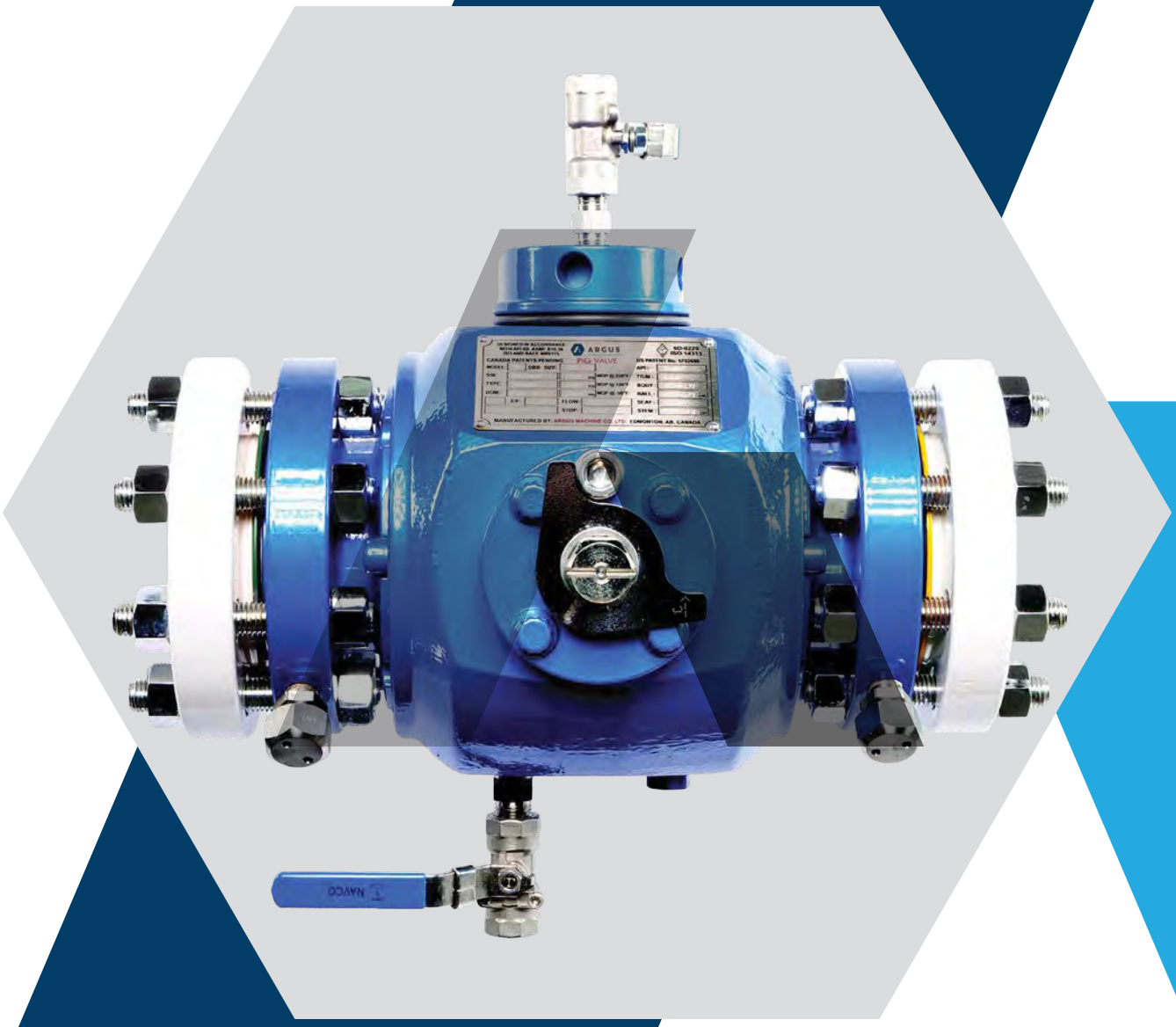
PIGGING PRODUCTS

Production Optimization & Corrosion Mitigation



ARGUS

Manufacturing Intelligent Solutions

Supplied by:

ANODE ENGINEERING

Anode Engineering Pty Ltd | Engineering Services

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www.anodeengineering.com

SPECIFICATIONS

Spec. 6D – 0225
Edmonton, AB, Canada

We are committed to product safety and quality.
Argus Pig Ball Valves conform to the following standards:

API	**AMERICAN PETROLEUM INSTITUTE**
SPEC. 6D[1]	Specification for Pipeline Valves
SPEC. 6FA[2]	Fire Test for Valves
STD. 607[2]	Fire Test for Quarter-turn Valves and Valves Equipped with Nonmetallic Seats
STD. 598	Valve Inspection and Testing
SPEC. Q1	Specification for Quality Programs for the Petroleum and Natural Gas Industry
ASME	**AMERICAN SOCIETY OF MECHANICAL ENGINEERS**
B1.20.1	Pipe Threads, General Purpose
B16.5	Pipe Flanges and Flange Fittings
B16.10	Face-to-Face and End-to-End Dimensions of Valves
B16.34	Valves - Flanged, Threaded, and Welding End
B31.3	Process Piping
ISO	**INTERNATIONAL ORGANIZATION FOR STANDARDIZATION**
ISO 9001	Quality Management System
ISO 15156	Materials for Use in H2S Containing Environments in Oil and Gas Production
ISO 10497[2]	Testing of Valves - Fire Type Testing
NACE	**NATIONAL ASSOCIATION OF CORROSION ENGINEERS**
MR0175	Materials for Use in H2S Containing Environments in Oil and Gas Production
CSA	**CANADIAN STANDARDS ASSOCIATION**
Z245.12	Steel Flanges
Z245.15	Steel Valves
Z662	Oil and Gas Pipeline Systems
CRN	**CANADIAN REGISTRATION NUMBERS**
0C02161.2	2" - 6" Pig Valves
0C12579.2	6" - 20" Pig Valves

[1] Pig Ball Valves with a "Left to Right" flow direction are marked with the API 6D Monogram as they are in full compliance with API 6D 25th Edition. Pig Ball Valves with a "Right to Left" flow direction are not marked with the API Monogram; although they meet the design requirements of API 6D 25th Edition, their closing direction is required to be counter-clockwise which does not meet the clockwise to close requirement specified in API 6D.

[2] Certification available for 6" - 12" 900 & 1500 ASME, 8" & Larger 300 & 600 ASME.

PIG BALL VALVES

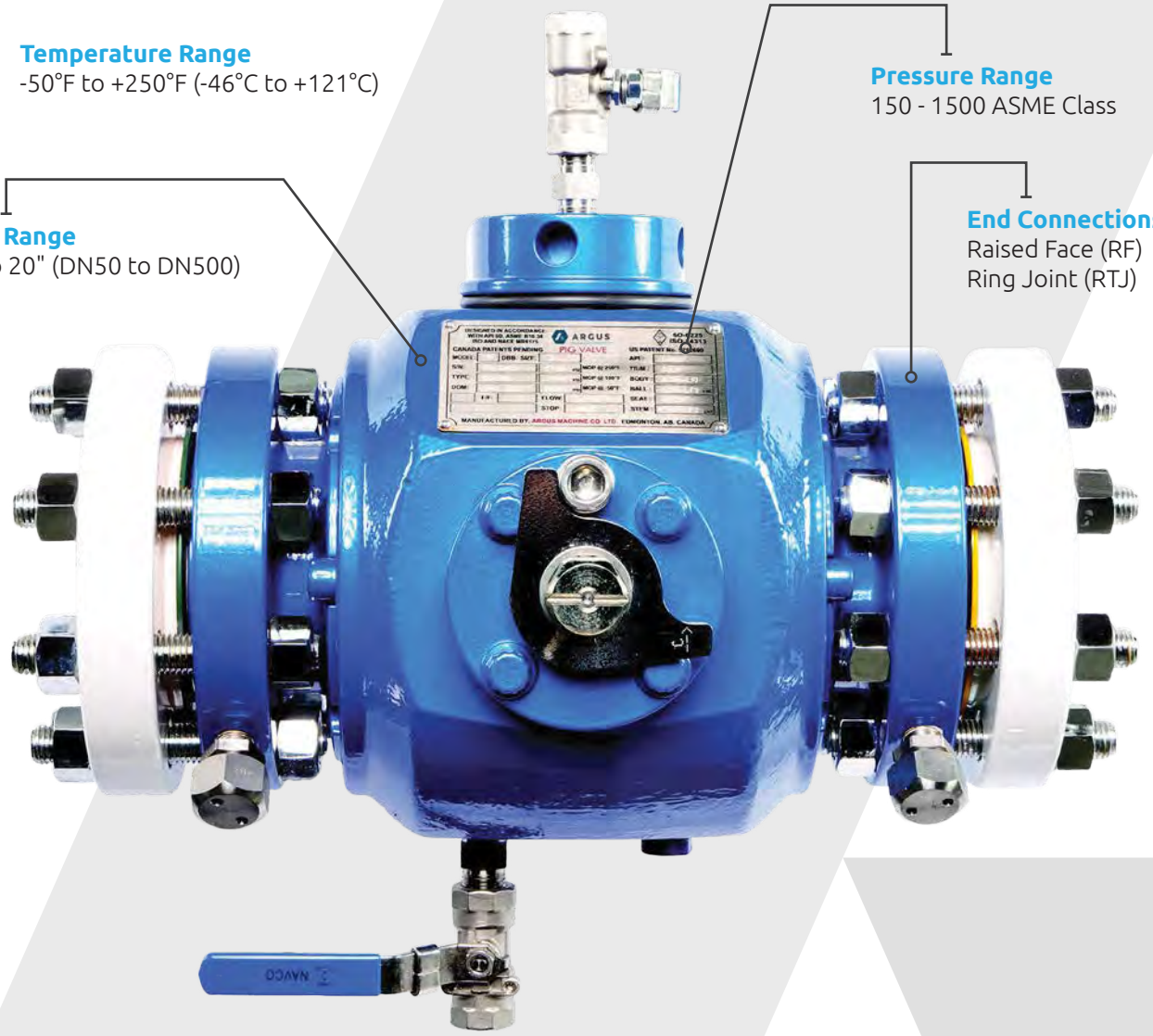
Designed to achieve optimal flow line and pipeline performance, the Argus Pigging Ball Valve offers unsurpassed quality and reliability.

