



## Durable Valve Solutions for Mining Industry and Hydrometallurgy

Valve, measurement and control systems for abrasive media and aggressive slurries in mining operations.

Valves play a central role in all areas of mining, from the regulation of fluid flows to gas management. Selecting the right valve type and materials is critical to optimizing efficiency and productivity in the mining industry. Our comprehensive range of valves, including butterfly valves, ball valves, globe valves and diaphragm valves are designed to withstand the tough demands of the mining industry - from abrasive slurries to corrosive chemicals.

GEMÜ, a world-leading manufacturer of valves, provides customized solutions and on-site technical support to ensure trouble-free and effective mining operations.

# Milling and Grinding




Ores must be crushed and milled homogeneously before separation and metallurgical processing is possible. The crushers and ball mills used must be supplied with water e.g. for cooling, to prevent dust, and for wet grinding. Powders and slurries must be discharged.

At this stage valves see the most challenging physical demands in a mining site. Abrasive slurries with a high solid content can cause severe damage to valves. Additional, particle settling due to low flow velocity in combination with large particle size can lead to blocking of a valve.

GEMÜ butterfly valves and full bore diaphragm valves with abrasion proof lining and coating material can help in this cases and are well suited for handling of slurries, water and other fluids in mining operations.



## Suitable GEMÜ Solutions

	GEMÜ 491 Edessa	GEMÜ 655	GEMÜ 656
			
Description	Pneumatic butterfly valve	Manual full bore diaphragm valve	Pneumatic full bore diaphragm valve
Media temperature	-20 to 200 °C	0 to 100 °C	0 to 100 °C
Operating pressure	0 to 10 bar	0 to 10 bar	0 to 7 bar
Nominal sizes	DN 25 to 600	DN 25 to 300	DN 25 to 250
Body materials	1.4404 I EN-GJS-400-18-LT I S355J2 + N I VE Duroplast, reinforced	EN-GJL-250 I EN-GJS-400-18-LT I EN-GJS-500-7	EN-GJL-250 I EN-GJS-400-18-LT I EN-GJS-500-7
Liner materials / Body lining	PTFE/silicone I PTFE TFM™/EPDM I PTFE TFM™/FKM I PTFE TFM™/silicone I PTFE/EPDM I PTFE/FKM	Butyl I Hard rubber I Soft rubber	Butyl I Hard rubber I Soft rubber
Disc materials / Diaphragm materials	1.4404 (316L) I 1.4469 2.4602 (alloy 22) I 3.7035	CR I EPDM I IIR I NBR I NR	CR I EPDM I IIR I NBR I NR
Application example	Handling chemically aggressive and corrosive media	Slurry handling	Slurry handling





# Separation Steps – Cyclones, Clarifier, Thickeners and Flotation Process

Separation technologies like clarifiers, thickeners, flotation columns or even filter presses are mandatory process steps to separate the desired minerals from „unwanted“ deposits in mining. While Clarifiers and Thickeners rely on gravity to separated suspended solids from dissolved minerals, the flotation process use the different surface chemistry of particles in connection with air bubbles during the process. Filter presses separate water from minerals mechanically.

In all cases slurries have to be handled together with their respective challenges. Abrasion proof rubber lined butterfly valves and full bore diaphragm valves can be the matter of choice in handling of abrasive slurries. In every separation process chemicals are necessary for a succesful operation. May it be flotation reagents , flocculants, precipitating agents etc. Chemical resistance of valve materials are the main challenges for a good valve choice. Diaphragm valves out of resistant materials can be used for dosing chemicals to every separation process.



