Lift plug & Switch plug valves

Technical brochure

AMPO
POYAM VALVES

Commitment made of steel

INDEX

1. COMPANY PROFILE

AMPO is an **international leader** in the design and manufacture of highly engineered valves for the most severe applications and industries as well as in stainless steel and high alloy castings.

Through our AMPO SERVICE team **we guarantee a prompt response** to customer needs wherever they are throughout the world: technical support in start-up stages, equipment selection, predictive and preventive maintenance, training, etc.

Fully inhouse manufacturing process

Worldwide references

Project based on people

Innovative spirit

700+ people

In more than 60 countries

Most important partners in the industry

Cutting edge technologies

Our commitment: the best service

Customer focus

Since 1964

2. APPLICATION

Non- lubricated metal to metal lift plug & switch plug valves are an ideal solution for severe services containing heavy crude feedstocks subject to high temperature and coke formation such as:

- Fluid Catalytic Cracking
- Visbreaking
- Delayed coking
- Thf (Hydroforming)
- Sulphur recovery
- Ethylene craker
- Olefins
- Fossil Fuel (Power Generation)
- Fly Ash Handling
- Coal Gasification
- Propane De – Hydrogenation

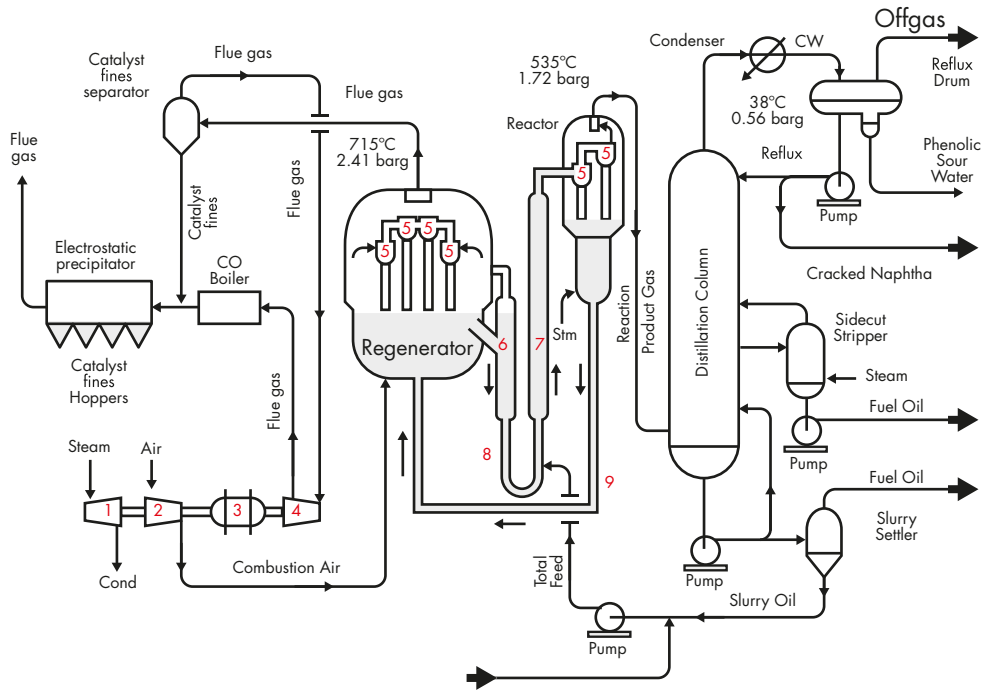
The processing of heavy oil (Residuum) results in coke formation and deterioration of a valve operation if the proper valve is not chosen. **The AMPO POYAM Lift Plug Valve has been designed specifically for the severe service conditions of these applications.**

2. APPLICATION

Fluid Catalytic Cracking (FCC) is one of the most important conversion processes used in petroleum refineries. It is widely used to convert the high-boiling, high-molecular weight hydrocarbon fractions of petroleum crude oils into more valuable gasoline, olefinic gases, and other products. Cracking of petroleum hydrocarbons was originally done by thermal cracking, which has been almost completely replaced by catalytic cracking because it produces more gasoline with a higher octane rating. It also produces byproduct gases that have more carbon-carbon double bonds (i.e. more olefins), and hence more economic value, than those produced by thermal cracking.

The feedstock to FCC is usually that portion of the crude oil that has an initial boiling point of 340 °C or higher at atmospheric pressure and an average molecular weight ranging from about 200 to 600 or higher. This portion of crude oil is often referred to as heavy gas oil or vacuum gas oil (HVGO). In the FCC process, the feedstock is heated to a high temperature and moderate pressure, and brought into contact with a hot, powdered catalyst. The catalyst breaks the long-chain molecules of the high-boiling hydrocarbon liquids into much shorter molecules, which are collected as a vapor.

Figure 1:
A schematic flow diagram of a Fluid Catalytic Cracking unit as used in petroleum refineries



Catalyst
CO Carbon monoxide
cw Cooling water
Stm Steam
Cond Condensate
1 Start-up steam turbine
2 Air compressor
3 Electric motor / generator
4 Turbo-expander
5 Cyclones
6 Catalyst withdrawal well
7 Catalyst riser
8 Regenerated catalyst slide valve
9 Spent catalyst slide valve

A Visbreaker is a processing unit in an oil refinery whose purpose is to reduce the quantity of residual oil produced in the distillation of crude oil and to increase the yield of more valuable middle distillates (heating oil and diesel) by the refinery. A visbreaker thermally cracks large hydrocarbon molecules in the oil by heating in a furnace to reduce its viscosity and to produce small quantities of light hydrocarbons (LPG and gasoline). The process name of "visbreaker" refers to the fact that the process reduces (i.e., breaks) the viscosity of the residual oil. The process is non-catalytic.

A Delayed Coker is a type of coker whose process consists of heating a residual oil feed to its thermal cracking temperature in a furnace with multiple parallel passes. This cracks the heavy, long chain hydrocarbon molecules of the residual oil into coker gas oil and petroleum coke.

Delayed coking is one of the unit processes used in many oil refineries. The adjacent photograph depicts a delayed coking unit with 4 drums. However, larger units have tandem pairs of drums, some with as many as 8 drums, each of which may have diameters of up to 10 meters and overall heights of up to 43 meters.

The yield of coke from the delayed coking process ranges from about 18 to 30 percent by weight of the feedstock residual oil, depending on the composition of the feedstock and the operating variables. Many refineries world-wide produce as much as 2,000 to 3,000 tons per day of petroleum coke and some produce even more.

Figure 2:
A schematic diagram of a Visbreaker unit

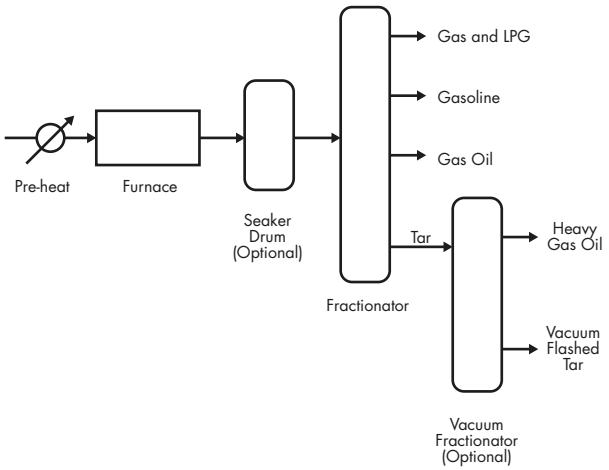
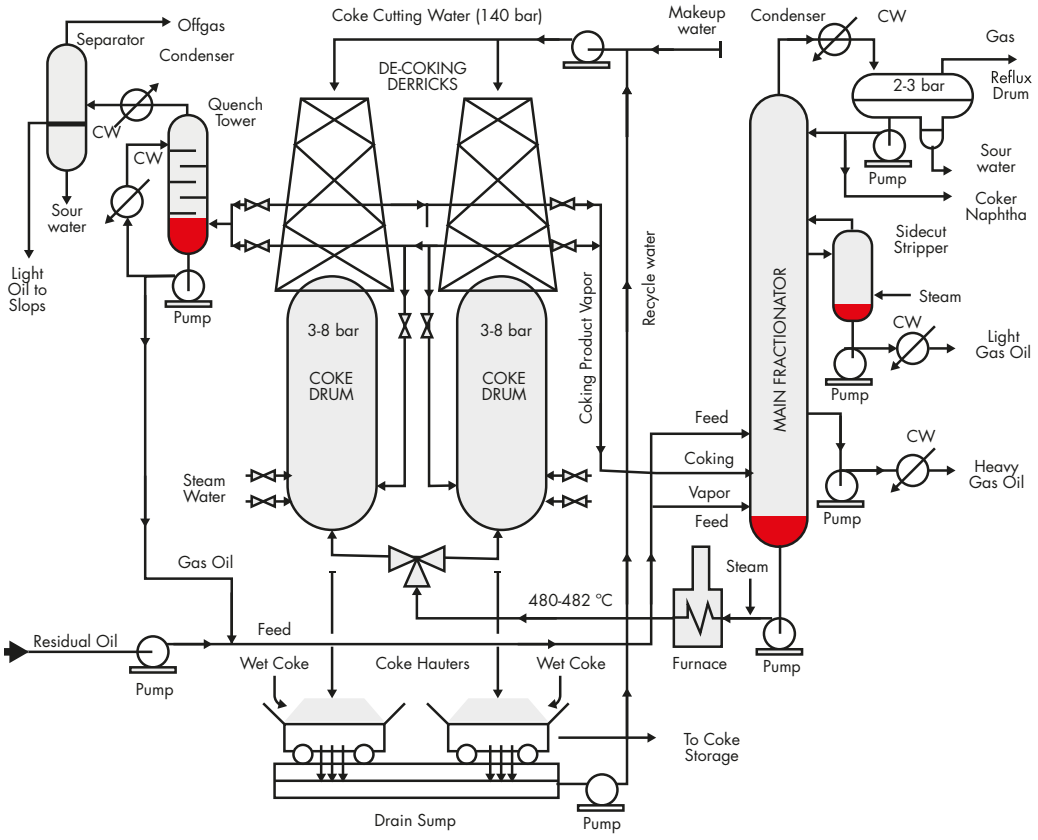


Figure 3:
A Delayed Coking Unit.
A schematic flow diagram of such a unit, where residual oil enters the process at the lower left, proceeds via pumps to the main fractionator (tall column at right), the residue of which, shown in red, is pumped via a furnace into the coke drums (two columns let and center) where the final carbonization takes place, at high temperature and pressure, in the presence of steam.

