



ITT

Engineered for life

Mining & Mineral Processing

Mining and Slurry Valve Solutions
from ITT



Engineered Valves



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>> ITT'S MINING / SLURRY CAPABILITIES



ITT is a global leader in fluid handling with 65 years of design, manufacture and fabrication of engineered valves with specific expertise in slurry applications.

Mining customers depend on ITT Engineered Valves for consistent reliable delivery, cost effective solutions, and after sale support.

We approach each customer's requirements with the certainty that we have the right product to fit their most challenging valve application.

- Better valve performance in mining and processing of metals and minerals
- Less unscheduled maintenance downtime
- Improved plant performance and pipeline reliability
- Safety for operators

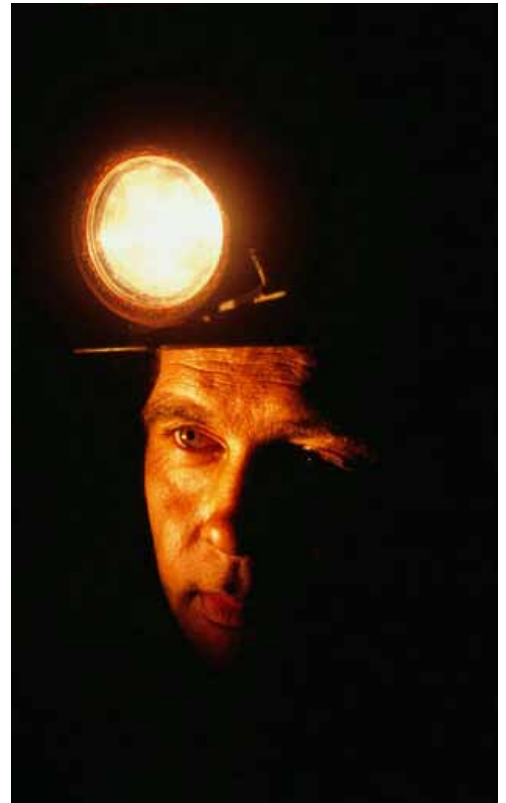


>> ITT OFFERS YOU CHOICES.

A wide variety of engineered valve products that are designed to solve your most challenging applications. Mines and mineral processing plants around the world use our process-proven Fabri® abrasion - resistant knife gate and slurry valves, Dia-Flo® full ported lined diaphragm valves, and Cam-Line® and Cam-Tite® ball valves to handle critical and corrosive chemical applications.

>> ITT OFFERS YOU PEACE OF MIND.

The number one concern in mining is safety. The industry demands solutions that will improve the mining environment as well as the bottom line. ITT works with our customers as a consultant to insure the best solution to their valve applications, with a constant eye on keeping with our core values of safety.



>> ITT OFFERS YOU SOLUTIONS.

Abrasive and often corrosive, mining slurries quickly attack unprotected or misapplied valves, pumps and other equipment in mining process line. This creates the need for frequent repairs that lead to unsafe conditions and system downtime. In order to safely minimize abrasion, corrosion and system downtime, ITT valves are designed and engineered with specific mining applications in mind.

Our balanced product portfolio contains valves such as the 133 series valve which is one of the safest, most durable slurry valves on the market.; the 33 PTA, 33 PTD, and C/F 33 valves are designed for heavy to light slurry service; the patented, perimeter seated, bi-directional C67 series valve is engineered for mining applications that require tight sealing capabilities; and the XS-150ULV is well suited for applications that require corrosion and abrasion resistance.

To meet the requirements of each application, ITT has the ability to manufacture standard and customized, lined and unlined valves in a wide variety of materials.



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>> MILLING

There are many types of process machinery to reduce the size of the ore and allow it to pass through to the next stages. These are found in both the primary and secondary milling stages. Some are high pressure grinding mills, autogenous and semiautogenous (SAG) mills, cone crushers and ball mills.

This is where valves see the most physical demands in mining operations. To handle these types of operations, ITT relies on our rugged **33 PTD valves** to provide extended valve life for our customers. Our **33 PTA** with its wide seats is well suited for slurries with high percent of solids and large particle sizes.



