



Valve Applications in the Mining Industry

Engineered for life

Valve Applications in the Mining Industry

Crushing and Grinding

– Mills

After ore is extracted from the ground the next operation in comminution crushes and grinds the ore to reduce the particle size while liberating the valuable product from the waste before physical or chemical separation processes occurs.

The crushing and grinding can take place in one of the following mills: high speed grinding mills, autogenous and semiautogenous (SAG) mills, cone crushers and ball mills.

Each mill and their associated pumps require isolation valves that are able to withstand the high demands of slurry handling.

This is where valves experience some of the highest physical demands in mining operations due of large particle size or high solids content.

Choose: **33 PTA**
CF33 (if settling occurs due to low slurry velocity)



- Slurry Feed Lines
- Mill and Pump Isolation
- Drains

Valve Applications in the Mining Industry

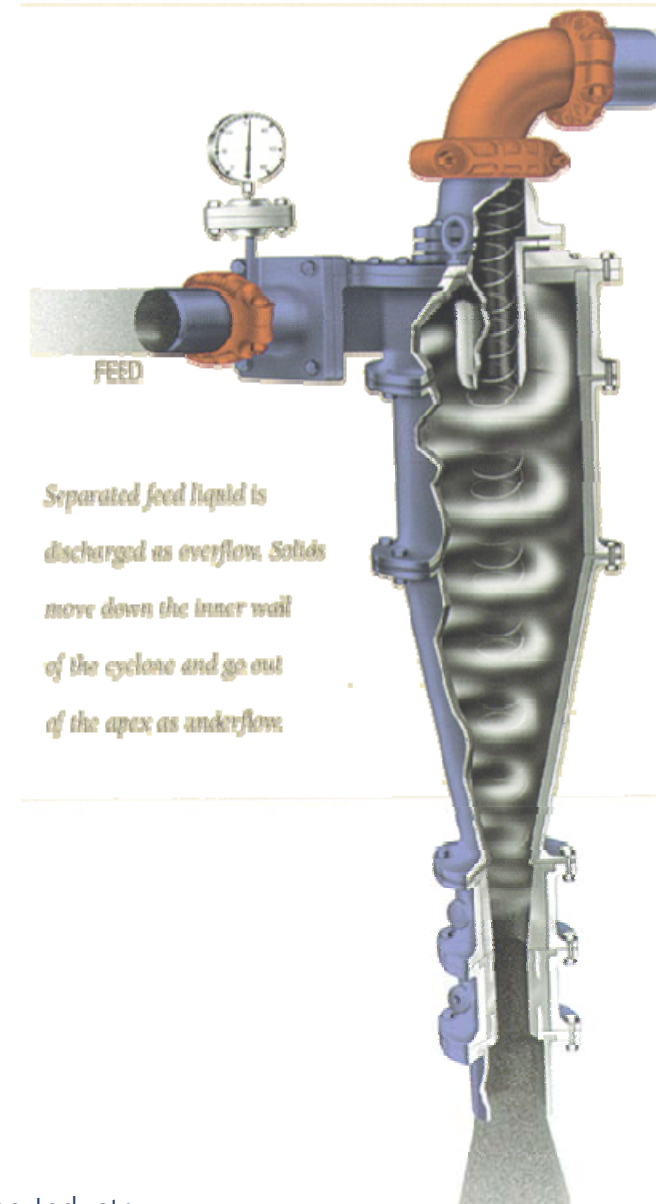
Size Separation

– Cyclone Separators

After being crushed and ground in the mills, the slurry is sent to the cyclones. The product enters the cyclone from the side and is spun around in the internal chamber of the cyclone. Cyclones rely on centrifugal and drag forces to separate the larger particles, which drop out of the bottom (called underflow) of the cyclone and are sent back to the mill for regrinding. The small, properly size particles are discharged out the top (called overflow) of the cyclone for further separation processes.

Isolation valves are required for all cyclones.

Choose: **33PTD**
ULV
C33 Bi-directional slide gate valve.



Valve Applications in the Mining Industry

Conditioners, Roughers and Cleaners

– Physical Separation

The purpose of a flotation cell, rougher or cleaner is to separate the valuable constituents from the waste constituents of the product. During this step, the slurry enters large tanks, and bubbles are introduced from the bottom. As the bubbles rise, the valuable constituents attach to the bubbles and are brought to the surface for collection and further processing. The waste is reprocessed until all of the valuable constituents from the slurry is extracted. This process is enhanced with the addition of specific chemicals or reagents known as collectors, frothers, extenders, activators, depressants, deactivators, flocculants, and dispersants.

Choose: **33PTD** for feed lines and isolation
Dia-Flo for reagent addition



- Isolation
- Reagent Addition

Valve Applications in the Mining Industry

Thickening

– Physical Separation

Following flotation, thickeners and clarifiers are used to increase the solids concentration of the product. Both rely on gravity to settle solids from liquid media. Thickeners differ by increasing the solid content of the product where clarifiers remove solids from a dilute stream of product. The use of hydroclones (similar to cyclones) is also employed to increase the solid content of the product.



Choose: 33PTD

Rubber lined straightway diaphragm valves: Used on inlet, overflow outlet, flocculant injection, or sludge piping depending on solid content, and other chemical feed piping or underflow.