Temperature Range
-50°F to +250°F (-46°C to +121°C)

Size Range
2" to 20" (DN50 to DN500)

Pressure Range
150 - 1500 ASME Class

End Connections
Raised Face (RF)
Ring Joint (RTJ)

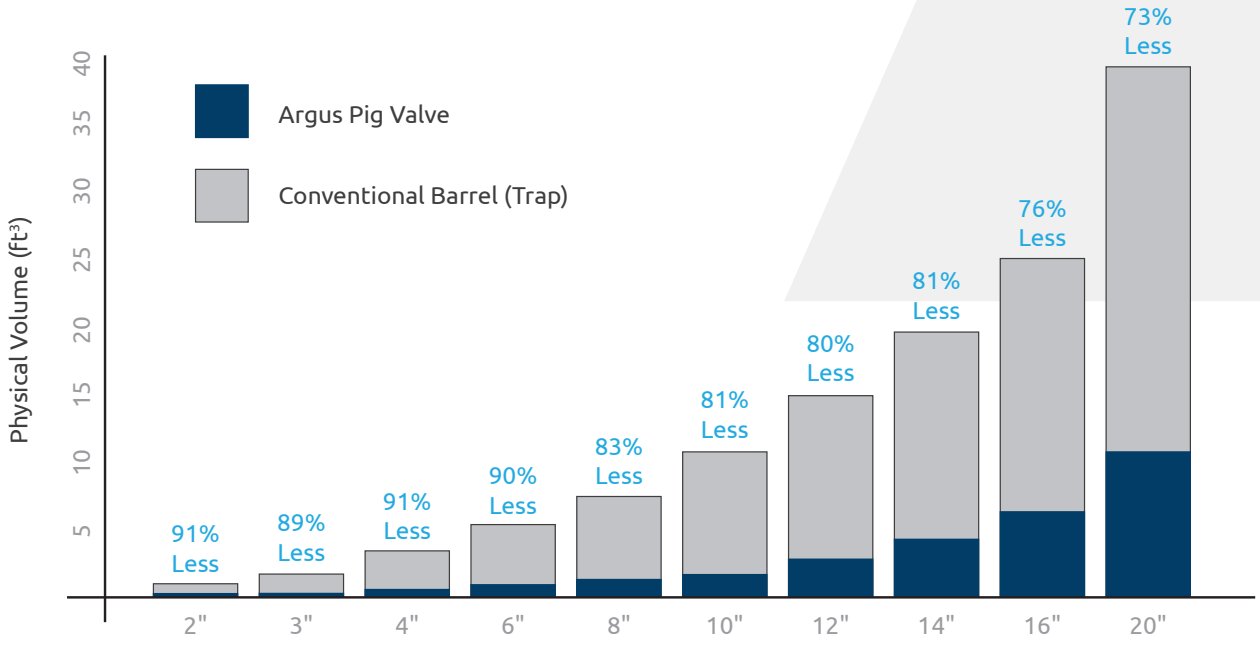


BENEFITS

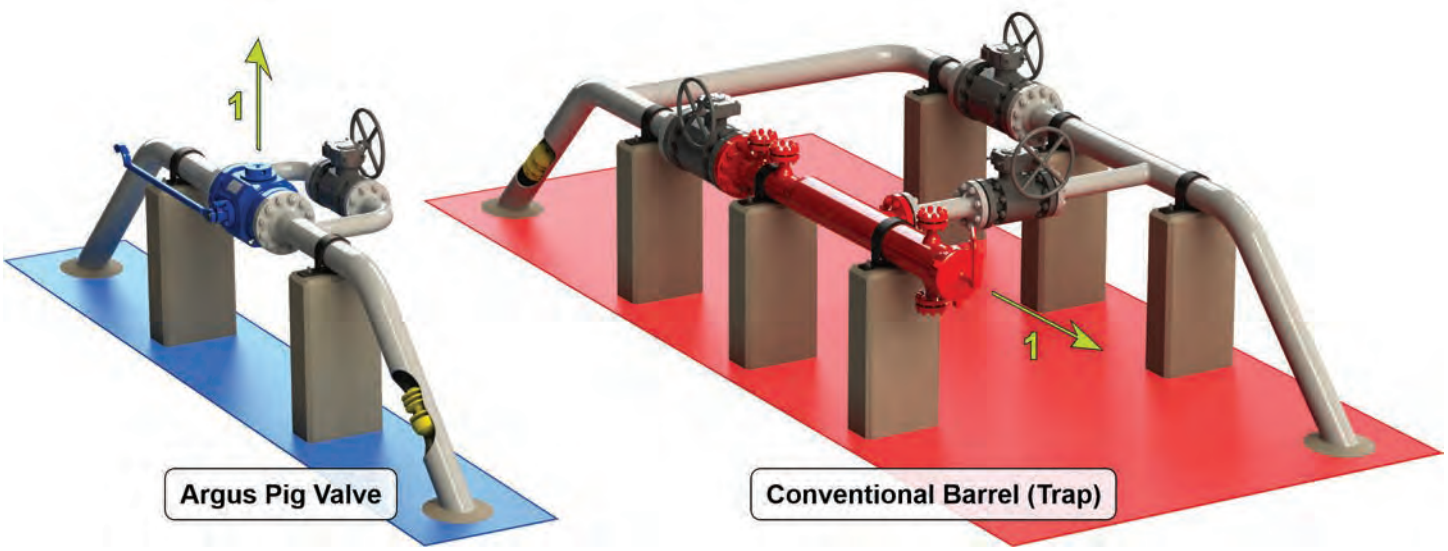
- Optimize production and mitigate corrosion through effective liquids sweeping and debris removal.
- Reduce emissions by up to 91% compared to traditional launching method.
- Significantly smaller footprint reduces the space required for pigging facilities.
- Reduced requirement for infrastructure decreases field construction time.
- Functionally simple design minimizes training and maintenance costs.
- Double block and bleed construction facilitates use as a traditional block valve, thus reducing the number of valves required in the pigging facility.
- Built in features enhance safety for operations personnel.
- Adaptable to batch, corrosion inhibition programs.
- Meets NACE MR01-75.

REDUCE EMISSIONS BY UP TO 91%

Emissions Comparison
Argus Pig Valve vs. Conventional Barrel (Trap)