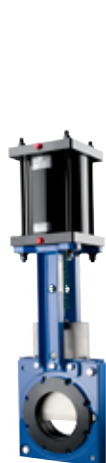
Challenges:

A typical challenge encountered in the mining process is particle settling. This is due to a slow slurry velocity combined with a large particle size (12-18mm). The valve may not be able to close because of solids settling at the bottom of the valve. This issue is further complicated because most mining operations find that their pumps need to be changed every 1800 hours on average. If you can't close the valve you can't isolate the pump.

If this is the case we would suggest using the **C/F 33 style valve**. The **C/F 33 valves** are ported slide gate valves specially designed for the gate to move a disc of slurry material out of the flow path and allow the gate to completely close the valve.



33 PTA



33 PTD



C/F 33/133

>> CYCLONE

Cyclones are used to separate mineral ore based on size. Through the process, the ore is separated into large and small diameters. Larger sizes are separated from the smaller where they will continue in the cyclone process until becoming a usable size. ITT offers multiple valves to suit each mine's need including: **33 PTA, C/F 33, C/F 133**, and the **33 PTD** in a secondary cyclone application. **XS150-ULV** valve can also be used.



XS150-ULV



C/F 33/133



33 PTA



33 PTD

>> FLOTATION CELL OR COLUMN THICKENERS

The purpose of a flotation cell or column thickeners is to begin separating particles in the slurry. The process can be used to separate any two different particles and operates by the surface chemistry of the particles. In flotation, bubbles are introduced to bind particles and bring the two to the surface.

The addition of flotation reagents also effects the operation of these processes. These commonly include collectors, frothers, extenders, activators, depressants, deactivators, flocculants, and dispersants.

You will commonly find ITT's **33 PTD valve** installed in this process. Also our **C/F 33**, **C/F 133** or **XS150-ULV** can be used.

Clarifiers and Thickeners

Relies on gravity to separate suspended solids.

Rubber lined straightway diaphragm valves can be used on clarifier inlet, overflow outlet, flocculant, sludge piping depending on solid content, and other chemical feed piping or underflow.

Froth Flotation Cells

Diaphragm valves can be used on pneumatic or mechanical flotation cells on feed lines, wash water and / or collector reagent addition lines.

Typical Configuration: **rubber lined straightway** for feed and wash water and **plastic lined weir** for chemical addition.



C/F 33/133



33 PTD



Dia-Flo® Diaphragm Valve



XS150-ULV



>> FILTER PRESS

Vacuum or press filters are an essential step in the mining process to separate water from the minerals. This is mostly done mechanically, although thermal drying can be used.

The transportation of the minerals at this stage is done through our **33 PTD valves** due to the smaller particle size, although our **C/F 33, C/F 133, 33 PTA** or **ULV valve** can be used depending on the particular media characteristics.



>> ROASTER / AUTOCLAVE

Roasting is a metallurgical process involving gas-solids reactions at elevated temperatures with the goal of purifying the metal component(s). Often before roasting, the ore has already been partially purified e.g., by froth floatation. The concentrate is mixed with other materials to facilitate the process. The **C67** is recommended, while the **ULV** and **33 PTD** are other options.



