

valve. This 8" Inconel disc, with Monel retaining rings spot welded at the disc periphery to eliminate torquing problems, was positioned below a removable stainless steel knife blade unit. As the disc buckled upon overpressure it was pierced by the knife blades to allow pressure relief. The disc held in place by nickel-plated flanges and the knife blade assembly were designed as a unit. Set pressure of the disc was 63 psig at 350°F, that is, the system pressure was 84% of the disc rating.

Another interesting application arose in a heat exchanger where light gasoline hydrocarbon at 1000 psig on the tube side is thermally contacted with steam at 200 psig on the shell side. Obviously, a tube failure could admit the 1000 psig pressure into the condensate system with possibly damaging results.

The shell is protected by two reverse buckling discs in series, the pair discharging directly into the flare system and capable of being isolated by two shut-off valves. The first disc was exposed directly to the steam pressure. If this disc should fail by fatigue or other than emergency reasons, the pressure would be contained by the second disc with no unnecessary loss or disturbance. Both discs were designed for approximately 200 psig. An emergency

failure immediately would blow both discs, thus protecting the low pressure system.

The cavity between the discs was put to use, and was monitored by a maximum reading, two pointer, pressure gauge which showed existing pressure at any time as well as most recent high reading since manual reset. A positive gauge reading would indicate leakage, requiring replacement of the disc.

Measures similar to the above examples have been extended throughout this large plant and the program is continuing.

Results

The discs, where used with safety valves, have provided a 100% seal against the corrosive effects of the process gases and vapors. The relief valves now remain clean and free from residue. Repair costs are substantially reduced. From the environmental standpoint, the escape of hydrocarbons to the air or flare system has been stopped.

A considerable labor savings has been effected in valve maintenance costs.

On the primary crude column described, after nine months of continuous service, the disc still is intact. The 100% protection of the relief valve led to

the decision to install similar reverse-acting knife blade types under the other valves.

In the case of the heat exchanger, all relief valves with attendant maintenance, and repair costs have been avoided. The in-series method of disc installation protects the equipment from incursion of high pressure and the maximum reading gauge provides a more constant self-checking security measure.

Shell feels that this ongoing program of the planned use of rupture discs used both alone and in conjunction with relief valves is substantially reducing maintenance costs. Shell intends to continue in this direction. Stocks are maintained and the plant engineering force has developed its own criteria for application.

The ZAP reverse buckling knife blade type disc described in this story is a product of The Continental Disc Corporation, 4103 Riverside N.W., Kansas City, MO 64150.

Circle 125 opposite last page.

The S-90 reverse buckling disc also used at Shell is a product of BS&B Safety Systems Inc., 7465 E. 46th St., Tulsa, OK 74145.

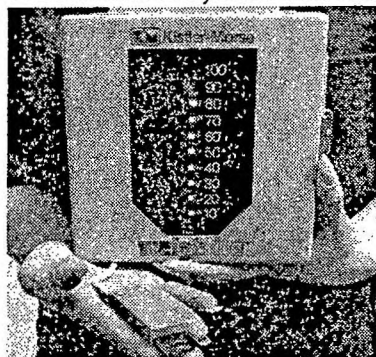
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