switch to bellows seal valves.

**Flammable fumes contained**

Various departments in the plant are relegated respectively to the manufacture of biocides, surfactants, ion-exchange resins and ortho- (used in treating leather). A fifth department processes multi-products and in this area, di-methyl and tri-methyl amines were causing great concern several years ago.

Packed valves used to transfer and feed these volatile, odorous and extremely flammable