C67



C/F 33/133



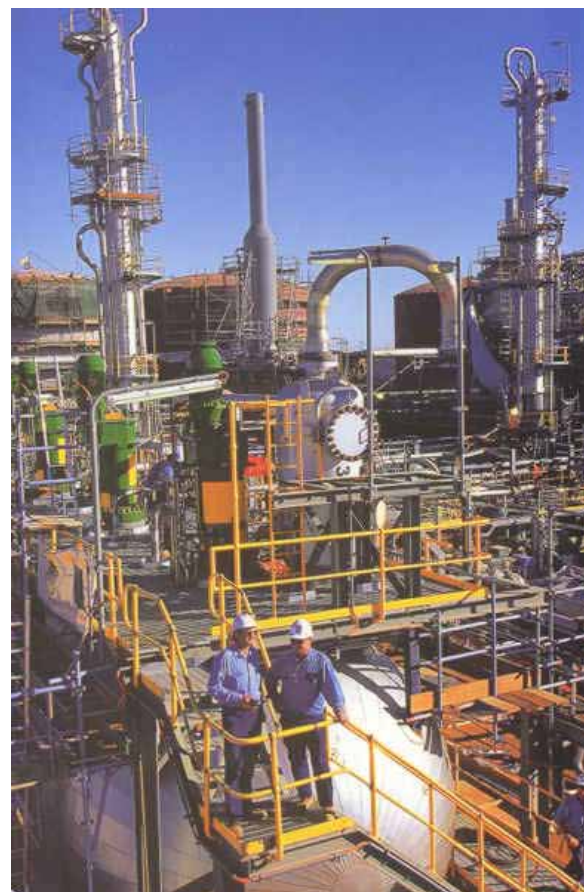
33 PTD



33 PTA



XS150-ULV





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>> LEACHING

The minerals in precious metal mining may need to be concentrated by a process called autoclaving. Gold, in particular is done by adding cyanide to the ore slurry and leaching the gold into a solution.

To handle the harsh chemicals, you can rely on our **Dia-Flo®** or **Cam-Tite®** valves.



>> 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). Customers will have the best results by using the **33 PTD valve**.

Rubber lined straightway diaphragm valves are excellent for tailings with low pressure drop and ability to seal over entrained solids. Tailings applications may be limited due to size and pressure limitations.



Cam-Tite® Ball Valve



33 PTD



Dia-Flo® Diaphragm Valve



>> PROCESS WATER

Water is a constant in every type of mining, because of this ITT has numerous valves available for water based applications. 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.

Our **Dia-Flo® valves** can handle those water applications as well as our **PTD** and **PTA valves**.

Drains and Sampling

Rubber lined weir diaphragm valves are excellent for drains and sampling due to the multiturn characteristics and ability to seal over entrained solids.

Demineralizers

Steam is used in conjunction with a boiler for many mining applications. Demineralizers eliminate efficiency robbing scale in the boiler tubes by removing the minerals in the water for the boiler. ITT recommends using **Plastic lined weir valves**.

Typical configurations: **Plastic lined weir**



Dia-Flo® Diaphragm Valve



33 PTA



33 PTD



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>> CHEMICAL FEED

Many mines are heavy users of various types of aggressive chemicals. **Rubber or plastic lined weir diaphragm valves** are the valve of choice for chemical feed injection due to their throttling, ability to seal over solids, streamlined flow path and tolerance to crystallization.



Dia-Flo® Diaphragm Valve



>> ELECTROWINNING

Removing gold from a solution can be done by a process known as electrowinning. When two electrodes (cathode and anode) are placed in a solution containing metal ions while an electric current is passed between them, the metal can be deposited on the negative electrode. The solutions used in the electrowinning process are highly corrosive and dangerous. For this reason, the use of a discharging valve is not recommended. ITT's **diaphragm valves** are an excellent choice for the electrowinning process because they are non-discharging, can be lined with compatible plastic materials and are a cost effective solution for the relatively small line sizes present in this application.