Note:
All pressures are absolute pressures.

Note:
The quench system in the upper left corner is used only when a drum is being steamed prior to de-coking.



3. LIFT PLUG & SWITCH PLUG VALVES

LIFT PLUG & SWITCH PLUG VALVES

CHARACTERISTICS

Design standards: ASME VIII Div 1 & 2, API 6D, ASME B16.5, ASME B.16.47A or ASME B.16.47B, ASME B16.10, API 598, ASME B16.34, API 599, API 641, ISO 15848, NACE MR0175 and NACE MR0103.

Classes: 150 lbs up to 2500 lbs

Sizes: 2" up to 36"

Materials: AMPO POYAM VALVES manufactures valves following any material specified on ASME B.16.34, such as:

- CARBON STEEL e.g.: WCB, WCC...
- ALLOY STEEL e.g.: WC1, WC6, WC9, C5, C12...
- CARBON STEEL FOR LOW TEMPERATURE e.g.: LCB, LCC...
- AUSTENITIC STAINLESS STEEL e.g.: CF8M, CF8C, CF10, CG8M...
- MARTENSITIC STEEL AND FERRITIC MARTENSITE FOR GENERAL SERVICE AND LOW TEMPERATURE e.g.: CA15, CA6NM...
- SUPERAUSTENITIC ALLOYS e.g.: CN7M, CK3MCuN...
- DUPLEX ALLOYS e.g.: S31803, S32760, A890Gr4A, A890Gr5A, A890Gr6A, CD4MCu...
- NICKEL BASE ALLOYS e.g.: INCOLOY 825, MONEL 400, INCONEL 625, CW-6MC, CW-12MW...

NACE MR0103 or NACE MR0175 compliance is a common requirement in sour service applications. Moreover, AMPO POYAM VALVES' Lift Plug Valve is commonly used in these applications and is compliant to NACE MR0103 and NACE MR0175 requirements in terms of materials.

For special process fluids where the material selection must be performed with a specific concentration in or out of the standards, AMPO POYAM VALVES is able to **customize the concentration of each component** such as Ni, Mb, C... etc. to follow the most severe corrosion conditions and enlarge the lifetime of the valve.

Moreover, one of our main advantages is that we have **our own foundry.** Consequently, AMPO FOUNDRY provides the best quality castings and service as it works hand in hand with our manufacturing processes. At our foundry, which is expert in stainless steel and high alloy castings, cast materials are produced under strict quality controls and this ongoing monitoring is the key to our quality and success. On the valve manufacturing process, we are in a privileged position, since at AMPO, we control the whole manufacturing process, from the very beginning to the end, from the receipt of the scrap material to cast and to end solution ready to ship to the customer, as our castings start from one of the world's leading valve foundries, and continue through to a product which is finished and tested to any specification all within our own facilities.

End connections: RF, RTJ

Actuation:

- Manual gearbox
- Electric or hydraulic actuator
- Control panels are available per request.

Temperature: -120 °C up to 900 °C

Design features:

- Available with 70%, 90% and full port designs.
- Bidirectional and optimum performance both in low and high differential pressures.
- Double block and bleed design.
- Advanced lift and turn technology.
- Switch type valves:
  · 3 ways, 1 inlet & 3 outlets (2 drums and 1 bypass)
  · 4 ways, 1 inlet & 4 outlets

4. WHY CHOOSE OUR LIFT PLUG & SWITCH PLUG VALVES?

TOP ENTRY DESIGN for ease of maintenance without removing the valve from the line.

A GUIDED DESIGN permits the valve to be installed vertically or horizontally and for high pressure differentials.

AN INTEGRAL PLUG-STEM COMPONENT which makes a stronger and more robust design avoiding hysteresis and misalignments found in similar designs.

LOW OPERATION TORQUE thanks to the lifting and turn system which significantly reduces the friction between the plug and the seats.

NO LUBRICATION is required so expensive lubricants are avoided as well as foreign body contaminants in the lubricant that could lead to premature wear.

LONG LIFE due to the low friction between the plug and the seats, because they are not continuously in contact, as happens with the ball valve.

MINIMAL MAINTENANCE: AMPO POYAM VALVES' Lift Plug Valve is designed to provide maintenance free operation between turnarounds.

LOW STEAM CONSUMPTION since flushing is required only during operation.

LESS FLUSHING POINTS than a ball valve. Ball valves need a continuous flushing process to keep the seat area clean while the Lift Plug Valve does not consume steam in the fully open or closed position.

LESS POTENTIAL LEAKAGE POINTS TO THE EXTERIOR being single body valve compared to a split body one.

Seats are **PROTECTED** from erosion in the open and closed position; resulting in longer seat life.

Purge/Flushing system **KEEPS SEATING SURFACES CLEAN** of debris thus avoiding seating surface erosion.

DBB

True double block and bleed **(DBB).**

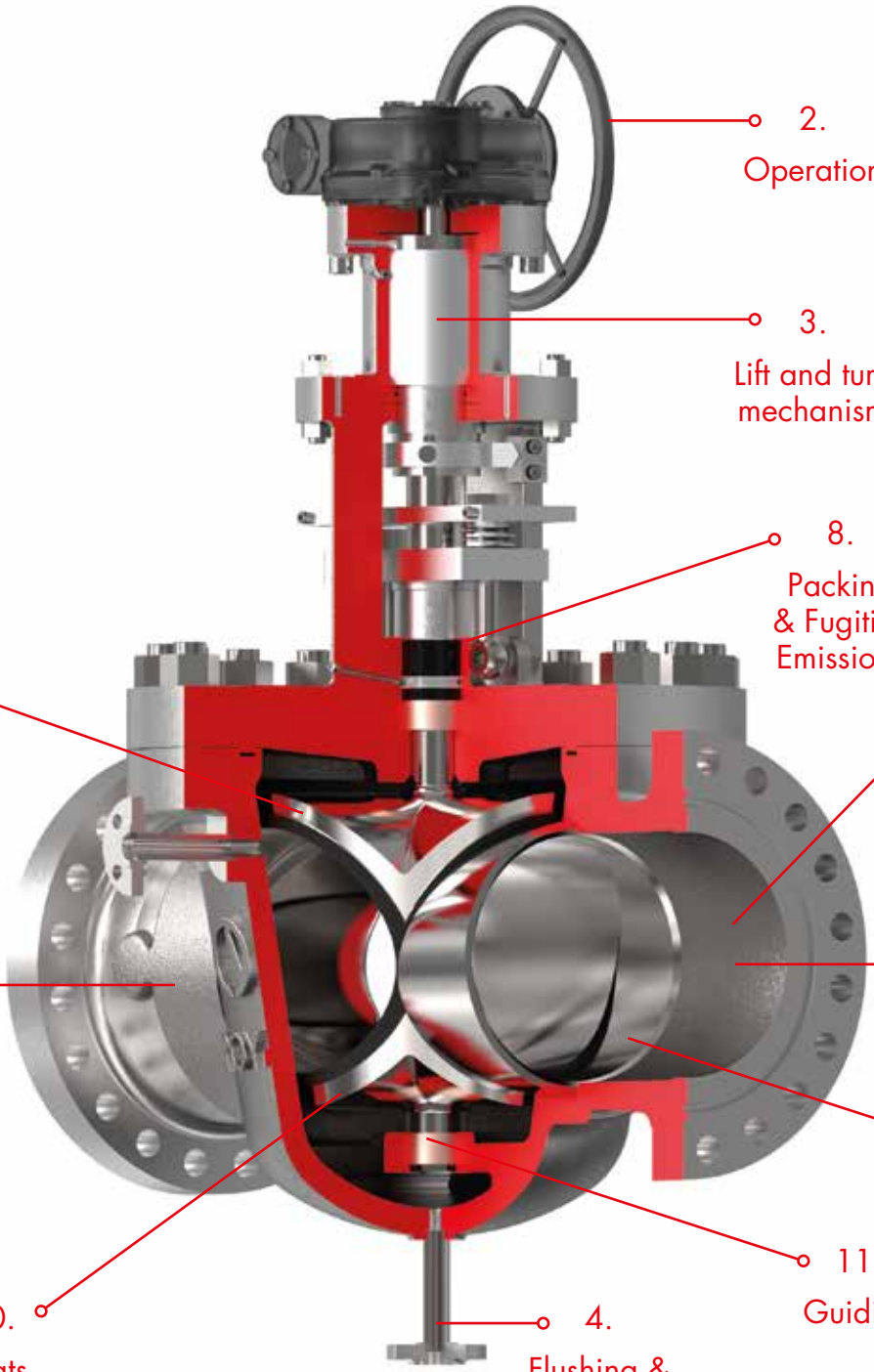
SELF ALIGNING GLAND. Minimal wear on stem due to small lift and 90° turn.

ACTUATION UNIT IS INLINE SERVICEABLE.

MECHANICAL STOPS prevent damage due to over-torque.

SIMPLICITY, fewer parts than any other comparable valves leading to greater reliability.

5. TECHNICAL FEATURES



5.1. FEA FOR HYDROCRACKING UNITS HANDLING SYSTEM

AMPO POYAM VALVES has a continuous improvement plan which includes performing analyses to verify our calculations and meeting our customer's needs.

Assessments have been carried out in compliance with **EN 12952-3** code and **EN-13445** code for design by analysis and fatigue assessment. Material properties and stress limit will be assumed accordingly following the **ASME** codes.