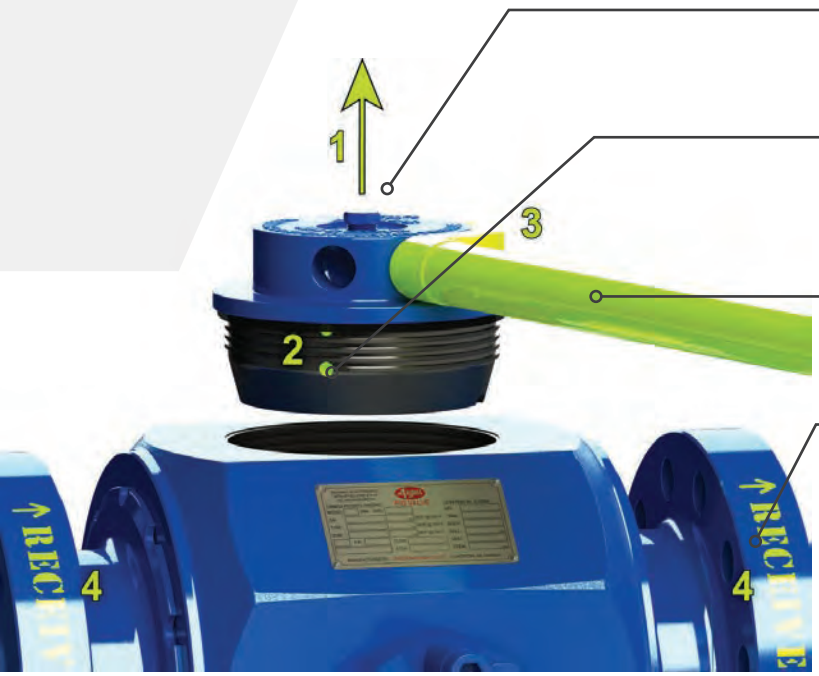


SIGNIFICANT SPACE AND COST SAVINGS



In addition to reduced emissions, the small footprint of the Argus Pig Valve minimizes environmental impact. Compared to conventional barrel-style launching and receiving traps, Argus Pig Valves are operationally more efficient and require less space, ultimately decreasing infrastructure costs.

SAFETY FEATURES
6" 600 ASME AND BELOW



Pig Entry Cap Orientation (Also See Opposite Page)
Vertical orientation of all Argus Pig Valve entry caps eliminates the threat of horizontal pressurized openings.

Pressure Alert Port
Will visually and audibly warn the operator that pressurized media is still present before the entry cap is fully opened.

Non-Impact Wrench and Entry Cap
Eliminates hammering on the entry cap and the associated material failure and sparking hazards.

Flow Direction and Valve Type Labels
High visibility stenciling minimizes potential confusion or misapplication during installation.

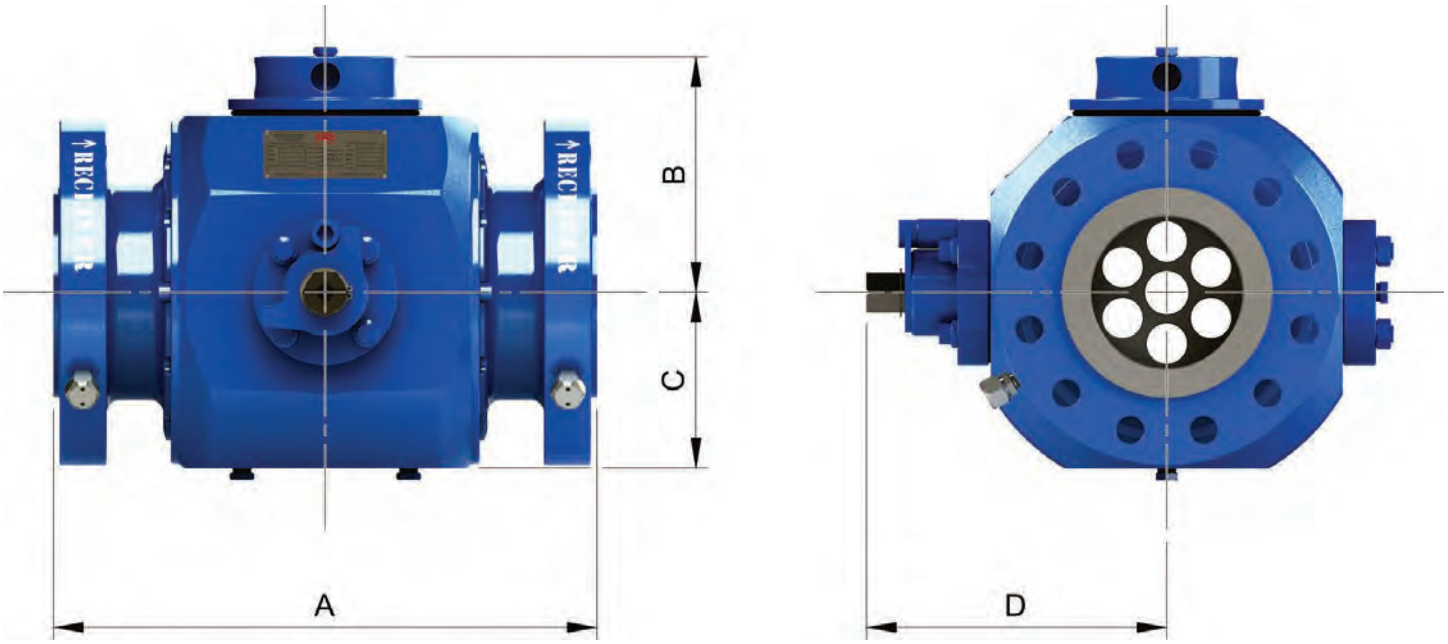
Optional Interlock System (Not Shown)
Provides an enhanced level of safety by ensuring operators can only follow the safest process for operation.