>> MINING VALVE SELECTION GUIDE

Type of Mining	Gold	Silver	Copper	Lead & Zinc	Cobalt & Nickel	Phosphate	Iron Ore
Operation							
Primary Milling	33 PTA 33 PTD C/F 33/133	33 PTA 33 PTD C/F 33/133	33 PTA 33 PTD C/F 33/133	33 PTA 33 PTD C/F 33/133	33 PTA 33 PTD C/F 33/133	33 PTA 33 PTD C/F 33/133	33 PTA 33 PTD C/F 33/133
Primary Cyclone	33 PTA 33 PTD C/F 33/133	33 PTA 33 PTD C/F 33/133	33 PTA 33 PTD C/F 33/133	33 PTA 33 PTD C/F 33/133	33 PTA 33 PTD C/F 33/133	33 PTA 33 PTD C/F 33/133	33 PTA 33 PTD C/F 33/133
Secondary Milling	33 PTA 33 PTD C/F 33/133	33 PTA 33 PTD C/F 33/133	33 PTA 33 PTD C/F 33/133	33 PTA 33 PTD C/F 33/133	33 PTA 33 PTD C/F 33/133	33 PTA 33 PTD C/F 33/133	33 PTA 33 PTD C/F 33/133
Secondary Cyclone	33 PTD 33 PTA ULV C/F 33/133	33 PTD 33 PTA ULV C/F 33/133	33 PTD 33 PTA ULV C/F 33/133	33 PTD 33 PTA ULV C/F 33/133	33 PTD 33 PTA ULV C/F 33/133	33 PTD 33 PTA ULV C/F 33/133	33 PTD 33 PTA ULV C/F 33/133
Flotation Cell or Column	33 PTD C/F 33/133 ULV DV*	33 PTD C/F 33/133 ULV DV*	33 PTD C/F 33/133 ULV DV*	33 PTD C/F 33/133 ULV DV*	33 PTD C/F 33/133 ULV DV*	33 PTD C/F 33/133 ULV DV*	33 PTD C/F 33/133 ULV DV*
Thickener	33 PTD 33 PTA C/F 33/133	33 PTD 33 PTA C/F 33/133	33 PTD 33 PTA C/F 33/133	33 PTD 33 PTA C/F 33/133	33 PTD 33 PTA C/F 33/133	33 PTD 33 PTA C/F 33/133	33 PTD 33 PTA C/F 33/133
Filter Pumps (vacuum or press)	33 PTD 33 PTA ULV C/F 33/133	33 PTD 33 PTA ULV C/F 33/133	33 PTD 33 PTA ULV C/F 33/133	33 PTD 33 PTA ULV C/F 33/133	33 PTD 33 PTA ULV C/F 33/133	33 PTD 33 PTA ULV C/F 33/133	33 PTD 33 PTA ULV C/F 33/133
Roaster / Autoclave	C67 ULV PTD (low temp)	C67 ULV PTD (low temp)				Chemical Plant Process	
Filter Pumps (vacuum or press)	C67 ULV	C67 ULV					
Leaching	DV CT	DV CT					
Tailing Thickener	33 PTD 33 PTA C/F 33/133	33 PTD 33 PTA C/F 33/133	33 PTD 33 PTA C/F 33/133	33 PTD 33 PTA C/F 33/133	33 PTD 33 PTA C/F 33/133		33 PTD 33 PTA C/F 33/133
Process Water	DV 33 PTD C67	DV 33 PTD C67	DV 33 PTD C67	DV 33 PTD C67	DV 33 PTD C67		DV 33 PTD C67
Tailings	33 PTD C/F 33/133	33 PTD C/F 33/133	33 PTD C/F 33/133	33 PTD C/F 33/133	33 PTD C/F 33/133		33 PTD C/F 33/133
Cyanide Extraction Plant (tailing)	C67 XS150 for higher pressure >270 psi	C67 XS150 for higher pressure >270 psi					
Electrowinning	DV	DV	DV	DV	DV		DV

* For chemical addition

This guide is intended to be used as a general guide to mining valve application. Refer to the factory for specific recommendations based on actual service conditions



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>> PRODUCTS



33 PTD

- Designed specifically for demanding light to medium slurry applications.
- For slurries ranging from dirty water to high-density settling slurries
- Self cleaning seats ensure consistent operation.
- When the valve is cycled from open to closed, the gate slides between the two seats and forms a seal to provide zero downstream leakage.
- Whether the valve is open or closed, the valve seats form a pressure boundary that is highly resistant to abrasive wear.
- This feature also allows the gate to be removed or placed without taking the valve out of service.



33 PTA

- Sleeves are replaceable without disassembling the valve
- Sleeves are molded with an integral, fully encapsulated, stiffener ring
- Full ported valve eliminates turbulence and has no metal parts in contact with flowing slurry
- Valve gate is completely withdrawn from the process flow when in the open position
- 100% factory tested for 100% bi-directional bubble tight shut-off
- No seat cavity where solids can collect.
- Engineered elastomer sleeve provide maximum performance and service life
- Stem cover available
- Open and closed lockout / tagout positions
- Gate wiper as standard



C/F 33/133

- Ported slide gate designed for difficult slurry applications.
- The C/F 33 is unbonneted and a discharging valve
- The C/F 133 version is bonneted to provide redirected discharge and is our safest and most reliable slurry valve. It provides the most protection from high temp and corrosive media applications.
- Equipped with constant contact elastomer seats
- Provides bidirectional shut off from zero to full rated pressure.
- Design includes a high lubricity body liner or gate support ring (depending upon size) to prevent seat deterioration caused by excess hydraulic load.
- Unsurpassed performance in scaling application
- Available in sizes 2"-54".