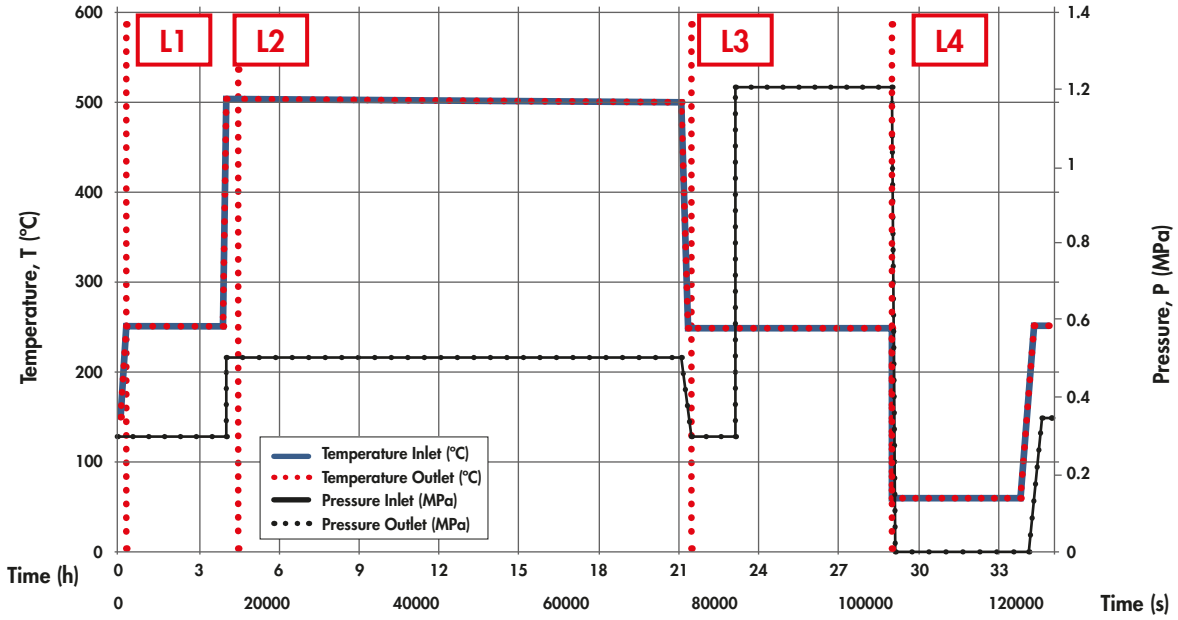
For the **FEA,** the worst possible high temperature scenarios have been evaluated **up to 620 °C.**

Areas of local stress intensifications where fatigue damage is higher and the maintenance controls have to be focused, have been identified. For these areas, **maximum number of cycle to failure of in excess of 11,000 cycles.**

Fatigue analysis example:

Temperature and pressure diagram during the cycle are summarized in the following charts:

- **Temperature and pressure diagram during the operating cycle with indication of temperature assessment point:**

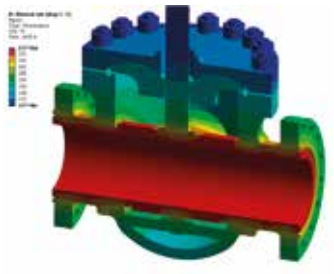


Following analysis steps that have been performed for the fatigue assessment:

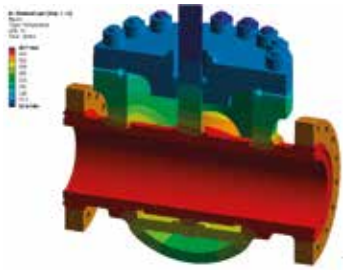
STEP 1.	STEP 2.	STEP 3.	STEP 4.	STEP 5.
Transient thermal analysis	Structural analysis of the whole thermal cycle	Cycle counting	Detailed structural analysis at cycle peaks	Fatigue assessment

Results:

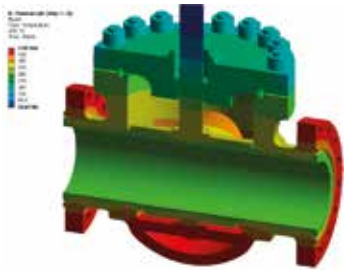
Temperature map at L1(1076 s, 0.30 h)



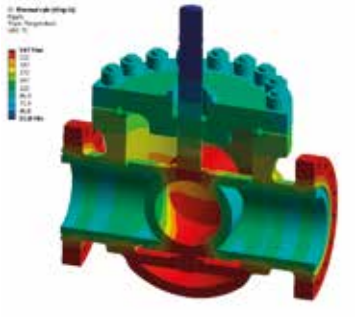
Temperature map at L2 (16064 s, 4.46 h)

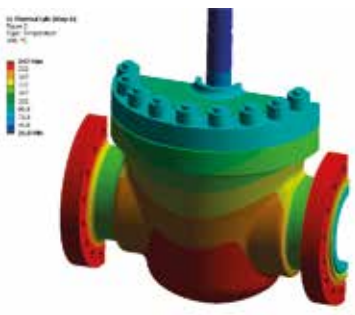


Temperature map at L3 (76500 s, 21.25 h)

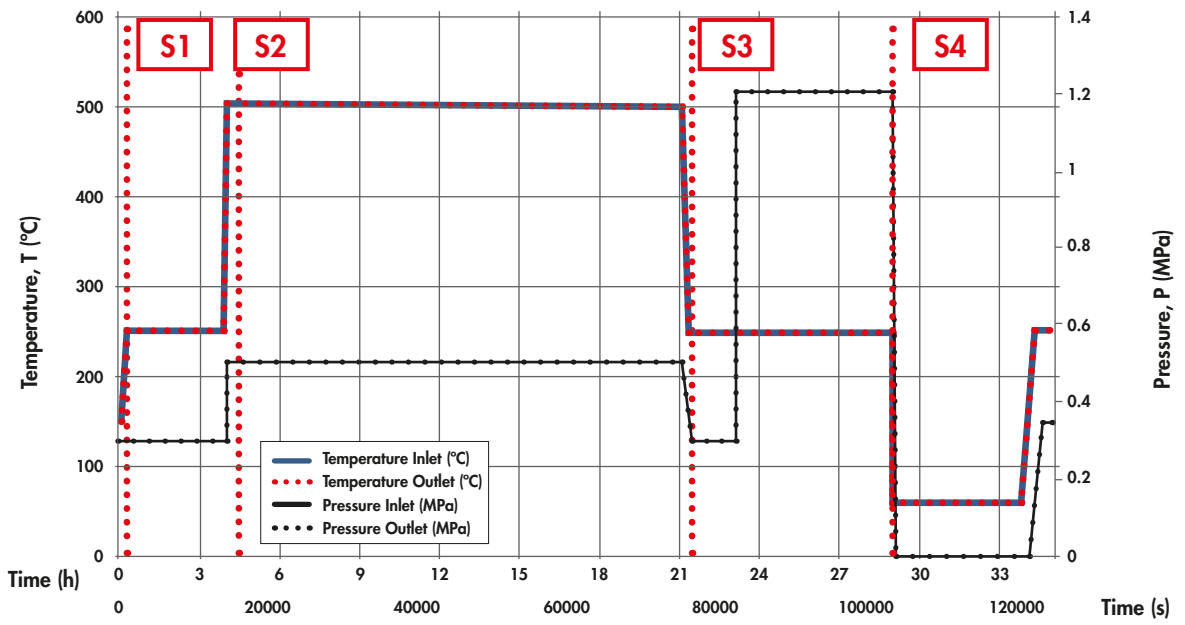


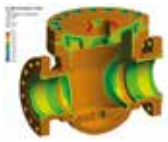
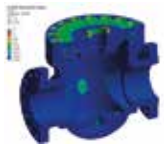
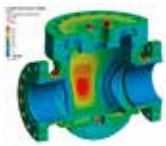
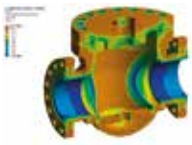
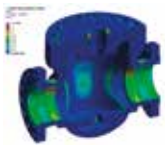
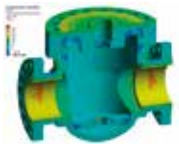
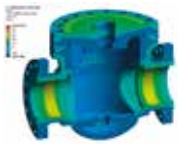
Temperature map at L4 (103680 s, 28.80 h)





- **Temperature and pressure diagram during the operating cycle with indication of stress assessment point:**



	PRINCIPAL STRESSES MAPS			FATIGUE DAMAGE
	Maximum principal	Middle principal	Minimum principal	
S1 (1030s, 0.29h)				
S2 (14590s, 4.05h)				
S3 (76539s, 21.26h)				
S4 (104010s, 28.89h)				

5.2. OPERATION

The special, screw type operator simplifies the plug lift, rotation and reseating, making the valve durable, reliable and economical. The operator automatically compensates for wear and varied operating conditions. They allow the plug to be seated by torque in both open and closed positions.

CLOSED POSITION

1.Plug is closed, seat protected.

PLUG LIFTING

2.Operator slightly lifts plug.

PLUG ROTATING

3. Operator rotates plug 90° to open position.

OPEN POSITION

4. Operator reseats plug in open position, seats protected.

This movement is achieved just with a **rotational movement** from the operator and only from a **single actuator.** As result, we have an **extremely low torque** requirement for actuation since with the lift step, **PLUG and SEAT would not be in contact** and there would be **no friction** between these sealing surfaces to create friction while the plug is rotating.

In one circular motion of the handwheel worm gear, the tapered plug gets lifted from the raised body seats, turns 90°, and gets reseated again. The operation also compensates for wear and thermal contraction and expansion in the body and the plug seats. **No lubrication is required** inside the body or on the plug for the sealing, plug rotation, or to prevent sticking. Expensive lubricants are avoided. And without lubricant, there is no foreign inclusion in the valve to contaminate the flow material.

AMPO POYAM VALVES lift and turn plug valve can be provided with the following **actuation systems:**

- **Gearbox**
- **Electric Actuator**
- **Hydraulic Actuator**

Note: For the SWITCH PLUG valves, AMPO POYAM VALVES is able to provide the **control panels** as well.

5.3. LIFT AND TURN MECHANISM

AMPO POYAM VALVES's manufacturing process for the operational mechanism, increases the hardness of the parts and consequently, enlarges mechanism's life time.

Our yoke is designed to allow maintenance works even when the valve is online and there is no need for the disassembly of it from the line for its replacement.

AMPO POYAM VALVES has perfected the lift and turn mechanism to eliminate the lock up issues seen in similar designs.

5.4. FLUSHING & PURGING DRAIN

Flushing or Purging can be accomplished with gas or liquid. Moreover, the fluid affects the actuator sizing, and **AMPO POYAM VALVES Engineering team always needs to know the intended flush/purge fluid** for designing purposes. The most common fluids used are Steam or nitrogen.

Flushing

Flushing is the supply of a clean fluid via the cavity surrounding the plug in the valve. The flushing fluid being at a higher pressure than the line media passes between the body and the plug into the line during the operation of opening or closing the valve. Furhermore, flushing fluid pressure must be notified as it affects the actuator sizing. This flushing fluid thus enters the main line during the operation and being of a clean nature **ensures that the plug reseats on clean metal to metal surfaces.** It also has the effect of pushing back into the line any media that may have become trapped in the bore of the plug whilst the valve is being closed. Having operated the valve, the flushing lines may be turned off.

