



# Cryogenic gate, globe and check valves

Technical brochure



Commitment made of steel

# 1. COMPANY PROFILE

AMPO is an **international leader** in highly engineered valves and Integrated Smart Solutions 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

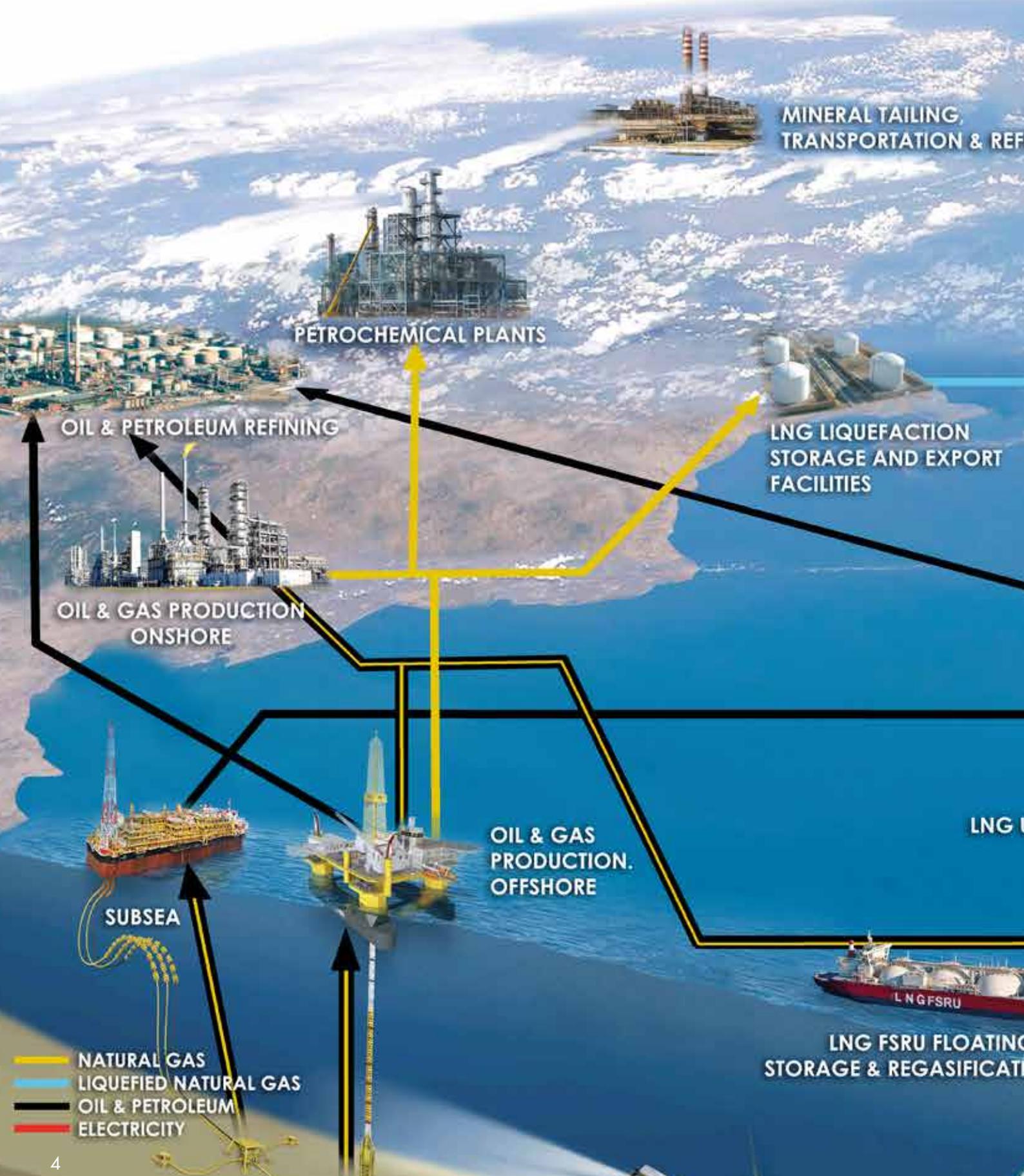
Cryogenic service valves main applications are focused in LNG and LPG terminals and transportation ships. AMPO POYAM VALVES manufactures valves for the **complete LNG and LPG chain**, as gas is obtained from gas cameras, transportation pipelines, liquefaction, carrier vessels, FPSO's, regasification terminals, peak saving plants, storage tanks, etc. Moreover, **our valves are also used for low temperatures**, offering the best solution for applications such as: **Ethylene, Oxygen, Nitrogen, petrochemical plants, special processes on refineries, etc.**

As a result of over 30 years of experience in the manufacturing of cryogenic valves, AMPO POYAM VALVES is the **leading manufacturer of highly engineered valves for the LNG market**, especially with top entry or split body cryogenic ball valves, cryogenic gate, globe and check valves as well as cryogenic butterfly valves.

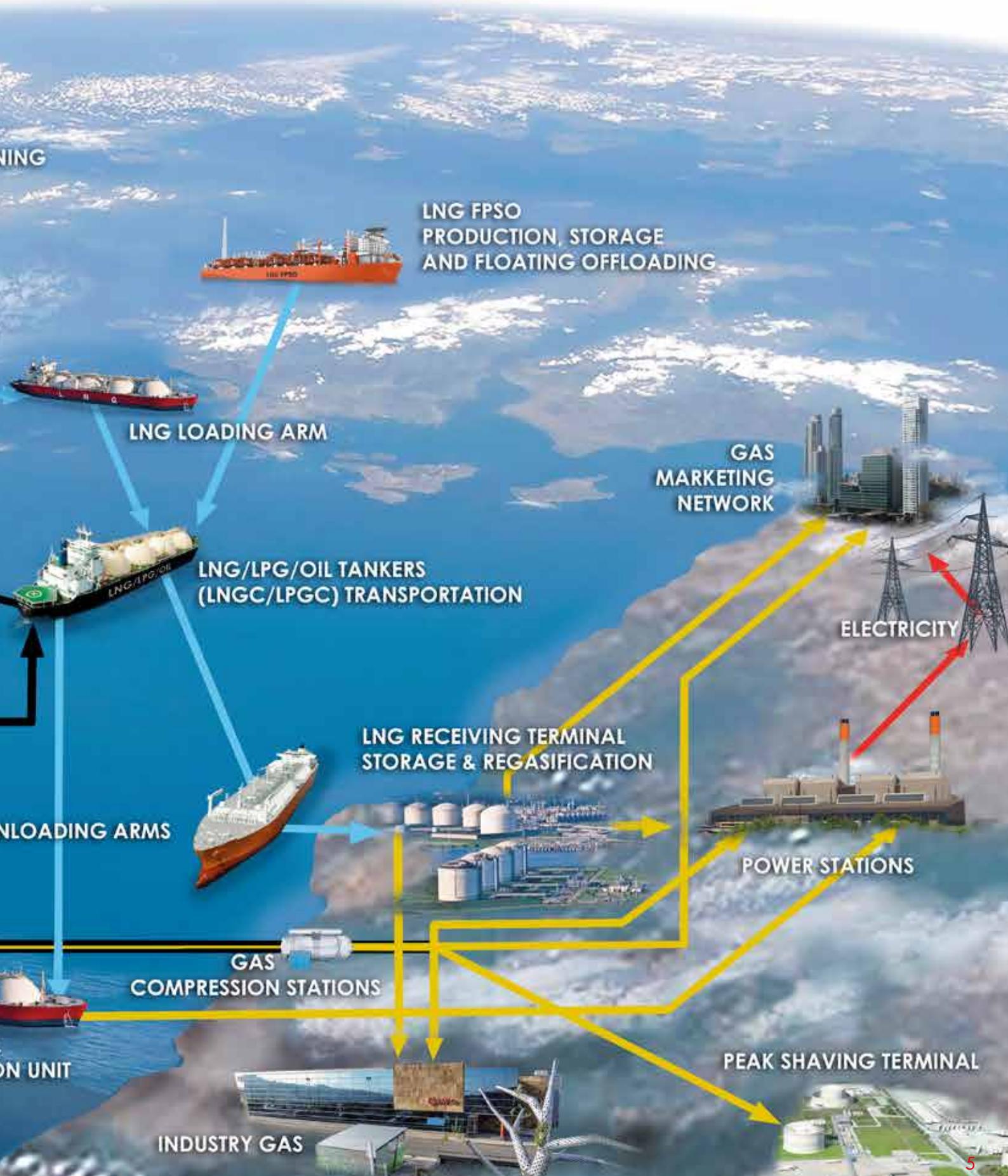
AMPO POYAM valves are currently installed and in safe and reliable operation in more than the 90% of the worldwide LNG plants.



# AMPO POYAM VALVES IN THE COMPLETE ENERGY CHAIN

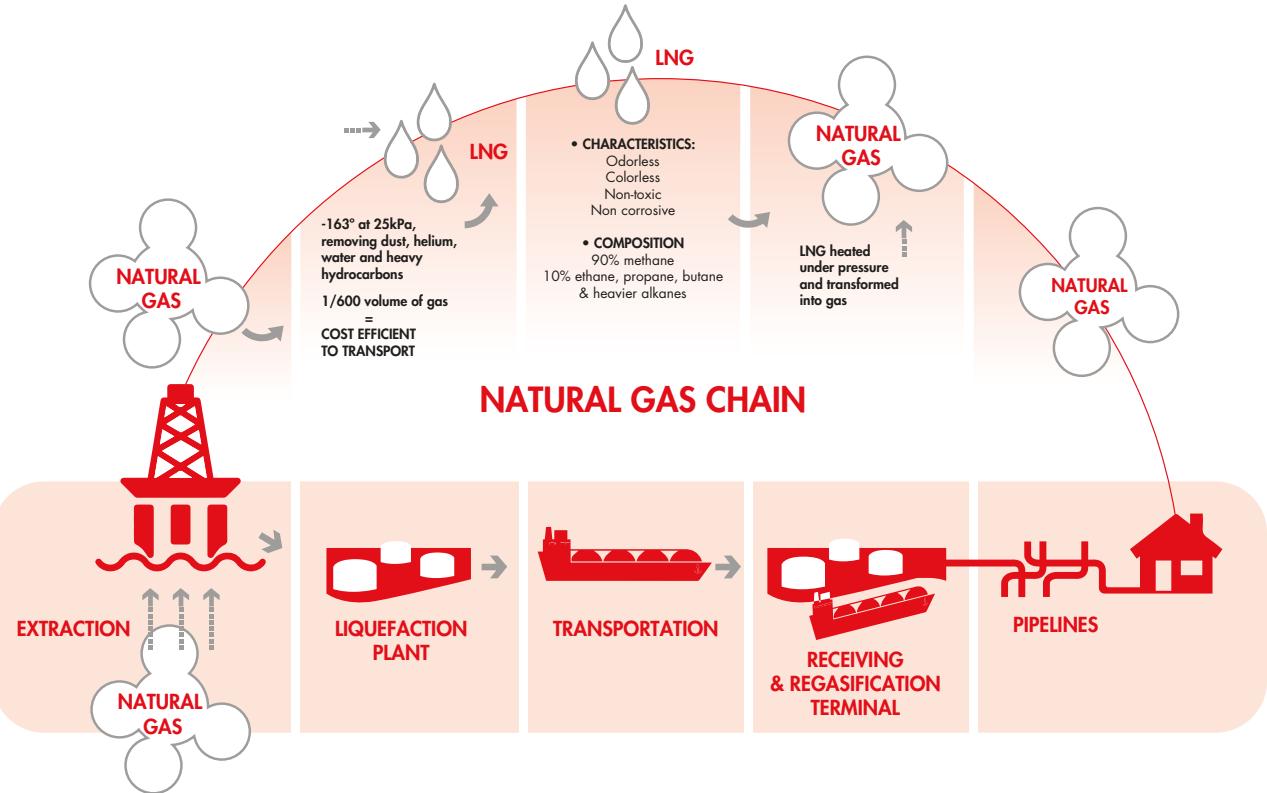


**AMPO POYAM** valves are currently installed and in safe and reliable operation in more than the 90% of the worldwide LNG plants.