C67

- Bi-directional Knife-Gate Valve
- Full port valve providing a bubble tight shut off in both directions, from zero to the full rated pressure.
- Used in water recovery systems
- Unique patented elastomer perimeter seat.
- The seat operates in a mode which insures positive shut off while controlling the effects of compression set to prolong the seat life.
- Available in sizes 2"-36" in stainless steel or ductile iron.



C37

- C37 knife gate valves through 96", feature a heavy duty, rugged one-piece cast body, chest and flanges (except 5", which is fabricated – F37).
- Sizes larger than 24" are fabricated from heavy plate.
- The Figure C/F37 is available in all stainless steel (designated "S") or with alloy steel wetted parts and carbon steel external parts (designated "R").
- In sizes 1.5" through 24", the "S" and the "R" share the same solid cast body.
- Sizes larger than 24" feature fabricated bodies configured to the service conditions.

PRODUCTS <<



Dia-Flo® Diaphragm Valve

- Diaphragm valves are the workhorses and foundation of ITT's valve product offerings.
- Engineered for tough work environments in the chemical processing, water treatment, pollution control, food and beverage, mining, pharmaceutical, pulp and paper, and power generation industries.
- Dependable, cost effective and versatile and is installed across the world in virtually every type of process plant.



Cam-Tite® Ball Valve

- Top entry design, non-spherical ball.
- Positive sealing, low operating torque, blow-out proof stem, and the available "caged ball" option.
- Top entry design allows seat replacement without taking the valve from the pipeline.
- "Caged ball" option allows for quick repair or replacement of all internal components by simply unbolting the cover and lifting off the bonnet assembly.
- Available in various materials of construction, internal trims, end connections, and pressure ratings of up to ANSI class 600 lb, depending on size required.



XS150-ULV

- Economical solution for abrasive and corrosive applications.
- No discharge of process media to the environment.
- Design utilizes the same superior sealing techniques as the XS150.
- Features a robust perimeter seal that provides bi-directional, bubbletight shutoff.
- Replaceable FV 8000™ urethane liners protect the body from abrasion and corrosion



XS150

- Robust perimeter seal that provides bi-directional bubble tight shutoff.
- ANSI Class 150 lb pressure temperature rating
- Unrestricted true flow port design
- Injectable packing feature allows for easy packing adjustments when valve is under pressure or inline
- Perimeter seal provides repeatable bi-directional bubble tight shut off
- Variety of body seat materials available for demanding applications