## Suitable GEMÜ Solutions

	GEMÜ R481 Victoria	GEMÜ 532	GEMÜ R677	GEMÜ R690
				
Description	Pneumatic butterfly valve	Control valve with electro-pneumatic positioner GEMÜ 1435 ePos	Manual diaphragm valve	Pneumatic diaphragm valve
Media temperature	-60 to 210 °C	0 to 180 °C	-10 to 80 °C	-10 to 80 °C
Operating pressure	0 to 16 bar	0 to 40 bar	0 to 10 bar	0 to 10 bar
Nominal sizes	DN 25 to 600	DN 15 to 100	DN 15 to 100	DN 15 to 100
Body materials	1.4408 (CF8M)   EN-AC-46100   EN-AC-47100   EN-GJS-400-15, coated   EN-GJS-400-18-LT, coated   S275JR, coated	1.4408   EN-GJS-400-18-LT	ABS   Inliner PP-H, grey / outliner PP, reinforced   Inliner PVDF/outliner PP, reinforced   PP, reinforced   PVC-U, grey   PVDF	ABS   Inliner PP-H, grey / outliner PP, reinforced   Inliner PVDF/outliner PP, reinforced   PP, reinforced   PVC-U, grey   PVDF
Liner materials / Body lining	CR   CSM (Hypalon®)   ECO   EPDM   NBR   SBR, abrasion resistant   Silicone	1.4404   PTFE   PTFE, reinforced		
Disc materials / Sealing materials / Diaphragm materials	1.4408   1.4408, coated   1.4469   1.4539   2.0975   2.4602 (alloy 22)   EN-GJS-400-15, coated	1.4404   PTFE   PTFE, reinforced	EPDM   FKM   NBR   PTFE/EPDM	EPDM   FKM   NBR   PTFE/EPDM
Application example	Water treatment and handling of low-concentrated chemicals	Dosing of water and air	Water treatment and handling chemically aggressive media	Water treatment and handling chemically aggressive media

# Mineral Processing – Leaching, Tailings, Chemical Processes

To extract the target metals, the ore has to be treated in several steps, often with the help of strong chemicals like e.g. sulphuric acid, hydroxides, cyanides. For this, the minerals are leached in various possibilities (heap- or tank-leaching). The residues of the processes that contain unusable substances are collected in tailings. These are usually in slurry form and are stored in huge basins where solid material can settle down. In many mines, chemical processes play an important role. They must be controlled safely and efficiently in order to obtain high-quality metals and products





Main challenges in handling slurries and chemicals in a mining facility are abrasion and corrosion due to chemical attack on the materials. Valve made out of suitable, or better chemical resistant materials are mandatory to overcome such issues.

GEMÜ Valves are made out of chemical resistant materials or are equipped with resistant lining material to overcome the issues of corrosion or abrasion.

Rubber lined full bore diaphragm valves can be used for the handling of abrasive slurries, PFA lined diaphragm valves can be used for the handling of aggressive chemicals.



## Suitable GEMÜ Solutions

	GEMÜ 491 Edessa	GEMÜ 620	GEMÜ 675	GEMÜ 695
				
Description	Pneumatic butterfly valve	Pneumatic diaphragm valve	Manual diaphragm valve	Pneumatic diaphragm valve
Media temperature	-20 to 200 °C	0 to 100 °C	0 to 100 °C	-10 to 80 °C
Operating pressure	0 to 10 bar	0 to 10 bar	0 to 10 bar	0 to 10 bar
Nominal sizes	DN 25 to 600	DN 15 to 150	DN 15 to 150	DN 15 to 100
Body materials	1.4404   EN-GJS-400-18-LT   S355J2 + N   VE Duroplast, reinforced	EN-GJL-250   EN-GJS-400-18-LT, lined   EN-GJS-500-7, lined	EN-GJL-250   EN-GJS-400-18-LT, lined   EN-GJS-500-7, lined	1.4408   1.4435 (316L)   1.4435 (BN2)   1.4435   1.4539 (904L)   EN-GJS-400-18-LT   EN-GJS-400-18-LT
Liner materials / Body lining	PTFE/silicone   PTFE TFM™/EPDM   PTFE TFM™/FKM   PTFE TFM™/silicone   PTFE/EPDM   PTFE/FKM	Hard rubber   PFA   PP	Hard rubber   PFA   PP	Hard rubber   PFA   PP
Disc materials / Diaphragm materials	1.4404 (316L)   1.4469 2.4602 (alloy 22)   3.7035	CR   EPDM   FKM   NBR   PTFE/EPDM   PTFE/FKM   PTFE/PVDF/EPDM	CR   EPDM   FKM   NBR   PTFE/EPDM   PTFE/FKM   PTFE/PVDF/EPDM	EPDM   FKM   NBR   PTFE/EPDM   PTFE/FKM
Application example	Handling chemically aggressive media in corrosive and non corrosive atmosphere			





# Process Water

Mining facilities are big users of water. Some applications use water to transport solids in a fine solution or slurry to various processes in a plant. Other applications consume water as part of the process. Additionally wastewater treatment is necessary for a large part of the water used.