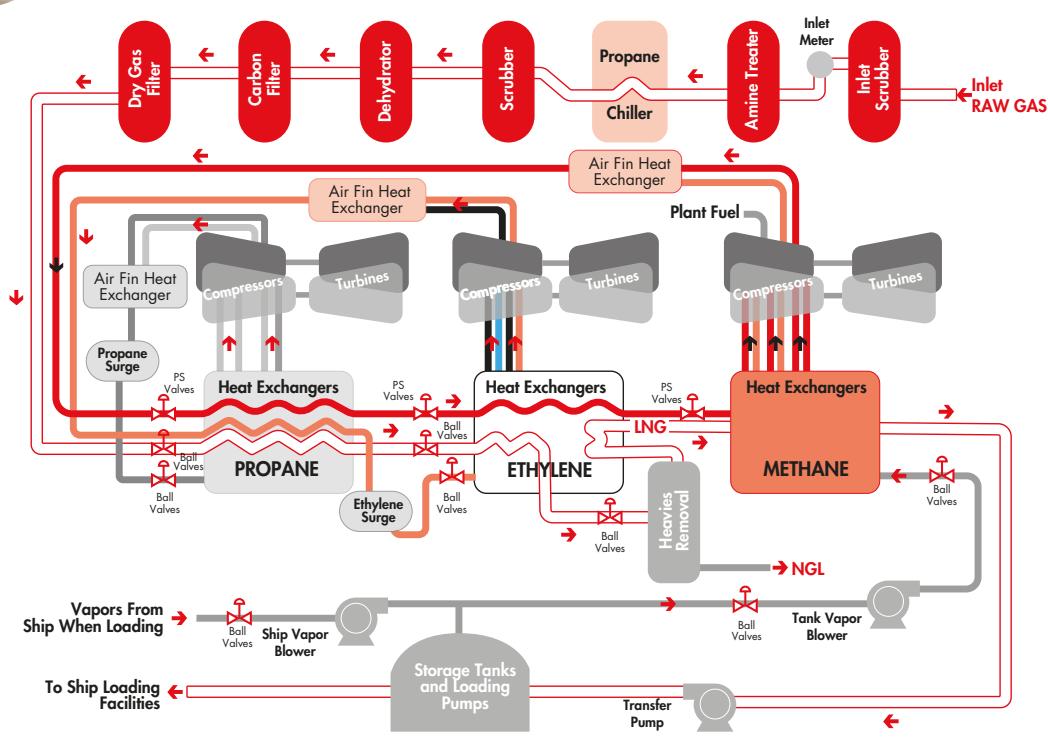
## 2. APPLICATION

Which is the natural gas chain?

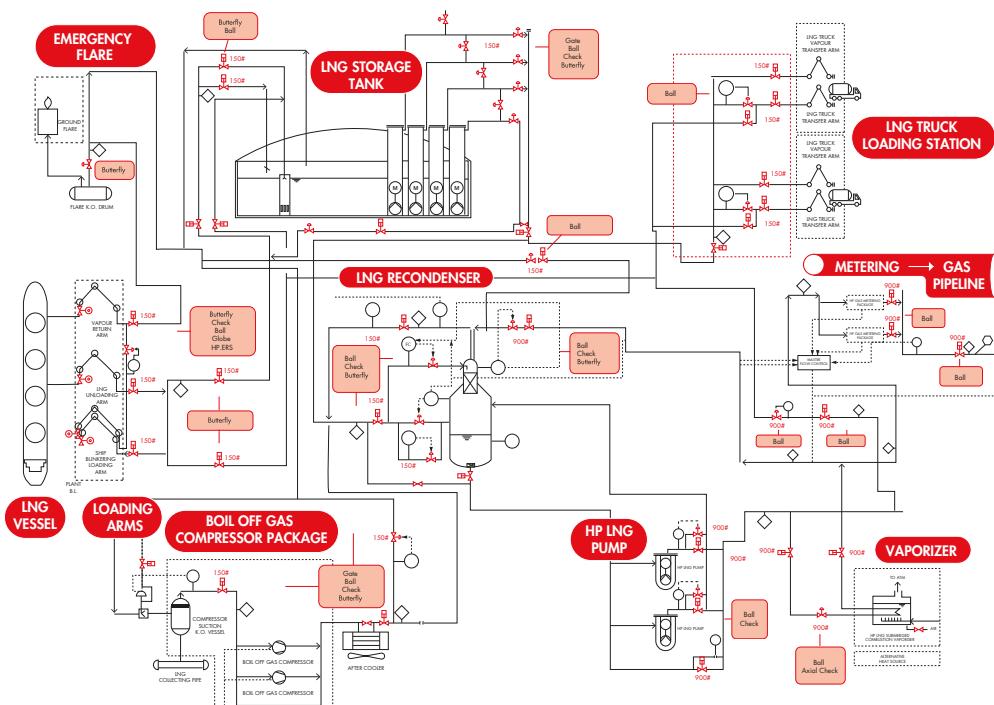




## LIQUEFACTION TERMINAL SAMPLE:



## RECEIVING TERMINAL SAMPLE:



### 3. CRYOGENIC GATE, GLOBE & CHECK VALVES

#### CRYOGENIC GATE VALVES

**Sizes:** 1/2" up to 72".

**Pressure class:** 150 LBS to 2500 LBS.

**Temperature:** Down to -196°C

**Bonnet type:** Bolted bonnet or Pressure seal bonnet.

**Wedge type:** Flexible wedge, solid wedge or parallel seats.

**Standards:** API 600, API 602, API 603, ASME B16.34, ISO 15761, EN 12516.

**Materials:** CF3, CF3M, CF8, CF8M, 304, 304L, 316, 316L, ...

**Seats:** Metallic, stellite, soft seat.

**Seals:** Gaskets: Inoxgraf, spiral wound, RTJ, graphoil.  
Packing: Graphite, PTFE.

**Ends:** RF, BW, RTJ, FF, NPT, SW; CLAMPS

**Actuation:** Actuator, gearbox, handwheel.

**Industries and applications:** Natural gas processing, oil & petroleum refining, petrochemical, chemical and power.



## **CRYOGENIC GLOBE VALVES**

**Sizes:** 1/2" up to 48".

**Pressure class:** 150 LBS to 2500 LBS.

**Temperature:** Down to -196°C

**Bonnet type:** Bolted bonnet or Pressure seal bonnet.

**Opening type:** Linear, slow opening, quick opening & stop-check.

**Construction:** Straight pattern, Y-type pattern, angle pattern.

**Standards:** API 623, API 602, ASME B16.34, BS 1873, ISO 15761, EN 12516.

**Materials:** CF3, CF3M, CF8, CF8M, 304, 304L, 316, 316L, ...

**Seats:** Metallic, stellite, soft seat.

**Seals:** Gaskets: Spiral wound, RTJ, graphite.

Packing: Graphite.

**Ends:** RF, BW, RTJ, FF, NPT, SW; CLAMPS

**Actuation:** Actuator, gearbox, handwheel.

**Industries and applications:** Natural gas processing, oil & petroleum refining, petrochemical, chemical and power.



## CRYOGENIC CHECK VALVES

**Sizes:** 1/2" up to 48".

**Pressure class:** 150 LBS to 2500 LBS.

**Temperature:** Down to -196°C

**Bonnet type:** Bolted bonnet or Pressure seal bonnet.

**Construction:** Swing type, lift type, axial type.

**Closure type:** Swing disc, conical plug, tilting disc.

**Standards:** API 6D, API 602, API 594, ASME B16.34, BS 1868, ISO 15761, EN 12516.

**Materials:** CF3, CF3M, CF8, CF8M, 304, 304L, 316, 316L, ...

**Seats:** Metallic, stellite, soft seat.

**Seals:** Gaskets: Spiral wound, RTJ, graphite.  
Packing: N/A

**Ends:** RF, BW, RTJ, FF, NPT, SW; CLAMPS

**Actuation:** N/A.

**Industries and applications:** Natural gas processing, oil & petroleum refining, petrochemical, chemical and power.



## 4. WHY CHOOSE OUR CRYOGENIC GATE, GLOBE & CHECK VALVES?



More than 500k valves in safe and reliable operation in more than the 90% of the **WORLDWIDE LNG PLANTS**



**LONG SERVICE LIFE** due to our proven cryogenic sealing technology of more than 40 years.



The valve construction is in compliance with **INTERNATIONAL STANDARDS**.



**MINIMUM PRESSURE-DROP** is ensured.



**FIRE SAFE DESIGN** in compliance with API 607 and API 6FA.



**TAILOR MADE DESIGN:** Body and TRIM components can be selected and designed for each project and application, considering fluid/flow properties of each service.