TRIM MATERIALS

STANDARD TRIM MATERIALS FOR 6" 600 ASME & BELOW	
Body	ASTM A350-LF2, Class 1
End Connections	ASTM A350-LF2, Class 1
Ball	ASTM A350-LF2 c/w 0.001" High-Phosphorus ENC
Entry Cap	ASTM A350-LF2, Class 1
Trunnion	ASTM A350-LF2 c/w 0.001" ENC
Seat Springs	Inconel X-750
Seat Support	AISI 1026 c/w 0.001" ENC (2") ASTM A350-LF2 c/w 0.001" ENC (3", 4", & 6" 150-600 ASME)
Seat Insert	Devlon 'V'
Primary Seals	Highly Saturated Nitrile (HSN), Carboxylated Nitrile (XNBR)
Bolting - Pressure Containing	ASTM A320 L7M/ASTM A194 L7M

Note: Alternative trim materials available upon request.

DIMENSIONS
6" 600 ASME & BELOW



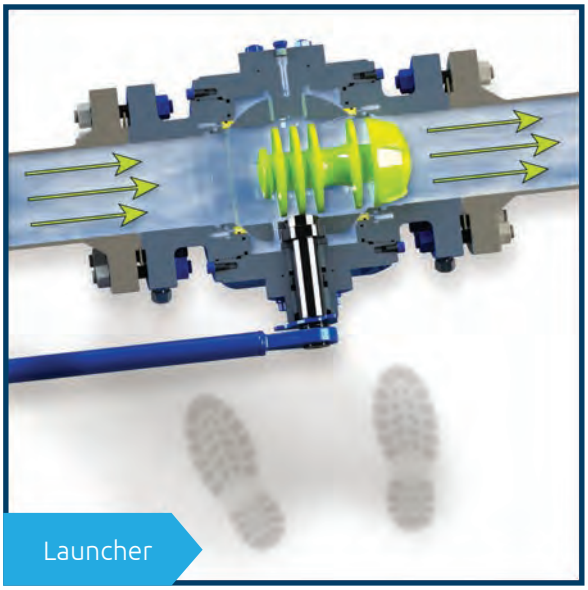
PIG VALVE		A (FACE TO FACE LENGTH)[1]				B		C		D		VALVE BORE		BALL CORE ID		ENTRY PLUG BORE		APPROX. WT.	
		RF		RTJ															
Size	*ASME*	*in*	*mm*	*in*	*mm*	*in*	*mm*	*in*	*mm*	*in*	*mm*	*in*	*mm*	*in*	*mm*	*in*	*mm*	*lbs*	*kg*
2"	150[1]	11.50	292	11.88	302	5.62	143	4.00	102	7.62	194	2.06	52	2.50	64	2.56	65	135	61
	300 / 600[1]	14.25	362	14.62	371	5.62	143	4.00	102	7.62	194	2.06	52	2.50	64	2.56	65	145	66
	900	14.50	368	14.62	371	5.62	143	4.00	102	7.62	194	2.06	52	2.50	64	2.56	65	175	79
3"	150[1]	12.75	324	13.12	333	6.38	162	4.75	121	8.38	213	3.13	80	3.56	90	3.59	91	190	86
	300[1] / 600	14.00	356	14.12	359	6.38	162	4.75	121	8.38	213	3.13	80	3.56	90	3.59	91	210	95
	900	15.00	381	15.12	384	6.38	162	4.75	121	8.38	213	3.13	80	3.56	90	3.59	91	230	104
4"	150[1]	15.50	394	16.00	406	7.34	186	5.35	136	10.03	255	4.13	105	4.56	116	4.59	117	310	141
	300[1]	16.00	406	16.50	419	7.34	186	5.35	136	10.03	255	4.13	105	4.56	116	4.59	117	325	147
	600	17.00	432	17.12	435	7.34	186	5.35	136	10.03	255	4.13	105	4.56	116	4.59	117	350	159
	900	18.00	457	18.12	460	7.34	186	5.35	136	10.03	255	4.13	105	4.56	116	4.59	117	370	168
	1500[2]	21.50	546	21.62	549	7.50	191	6.25	159	15.38	391	4.00	102	4.75	121	4.97	126	600	272
6"	150[1]	18.00	457	18.38	467	9.50	241	7.12	181	12.12	308	6.13	156	6.75	172	6.72	171	580	263
	300[1]	18.88	480	19.38	492	9.50	241	7.12	181	12.12	308	6.13	156	6.75	172	6.72	171	620	281
	600	22.00	559	22.12	562	9.50	241	7.12	181	12.12	308	6.13	156	6.75	172	6.72	171	700	317