AMPO's flushing parts are manufactured according **to ASME B.16.34.**

Parameters:

- **Line pressure**
- **Steam T°**
- **Steam pressure**
- **Schedule**

Purging

Purging is the supply of an inert and safe fluid into the cavity surrounding the plug in the valve. The purge is maintained at a higher pressure than the media. Purging fluid pressure must be notified as it affects the actuator sizing. **The purpose is to ensure no leakage of the line media takes place past the plug or past the gland packing.** Should a leak develop between the plug and the body seats, line media would be unable to flow into the cavity as the purge media, being at a higher pressure, would flow from the cavity into the line. When the valve is sealing no flow of purge fluid need take place.

Leakage of the valve would be detected by an increase in the flow of the purge fluid through the lines.

A result of the purge is that the gland is subjected only to the inert purge media rather than the line media. This is an important safety factor when handling toxic or volatile hydrocarbons.

The AMPO POYAM Valve is configured with multiple bosses cast into the body for purge connections. Typical purge connection sizes are listed in the following table along with expected flow area when the plug is in the lifted position. The flow areas are approximate and may be used to calculate flow rates.

However Flushing/Purge connections **can be configured to customer request.** When requesting non-standard configurations merely indicate the location desired, and specify the size of tapped hole required as well as thread type.

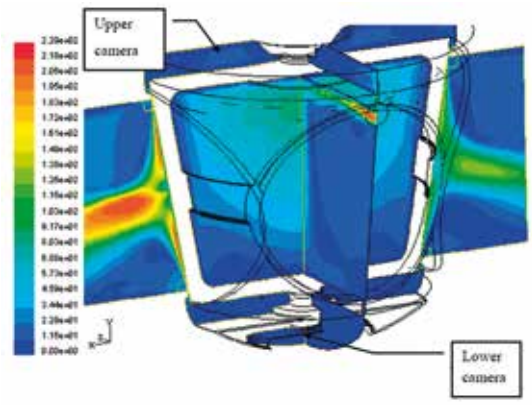
It is absolutely **essential** that sufficient **flow** be provided the **15-25 psi** differential between flushing/purge line inlet to the valve and main line pressure for compressible flushes (5 to 10 psi for incompressible flushes). Differentials greater than 25 psi are not recommended due to possibility of seating surface damages due to wire draw, etc.

AMPO POYAM VALVES can also perform a fluid-dynamic analysis, in order to design the correct system of flushing to facilitate the flow value.

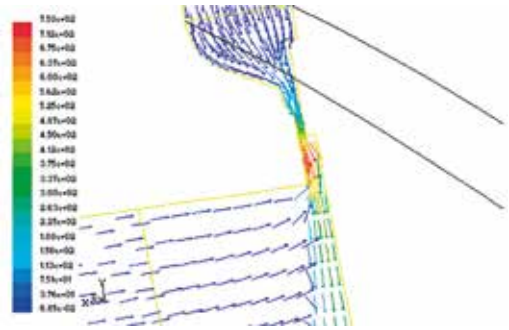
By monitoring the purge flow rate the end-user can monitor the health of the seating surfaces.

Below, **purging position and size calculation for internal and external flushing/purging is shown:**

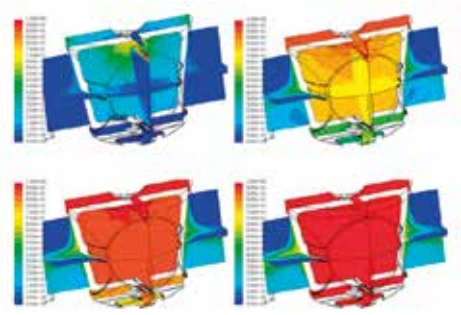
1. **Fluid velocity of the steam for the internal purgings:**



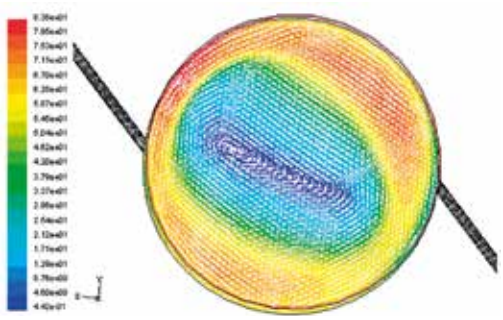
2. Velocity vectors of internal purgings:



3. Internal purges: Contour of mass fraction of steam for different times:



4. Velocity vectors of external purgings:



5. Fluid flow of the external purgings:

Our lift plug valves have integral bosses which may be taped for the addition of drains, bleeders, blow connections and bypasses. The following **table shows the recommended maximum size of a tapped hole in a boss** and in **accordance** with the standard set up by the Manufacturers Standardization Society Specification **SP-45.** When ordering a tapped hole, merely indicate the location desired and specify the size. For very small drains, bodies may be tapped without bosses. The size of the hole depends on the location and pressure rating of the valve.

Bosses are **available tapped or socket weld.**

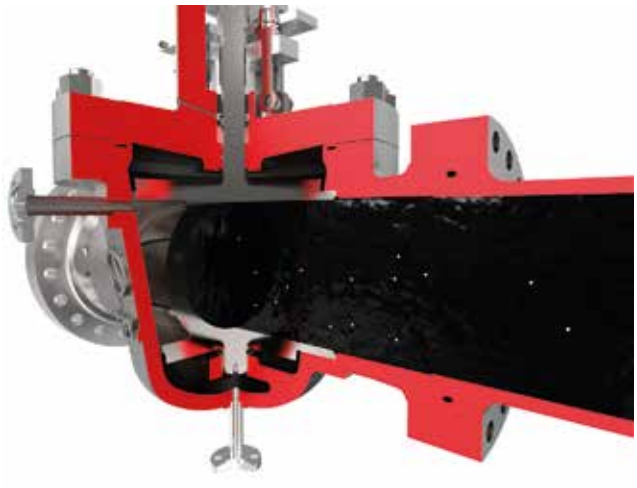
Listed below are recommended sizes and numbers of tapped bosses required to affect an inlet flow area equal to the flow area around the plug in the raised position.

VALVE SIZE			2″	2 ½″	3″	4″	6″	8″	10″	12″	14″	16″	18″	20″	24″	28″	30″
150 pound valve	70%	Drain size (ins)	1/2	1/2	1/2	1/2	3/4	3/4	1	1							
		Number	2	2	3	3	3	3	3	3							
		Flow area (sq ins)	566	566	738	1.018	1.339	2.063	2.549	3.604							
150 pound valve	100%	Drain size (ins)	1/2	1/2	1/2	1/2	3/4	3/4	1	1	1	1	1	1	1	1	1
		Number	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
		Flow area (sq ins)	648	782	972	1.297	1.945	2.594	3.132	3.891	3.556	4.168	4.505	4.716	5.020	5.262	5.365
300 pound valve	70%	Drain size (ins)	1/2	1/2	1/2	1/2	3/4	3/4	1	1	1	1	1	1			
		Number	2	3	3	3	3	3	3	3	3	3	3	3			
		Flow area (sq ins)	566	698	738	1.018	1.339	2.063	2.715	3.604	3.233	3.863	4.200	4.411			
300 pound valve	100%	Drain size (ins)	1/2	1/2	1/2	1/2	3/4	3/4	1	1	1	1	1	1	1	1	1
		Number	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3
		Flow area (sq ins)	648	741	972	1.297	1.945	2.594	3.262	3.891	3.556	4.168	4.505	4.716	5.020	5.262	5.365
600 pound valve	100%	Drain size (ins)	1/2	1/2	1/2	1/2	3/4	3/4	1	1							
		Number	3	3	3	3	3	3	3	3							
		Flow area (sq ins)	648	741	972	1.297	1.945	2.594	3.262	3.891							
900 pound valve	100%	Drain size (ins)			1/2	1/2	3/4	3/4	1								
		Number			2	3	3	3	3								
		Flow area (sq ins)			972	1.297	1.945	2.594	3.262								

Tapped basses

5.5. HANDLING SOLIDS IN SUSPENSION

Problems may exist with crude feedstock subject to high temperature cracking and coke formation. Valves should be installed so that one of the tapped bosses is at the lowest point in the body. The bosses of the valve body are regularly tapped at the factory.



This permits easy installation of a bleeder and/or blow connection. If permissible to blow back into the line, any purging medium such as air, inert gas, steam or flushing oil may be introduced through connection.

Then as the plug is lifted off its seats, any accumulation below the plug or on the seats will be blow back into the line. Conversely by opening the bleeder, line pressure will blow out any accumulation when the plug is lifted. An upper barrel boss may also be tapped for a second bleeder and/or blow connection. This also permits circulation of a flushing medium around the plug.

AMPO POYAM VALVES is able to support the customer on the optimization of the flushing/purging and drain process to avoid the coking formation in the internal cavity. A preliminary study of the cases can be performed by FEA and provide it for a proper study and application.

5.6. SEATING SURFACES CLEANING METHOD

During the operation, and more specific on the reseat process, the seating surfaces where the **plug and seats** are going to make the contact **are cleaned automatically by the steam used for the flushing/purging purpose.**

Once the plug is lifted and turning, **the vapor in the middle cavity is in higher pressure than the fluid in the process line, avoiding the media coming to the internal cavity,** but also making this vapor go to the main line.

While the reseating process, the area where this vapor is able to pass to the main line is going decreasing, increasing the strength with which will clean the seating surfaces to obtain a perfect sealing without any friction.

Typical STEAM consumption on the AMPO POYAM PLUG VALVES vs Ball valve is detailed below as a case study:

				STEAM CONSUMPTION (lbs)						
	Valve size	Qty	Steam Usage	Min/ Day	Per Valve Conn. (lb/min)	Purge QTY	Each Valve/day	Each Valve/Yr	Total Valves/Yr	All Valves/Yr
AMPO POYAM LIFT PLUG VALVE	4"	4	During Valve Cycle only	2	1,5	2	6	2.100	8.400	586.320
	10"	5		4	8,6	3	103	36.120	180.600	
	14"	2		4	8,6	3	103	36.120	72.240	
	20"	4		6	12,9	3	232	81.270	325.080	
TYPICAL BALL VALVE	4"	4	Continuous	1440	1,5	2	4.320	1.512.000	6.048.000	92.530.080
	10"	5		1440	5,2	3	22.464	7.862.400	39.312.000	
	14"	2		1440	5,2	3	22.464	7.862.400	15.720.480	
	20"	4		1440	5,2	3	22.464	7.862.400	31.449.600	

A case study: (Example)	AMPO POYAM Lift Plug steam savings (LBS)	91.943.760
	Average Cost os Steam Production (US$/1000 LBS)	2
	Estimated Total Steam Production Saving Per Year	183.887,52 $

Notes:
1. Steam amounts shown are maximum, assuming ideal supply and nozzle, with no seat area restraint.
2. No steam is consumed at other times for AMPO POYAM Lift Plug. Steam is only consumed when AMPO POYAM Lift Plug is in motion (cycling).
3. Continuous steam consumption in uni-directional Gate valve or Ball valve.
4. Steam consumption rates are based on 25 psig differential pressure (purge steam vs line pressure).
5. Ball valve typically required more purge connections than Lift Plug. Steam consumption, therefore, will be higher than the above estimate.
6. Consumption will vary with the fluid chosen for Flush or Purge.