**LOW OPERATION TORQUE** with consequent cost savings. Moreover, torque remains consistent.



**ZERO LEAKAGE** with preferential and non-preferential flow. Precision ground seating surface assuring zero leakages.



**LOW FUGITIVE EMISSIONS**, achieving a **CLASS A** level solution and increasing plant safety.



**EASY MAINTENANCE AND HIGH INTERCHANGEABILITY**, due to components' standardization.

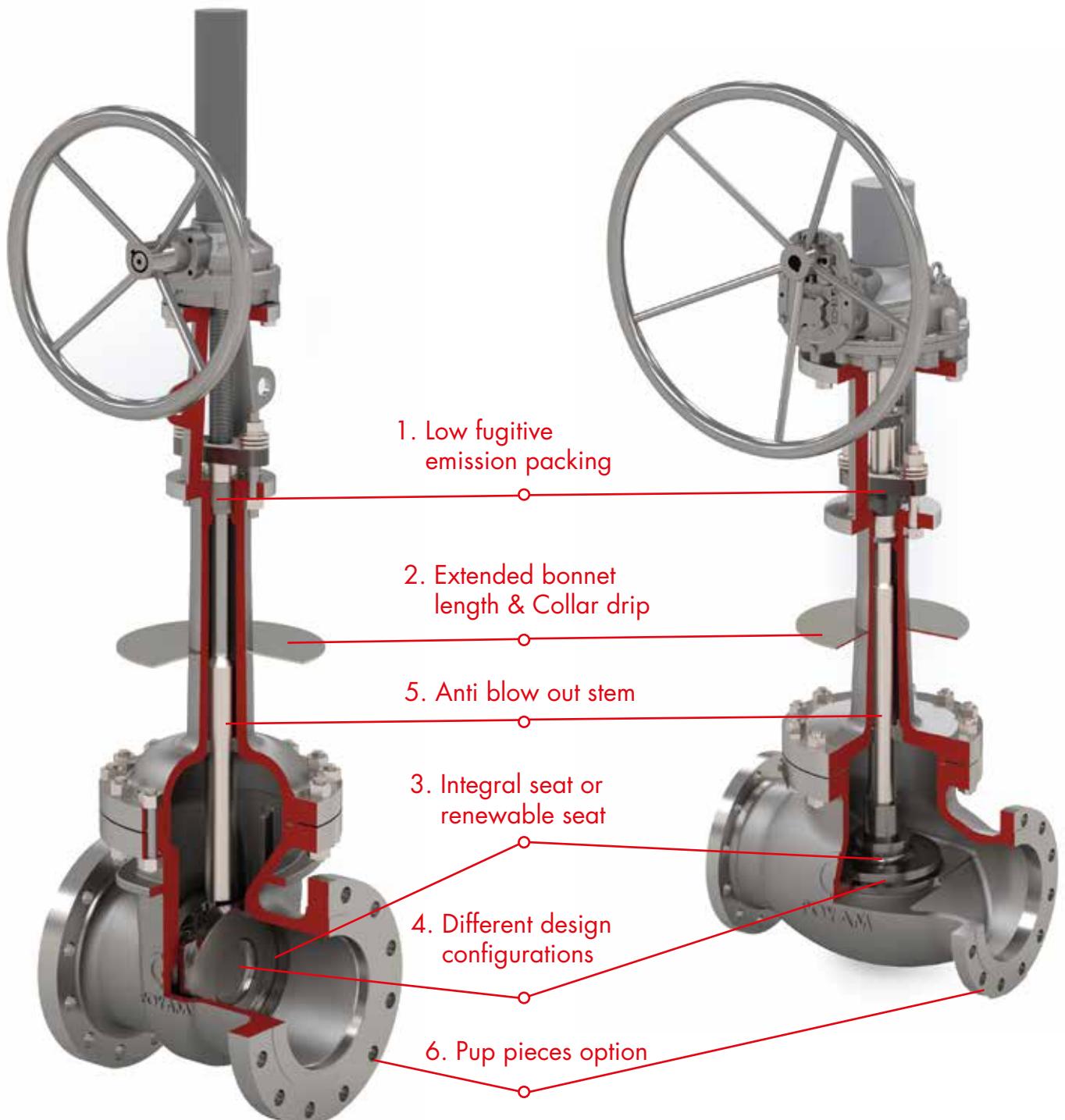


**SAFE AND FLEXIBLE** valve handling systems, even with large actuators.



## 5. TECHNICAL FEATURES

### 5.1 CRYOGENIC GATE & GLOBE VALVES



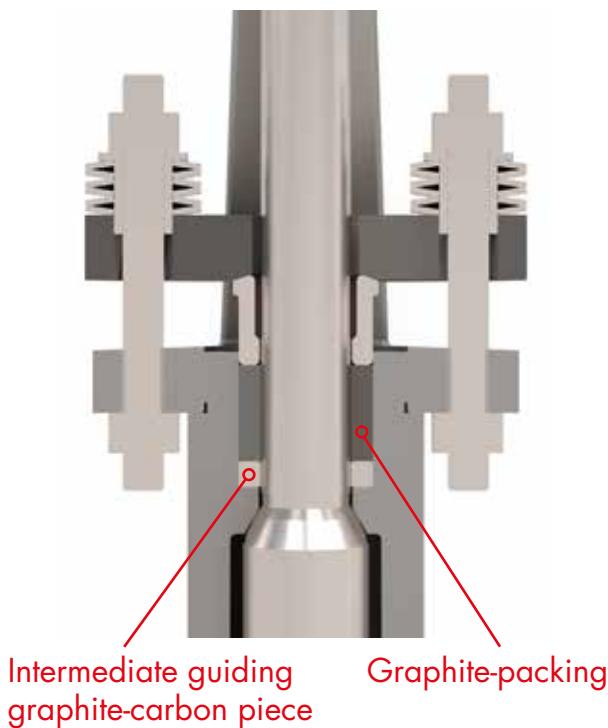
CRYOGENIC GATE VALVE

CRYOGENIC GLOBE VALVE

## 5.1.1 LOW FUGITIVE EMISSION PACKING:

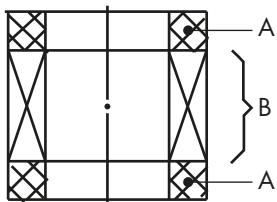
In severe service conditions, the graphite material parts suffer more than in other processes. Stem sealing is an extremely important valve performance feature, since seal leakage can represent safety hazard, a potential environmental risk, energy loss or a loss of product.

The packing area design optimization is critical in gate and globe valves, since it is the key location for the possible external leakages that valves in this service can suffer due to the rising stem design.



### • GRAPHITE RINGS:

- Braided Graphite Inner and Upper rings → A
- Die Formed Corrosion Inhibited graphite rings → B



- This configuration is defined by international standards.
- Low-emission packing as per API 622 is AMPO's standard packing choice.

The following design options can be considered depending on the client's requirements:

- **GRINDING** in the stem and stuffing box for a better surface finishing and extra sealing performance (lip seal + graphite packing).

- **LIVE-LOADING SYSTEM:**

A live-loading system is also available with belleville springs, to avoid any preload relaxation in the bolting.

- **LIP-SEAL** can be applied in our designs before graphite packing (two sealing points).

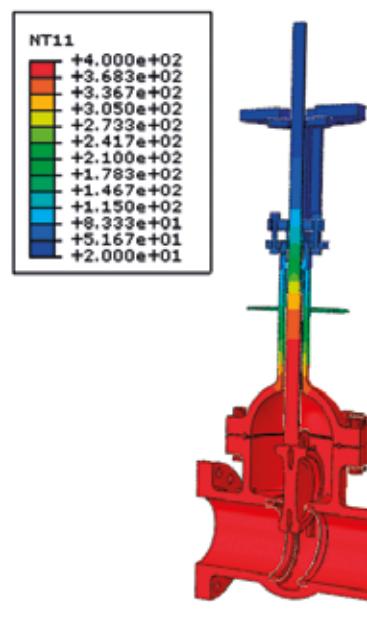
## 5.1.2 EXTENDED BONNET LENGTH AND COLLAR DRIP:

### BONNET LENGTH:

International standards are followed to define bonnet length:

- BS 6364:
  - Non-cold box.
  - Cold box.
- MESC SPE 77/200.
- ISO 28921-1
- MSS SP 134.

Most restrictive one is considered and double-checked by thermal Finite Element Analysis, in order to guarantee temperatures higher than -50°C in the packing:



*Thermal analysis results performed on a cryogenic valve with extended stem and bonnet*

### COLLAR-DRIP:

Thermal Finite Element Analysis are carried out to guarantee correct heat dissipation:

- Collar-drip external diameter.
- Collar-drip position.

### **5.1.3. INTEGRAL SEAT OR RENEWABLE SEAT:**

Valve working conditions require performing a fluid process analysis, where the seating solution is defined. While it is a common practice to use renewable seats, some services may require the design solution to be reconsidered, obtaining a reliable sealing for a lifetime without extra parts.

AMPO POYAM VALVES can offer welded, threaded, and integral seats and different hardfacing options.



*Renewable seat*



*Integral seat*



*Renewable seat*



*Integral seat*

## 5.1.4. DIFFERENT DESIGN CONFIGURATIONS:

### 5.1.4.1. GATE VALVES:

The main constructions of cryogenic gate valves are:

- **WEDGE GATE:**

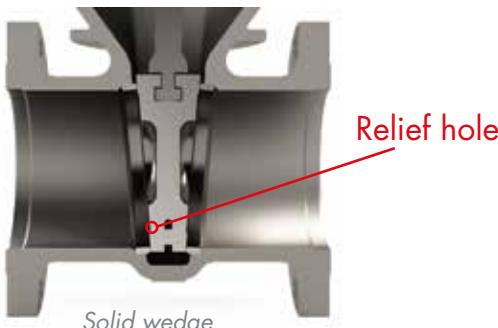
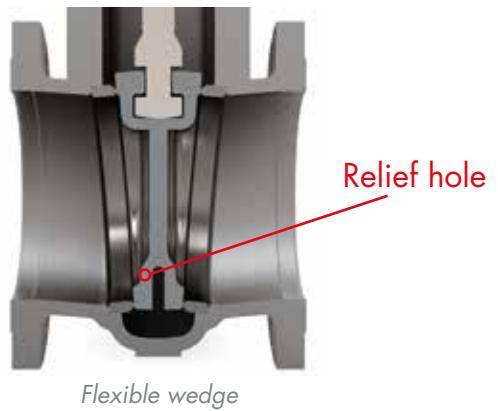
In this type of valve, the seating element is wedge-shaped. Therefore, the wedge closes against two inclined seats.

The purpose of the wedge shape is to introduce a high supplementary seating load that enables metal-sealed wedge gate valves to seal against not only high but also low fluid pressure.

Wedge valves' sealing is performed by the closing manual (or actuated) force. This means that the force applied by the operator has direct impact on valve sealing performance.

The wedge can be either flexible or solid. Flexible wedge gate valves are considered a higher performance solution than solid wedge gate valves: they require lower closing force and due to its flexibility, the sealing performance increases with pressure drop. Manufacturing adjustments are higher in solid wedge designs.

In any case, all cryogenic wedge gate valves are including a relief hole on the wedge to relieve any pressure increase on the cavity.

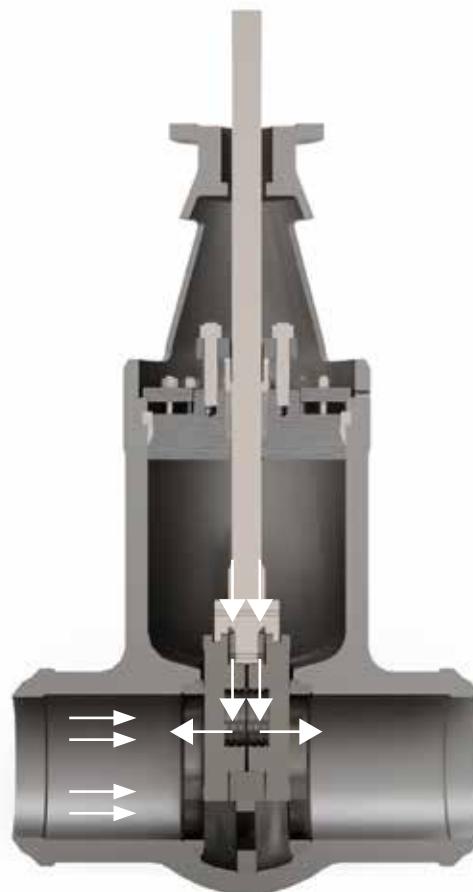


Soft seated wedge gate valves can be manufactured upon request.

- **PARALLEL SLIDE GATE:**

The parallel slide gate valve is designed to obtain a sealing with a correct positioning of the wedge, avoiding over-torque. This is achieved with an open and close mechanical stopper, that guarantees the correct location of the wedge in both positions.

Parallel slide gate valves are generally used in high pressure condition, as they take advantage of the line pressure to push the closure member against the seats. As shown in the below figure, when the line pressure enters the cavity, it helps pushing the wedges against the seats, assuring that the valve closes properly. Under low pressure conditions, a spring system guarantees the valve sealing.



In high-pressure and temperature severe applications, the closure member of gate valves is more likely to deform or expand. In such cases, parallel slide configuration can be a more suitable option.

### 5.1.4.2. GLOBE VALVES:

The main constructions of cryogenic globe valves are:

- Straight pattern or "T" form.
- "Y" pattern with inclined bonnet design.

