

MINING INDUSTRY



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Typical Rupture Disc Application for Slurry Pipeline System

IN the mining of copper, there is an interesting application for rupture discs. This application is typical for mines located at elevations of 1500 meters or higher, and transport concentrate, tailings, or mineral diluted in water through a high pressure pipeline, and where measures have been put in place to reduce and control the corrosion occurring due to heavy internal scaling of the customers' high pressure pipeline. This corrosion occurs due to the calcium carbonate used in the process to keep the pH level during the transfer of copper concentrate in a slurry form, as it makes its way down the mountain. Prior to making some design modifications, the customer found that heavy internal scaling did indeed occur and was evident in the increase of wall thickness (less area inside the pipe) throughout the 167 kilometers of 9-5/8 inch (outside diameter ERW steel) pipeline. The pipeline was designed to operate at a pressure as high as 3700 psig.

The Solution:

Three valve stations were used to section off the pipeline, thus limiting the static head to an acceptable pressure. Each pipeline station block valve must be opened in sequence, from the lowest point to the highest, and shut down in sequence, beginning with the highest point. This allows telescoping the pipeline wall thickness, thus saving a significant cost in steel pipe. Rupture Discs with set points up to 4000 psig were installed to protect each pipeline section, should the lower end of the pipeline become plugged or accidentally shut down with full static head in two sections or more. The rupture discs were designed to release the pressure and protect the pipeline section. Rupture Discs were used instead of relief valves due to the severe service of the copper concentrate slurry. In addition, each rupture disc includes our BDI Alarm

System which is designed specifically for use with our rupture discs. It signals the operator when a rupture disc has burst to relieve an over pressure condition. This is extremely important based on the valve station being very remote. Two companies successfully utilizing rupture discs in the mining of copper concentrate are: Anglo American Chile Division los Bronces and Cia. Minera Doña Ines de Collahuasi. In addition, in each valve station there were three block valves, an isolation valve, a seal valve, and a wear valve. On the upstream side at each valve station, a rupture disc was installed ahead of each isolating valve to protect and prevent the pipeline section from the combined static head of two or more sections.

The remedy of using rupture discs solved the long down-time with the copper slurry in the pipeline which in the past had set up galvanic action with the copper sitting in the bottom of the steel pipe. Each unscheduled maintenance shut-down and start-up could cause excessive wear in the bottom of the pipe and higher wear in the slack flow areas. Additionally, bacteria found in the slurry were both aerobic and anaerobic: treatment costs were expensive and could cause environmental problems. The major concern was the plant water discharge needed to be environmentally friendly. Also, the selected system using rupture discs provided an operating cost savings and the outfall water could be used for other purposes.





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Pressure Equipment Directive
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