5.7. BORE SIZES

Depending the available drop pressure in the line and the requirement of the customer we are able to provide the following solutions:

Full Port

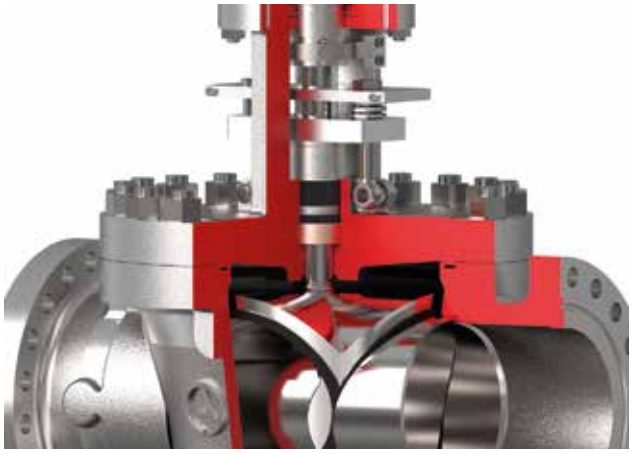
Reduced Port

- **90% of reduction**
- **70% of reduction**

** 70% of reduction*

5.8. PACKING & FUGITIVE EMISSIONS

AMPO POYAM Lift plug valve designs for all ratings, from 150 to 2500 class, have been certified with **Fugitive Emission tests as per ISO 15848, obtaining A class certificates. API 641** testing with methane gas has also been performed in order to get API certification. Moreover, the design has been checked with other testing procedures that involve the toughest requirements such as thermal variations of more than 500 °C variations, and operation cycles of more than 500 opening-closing events. All these tests and certificates, in addition to AMPO POYAM VALVES 50+ years of experience, are the best guarantee of the proper sealing of AMPO POYAM Lift plug valves and the main reason to assure that lantern rings are not required for packing sealing assurance in normal operation.



In severe service conditions, the graphite material parts suffer more than in other processes.

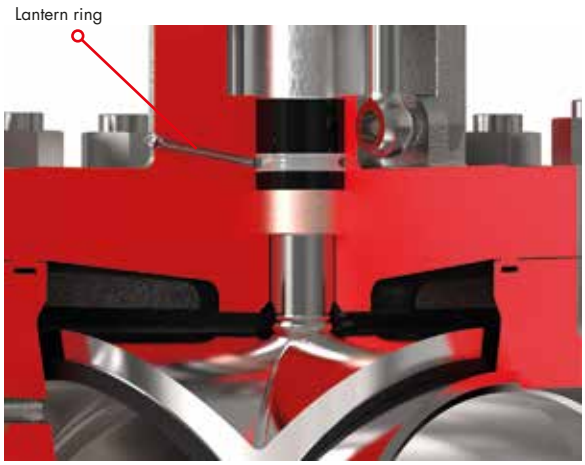
The optimization of the design on the packing area, is one of the most important aspects while designing the AMPO POYAM PLUG VALVE, since it is the key location for a possible external leakage a valve in this service may suffer.

The design concepts that are taken into account are:

- **FLUSHING/PURGING** connection to the packing area to be able **to clean any coke impurity** is able to build up close to the area of the packing and the stem.
- To ensure that no leakage can happen to the atmosphere, plug valves are always designed with a **live loaded packing.** Live load packings apply constant pressure on the packing rings, guaranteeing a perfect sealing of the packing during longer time in case the fluid damages the graphite. AMPO's plug valves are available with a wide range of packing types, including **braided/die-formed graphite and V-type packing rings.**

- **Lantern ring:** Lantern rings are widely used **in special applications where outside lubrication is necessary** in order to keep packing lubricated. For example, in applications where the fluid to be sealed is contamined with abrasives or is corrosive and a clean fluid is required for lubrication.

  The lubrication greatly increases the life of compression packing, resulting in less maintenance and downtime over the life of the equipment.



The main purposes of using lantern rings are:

1. **Packing lubrication in severe applications.**
2. **Emergency sealing** (grease injection).
3. **Non-emergency sealing** (pressure injection to improve packing's sealing).

Considerations:

- A lantern ring is an annular ring with channels for the passage of lubricant inserted between the two sets of packing rings.
- Fluid is fed from an external pipe to the lantern ring.
- While installation it is really important that the holes in the lantern ring meet or are aligned with the holes in the pipes.

5.9. DOUBLE BLOCK AND BLEED DESIGN AVAILABLE (DBB)

AMPO POYAM VALVES is able to provide Double Block and Bleed concept described on **API6D** with a single valve.

API6D quote:

"Double Block and Bleed, DBB; Single valve with two seating surfaces, in the close position, provides seal against pressure from both ends of the valve with a means of venting/bleeding of the cavity between the seating surfaces".

5.10. SEATS

Our stellite overlay on the seating surfaces **improves** the **grinding conditions, avoids galling** effects and **improves operational functionality** of the valve.

Due to the severe conditions **plugs are also stellite welded, which minimizes the erosion of materials** that happen due to flow of catalyst.

The hard-facing process is one of the keys on the AMPO POYAM PLUG VALVES. The thickness of the coating and the surface finish of these sealing surfaces are one of the main reasons of the perfect performance of the AMPO POYAM PLUG VALVES during the lifetime of the valves.

The material we usually apply for these coatings **are Stellite 6** and **Stellite 21,** each of which offers different properties which are more suitable for a process or another.

Additional materials for the hard facing are available as per request to obtain the perfect performance of the valve and assure to long lifetime of the valve following different conditions of the process.

5.11. GUIDING

Our design is defined with a perfect guiding system, which is based on two main characteristics. On one hand, **integral plug and stem,** which **ensures no misalignment** between these components. On the other hand, **plug is guided in the body with the trunnion design of its bottom part.** All this makes AMPO's design a guarantee to avoid hysteresis and misalignment between main components even at toughest service conditions. The trunnion provides support for the plug, particularly on large valves when the valve is installed in a vertical line. In addition, additional support is provided at the bonnet to prevent stem binding common with other lift

plug products. **The trunnion eliminates the binding problem created by high differential pressures.** High differential pressures can cause the plug on most Lift Plug valve to move to one side which causes the stem to bind in the packing area. A misalignment of the stem also causes binding in the lift and turn mechanism which leads to premature failure of the mechanism and causes it to lock up preventing any further movement of the valve.

5.12. SWITCH PLUG VALVES

Apart from all the features of the AMPO POYAM ISOLATION PLUG VALVES, there are other special features applied only to the SWITCH valves.

- **3 or 4 way.**

  a) 3 way

  Basically is designed for a system with two DRUMS and a BYPASS line.

  Angle between ports can vary from 90° to 120°.

  b) 4 way

  Angle between ports would be of 90°.

  4 way SWITCH PLUG valve is available with the use of only one AMPO POYAM SWITCH PLUG VALVE instead of two conventional one valves. This avoids the risk of hot process fluid getting into the valve cavity.

- Lift operator and Turn operator independent.
- CONTROL PANEL upon request:

  AMPO POYAM VALVES can manufacture the control cabinet to the needs of the customers.

- AMPO POYAM switch plug valve can be supplied to meet ball or lift and turn plug valve face to face dimensions.

5.13. ADDITIONAL FEATURES TO BE ADDED

- Position indicator
- Extended bonnet
- Lantern ring
- ET (Default yes)
- Limit Switches, proximity or mechanical
- Interlock
- Legs / Feet
- Coatings
- Corrosion allowance
- Jacket
- Drain/Vent
- Available soft seat design

plug products. **The trunnion eliminates the binding problem created by high differential pressures.** High differential pressures can cause the plug on most Lift Plug valve to move to one side which causes the stem to bind in the packing area. A misalignment of the stem also causes binding in the lift and turn mechanism which leads to premature failure of the mechanism and causes it to lock up preventing any further movement of the valve.

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  a) 3 way

  Basically is designed for a system with two DRUMS and a BYPASS line.

  Angle between ports can vary from 90° to 120°.

  b) 4 way

  Angle between ports would be of 90°.

  4 way SWITCH PLUG valve is available with the use of only one AMPO POYAM SWITCH PLUG VALVE instead of two conventional one valves. This avoids the risk of hot process fluid getting into the valve cavity.

- Lift operator and Turn operator independent.
- CONTROL PANEL upon request:

  AMPO POYAM VALVES can manufacture the control cabinet to the needs of the customers.

- AMPO POYAM switch plug valve can be supplied to meet ball or lift and turn plug valve face to face dimensions.

5.13. ADDITIONAL FEATURES TO BE ADDED

- Position indicator
- Extended bonnet
- Lantern ring
- ET (Default yes)
- Limit Switches, proximity or mechanical
- Interlock
- Legs / Feet
- Coatings
- Corrosion allowance
- Jacket
- Drain/Vent
- Available soft seat design

6. QUALITY

AMPO values quality and therefore our operating and production processes are implemented and controlled by a quality assurance system, certified since 1991 under the **ISO 9001 Standard, API Spec Q1&6D and SIL 3** and accredited by the most important external organizations in the market, such as Lloyd's Register, Bureau Veritas (BV), Det Norske Veritas (DNV) and American Bureau (ABS).

We are equipped with the **most modern testing facilities** and highly qualified Internal Quality Control Personnel to ensure the reliability of our valves. We carry out Non Destructive Testing such as **X-ray, Dye Penetrant, Ultrasonic Test, Magnetic Particle and PMI** (Positive Material Identification), **Impact Tests, Visual inspections, Hydrostatic Tests, Pneumatic Tests, Cryogenic or Low Temperature Tests, Fugitive Emission Tests, Vacuum Tests, High Temperature Tests, High Pressure Tests, etc.**

Our management is completely based on the strictest quality standards, which is the foundation to enable AMPO to develop the product which best satisfies our customer.