Angle pattern is also available upon request.



Straight pattern



Y-pattern



Angle pattern

Some of the highlights on the comparison of these designs are:

- Drop pressure depends on the body configuration.
- The different body pattern configurations allow the valve installation in every orientation possible: straight lines ("T" pattern), inclined lines ("Y" pattern) and 90° lines (angle pattern).

The design of the disc against the seating surfaces can warranty a quick opening, linear opening, or slow opening operation, providing higher control of the flow during the operation of the valve. Cv / Opening % charts are available upon request. Throttling option is also available as per request.

The closure member can be either conical or parabolic:



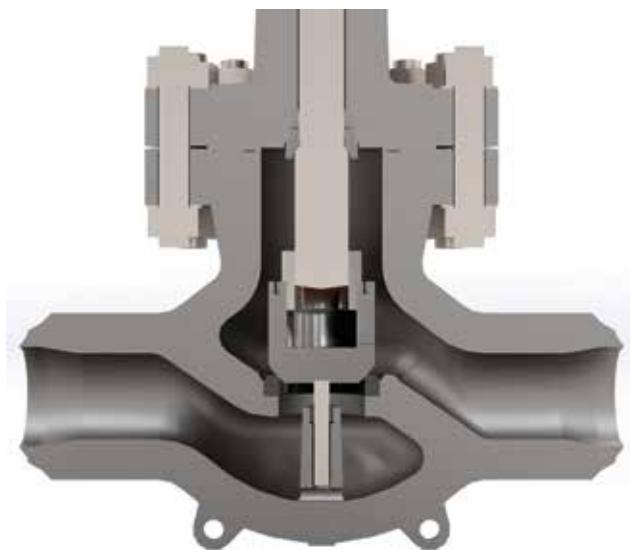
Conical disc



Parabolic disc

Soft seated globe valves can also be manufactured upon request.

Globe valves can be designed as stop check valves. A stop check valve design has the advantages of the check valve, working as a non-return when it is in open position and the advantage of the globe valve for shut-off when closed.



*When the stem is in open position the disc can move freely*

### 5.1.5. ANTI BLOW OUT STEM:

The stem is inserted from inside the valve body to prevent any possible blowout. When the gland flange is removed, the stem is held securely by the backseat even when the valve is under pressure.



*Backseat in contact with the stem when the valve is in open position*

The backseat is a critical area of the valve. Not only it holds the stem against the bonnet but also it prevents leaks. The backseat is the first barrier of any possible stem leakage. Moreover, it is an important performance checkpoint of the valve.

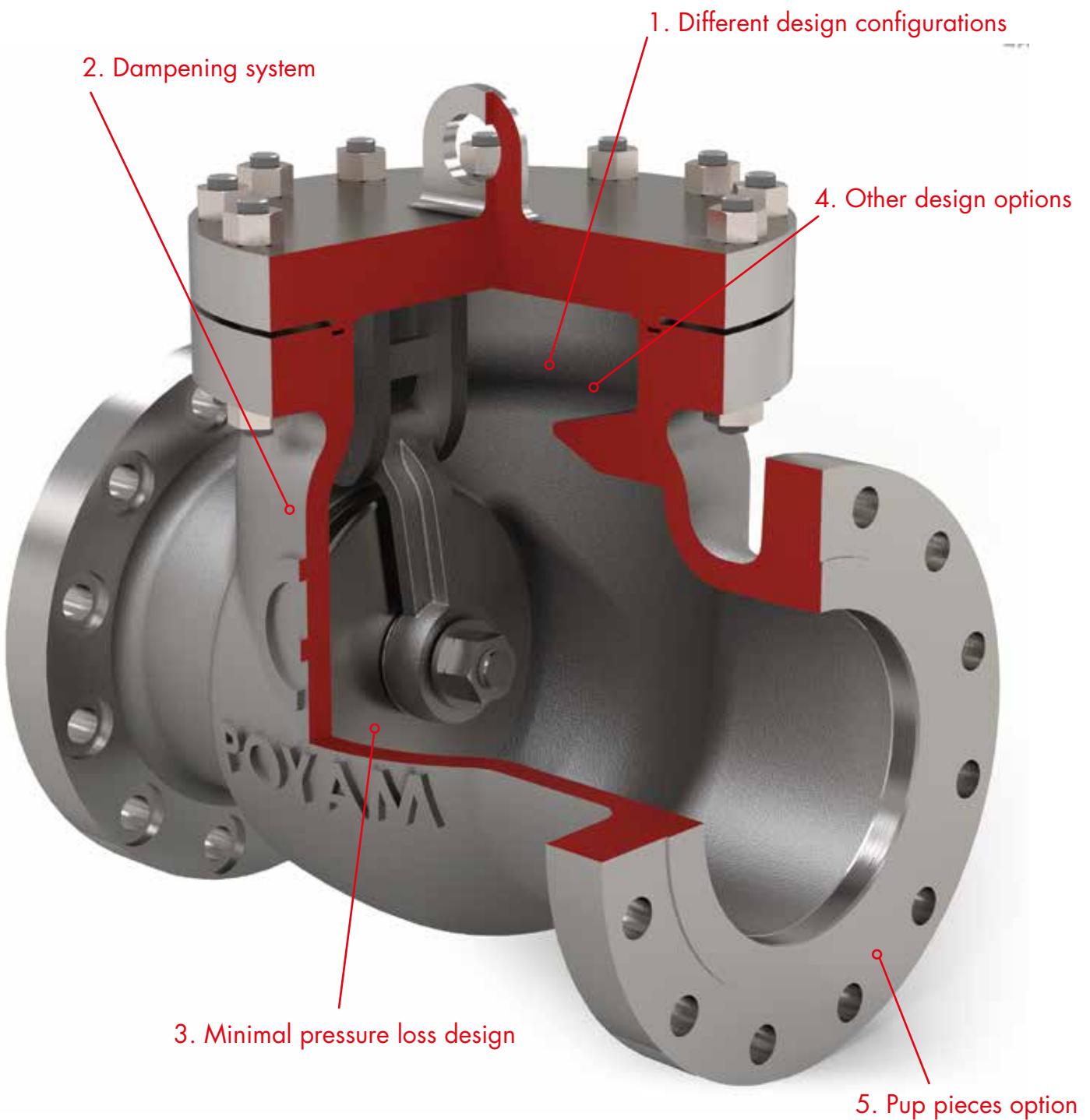
AMPO offers welded, threaded, and integral backseat configuration depending on the client's needs. Multiple hardfacing options are available upon request.

### 5.1.6. PUP PIECES:

Transition pieces are available upon request.



## 5.2. CRYOGENIC CHECK VALVES



## 5.2.1. DIFFERENT DESIGN CONFIGURATIONS:

AMPO POYAM VALVES offers three main check valve construction types:

- **SWING CHECK VALVES:**

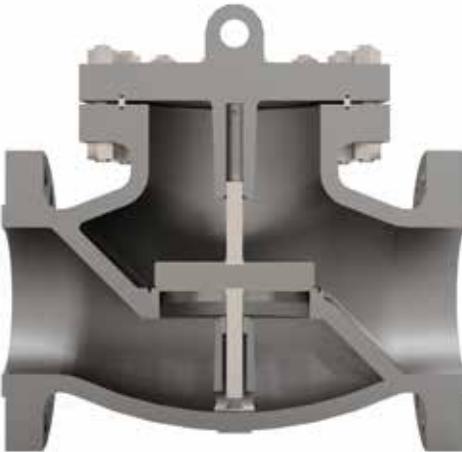
It is the most common check valve construction. The fluid flows straight through the valve, pushing a swing plate that swings freely on a hinge. Swing check valves have low pressure drop and are best suitable for moderate velocity applications.



*Swing check valve*

- **LIFT CHECK VALVES:**

The closure member is lifted from the seat during forward flow. The valve construction is similar to stop-check globe valve, but, in this case, the valve opening cannot be manually limited.



*Lift check valve*

- **AXIAL FLOW CHECK VALVES:**

The closure member moves in the line of the flow. The closure member is spring assisted, avoiding water hammer effect when the valve closes due to fluid velocity decrease. Either too low line velocity or too high velocity can damage valve internals and shorten valve life. In these cases, non-slam axial check valves can be used, which offer a rapid self-dampening response to flow reductions. Axial flow check technical brochure is available on demand.



*Axial flow check valve*

## **5.2.2. DAMPENING SYSTEM:**

As standard, check valves are designed as swing check valves. These valves come with an internal hinge, but external hinge swing check valves are also available with an optional outside gearbox, counterweight, or damper. This feature can be used to make smoother or assist closing of the check valve disc depending on orientation.

## **5.2.3. MINIMAL PRESSURE LOSS DESIGN:**

Swing check valves' straight through design allows lower pressure-drop compared to other check valves. The disc can move/swing freely, requiring low pressure to move up. By the use of a counterweight for counterbalancing the disc, the valve can be opened requiring even lower flow rates.

The internal profile of axial check valve body and disc is designed to closely follow the precisely contoured surface of the diffuser, minimizing the pressure loss.

## **5.2.4. OTHER DESIGN OPTIONS:**

Soft seated check valves can be manufactured upon request. Also, swing Check valves can be manufactured with gearbox to make the valve piggable. This kind of valve works as a common swing check valve but when a reverse flow is required by plant process, it can be operated and opened by means of the handwheel. It is commonly used in LNG vessel discharge lines in order to make easier carrier cooling downs.

## **5.2.5. PUP PIECES:**

Transition pieces are available upon request.



## 6. QUALIFICATION

AMPO POYAM VALVES 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 and accredited by the most important external organizations. Moreover AMPO POYAM VALVES holds international standard approvals and completely fulfills international standard requirements, reinforcing its leading position on the LNG market.

A summary of the most demanded standards is presented hereafter, although the qualification list can be extended upon each customer request:

**General Standards:**

ASME B16.34, JIS, SIL, B16.5, MSS SP-44, B16.47, B16.10, ISO 5752, B16.25, B16.11, ISO 5210/5211, etc.

**Fire Safe:** API 6FA.

**Fugitive Emission:** API 624, API 622, ISO 15848 Part 1&2 up to Class A.

**Testing:** API 6D, ISO 14313, API 598, ISO 5208, BS6364, ISO 28921 Part 1&2, MSS SP-134, etc.

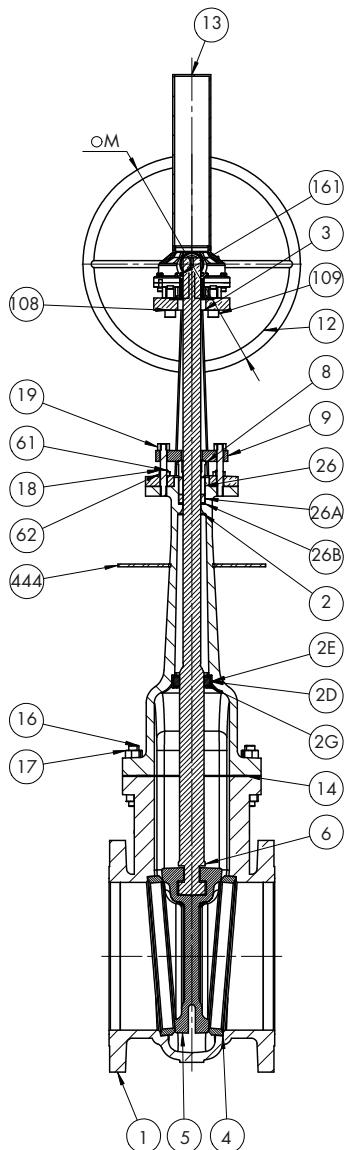
**Type Approvals (for marine service too):** Bureau Veritas, ABS, Lloyds, TUV, DNV, NORSO, etc.