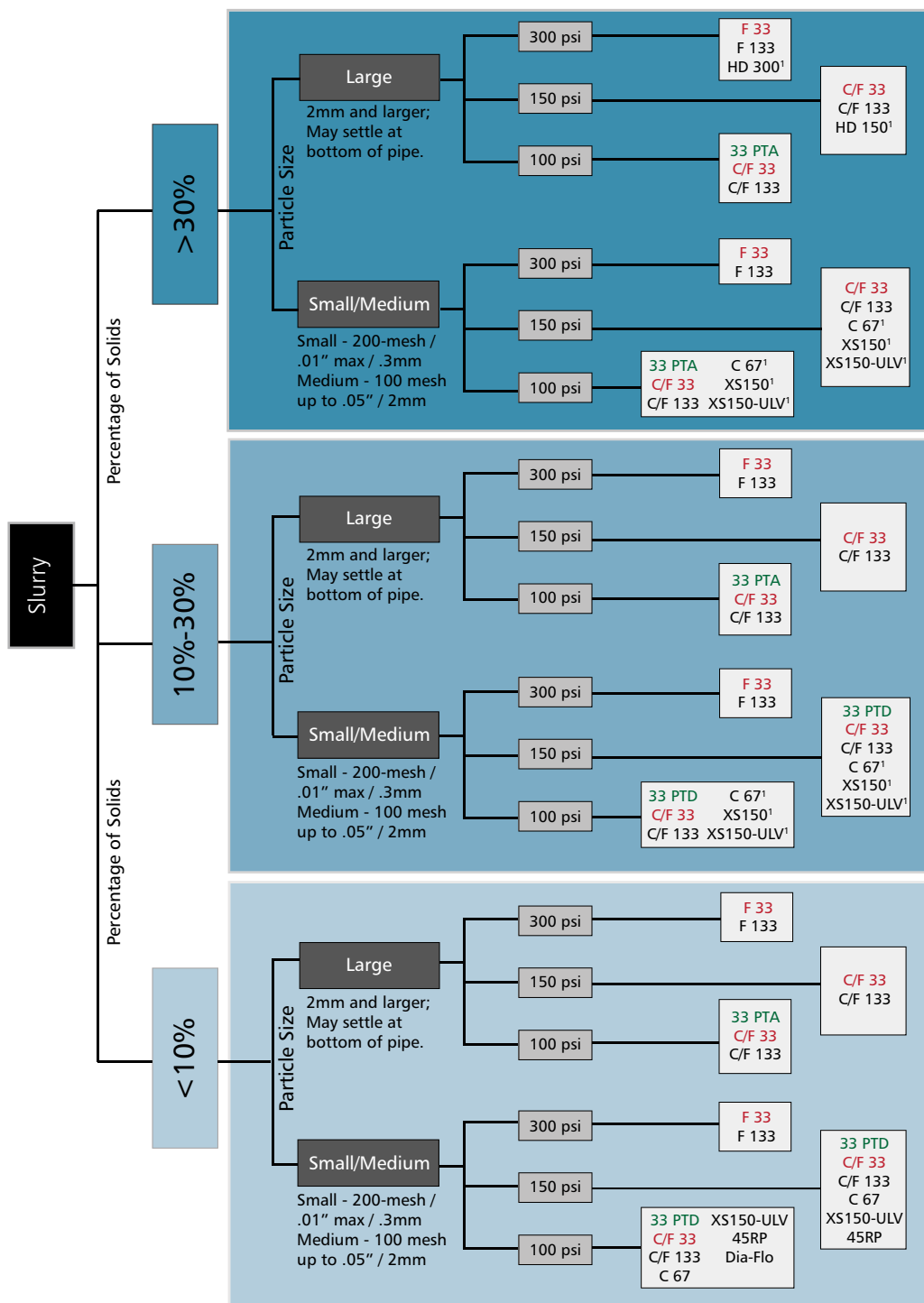
>> FOR MORE INFORMATION

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>> SLURRY VALVE DECISION PROCESS



Key:

Discharging Only

Non Discharging Only

Discharging or Non Discharging

Why Discharging Valves?

- Self cleaning
- Long lasting
- Low cost
- Safety precautions must be considered

Why Non Discharging Valves?

- Environmental
- Safety from high temperatures and pressure

¹For detailed valve information and trim selection go to www.engvalves.com/mining.html

>> ITT'S VISION AND VALUES

ITT Corporation is a global company with a portfolio of highly-engineered products and solutions that serve all industrial segments including oil and gas, chemical and petrochemical, mining, power generation, and pulp and paper.

Do the Right Thing – *Always*

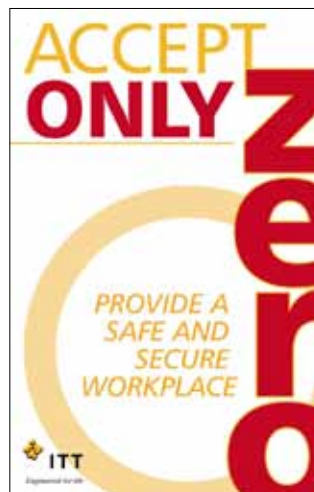
Our business success is built on a solid foundation of our corporate vision and values. At ITT, we are firmly committed to doing the right thing always. We accomplish this through transparency in governance, a dedication to creating value with the right values, and fair competition in the marketplace. Grounded in our values of respect, responsibility and integrity, we expect our people, processes, policies and systems to be fair and accountable.

