

## **MULTI AERATOR (PACHUKA VALVE)**

### **1. Introduction**

During cyanide leaching in the gold production process, large tanks are used, so-called Pachucas. In these Pachucas, the slurry is aerated by means of compressed air injected into the cylindrical tanks from the bottom. This is done firstly to keep the slurry particles in suspension and secondly to provide oxygen, both vital components of the leaching reaction. Currently compressed air is injected through a central pipe using a standard shut-off valve.

In the case of a total disruption of the air supply (e.g. power failure), it is impossible to remove the resulting blockage in the air supply lines by means of the supplied air pressure only, even after short periods of air disruptions. In such cases, the tank has to be emptied of its 400-600 ton contents to allow access to the valve to enable manual cleaning of the blockage by means of high-pressure water jet. This is a costly, time consuming inconvenience that also results in losses in recovery of expensive reagents and gold concentrate.

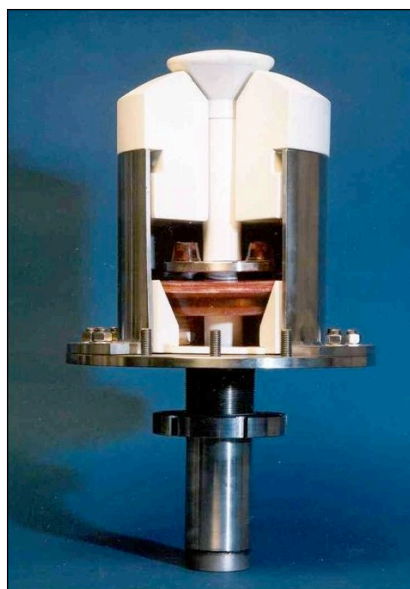
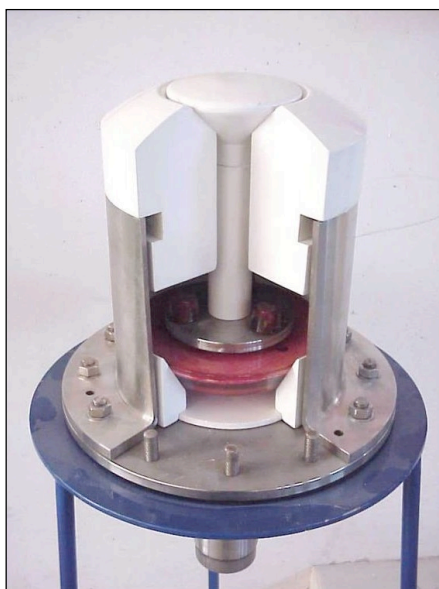


Figure 1 : Multi Aerator Valve



In an effort to solve the above problem, the **Multi Aerator Valve** was developed.

## 2. Features

After intensive research and development, the following features were incorporated into the new design:

- The **Multi Aerator Valve** closes automatically if the air pressure falls below 1 bar. When the air pressure is increased again over this threshold value, the valve opens automatically and aeration is continued. Due to the layout of the valve, no slurry particles are able to enter the airline and blockages are therefore avoided.
- The valve prevents built-up of solids in the Pachucas, ensuring maximum residence time
- No practical pressure limits apply to the valve. With the high pressure of the slurry pressing down on it and 5 - 12 bar air pressure acting on the air inlet side, even after a long settling period, the valve opens without hesitation and agitates the slurry within 2 minutes to full suspension.
- The critical parts are made of high-density alumina ceramics to minimise wear and corrosion in the aggressive environment of forced air and chemical reagents

