

Interoffice Communication

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Subject SAFETY RELIEF SYSTEMS

An experimental test program was initiated this past month in Tulsa with participation from BS&B, Consolidated Valve, and Conoco. The purpose of the test program was to better understand the response of a rupture disc/relief valve arrangement to premature failure of the primary disc. The major findings (preliminary) were:

1. In all cases, regardless of piping configuration, the relief valve opened when the primary disc was burst at 70, 80, or 90 percent of the valve rating.
2. It appears that the valve opening is reduced the shorter the distance between the disc and the valve.
3. An elbow/tee arrangement between the disc and the valve may reduce the degree of valve opening.

Discussion

Air testing was performed using a 120-gallon vessel with 3" rupture discs mounted beneath a 3" x 5" safety relief valve. Rupture discs which were manufactured to burst at 90, 80, and 70 percent of the valve set pressure were used to simulate premature disc failure.

Initially, the safety relief valve was mounted vertically, in line, over the rupture disc. To determine the effect of rupture disc relief valve spacing in controlling premature gas emissions, rupture discs were burst at a 0, 6, or 9-pipe diameter (p.d.) distance between the disc and relief valve. In all of these tests, the relief valve opened to differing degrees and discharged air when the rupture disc burst. The relief valve opened regardless of the pressure that the rupture disc burst at. Shock waves which are generated when the disc bursts are thought to cause the premature opening of the relief valve. The testing indicated that the 9 p.d. spacing was the least effective in containing premature disc failure and that the relief valve should be mounted as close as possible to the disc.

A tee/elbow configuration (equivalent to 6 p.d.) between the rupture disc and relief valve was later tested. (See Figure 1.) Here again,