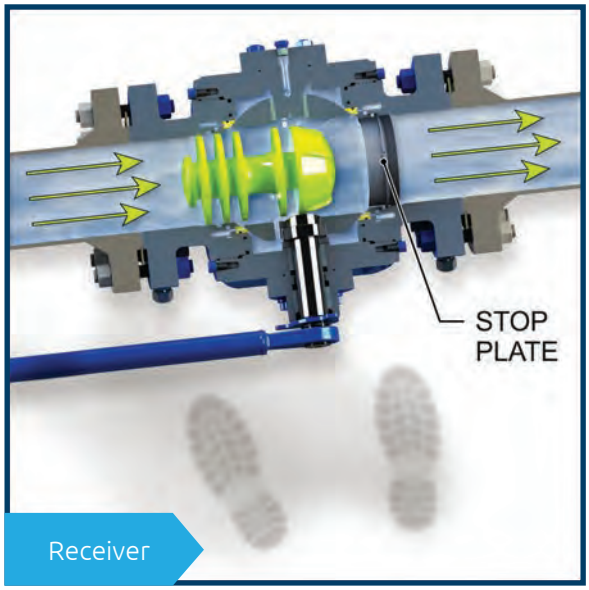
[1] *Face to Face Length does not meet API Spec. '6D', ASME 'B16.10', or CSA Z245.15.*
[2] *Supplied with Gear Operator.*
Note: Design specifications subject to change without prior notice.