**Country based certifications:** 2014/68/UE (CE), GOST, TSG, CRN, KGS, 2014/34/EU (ATEX), PESO, etc.

## 7. MATERIAL SELECTION

# CRYOGENIC GATE VALVES

## Sample drawing



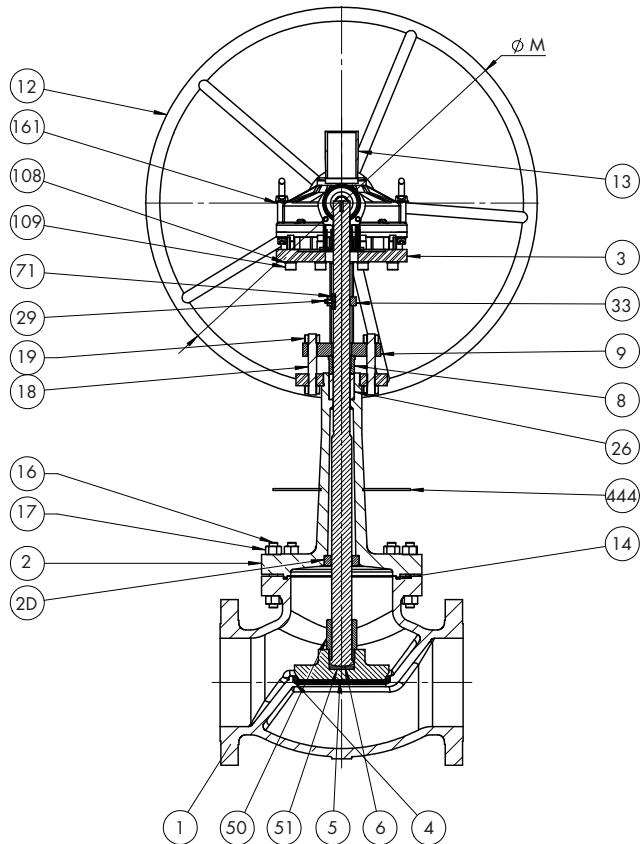
### CF8-316 AND CF3M-316 MATERIALS

NO.	PART	CF8-316 MATERIAL	CF3M-316 MATERIAL
1	BODY	ASTM A 351 CF8	ASTM A 351 CF3M
2	BONNET	ASTM A 351 CF8	ASTM A 351 CF3M
2D	BUSHING	GRAPHITE + CARBON	GRAPHITE + CARBON
2E	BUSHING	ASTM A 479 Gr. 316	ASTM A 479 Gr. 316
2G	WASHER	ASTM A 479 Gr. 316	ASTM A 479 Gr. 316
3	YOKE	ASTM A 351CF8	ASTM A 351 CF3M
4	SEAT	A 182F-316 + STELL.-6	ASTM A 182F-316 + STELL.-6
5	WEDGE	ASTM A 351 CF8M	ASTM A 351 CF8M
6	STEM	ASTM A 182 F-316	ASTM A 182 F-316
8	GLAND BUSHING	ASTM A 479 Gr. 316	ASTM A 479 Gr. 316
9	GLAND FLANGE	ASTM A 351 CF8	ASTM A 351 CF3M
12	HANDWHEEL	CARBON STEEL	CARBON STEEL
13	PIPE	ASTM A 29 Gr. 1045	ASTM A 29 Gr. 1045
14	GASKET	SS304 + GRAPHITE	SS316L + GRAPHITE
16	STUD BOLT	ASTM A 320 B8 CLASS 2	ASTM A 320 B8 CLASS 2
17	NUT	ASTM A 194 Gr. 8	ASTM A 194 Gr. 8
18	STUD BOLT	ASTM A 320 B8 CLASS 2	ASTM A 320 B8 CLASS 2
19	NUT	ASTM A 194 Gr. 8	ASTM A 194 Gr. 8
26	PACKING	GRAPHITE	GRAPHITE
26A	PACKING BUSHING	GRAPHITE + CARBON	GRAPHITE + CARBON
26B	WASHER	ASTM A 479 Gr. 316	ASTM A 479 Gr. 316
61	STUD BOLT	ASTM A 320 B8 CLASS	ASTM A 320 B8 CLASS
62	NUT	ASTM A 194 Gr. 8	ASTM A 194 Gr. 8
108	GROWER WASHER	ASTM A 479 Gr. 316	ASTM A 479 Gr. 316
109	SOCKET BOLT	ASTM A 479 Gr. 316	ASTM A 479 Gr. 316
161	GEAR	COMMERCIAL	COMMERCIAL
444	COLLAR DRIP	ASTM A 240 Gr. 316	ASTM A 240 Gr. 316

# CRYOGENIC GLOBE VALVES

## Sample drawing

### CF8-316 AND CF3M-316 MATERIALS

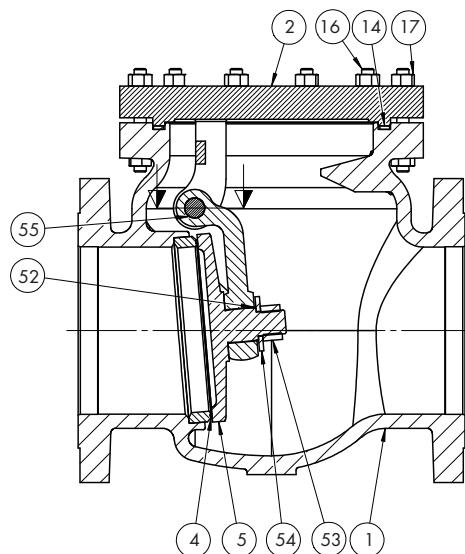


NO.	PART	CF8-316 MATERIAL	CF3M-316 MATERIAL
1	BODY	ASTM A 351 CF8	ASTM A 351 CF3M
2	BONNET	ASTM A 351 CF8	ASTM A 351 CF3M
2D	BUSHING	GRAPHITE + CARBON	GRAPHITE + CARBON
3	YOKE	ASTM A 351 CF8	ASTM A 351 CF3M
4	SEAT	ASTM A 182F-316 + STELL.-6	ASTM A 182F-316 + STELL.-6
5	DISC	ASTM A 479 Gr. 316	ASTM A 479 Gr. 316
6	STEM	ASTM A 479 Gr. 316	ASTM A 479 Gr. 316
8	GLAND BUSHING	ASTM A 479 Gr. 316	ASTM A 479 Gr. 316
9	GLAND FLANGE	ASTM A 351 CF8	ASTM A 351 CF3M
12	HANDWHEEL	CARBON STEEL	CARBON STEEL
13	PIPE	ASTM A 29 Gr. 1015	ASTM A 29 Gr. 1015
14	GASKET	SS304 + GRAPHITE	SS316L + GRAPHITE
16	STUD BOLT	ASTM A 320 B8 CLASS 2	ASTM A 320 B8 CLASS 2
17	NUT	ASTM A 194 Gr. 8	ASTM A 194 Gr. 8
18	STUD BOLT	ASTM A 320 B8 CLASS 2	ASTM A 320 B8 CLASS 2
19	NUT	ASTM A 194 Gr. 8	ASTM A 194 Gr. 8
26	PACKING	GRAPHITE	GRAPHITE
29	SCREW	ASTM A 479 Gr. 316	ASTM A 479 Gr. 316
33	STEM GUIDE	ASTM A 351 CF8	ASTM A 351 CF8
50	DISC THRUST PLATE	ASTM A 240 Gr. 316	ASTM A 240 Gr. 316
51	DISC NUT	ASTM A 479 Gr. 316	ASTM A 479 Gr. 316
71	KEY	ASTM A 479 Gr. 316	ASTM A 479 Gr. 316
108	GROWER WASHER	ASTM A 479 Gr. 316	ASTM A 479 Gr. 316
109	SOCKET BOLT	ASTM A 479 Gr. 316	ASTM A 479 Gr. 316
161	GEAR	COMMERCIAL	COMMERCIAL
444	COLLAR DRIP	ASTM A 240 Gr. 316	ASTM A 240 Gr. 316

# CRYOGENIC CHECK VALVES

## Sample drawings

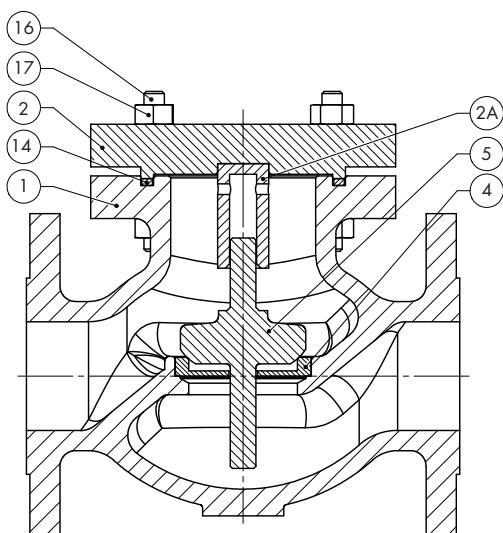
### Swing check valve:



### CF8-316 AND CF3M-316 MATERIALS

NO.	PART	CF8-316 MATERIAL	CF3M-316 MATERIAL
1	BODY	ASTM A 351 CF8	ASTM A 351 CF3M
2	BONNET	ASTM A 351 CF8	ASTM A 351 CF3M
4	SEAT	ASTM A 182 F-316 + STELLITE-6	ASTM A 182 F-316 + STELLITE-6
5	DISC	ASTM A 351 CF8M	ASTM A 351 CF8M
14	GASKET	SPIRAL WOUND 316 + GRAPHITE	SPIRAL WOUND 316 + GRAPHITE
16	STUD BOLT	ASTM A 320 B8 CLASS 2	ASTM A 320 B8 CLASS 2
17	NUT	ASTM A 194 Gr. 8	ASTM A 194 Gr. 8
52	HINGE	ASTM A 351 CF8	ASTM A 351 CF3M
53	NUT	ASTM A 479 Gr. 316	ASTM A 479 Gr. 316
54	WASHER	ASTM A 240 Gr. 316	ASTM A 240 Gr. 316
55	HINGE PIN	ASTM A 479 Gr. 316	ASTM A 479 Gr. 316