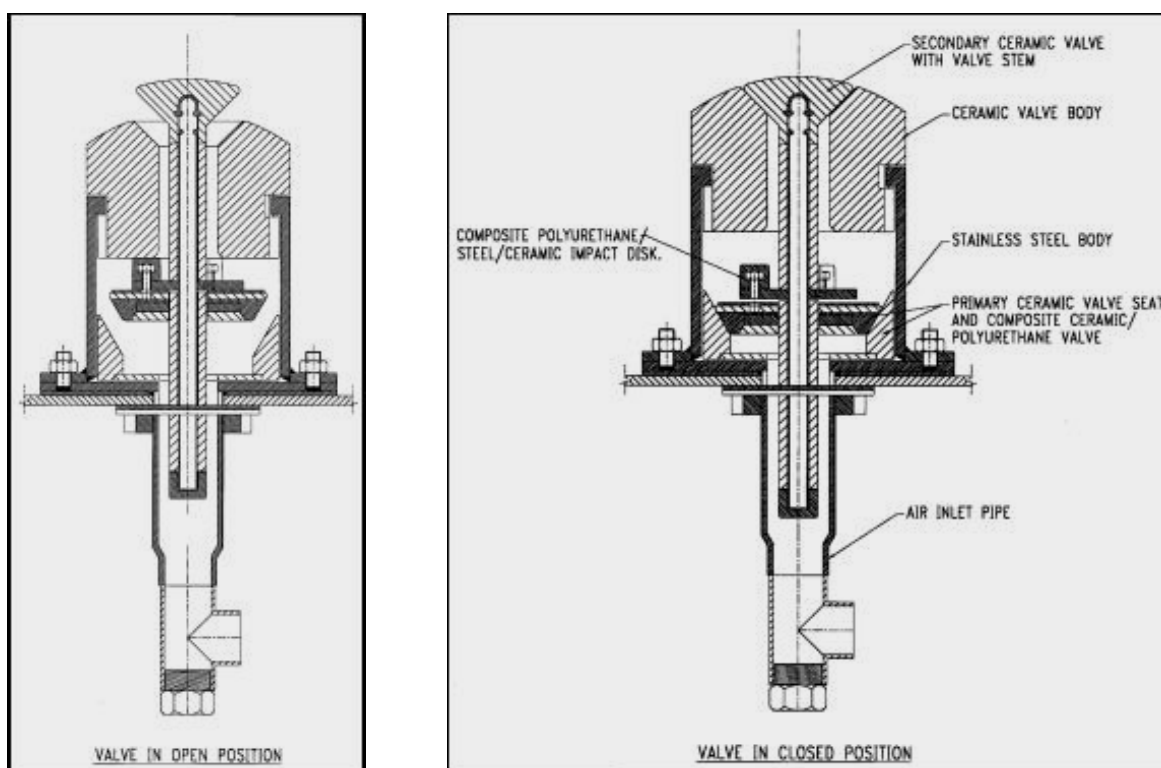


Figure 2 : Open/closing principle of valve

The **Multi Aerator Valve** was tested at a gold plant in the leaching Pachuca of the leaching process. Numerous tests were done where the air supply was interrupted for 30 minutes, 1 hour, 6 hours and even 8 hours. In this time the slurry was not agitated but was allowed to settle. When the air supply was restarted, the valve opened and within two minutes brought the slurry into full suspension again.

The above tests, carried out over a period of three months, have shown that the design of the **Multi Aerator Valve** is superior to other valves developed to date for these applications. Today, the valves are operating successfully for the past 18 months.

Furthermore, the design of the valve results in a dynamic, centrifugal movement of the rising air bubbles, promoting better dispersion and disengagement of the slurry throughout the tank and thus improving the efficiency for the leaching process.

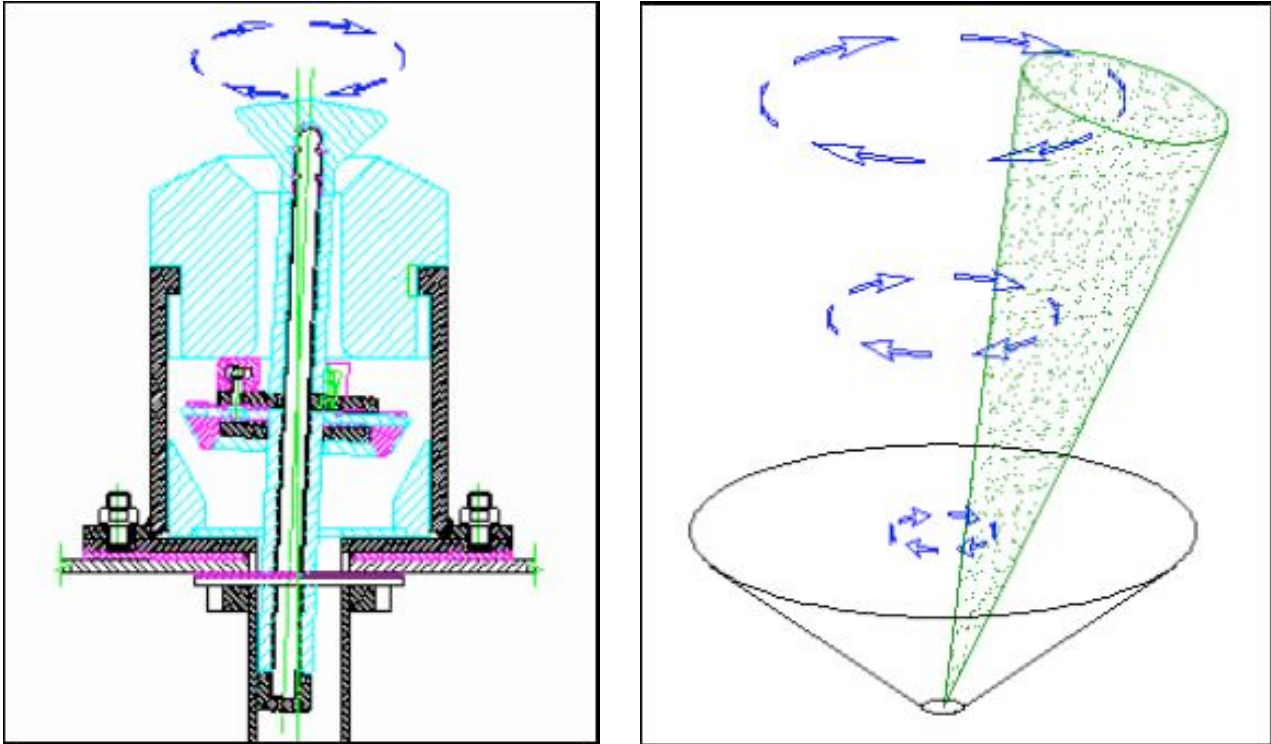


Figure 3 : Flow pattern of dispersed air

For mechanically agitated tanks, the **Multi Aerator Valve** can also be used to start tank agitation, eliminating damages to the mechanical mixers installed. Should the mechanical mixers also not be sufficient, the **Multi Aerator Valve** can be used concurrently with the mixers to ensure efficient agitation of the tanks.

Air consumption is substantially lower with this valve than with previously used system, which results in large savings of air, as well as meeting the mine's objective of reducing operating, maintenance, labour costs and downtime in the long run. The unit could have a wide range of applications in other areas that require gas/liquid interaction, such as water treatment.

Table 1 : Operating conditions

Working pressure	1 to 15 bar
Normal closing pressure	< 100 kPa Differential Pressure
Normal opening pressure	> 100 kPa Differential Pressure



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