The standard **testing procedure** of our PLUG valves is based on the **API 598.**

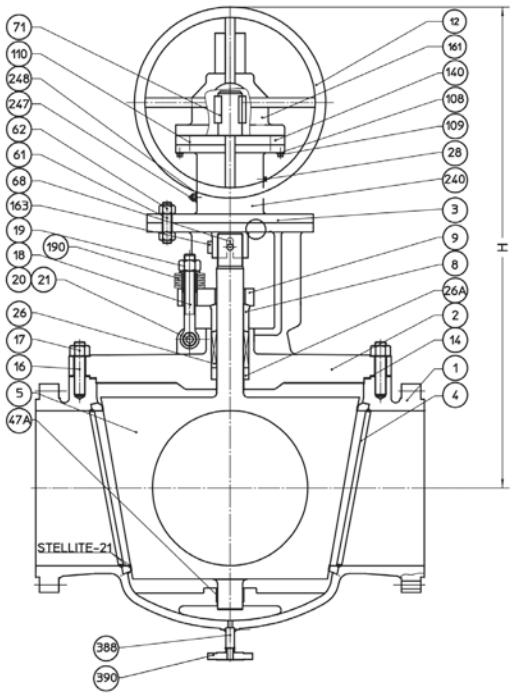
To assure the AMPO POYAM VALVES quality, all tests specified on the standard are performed as mandatory, even the optional ones such as High Pressure Closure test.

Fugitive Emission Class A standard design is achieved on these valves following **ISO 15848. API 641** fugitive emission compliant valve can be offered **as an option** as well. If further improvement is needed it would be studied case by case.

All the painting works are performed fully in house, special requirements for high temperatures or adhesions test are available for the special processes.

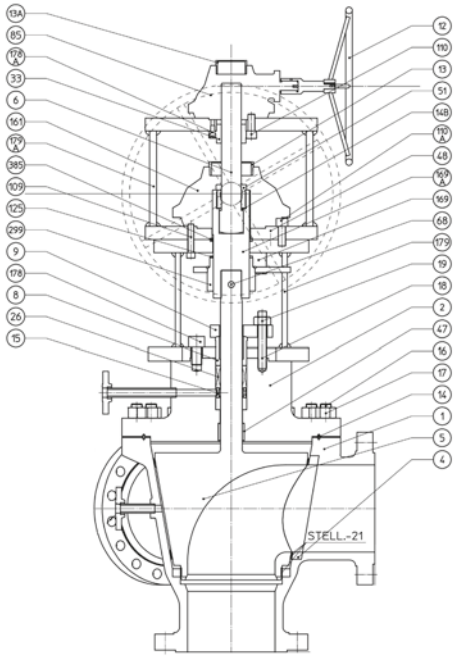

AMPO
30
300
POYAM
WCB
C0323-4

7. MATERIAL SELECTION



LIFT PLUG VALVE
Sample drawing

		WCB - F6	LCB - 316	CF8C - 347	INC825 - INC 825
	PART	MATERIAL	MATERIAL	MATERIAL	MATERIAL
1	BODY	ASTM A 216 WCB	ASTM A 352 LCB	ASTM A 351 CF8C	ASTM A 494 Cu5MCuC
2	BONNET	ASTM A 216 WCB	ASTM A 352 LCB	ASTM A 351 CF8C	ASTM A 494 Cu5MCuC
3	YOKE	ASTM A 216 WCB	ASTM A 352 LCB	ASTM A 351 CF8C	ASTM A 494 Cu5MCuC
4	SEAT	ASTM A 217 CA15 + STELL.-21	ASTM A 351 CF8M + STELL.-21	ASTM A 351 CF8C + STELL.-21	ASTM A 494 Cu5MCuC + STELL.-21
5	PLUG	ASTM A 487 CA15 + STELL.-21	ASTM A 351 CF8M + STELL.-21	ASTM A 351 CF8C + STELL.-21	ASTM A 494 Cu5MCuC + STELL.-21
8	GLAND BUSHING	ASTM A 479 Gr. 410	ASTM A 479 Gr. 316	ASTM A 479 Gr. 347	ASTM B 425 UNS N08825
9	GLAND FLANGE	ASTM A 516 Gr. 70	ASTM A 240 Gr. 316	ASTM A 240 Gr. 316	ASTM A 240 Gr. 316
12	HANDWHEEL	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518
14	GASKET	SPIRAL WOUND 316 + GRAPHOIL	SPIRAL WOUND 316 + GRAPHOIL	SPIRAL WOUND 316 + GRAPHOIL	SPIRAL WOUND 316 + GRAPHOIL
16	STUD BOLT	ASTM A 193 B7	ASTM A 320 L7	ASTM A 320 B8 CLASS 2	ASTM A 320 B8 CLASS 2
17	NUT	ASTM A 194 Gr. 2H	ASTM A 194 Gr. 7	ASTM A 194 Gr. 8	ASTM A 194 Gr. 8
18	EYE BOLT	ASTM A 29 Gr. 1045	ASTM A 29 Gr. 1045	ASTM A 29 Gr. 1045	ASTM A 29 Gr. 1045
19	NUT	ASTM A 194 Gr. 2H	ASTM A 194 Gr. 7	ASTM A 194 Gr. 8	ASTM A 194 Gr. 8
20	STUD BOLT	ASTM A 193 B7	ASTM A 320 L7	ASTM A 320 B8 CLASS 2	ASTM A 320 B8 CLASS 2
21	NUT	ASTM A 194 Gr. 2H	ASTM A 194 Gr. 7	ASTM A 194 Gr. 8	ASTM A 194 Gr. 8
26	PACKING	GRAPHOIL	GRAPHOIL	GRAPHOIL	GRAPHOIL
26A	BUSHING	GRAF + CARB	GRAP + CARB	GRAP + CARB	GRAP + CARB
28	GREASE NIPPLE	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518
47A	BUSHING	ASTM A 479 Gr. 410	ASTM A 479 Gr. 347	ASTM A 479 Gr. 347	ASTM B 425 UNS N08825
61	STUD BOLT	ASTM A 193 B7	ASTM A 320 L7	ASTM A 320 B8 CLASS 2	ASTM A 320 B8 CLASS 2
62	NUT	ASTM A 194 Gr. 2H	ASTM A 194 Gr. 7	ASTM A 194 Gr. 8	ASTM A 194 Gr. 8
68	PIN	ASTM A 29 Gr. 4135	ASTM A 29 Gr. 4135	ASTM A 29 Gr. 4135	ASTM A 29 Gr. 4135
71	KEY	ASTM A 29 Gr. 1045	ASTM A 29 Gr. 1045	ASTM A 29 Gr. 1045	ASTM A 29 Gr. 1045
108	GROWER WASHER	ASTM A 29 Gr. 6150	ASTM A 29 Gr. 6150	ASTM A 29 Gr. 6150	ASTM A 29 Gr. 6150
109	SOCKET BOLT	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518
110	SOCKET BOLT	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518
140	COUPLING FLANGE	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518
161	GEAR	ASTM A 216 WCB	ASTM A 216 WCB	ASTM A 216 WCB	ASTM A 216 WCB
163	POSITION INDICATOR	ASTM A 36	ASTM A 36	ASTM A 36	ASTM A 36
190	SPRING WASHER	ASTM A 693 (UNS S17700)	ASTM A 693 (UNS S17700)	ASTM A 693 (UNS S17700)	ASTM A 693 (UNS S17700)
240	OPERATOR	ASTM A 29 Gr. 4135	ASTM A 29 Gr. 4135	ASTM A 29 Gr. 4135	ASTM A 29 Gr. 4135
247	STUD BOLT	ASTM A 29 Gr. 4340	ASTM A 29 Gr. 4340	ASTM A 29 Gr. 4340	ASTM A 29 Gr. 4340
248	NUT	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518
388	PIPE	ASTM A 106 GrB	ASTM A 333 Gr. 6	ASTM A 312 TP. 347	ASTM B 166 UNS N08825
390	FLANGE PURGE CONNECTION	ASTM A 106 GrB	ASTM A 350 LF2	ASTM A 182 F-347	ASTM B 564 UNS N08825