Environment, Safety and Health

ITT is proud to be a leader in protecting our employees, customers and the communities where we operate. The ITT Environment, Safety and Health Management System provides for the systematic control of environmental, safety and health (ESH) risks. Using this system, operational, administrative and cultural ESH processes are standardized and applied to continually improve environmental and occupational safety and health performance.

Eco-footprint

ITT is acting to preserve and enhance our environment. We are striving to shrink our eco-footprint by further reducing the use of natural resources and hazardous materials in production, lowering emissions and cutting energy use in operations, and by improving product design.



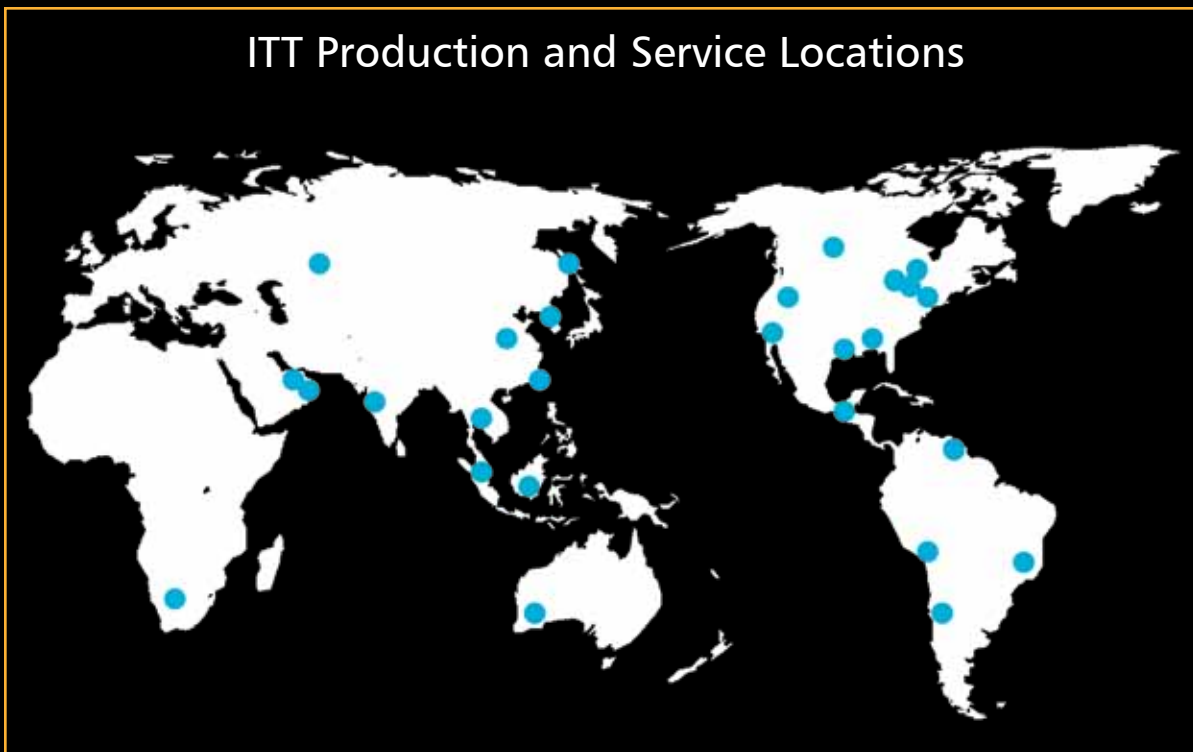
Think global. Act local.

Today, a global presence means being there locally, directly at the customers' side. Whether it is in Mining, Chemical, Pharmaceutical, Nuclear, Power, Water, Pulp and Paper, Oil and Gas or many other markets, the name "ITT Industrial Process" stands for excellence, dependability, and quality.

ITT IP is a global technology leader in its respective fields and markets. Helping our customers reach their goals is one of the most important principles of ITT IP. We utilize our engineering capabilities for the creation and construction of high quality valves and pumps. Our many years of experience allow us to design and manufacture features in our products that other companies offer as options.

The technological competence and wide product portfolio of our company form the foundation for ITT's high-quality range of complete and integrated solutions for valves and pumps.

ITT Production and Service Locations



Visit our website at www.EngValves.com



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