### Lift check valve:

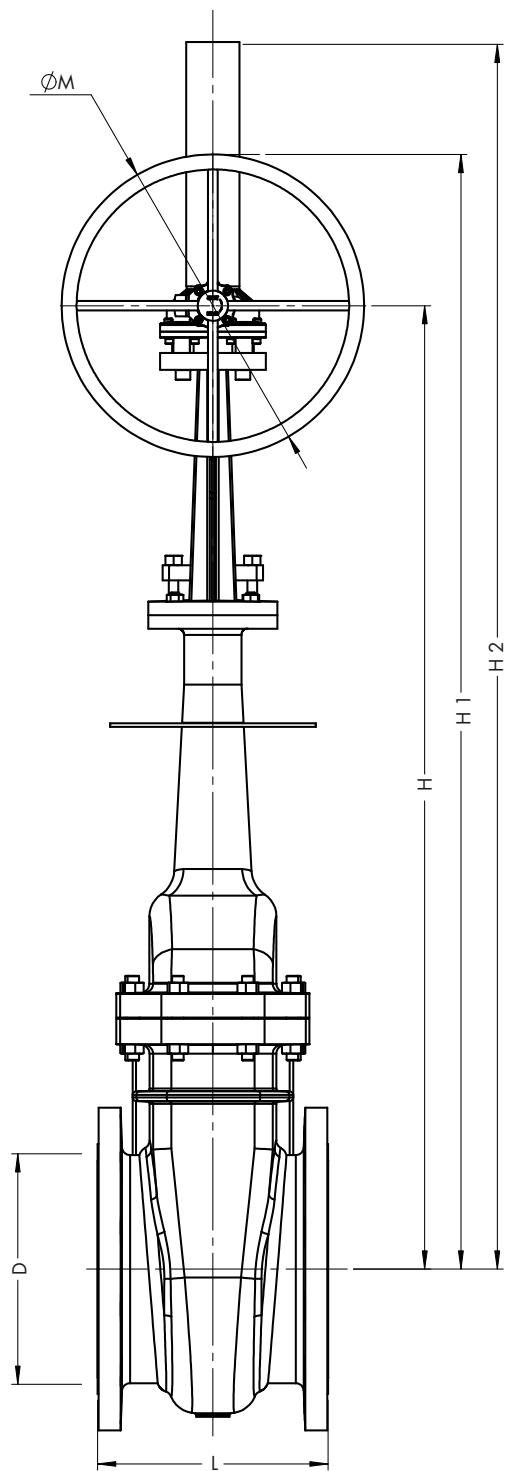


### CF8-316 AND CF3M-316 MATERIALS

NO.	PART	CF8-316 MATERIAL	CF3M-316 MATERIAL
1	BODY	ASTM A 351 CF8	ASTM A 351 CF3M
2	BONNET	ASTM A 182 F-304	ASTM A 182 F-316L
2A	DISC-GUIDE	ASTM A 182 F-304	ASTM A 182 F-316L
4	SEAT	ASTM A 182 F-316 + STELL.-6	ASTM A 182 F-316 + STELL.-6
5	DISC	ASTM A 479 Gr. 316	ASTM A 479 Gr. 316
14	GASKET	SPIRAL WOUND 316 + GRAPHITE	SPIRAL WOUND 316 + GRAPHITE
16	STUD BOLT	ASTM A 320 B8 CLASS 2	ASTM A 320 B8 CLASS 2
17	NUT	ASTM A 194 Gr. 8	ASTM A 194 Gr. 8

## 8. DIMENSIONAL TABLES

## CRYOGENIC GATE VALVES



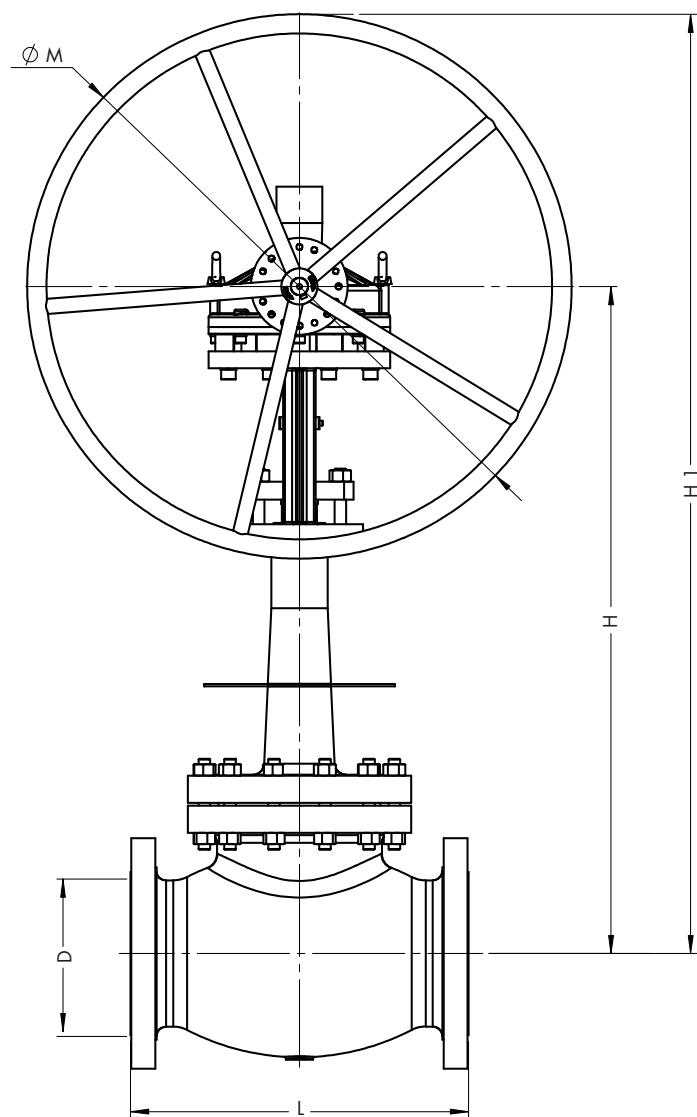
SIZE	L (RF or BW)	D	M	H	H1	H2	WEIGHT RF (KG)	WEIGHT BW (KG)	CV
<b>150 LBS</b>									
1/2"	108	13	140	447	-	-	7	6	16
3/4"	117	19	140	533	-	-	10	9	38
1"	127	25	200	588	-	-	14	12	68
1 1/2"	165	38	200	637	-	-	22	19	165
2	178	51	200	648	-	-	27	24	307
3	203	76	325	701	-	-	46	38	715
4	229	102	325	836	-	-	69	60	1331
6	267	152	380	1037	-	-	124	107	3088
8	292	203	380	1224	-	-	185	161	5676
10	330	254	500	1442	-	-	312	271	9092
12	356	305	400	1420	1620	1860	429	373	13352
14	381	337	500	1542	1792	2046	533	463	16461
16	406	388	700	1727	2077	2321	703	612	22003
18	432	438	300	1855	2005	2414	767	667	28521
20	457	490	800	2077	2477	2736	1060	921	35924
24	508	591	940	2336	2806	3094	1572	1367	53413
26	559	643	800	2436	2836	3223	2067	1797	62074
28	610	694	700	2589	2939	3445	2434	2116	72961
30	610	743	900	2753	3203	3564	2760	2400	84766
32	711	799	800	2913	3313	3876	3276	2849	95692
34	762	832	700	3047	3397	4042	3951	3435	109219
36	711	879	800	3143	3543	4223	4709	4094	121638
38	832	936	900	3411	3861	4686	5538	4816	136904
40	813	984	600	3579	3879	4863	6109	5312	153110
42	889	1030	900	3666	4116	4827	6942	6037	167164
44	921	1082	1000	3296	3796	5185	7326	6370	185454
46	946	1130	800	3396	3796	5241	8684	7551	203593
48	864	1180	500	4120	4370	5578	9893	8603	221818
50	1092	1232	900	4319	4769	5632	11236	9770	242099
52	1054	1283	1000	4464	4964	5830	12346	10736	262869
54	1067	1328	1200	4632	5232	6185	15392	13384	283626
56	1118	1377	600	4757	5057	6430	17072	14845	306609
58	1160	1430	700	4952	5302	6711	18906	16440	330034
60	1187	1473	800	5145	5545	7237	19195	16691	353850
62	1261	1530	800	5240	5640	7244	22245	19343	379051
64	1299	1574	800	5255	5655	7147	24312	21141	404612
66	1338	1651	800	5696	6096	7945	26472	23019	431598
68	1376	1671	600	5934	6234	7712	28723	24977	458911
70	1414	1726	700	5970	6320	8155	31066	27014	487690
72	1426	1770	1000	6089	6589	8337	33856	29440	516764

SIZE	L (RF or BW)	D	M	H	H1	H2	WEIGHT RF (KG)	WEIGHT BW (KG)	CV
<b>600 LBS</b>									
1/2"	165	13	140	473	-	-	9	8	16
3/4"	190	19	140	570	-	-	12	10	38
1"	216	25	200	602	-	-	23	20	68
1 1/2"	241	38	200	645	-	-	29	25	165
2	295	51	200	694	-	-	53	46	307
3	356	76	325	701	-	-	99	90	715
4	435	102	380	949	-	-	172	149	1331
6	562	152	500	1164	-	-	333	289	3088
8	660	200	630	1068	1383	1411	545	474	5501
10	787	248	800	1269	1669	1631	923	803	8647
12	838	298	800	1584	1984	2151	1318	1146	12717
14	889	327	630	1675	1990	2284	1689	1468	15453
16	991	375	710	1815	2170	2427	2188	1903	20596
18	1092	420	710	1971	2326	2582	2731	2375	25990
20	1194	464	710	2097	2452	2703	3501	3044	32184
24	1397	559	710	2307	2662	2968	5073	4411	47539
26	1448	607	800	2504	2904	3243	5906	5136	55708
28	1549	652	800	2629	3029	3407	6997	6084	64762
30	1651	696	1000	2858	3358	3960	8822	7671	74977
32	1778	743	800	3111	3511	3940	12175	10587	85731
34	1930	781	900	3016	3466	4073	13190	11469	98011
36	2083	830	710	3370	3725	4530	15938	13859	108945
38	2172	984	700	3587	3937	4501	19023	16542	122510
40	2261	933	800	3719	4119	4682	21710	18878	136904
42	2318	968	900	3832	4282	4836	24081	20940	149535
44	2394	1016	800	4032	4432	5144	27862	24227	165798
46	2470	1073	800	4205	4605	5444	29241	25427	181860
48	2540	1118	800	4397	4797	5722	35994	31299	198320

SIZE	L (RF or BW)	D	M	H	H1	H2	WEIGHT RF (KG)	WEIGHT BW (KG)	CV
<b>1500 LBS</b>									
1/2"	216	13	140	380	-	-	10	9	16
3/4"	229	18	200	407	-	-	14	12	32
1"	254	22	200	432	-	-	25	21	51
1 1/2"	305	35	200	519	-	-	36	32	138
2	368	48	325	803	-	-	100	87	270
3	470	74	600	901	1201	1080	209	186	601
4	546	93	700	904	1254	1236	329	286	1071
6	705	137	710	1139	1494	1406	819	712	2481
8	832	183	400	1241	1441	1513	1760	1531	4305
10	991	222	800	1382	1782	2130	2341	2036	6851
12	1130	248	400	1636	1836	2080	3530	3069	9861
14	1257	289	700	1694	2044	2137	4137	3597	11924
16	1384	333	1000	1968	2468	2411	6123	5324	15752
18	1537	373	600	2166	2466	2624	9872	8585	20138
20	1664	420	1000	2276	2776	2945	12477	10850	25601
24	1971	503	1000	2657	3157	3470	20306	17657	37323