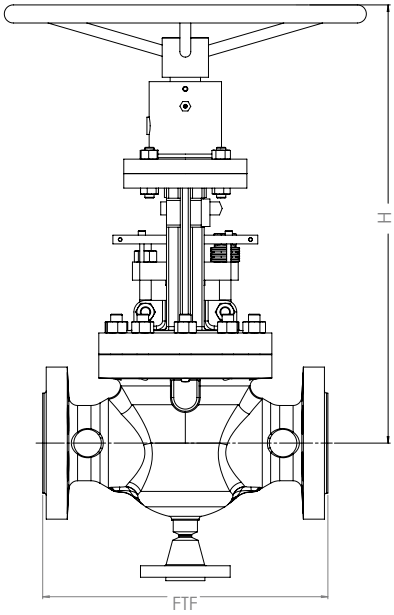


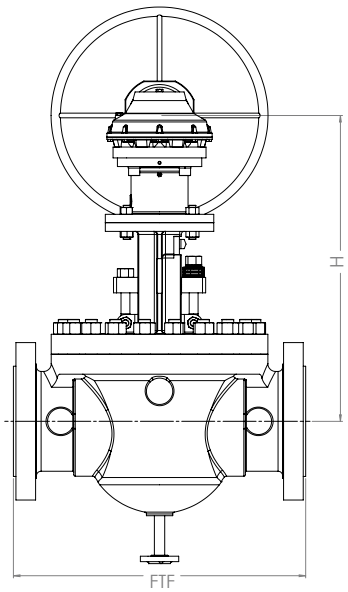
SWITCH PLUG VALVE
Sample drawing

		C12 - F6	LCB - 316	CF8C - 347	INC825 - INC 825
	PART	**MATERIAL**	**MATERIAL**	**MATERIAL**	**MATERIAL**
1	BODY	ASTM A 217 C12A	ASTM A 352 LCB	ASTM A 351 CF8C	ASTM A 494 Cu5MCuC
2	BONNET	ASTM A 182 F91	ASTM A 352 LCB	ASTM A 351 CF8C	ASTM A 494 Cu5MCuC
4	SEAT	ASTM A 217 CA15 +STELL.-21	ASTM A 351 CF8M + STELL.-21	ASTM A 351 CF8C + STELL.-21	ASTM A 494 Cu5MCuC + STELL.-21
5	PLUG	ASTM A 217 CA15 +STELL.-21	ASTM A 351 CF8M + STELL.-21	ASTM A 351 CF8C + STELL.-21	STM A 494 Cu5MCuC + STELL.-21
6	STEM	ASTM A 479 Gr. 410	ASTM A 479 Gr. 410	ASTM A 479 Gr. 410	ASTM A 479 Gr. 410
8	GLAND BUSHING	ASTM A 479 Gr. 410	ASTM A 479 Gr. 316	ASTM A 479 Gr. 347	ASTM B 425 UNS N08825
9	GLAND FLANGE	ASTM A 516 Gr. 70	ASTM A 240 Gr. 316	ASTM A 240 Gr. 316	ASTM A 240 Gr. 316
12	HANDWHEEL	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518
13	PIPE	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518
13A	PIPE	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518
14	GASKET	ASTM A 479 Gr. 410	SPIRAL WOUND 316 + GRAPHOIL	SPIRAL WOUND 316 + GRAPHOIL	SPIRAL WOUND 316 + GRAPHOIL
14B	GASKET	ASTM B 62 4A	ASTM B 62 4A	ASTM B 62 4A	ASTM B 62 4A
15	LANTERN	ASTM A 479 Gr. 410	ASTM A 479 Gr. 316	ASTM A 479 Gr. 347	ASTM B 425 UNS N08825
16	STUD BOLT	ASTM A 193 B16	ASTM A 320 L7	ASTM A 320 B8 CLASS 2	ASTM A 320 B8 CLASS 2
17	NUT	ASTM A 194 Gr. 4	ASTM A 194 Gr. 7	ASTM A 194 Gr. 8	ASTM A 194 Gr. 8
18	STUD BOLT	ASTM A 193 B16	ASTM A 320 L7	ASTM A 320 B8 CLASS 2	ASTM A 320 B8 CLASS 2
19	NUT	ASTM A 194 Gr. 4	ASTM A 194 Gr. 7	ASTM A 194 Gr. 8	ASTM A 194 Gr. 8
26	PACKING	GRAPHOIL	GRAPHOIL	GRAPHOIL	GRAPHOIL
33	GUIDE	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518
47	BUSHING	ASTM A 479 Gr. 410	ASTM A 479 Gr. 316	ASTM A 479 Gr. 347	ASTM B 425 UNS N08825
48	PIN	ASTM A 29 Gr. 4135	ASTM A 29 Gr. 4135	ASTM A 29 Gr. 4135	ASTM A 29 Gr. 4135
51	DISC NUT	ASTM A 479 Gr. 410	ASTM A 479 Gr. 410	ASTM A 479 Gr. 410	ASTM A 479 Gr. 410
68	PIN	ASTM A 29 Gr. 4135	ASTM A 29 Gr. 4135	ASTM A 29 Gr. 4135	ASTM A 29 Gr. 4135
85	GEAR	COMMERCIAL	COMMERCIAL	COMMERCIAL	COMMERCIAL
109	SOCKET BOLT	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518
110	SOCKET BOLT	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518
110A	SOCKET BOLT	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518
125	WASHER	ASTM B 62 4A	ASTM B 62 4A	ASTM B 62 4A	ASTM B 62 4A
161	GEAR	COMMERCIAL	ASTM A 216 WCB	ASTM A 216 WCB	ASTM A 216 WCB
169	STOP BOLT	ASTM A 29 Gr. 4135	ASTM A 29 Gr. 4135	ASTM A 29 Gr. 4135	ASTM A 29 Gr. 4135
169A	NUT	ASTM A 29 Gr. 4135	ASTM A 29 Gr. 4135	ASTM A 29 Gr. 4135	ASTM A 29 Gr. 4135
178	SOCKET BOLT	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518
178A	SOCKET BOLT	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518
179	COUPLING	ASTM A 516 Gr. 70	ASTM A 516 Gr. 70	ASTM A 516 Gr. 70	ASTM A 516 Gr. 70
179A	COUPLING	ASTM A 516 Gr. 70	ASTM A 516 Gr. 70	ASTM A 516 Gr. 70	ASTM A 516 Gr. 70
299	STOP BOLT	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518
385	WASHER	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518	ASTM A 29 Gr. 1518

8. DIMENSIONAL TABLES

NON LUBRICATED LIFT PLUG VALVES:

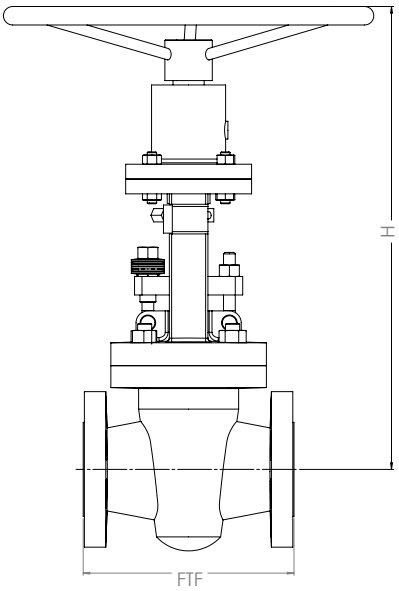


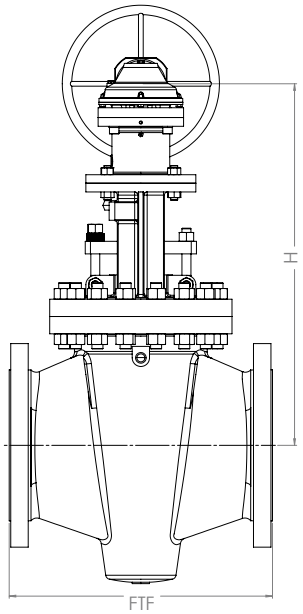


SIZE	FTF RF	FTF RTJ	Height (H)	Weight (Kg)
150 LBS				
1 1/2"	222	235	513	34
2"	267	279	529	42
2 1/2"	298	311	597	59
3"	343	356	597	72
4"	432	445	680	122
6"	533	546	821	270
8"	635	648	922	475
10"	787	800	938	763
12"	914	927	1010	924
14"	978	991	1109	1181
16"	1067	1080	1198	1354
18"	1156	1168	1279	1838
20"	1289	1302	1473	2523
24"	1422	1435	1550	3520
28"	1727	1740	1704	5246
30"	1816	1829	1974	7300
36"	2134	2147	2430	8500
300 LBS				
1 1/2"	241	257	525	40
2"	282	298	537	54
2 1/2"	330	346	605	72
3"	387	403	606	90
4"	457	473	688	170
6"	559	575	821	330
8"	692	708	982	675
10"	826	841	992	880
12"	965	983	1038	1440
14"	1041	1057	1197	1732
16"	1130	1146	1288	2100
18"	1206	1222	1421	2614
20"	1289	1308	1545	3520
24"	1499	1521	1608	5160
28"	1727	1752	1844	7060
30"	1816	1842	2002	9500
600 LBS				
2"	330	333	604	65
2 1/2"	381	384	613	102
3"	445	448	713,5	132
4"	508	511	791	225
6"	660	663	866	440
8"	794	797	990	715
10"	910	943	987	1180
12"	1067	1070	1055	1560
14"	1143	1146	1210	2050
16"	1245	1248	1430	2574
18"	1372	1375	1560	3222
20"	1524	1529	1645	4189
24"	1727	1737	1750	6192
900 LBS				
2"	381	384	624	77
2 1/2"	432	435	648	117
3"	470	473	747	153
4"	559	562	854	374
6"	737	740	967	632
8"	813	816	1039	1400
10"	965	968	1122	2160
12"	1118	1121	1193	2965
14"	1219	1229	1350	3522
16"	1330	1340	1569	4171
18"	1473	1486	1700	5012
20"	1626	1639	1745	6015
24"	1778	1797	1890	7214

*Non lubricated lift plug valves following AMPO STD.
*Higher pressure valves are available as per request.

NON LUBRICATED LIFT PLUG VALVES 70%:





SIZE	FTF RF	FTF RTJ	Height (H)	Weight (Kg)
150 LBS				
1 1/2"	165	178	475	30
2"	178	191	523	48
2 1/2"	191	203	575	61
3"	203	216	616	75
4"	229	241	686	88
6"	267	279	738	168
8"	457	470	926	268
10"	533	546	949	381
12"	610	622	1034	515
14"	686	699	1093	645
16"	762	775	1136	795
18"	864	876	1270	953
20"	914	927	1320	1137
24"	1067	1080	1440	1332
28"	1143	1156	1490	1579
30"	1295	1308	1550	1852
300 LBS				
1 1/2"	191	203	475	34
2"	216	232	523	51
2 1/2"	241	257	616	64
3"	282	298	625	78
4"	305	321	686	98
6"	403	419	743	228
8"	419	435	936	361
10"	457	473	959	501
12"	502	518	1074	653
14"	762	778	1133	856
16"	838	854	1177	1100
18"	914	930	1293	1312
20"	991	1006	1347	1543
24"	1143	1165	1471	1791
28"	1346	1371	1525	2054
30"	1397	1422	1590	2322

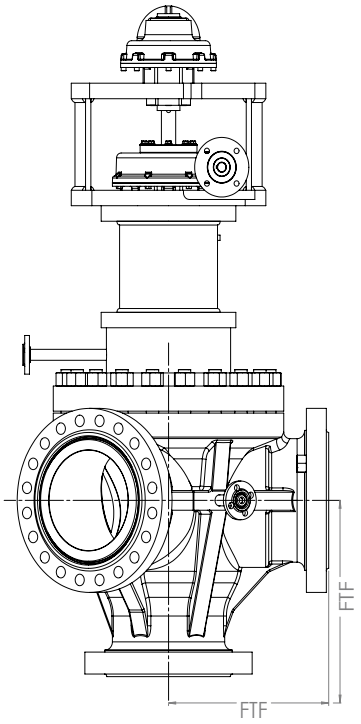
*Non lubricated lift plug valves following AMPO STD.
*Higher pressure valves are available as per request.

SWITCH PLUG VALVES:

*Switch Plug Valves following AMPO STD.

SWITCH valves are customized usually to the available P&ID's of the customers.