GEMÜ has years of experience in handling of water in various application. From filtration processes up to reverse osmosis, manufacturers and supplier of these processes rely on GEMÜ valves for years. Diaphragm valves, globe valves, butterfly and ball valves are well suited for handling of water in nearly every system.



## Suitable GEMÜ Solutions

	GEMÜ R487 Victoria	GEMÜ 415	GEMÜ B42	GEMÜ 671
				
Description	Manual butterfly valve	Pneumatic butterfly valve	Pneumatic ball valve	Manual diaphragm valve
Media temperature	-10 to 160 °C	-20 to 120 °C	0 to 100 °C	-10 to 80 °C
Operating pressure	0 to 16 bar	0 to 10 bar	0 to 10 bar	0 to 10 bar
Nominal sizes	DN 25 to 600	DN 15 to 50	DN 15 to 100	DN 15 to 100
Body materials	EN-GJS-400-15 I EN-GJS-400-18-LT, epoxy coated	1.4408	1.4408	1.4408 I 1.4408, PFA lined I 1.4435 (316L) I 1.4435 (BN2) I 1.4435 I 1.4539 (904L) I CW617N I EN-GJS-400- 18-LT I EN-GJS-400-18-LT, PFA lined I EN-GJS-400-18-LT, PP lined
Liner materials / Body lining	EPDM I FKM I NBR I SBR, abra- sion resistant I Silicone	EPDM I FKM I Silicone	-	PFA I PP
Disc materials / Diaphragm materials	Epoxy I Halar® I Rilsan®	1.4408	PTFE	EPDM I FKM I PTFE/EPDM I PTFE/PVDF/EPDM
Application example	Process water and waste water	Process water and compressed air	Process water and compressed air	Handling water treatment chemicals

# Selection guide

The following table aims to give you an overview of which valve function is most appropriate for which processes and media. In addition to these categories, we also offer valves for special applications.

## Valve groups according to valve function

Criteria	Diaphragm valves		Globe valves	Butterfly valves	
	Metal	Plastic	Metal	Metal	Plastic
<b>MEDIUM</b>					
Gaseous	○	○	●	●	–
Steam	○	–	●	●	–
Liquid	●	●	●	●	●
Viscous	●	●	○	●	●
Particulate, abrasive	●	○	–	●	○
Granular	○	○	–	○	○
Corrosive (depends on material)	●	●	–	●	●
<b>PROCESS</b>					
Multi-port design available	●	●	●	–	–
Piggable	–	–	–	–	–
Controllable	○	○	●	For larger diameters	
Media temperature	up to 100 °C	up to 150 °C	up to 210 °C*	up to 230 °C	up to 90 °C
Operating pressure	up to 10 bar	up to 10 bar	up to 40 bar	up to 40 bar	up to 10 bar
Frequent cycle duties	○	○	●	–	–

\* Higher temperatures on request

- Very suitable
- Conditionally suitable
- Not suitable

## Further process accessories



Check valves



Flow meters and accessories

Ball valves		Diaphragm globe valves	Process solenoid valves	
Metal	Plastic	Plastic	Metal	Plastic
●	●	○	–	–
●	●	○	–	–
●	●	●	●	●
○	○	●	○	○
–	–	–	–	–
–	–	–	–	–
–	●	●	–	○
●	●	●	●	–
●	●	–	–	–
○	–	●	–	–
up to 220 °C	up to 100 °C	up to 150 °C	up to 60 °C	up to 60 °C
up to 137 bar	up to 16 bar	up to 6 bar	up to 20 bar	up to 6 bar
–	–	●	●	●



Positioners and process controllers



Pressure and temperature sensors