SIZE	L (RF or BW)	D	M	H	H1	H2	WEIGHT RF (KG)	WEIGHT BW (KG)	CV
<b>300 LBS</b>									
1/2"	140	13	140	459	-	-	8	7	16
3/4"	152	19	140	545	-	-	12	10	38
1"	165	25	200	591	-	-	17	15	68
1 1/2"	190	38	200	616	-	-	25	21	165
2	216	51	200	650	-	-	34	29	307
3	283	76	225	715	-	-	66	55	715
4	305	102	225	859	-	-	85	73	1331
6	403	152	380	1120	-	-	196	171	3088
8	419	203	400	1107	1307	1451	304	265	5676
10	457	254	400	1230	1430	1620	499	434	9092
12	502	305	710	1486	1841	1926	651	566	13352
14	762	337	400	1586	1786	2065	905	787	16461
16	838	388	900	1741	2191	2293	1186	1031	22003
18	914	432	630	1909	2224	2497	1730	1505	28521
20	991	483	630	2053	2368	2762	2024	1760	35924
24	1143	584	710	2352	2707	3164	3241	2818	53413
26	1245	641	700	2566	2916	3256	4060	3530	62074
28	1346	690	900	2623	3073	3422	4160	3617	72961
30	1397	740	710	2803	3158	3667	4818	4189	84766
32	1524	789	800	2917	3317	3819	5695	4952	95692
34	1626	836	900	3062	3512	3992	6544	5691	109219
36	1727	879	800	3083	3483	4180	7708	6702	121638
40	1930	977	900	3440	3890				

## CRYOGENIC GLOBE VALVES

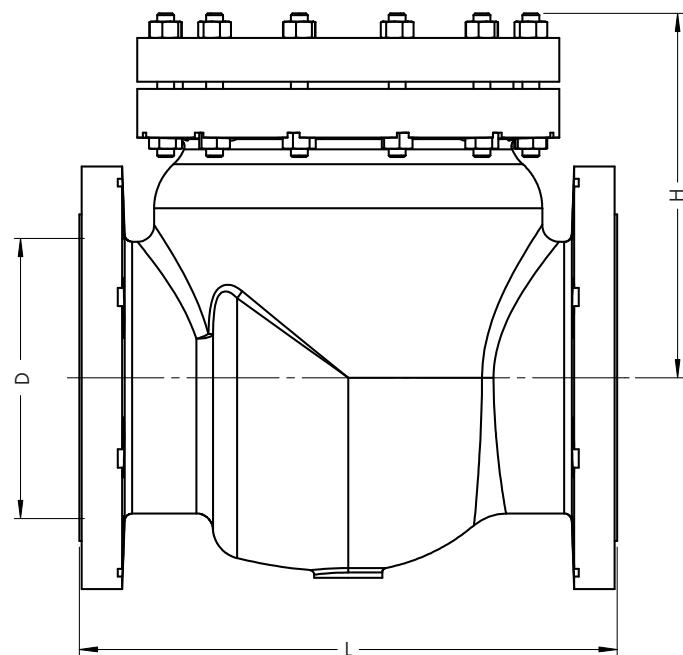


SIZE	L (RF or BW)	D	M	H	H1	WEIGHT RF (KG)	WEIGHT BW (KG)	CV
<b>150 LBS</b>								
1/2"	108	13	160	477	-	8	7	3
3/4"	117	19	160	510	-	12	10	6
1"	127	25	160	542	-	16	14	10
1 1/2"	165	38	225	653	-	20	17	25
2	203	51	225	665	-	30	26	46
3	241	76	325	802	-	51	46	110
4	292	90	380	824	-	55	47	204
6	406	135	380	906	-	77	67	474
8	495	182	500	977	1227	144	125	871
10	622	224	710	1049	1404	186	162	1395
12	698	275	500	1227	1477	282	245	2048
14	787	303	700	1299	1649	359	312	2525
16	914	349	700	1378	1728	521	453	3375
18	978	396	700	1438	1788	654	569	4375
20	978	444	700	1504	1854	806	701	5510
24	1168	539	700	1682	2032	1279	1112	8193
26	1295	643	800	1840	2240	2746	2387	9711
28	1558	692	700	1891	2241	3302	2871	11397
30	1524	743	600	2075	2375	3483	3028	13225
32	1651	781	500	2130	2380	4815	4187	14678
34	1803	832	600	2193	2493	5478	4764	16753
36	1956	876	800	2411	2811	6366	5536	18658
38	1956	945	900	2379	2829	7573	6585	21000
40	2033	978	1000	2549	3049	7896	6866	23486
42	2152	1042	1000	2561	3061	9755	8482	25642
44	2250	1094	900	2651	3101	10948	9520	28447
46	2348	1150	1000	2742	3242	12210	10618	31230
48	2446	1200	900	2832	3282	13541	11775	34025
<b>600 LBS</b>								
1/2"	165	13	160	517	-	12	10	3
3/4"	210	19	160	583	-	17	15	6
1"	216	25	160	626	-	20	17	10
1 1/2"	241	38	225	678	-	35	31	25
2	292	51	225	800	-	61	53	47
3	356	76	380	980	-	107	95	110
4	432	90	380	980	-	118	103	204
6	559	135	500	1089	1339	255	222	474
8	660	182	600	1194	1494	517	450	871
10	787	222	630	1310	1625	841	731	1395
12	838	250	700	1488	1838	940	817	2048
14	889	294	1000	1527	2027	1304	1134	2525
16	991	337	710	1642	1997	1561	1358	3375
18	1092	377	1000	1755	2255	1775	1543	4250
20	1194	417	800	1836	2236	2262	1967	5347
24	1397	503	600	1957	2257	3259	2834	7991
26	1448	603	700	2249	2599	8779	7634	9522
28	1600	648	700	2684	3034	10657	9267	11192
30	1651	695	700	2795	3145	11861	10314	13002
32	1796	739	900	2754	3204	13880	12070	14678
34	1893	781	700	2866	3216	16344	14212	16753
36	2083	831	800	3141	3541	18889	16425	18658
<b>1500 LBS</b>								
1/2"	216	13	200	535	-	22	19	3
3/4"	229	18	225	613	-	36	32	5
1"	254	25	225	665	-	69	60	8
1 1/2"	279	35	325	727	-	79	69	21
2	368	48	325	878	-	113	98	41
3	470	70	380	1072	-	290	251	92
4	546	92	400	1081	1281	381	331	164
6	705	135	500	1324	1574	1136	988	381
8	832	178	750	1424	1799	1821	1584	660
10	991	222	700	1642	1992	3099	2695	1051
12	1130	264	800	1946	2346	5010	4357	1513
14	1257	289	900	2053	2503	5997	5215	1829
16	1384	330	800	2259	2659	8451	7349	2416
18	1537	371	700	2403	2753	10651	9262	3089
20	1667	416	800	2902	3302	13145	11430	3927
24	1943	498	700	2976	3326	20983	18246	5725
26	2098	541	900	3233	3683	24598	21390	6783

SIZE	L (RF or BW)	D	M	H	H1	WEIGHT RF (KG)	WEIGHT BW (KG)	CV
<b>300 LBS</b>								
1/2"	152	13	138	512	-	10	9	3
3/4"	178	19	160	574	-	14	12	6
1"	203	25	160	637	-	18	16	10
1 1/2"	229	38	225	664	-	22	19	25
2	267	51	225	695	-	39	34	47
3	318	76	225	801	-	73	69	110
4	356	90	380	915	-	81	70	204
6	444	135	710	963	1318	135	118	474
8	559	182	630	1064	1379	226	197	871
10	622	224	630	1170	1485	384	333	1395
12	711	275	700	1371	1721	533	463	2048
14	838	303	700	1425	1775	690	600	2525
16	864	349	700	1537	1887	924	804	3375
18	978	389	800	1560	1960	1105	961	4375
20	1016	434	800	1772	2172	1481	1288	5510
24	1346	526	700	1819	2169	2037	1771	8193
26	1346	635	700	2129	2479	4663	4055	9711
28	1499	692	800	2257	2657	6167	5363	11397
30	1594	737	800	2364	2764	7220	6278	13225
32	1854	781	800	2531	2931	9303	8089	14678
34	1968	832	700	2600	2950	10056	8744	16753
36	2083	876	1000	2733	3233	12091	10514	18658
38	2121	927	1000	2938	3438	13316	11579	21000
40	2230	991	900	2901	3351	15528	13503	23486
42	2337	1044	900	3012	3462	17587	15293	25642
<b>900 LBS</b>								
1/2"	216	13	160	526	-	17	15	3
3/4"	220	19	160	500	-	27	24	5
1"	254	25	160	653	-	44	38	8
1 1/2"	279	38	225	704	-	57	50	21
2	368	48	325	878	-	113	98	42
3	381	73	380	1050	-	182	160	101
4	457	98	500	847	1097	261	227	188
6	610	147	500	1391	1641	741	644	435
8	737	190	800	1406	1806	1136	988	758
10	838	238	1000	1456	1956	1749	1520	1216
12	965	283	630	1626	1941	2249	1956	1750
14	1029	311	700	1705	2055	3073	2672	2134
16	1130	356	900	1921	2371	4095	3561	2833
18	1219	400	700	2011	2361	5568	4842	3617
20	1321	444	800	2223	2623	7319	6364	4501
24	1549	533	700	2585	2935	11756	10223	6600
26	1663	579	800	2687	3087	13591	11818	7821
28	1765	622	700	2911	3261	17336	15074	9118
30	1886	667	1000	3035	3535	20489	17817	10553
<b>2500 LBS</b>								
1/2"	264	11	160	545	-	36	32	2
3/4"	273	15	160	665	-	48	42	3
1"	308	19	325	742	-	83	72	6
1 1/2"	384	29	380	890	-	182	158	14
2	451	38	600	930	1230	272	236	25
3	578	57	600	1114	1414	368	311	60
4	673	73	600	1231	1531	907	789	101
6	914	111	900	1545	1995	2213	1924	244
8	1022	146	1000	1721	2221	3124	2716	435
10	1270	184	800	2120	2520	5530	4809	708
12	1422	219	1000	2396	2896	7783	6768	1021
14	1568	241	800	2475	2875	10249	8912	1249
16	1730	276	700	2549	2899	12613	10967	1661
18	1797	311	700	3086	3436	18399	15999	2134
20	2080	343	700	3271	3621	23037	20032	2620

## CRYOGENIC CHECK VALVES

### Swing check



SIZE	L (RForBW)	D	H	WEIGHT RF (KG)	WEIGHT BW (KG)	CV
<b>150 LBS</b>						
1/2"	108	13	89	4	3	7
3/4"	117	19	101	7	6	15
1"	127	25	113	9	8	27
1 1/2"	165	38	125	12	10	66
2	203	52	151	18	16	123
3	241	77	196	42	36	286
4	292	103	209	59	51	533
6	356	154	240	92	80	1235
8	495	205	303	161	140	2271
10	622	257	353	268	233	3637
12	698	308	391	390	339	5341
14	787	340	441	525	457	6585
16	914	391	488	686	597	8801
18	978	438	553	920	800	11408
20	978	489	575	1040	904	14370
24	1295	597	658	1690	1470	21365
28	1448	692	782	2464	2142	29184
30	1524	744	827	2847	2476	33906
32	1651	789	873	3474	3021	38277
34	1803	845	884	3928	3416	43688
36	1956	885	964	4677	4067	48655
38	1981	933	995	5430	4721	54762
40	2030	985	1045	6335	5509	61244
42	2126	1034	1091	7142	6210	66866
44	2221	1083	1138	7998	6955	74182
46	2250	1132	1184	8903	7742	81437
48	2273	1180	1214	10238	8902	88727