- Tank Isolation
- Pump Isolation
- Overflow
- Underflow

Valve Applications in the Mining Industry

Storage and Stock Tanks

Facility stock tanks are present through out the processing facility to store processed material for further processing or to hold necessary chemicals or reagents use at a later time.

Each tank and its associated pumps will typically require some method of isolation from the system.

The solid content, chemical make-up, desired flow rate, temperature, and pressure will all be factors in selecting the correct valve for isolation and drain purposes.

Choose: **Fabri-Valve** or **Dia-Flo**: based on service conditions and line size



- Tank Isolation
- Drains
- Pump isolation

Valve Applications in the Mining Industry

Filtration

Vacuum, drum, disc, and press filters are used to recover the valuable solids from liquids of suspension. The concentrated cake or solids are collected for further refining or drying when necessary.

Choose: **33 PTD**
Dia-Flo



- Feed Lines
- Pump Isolation

Valve Applications in the Mining Industry

Tailings

Tailings are the materials left over after separating the valuable minerals from the unusable portion of an ore. Tailings are distinct from overburden or waste rock, which are the materials overlying an ore or mineral body that are displaced during mining without being processed.

Mine tailings are usually produced from the mill in slurry form (a mixture of fine mineral particles and water).

Choose: **33 PTD**



- Pump Isolation
- Splitting Systems

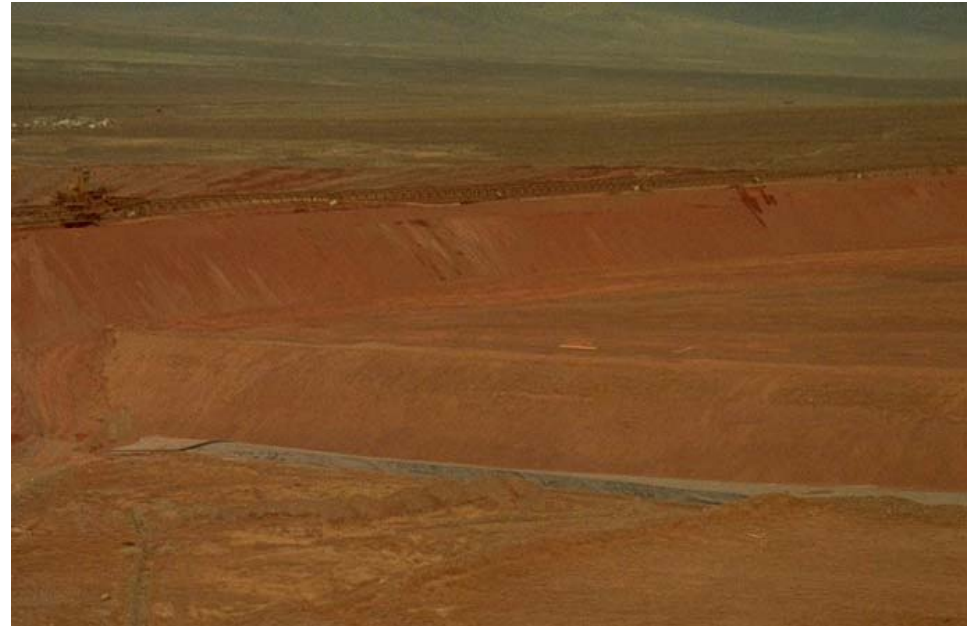
Valve Applications in the Mining Industry

Heap Leaching

Low grade oxide ores or tailings from the concentration process sometimes require the use of heap leach mining to extract the minerals.

Crushed ore or fines from tailings are piled on top of a layer of gravel, drain pipes, and a liner of HDPE. These heaps are sprayed with dilute acid which dissolves the desired mineral. The solution (called pregnant leach solution) is collected through the drain pipes and sent to be treated at the Solvent Extraction Electrowinning (SX/EW) Plant.

Choose: **C67 or ULV:** pregnant leach acid.
Dia-Flo or Cam-Tite: for dilute acid.



Valve Applications in the Mining Industry

Extraction and Stripping

Pregnant leach solution is sent to the extraction plant where it is mixed with an organic solvent. The solvent bonds to the minerals in the pregnant leach solution where it physically separates from the now free leach solution (called raffinate). The raffinate is sent back to the leach pile for use again. The mineral rich organic (or loaded organic) chemical is transported to another section of the plant to be stripped.

Acid is added at the stripping cell to remove the minerals from the loaded organic. The now barren organic is sent back to the extractor and the mineral rich solution is sent to the electrowinning tankhouse.



Choose: **33PTD, C67 or ULV**
Dia-Flo or Cam-Tite: for acid

Valve Applications in the Mining Industry

Electrowinning

As the mineral rich solution arrives at the electrowinning tankhouse, two electrodes (cathode and anode) are placed in the solution. An electric current is passed between them, the metal can be deposited on the negative electrode.

There are hundreds to thousands of cathodes pairs and anodes in the EW tankhouse. It takes several days or weeks of metal deposition to produce a cathode weighing a few hundred pounds at which point they are harvested for purifying, melting or shaping and shipping.

Choose: **Dia-Flo** or **Cam-Line** or **Cam-Tite**