"Due to engineering activities, all the dimensions and weights could be subjected to changes by AMPO POYAM VALVES without any notification. Therefore, please consult us for confirmation on the above data as well as for other dimensions and weights not reported in the tables."



SIZE	FTF RF	Weight (Kg)
150 LBS		
1 1/2"	111	100
2"	133,5	140
2 1/2"	149	201
3"	171,5	327
4"	216	504
6"	266,5	655
8"	317,5	850
10"	393,5	1180
12"	457	1473
14"	489	1785
16"	533,5	2192
18"	578	2714
20"	644,5	3320
24"	711	3951
28"	863,5	4625
30"	908	5367
36"	1067	6201

SIZE	FTF RF	Weight (Kg)
300 LBS		
1 1/2"	120,5	120
2"	141,3	170
2 1/2"	165	251
3"	193,7	387
4"	228,6	624
6"	279,4	855
8"	346,1	1150
10"	413	1480
12"	482,6	1892
14"	520,5	2454
16"	565,15	3220
18"	603	3758
20"	644,5	4352
24"	749,3	5183
28"	863,5	6070
30"	908,05	7105

SIZE	FTF RF	Weight (Kg)
600 LBS		
2"	165,1	180
2 1/2"	190,5	300
3"	222,25	480
4"	254	753
6"	330,2	1000
8"	396,9	1325
10"	469,9	1700
12"	533,4	2560
14"	571,5	3150
16"	622,5	3782
18"	686	4270
20"	762	5268
24"	863,5	6990

SIZE	FTF RF	Weight (Kg)
900 LBS		
2"	190,5	240
2 1/2"	216	400
3"	235	610
4"	279,5	903
6"	368,5	1200
8"	406,5	1590
10"	482,5	2040
12"	559	3072
14"	609,5	3780
16"	665	4538
18"	736,5	5124
20"	813	6321
24"	889	8388

*Higher pressure valves are available as per request.

9. FIGURE/ORDER NAMING SYSTEM

How to order AMPO POYAM VALVES Lift plug and Switch plug valves.

The figure / order naming system outlined below has been designed to cover the most common valve configurations. If special features are required, please advise the detailed description for accurate processing of the order.

LIFT PLUG VALVES ORDER NAMING SYSTEM:

Example: **7.M.2.30.C12A.F6.RF.AE**

Bore size
None: Full Port
7: 70% of reduction
9: 90% of reduction

Valve type
Lift plug valve

Valve Class
1: 150#
2: 300#
3: 600#
4: 900#
5: 1500#
6: 2500#

Valve size
2″
3″
4″
…
36″

Valve Body-bonnet material

Valve Trim material

Valve End

Actuation
None: Manual
RC: Gearbox
AE: Electric Actuator
AH: Hydraulic Actuator

SWITCH PLUG VALVES ORDER NAMING SYSTEM:

In this case, you may introduce a **"S"** after the Valve type letter.

The rest of the nomenclature is exactly the same of Lift Plug Valves.

Example: **M.S.2.30.C12A.F6.RF.AE**

Switch Plug Valve

10. MORE AMPO POYAM VALVES SOLUTIONS

Other products applicable for coker service AMPO POYAM VALVES is able to offer:

- **THROTTLING BALL valves:**

  Up to 36" & 900#
  High Temperatures

- **Slurry GATE & ANGLE valves**

  Solid Wedge
  Up to 60" & 2500#

- **BALL valves for High Temperature and Metal to Metal**

  Slurry application
  Up to 36" & 2500#

11. VALVE COMPARISON

	AMPO POYAM LIFT PLUG VALVE	BALL VALVE	SLIDING GATE VALVE
DESIGN	• **Simple - only 3 major parts:** body, plug and bonnet. • **Torque seated:** If small amount of leakage is noticed, an increase in applied torque is used to improve shutoff.	• **Complex - more than 8 major parts,** 2 body halves, bellows, bellows sleeve, upstream seat, downstream seat, and ball assembly. • **Position seated** - If leakage occurs, there is no way to decrease. The leak will only increase from erosion until the coke unit must shut down and valve is removed for repair.	• **Multiple body flange joints** susceptible to thermal expansion issues and fugitive emission paths. • **Multiple internal components,** guides, springs and seats can affect service reliability in case of purge loss. • Large valve profile can be a challenge in existing Coker units.
SEALING DIRECTION	• **Bi-directional sealing.**	• **Uni-directional** sealing increases risk. The valve manufacturer must be involved in proper installation.	• Some models are **uni-directional.**
SEAT	• **Non-rubbing lift and turn design** prevents wear and galling of the seal surfaces during operation. • **Integral:** No voids to allow for coke buildup. • **Simple repair:** Only two pieces require any possible repair, the plug and seats.	• **Constantly rubbing sealing surfaces** allows wearing and damage by galling during the normal operation of the valve. • **Separate/interference fit:** Allows for coke buildup behind the seat and misalignment during installation. • **Complex Repair: The valve must be removed from the piping.** One must heat seal to high temperature to remove. Chance of thermal destruction and damage behind the seat.	• **Spring loaded.** • Separate from body so **susceptible to misalignment** from coke buildup. • **High frictional wear** between seat and wedge thus can affect life cycle and maintenance costs.

	AMPO POYAM LIFT PLUG VALVE	BALL VALVE	SLIDING GATE VALVE
SPRING	• **None required**	• **Bellows must be used to hold the ball** in the seat to maintain isolation. It must be designed using high strength, thin, expensive material like Inconel® 718. • **Complex:** Utilizes multiple convolutions, which allows for many areas of coke buildup. • **Requires a protective sleeve** to protect and isolate the sensitive bellows from the process. • **Purge is required** at the bellows to prevent the bellows from catastrophic damage from normal operating pressures. • **Lapping of bellows is required** to prevent massive steam consumption. • **Low spring loads allow for adhered coke on the ball to migrate between the ball and the seat.**	• **Susceptible to coke build up if purge is disrupted** and this may affect valve sealing capability.
PLUG/BALL	• **Hardened martensitic stainless steel** (Hb 350400), ground to prevent erosion and adhesion.	• **Conventional chrome** plating provides a finish of 2-4 RMS that resist coke adhesive. However, **chrome plating is a weak mechanical bond** with discontinuities known as "holidays". These discontinuities allow permeation of corrosives through the coating. These corrosives attack the bond causing the bond to weaken and fail.	
TESTING	• **Valve and trim design is capable of withstanding 100% ASME/API.** No "modified" or de-rated test needed.	• **ASME/API test must be "modified" or de-rated** to prevent damage to valve internals.	
ACTUATION	• **Plug does not contact/rub the seat during rotation thus torques are low.** This results in **smaller actuators** and lower capital cost. • Lower torque is lower work for the actuator, thus the **actuator life is increased.** • Plug and seat do not contact during rotation, **so torques do not increase after being in service.** • Low torque allows for **easy manual operation,** with 30-60 turns to open and close.	• Ball constantly contacts and rubs the seat during rotation causing **significant run torques.** This results in much **larger, expensive actuators** being required. • Increased torque **lowers the life expectancy of the actuator.** • Ball and seats in constant contact must wipe or overcome coke buildup on the ball during rotation. **The increasing torques after being in service causes jamming.** • High torques require **minimum of 100 turns of a handwheel** to open and close.	• **MOV adds additional ceiling height to envelope dimension.**
IN-LINE REPAIR	• One-piece body allows for the bonnet and plug to be removed, and the seat inspected and cleaned **without removing the body from the line.**	• Two-piece split body requires **the valve to be removed** from the line to allow inspection and cleaning of the internals.	
IN-LINE DECOKE	• Lift and turn torque seating allows the valve **to be decoked in line during operation.**	• **Coker unit must be shut down** and valve removed in order to be decoked.	

12. CUSTOMERS

These are some of the main customers who trust on AMPO POYAM VALVES for lift plug and switch plug valves:

2020
2015

2014
2010

2009
2005

2004
2000

1999
1995

1994
1990

1989
1984

....

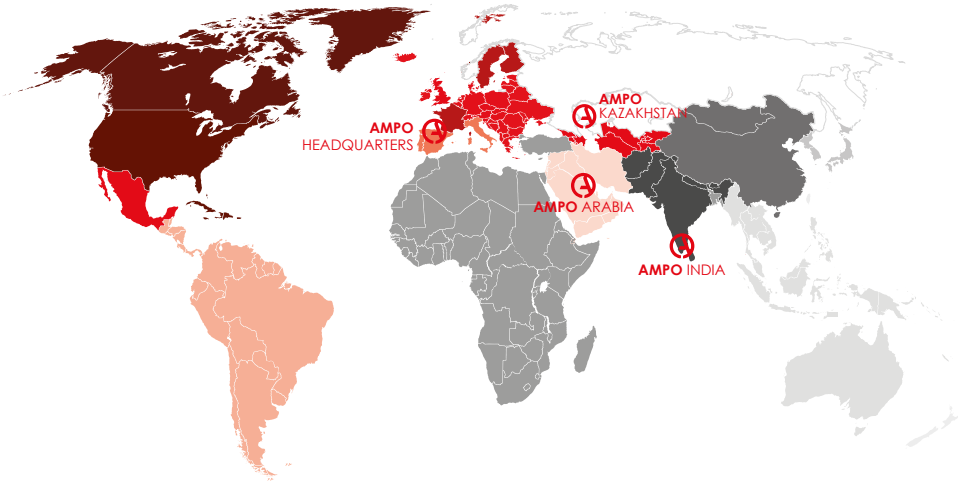
13. AMPO SERVICE

- Predictive and preventive maintenance
- Technical support
- Technical training
- Valve condition monitoring
- Spare parts and valve supply

On-site support within 72 hours.
Experience in executing global maintenance service for complete projects.
Maintenance and Operation Manuals are provided and customized per project and per type of valve supplied.

14. WORLDWIDE SALES AND MANUFACTURING NETWORK

AMPO
POYAM VALVES
Commitment made of steel



AMPO Manufacturing plants
Idiazabal - Spain
Coimbatore - India
Dammam - Saudi Arabia
Atyrau - Kazakhstan

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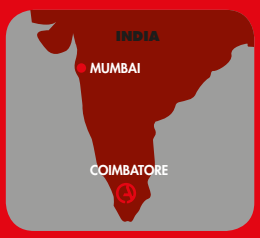
AMPO is just 1 hour drive away from BILBAO (International Airport) and at the following distances from other important places:
65 km west of Pamplona/45 km south of San Sebastian/ 70 km south of the French border.



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