SIZE	L (RForBW)	D	H	WEIGHT RF (KG)	WEIGHT BW (KG)	CV
<b>600 LBS</b>						
1/2"	165	13	139	9	8	7
3/4"	190	19	149	10	9	15
1"	216	26	157	12	10	27
1 1/2"	229	28	180	23	20	66
2	292	52	189	36	32	123
3	356	77	249	79	68	286
4	432	103	291	137	119	533
6	559	153	364	273	237	1235
8	660	202	446	517	450	2201
10	787	252	522	884	769	3459
12	838	301	585	1126	979	5087
14	889	327	593	1398	1215	6181
16	991	381	625	1749	1520	8239
18	1092	423	735	2317	2014	10396
20	1194	489	785	3185	2770	12874
24	1397	559	841	4531	3940	19015
28	1600	648	1033	6146	5345	25905
30	1651	702	1082	7797	6780	29991
32	1778	748	1110	9257	8050	34292
34	1930	798	1185	10726	9327	39205
36	2083	847	1222	11973	10411	43578
38	2121	895	1324	14443	12559	49004
40	2261	935	1410	15272	13280	54762
42	2394	965	1562	18850	16391	59814
44	2438	1026	1515	20138	17511	66319
46	2521	1080	1566	22873	19889	72744
48	2570	1118	1636	26614	23142	79328

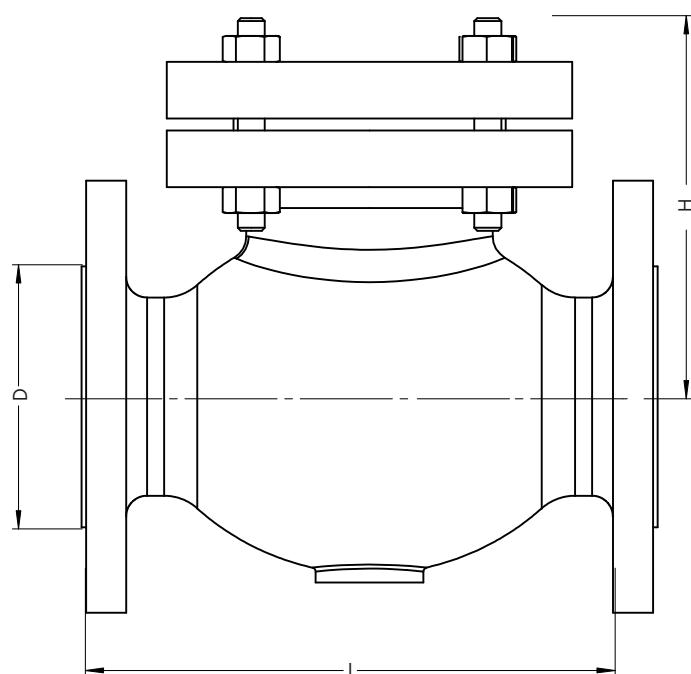
SIZE	L (RForBW)	D	H	WEIGHT RF (KG)	WEIGHT BW (KG)	CV
<b>1500 LBS</b>						
1/2"	216	13	165	18	16	7
3/4"	229	18	171	26	23	13
1"	254	22	180	34	29	21
1 1/2"	305	35	190	56	49	55
2	368	49	242	92	80	108
3	470	71	286	147	134	240
4	546	93	345	280	243	428
6	705	137	467	741	644	992
8	832	180	569	985	857	1722
10	991	222	643	1963	1707	2741
12	1130	267	753	2932	2549	3944
14	1257	289	809	3922	3411	4770
16	1384	333	954	5350	4652	6301
18	1537	371	977	7201	6261	8055
20	1664	420	1087	9186	7988	10241
24	1943	502	1250	13462	11706	14929
28	2115	592	1354	19994	17386	20839
30	2134	651	1373	23711	20618	24018

SIZE	L (RForBW)	D	H	WEIGHT RF (KG)	WEIGHT BW (KG)	CV
<b>300 LBS</b>						
1/2"	160	13	93	8	7	7
3/4"	178	19	106	9	8	15
1"	216	25	111	12	10	27
1 1/2"	241	38	129	18	16	66
2	267	52	170	26	23	123
3	318	77	212	55	46	286
4	356	102	230	83	72	533
6	444	154	281	155	135	1235
8	533	205	334	255	222	2271
10	622	257	405	420	365	3637
12	711	308	453	623	542	5341
14	838	340	498	809	704	6585
16	864	387	551	1075	935	8801
18	978	436	595	1330	1156	11030
20	1016	483	612	1703	1481	13942
24	1346	584	640	2600	2261	20839
28	1499	686	689	4120	3582	29184
30	1594	743	899	5252	4567	33906
32	1854	789	981	5386	4683	38277
34	1968	840	999	7020	6104	43688
36	2083	885	1024	7233	6290	48655
38	2072	934	1109	7903	6872	54762
40	2214	988	1151	8464	7360	61244
42	2267	1030	1267	9520	8278	66866
44	2382	1081	1289	10756	9353	74182
46	2486	1130	1346	11805	10265	81437
48	2513	1180	1458	12864	11186	88727

SIZE	L (RForBW)	D	H	WEIGHT RF (KG)	WEIGHT BW (KG)	CV
<b>900 LBS</b>						
1/2"	216	13	173	18	16	7
3/4"	229	18	186	25	21	13
1"	254	22	198	30	26	21
1 1/2"	305	35	214	35	31	55
2	368	51	278	64	55	118
3	381	76	286	135	113	263
4	457	102	300	234	203	489
6	610	146	427	387	337	1135
8	737	192	468	671	583	1976
10	838	255	657	1054	917	3172
12	965	286	640	1596	1388	4564
14	1029	311	645	1742	1515	5564
16	1130	356	678	2535	2204	7387
18	1219	404	738	3299	2869	9432
20	1321	448	895	5511	4792	11738
24	1549	538	1070	7431	6462	17211
28	1766	628	1130	10286	8944	23778
30	1804	672	1139	12025	10457	27519
32	2057	706	1271	14963	13011	29007
34	2173	749	1339	17265	15013	33046
36	2237	818	1495	19751	17175	36756
38	2404	835	1474	22372	19454	41308
40	2658	863	1508	25527	22197	46137
42	2690	920	1609	28151	24479	50412
44	2800	944	1642	31426	27327	55754
46	2868	1006	1745	34601	30088	61244
48	2984	1049	1812	38078	33111	66729

## CRYOGENIC CHECK VALVES

### Lift check



SIZE	L (RForBW)	D	H	WEIGHT RF (KG)	WEIGHT BW (KG)	CV
<b>150 LBS</b>						
1/2"	108	13	81	4	4	2
3/4"	117	19	92	7	6	5
1"	127	25	103	10	9	9
1 1/2"	165	38	114	13	11	21
2	203	51	138	19	17	37
3	241	77	198	39	36	83
4	292	90	200	62	53	118
6	406	135	229	101	85	278
8	495	182	289	177	153	521
10	622	224	345	287	254	806
12	698	275	384	420	357	1241
14	787	303	422	555	506	1521
16	914	349	467	755	640	2046
18	978	396	516	996	862	2668
20	978	444	533	1093	994	3389
24	1168	539	636	1843	1589	5086
<b>600 LBS</b>						
1/2"	165	13	126	10	9	2
3/4"	10	19	135	11	10	5
1"	216	25	143	13	11	9
1 1/2"	241	38	164	26	22	21
2	292	51	187	40	34	37
3	356	77	257	83	69	83
4	432	90	276	144	132	118
6	559	135	354	300	262	278
8	660	182	445	572	468	521
10	787	222	503	968	810	791
12	838	250	583	1241	1084	1016
14	889	294	583	1535	1315	1427
16	991	337	572	1897	1633	1901
18	1092	377	722	2537	2225	2405
20	1194	417	749	3469	3017	2971
24	1397	503	812	4947	4233	4401
<b>1500 LBS</b>						
1/2"	216	13	150	20	17	2
3/4"	229	18	155	29	25	4
1"	254	25	164	37	32	8
1 1/2"	279	35	173	61	53	19
2	368	48	241	97	88	31
3	470	71	293	174	147	71
4	546	92	336	299	258	124
6	705	135	464	776	676	278
8	832	178	530	1058	914	497
10	991	222	616	2155	1863	791
12	1130	264	721	3182	2745	1139
14	1257	289	762	4190	3705	1377
16	1384	330	930	5676	4932	1819
18	1537	371	905	7658	6681	2325
20	1667	416	996	9852	8368	2956
24	1943	498	1227	14887	12597	4310

SIZE	L (RForBW)	D	H	WEIGHT RF (KG)	WEIGHT BW (KG)	CV
<b>300 LBS</b>						
1/2"	152	13	85	9	7	2
3/4"	178	19	96	10	9	5
1"	203	25	101	13	11	9
1 1/2"	229	38	117	20	17	21
2	267	51	157	29	24	37
3	318	77	212	60	53	83
4	356	90	215	88	80	118
6	444	135	267	163	142	278
8	559	182	306	269	239	521
10	622	224	390	465	396	806
12	711	275	427	657	567	1241
14	838	303	455	865	763	1521
16	864	349	525	1150	1015	2046
18	978	389	589	1475	1251	2668
20	1016	434	582	1859	1581	3231
24	1346	526	588	2797	2460	4833
<b>900 LBS</b>						
1/2"	216	13	157	20	17	2
3/4"	220	19	169	27	24	4
1"	254	25	180	33	29	8
1 1/2"	279	38	195	39	34	19
2	368	48	259	68	59	31
3	381	76	264	147	125	80
4	457	98	275	257	215	141
6	610	147	426	429	353	332
8	737	190	440	713	628	570
10	838	238	638	1163	1006	916
12	965	283	631	1741	1513	1316
14	1029	311	589	1882	1635	1606
16	1130	356	635	2801	2446	2133
18	1219	400	692	3592	3184	2723
20	1321	444	831	5850	5131	3389
24	1549	533	1061	7825	6905	4968
<b>2500 LBS</b>						
1/2"	264	11	155	31	27	2
3/4"	273	15	168	39	34	4
1"	308	19	186	53	46	7
1 1/2"	384	29	245	100	87	15
2	451	38	282	166	145	19
3	578	64	386	381	339	57
4	673	73	439	594	498	76
6	914	111	542	1215	1064	184
8	1022	146	691	2285	1928	328
10	1270	184	816	4297	3701	533
12	1422	219	801	5028	4424	769
14	1568	241	963	7793	6750	940
16	1730	276	1077	10404	9247	1250
18	1797	311	1199	13004	11711	1606
20	2080	343	1367	16681	14783	1973
24	2403	414	1559	24817	21587	2937

"Due to engineering activities, all the above 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".

## 9. AMPO SERVICE

AMPO SERVICE has a wide experience in guaranteeing a **prompt response** (72 hours at site if needed) to customer needs **all over the world** with a highly experienced, customer oriented and specialized team. It provides a wide range of **ad-hoc and high added value services**:

- **MRO SERVICES.** Plug and play valves. Fast track.
- **SPARE PARTS.** Optimized Management Program. Fast track services.
- **TRAINING SERVICES**
- **FIELD ENGINEERING SERVICES (FES):** Consulting services during plant construction. Commissioning and start-up services. Planned shut-down services. Troubleshooting.
- **PREDICTIVE MAINTENANCE SERVICE:** Patented AMPO RCM system (Remote Valve Condition Monitoring Service)
- **PREVENTIVE MAINTENANCE SERVICE:** Maintenance Plan developments.
- **WORLDWIDE REPAIR AND MAINTENANCE CENTERS**
- **TAILORED ENGINEERING SOLUTIONS**
- **MASTER SERVICE AGREEMENTS WITH END USERS**

Our main aim is to fulfill customer needs worldwide with the following key premises: **reliability, safety, trust and efficiency.**



Commitment made of steel

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