PIG VALVE ORIENTATION

Orientation 1

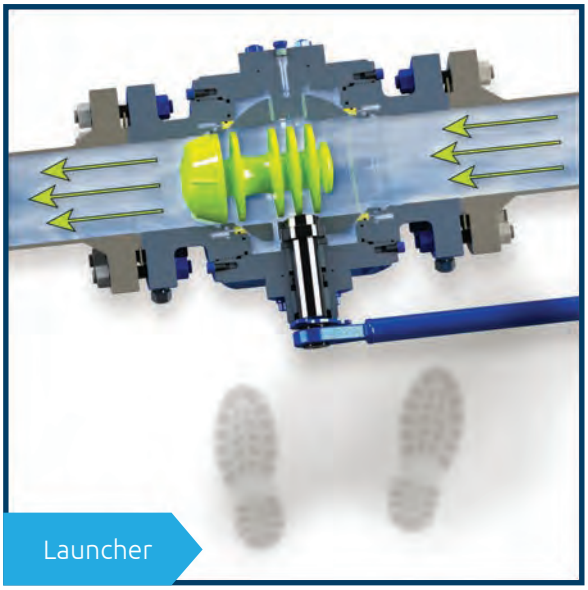
Flow Direction: Left to Right

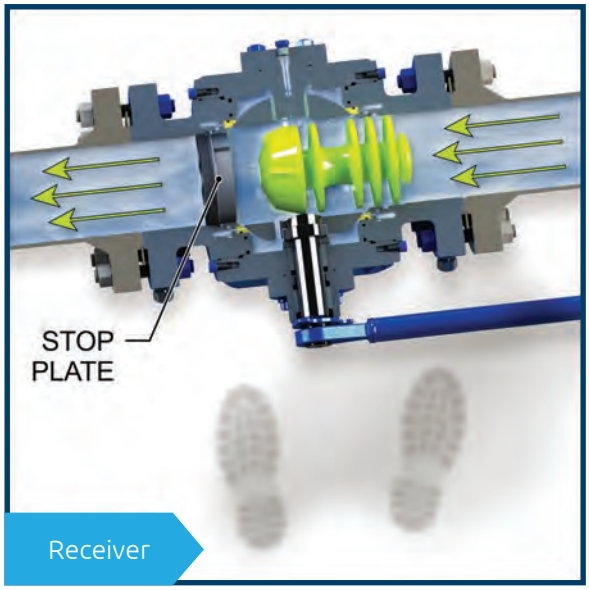




Orientation 2

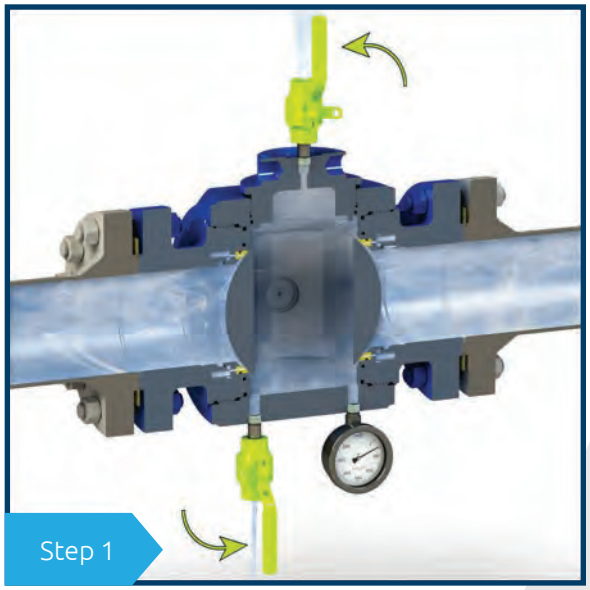
Flow Direction: Right to Left



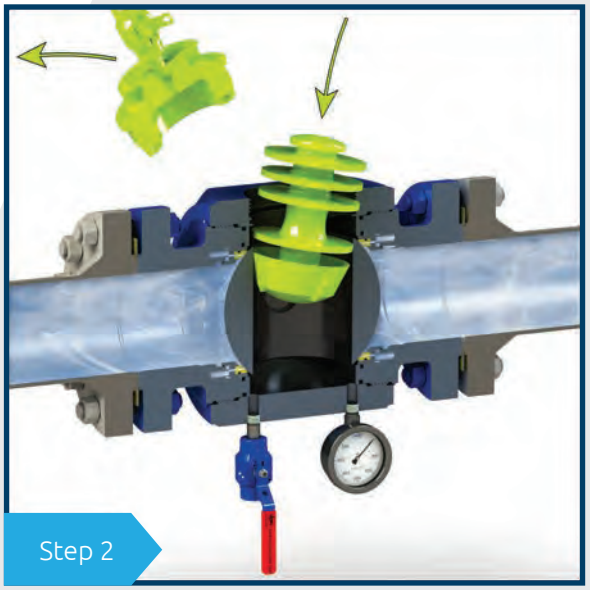


OPERATIONAL SEQUENCE
6" 600 ASME & BELOW

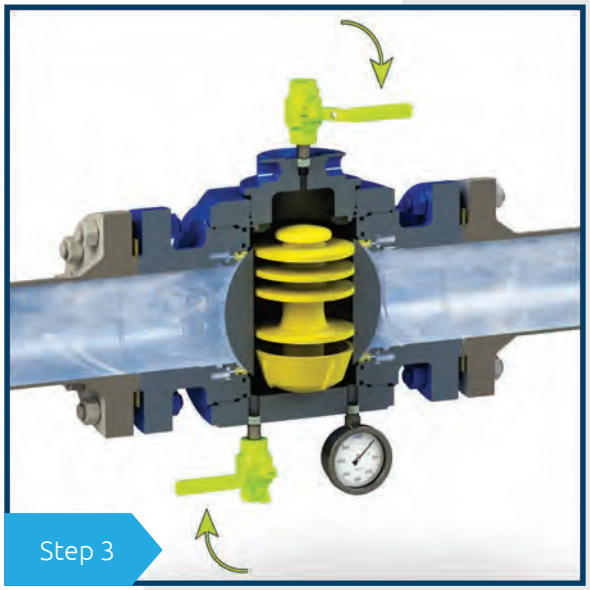
Launching



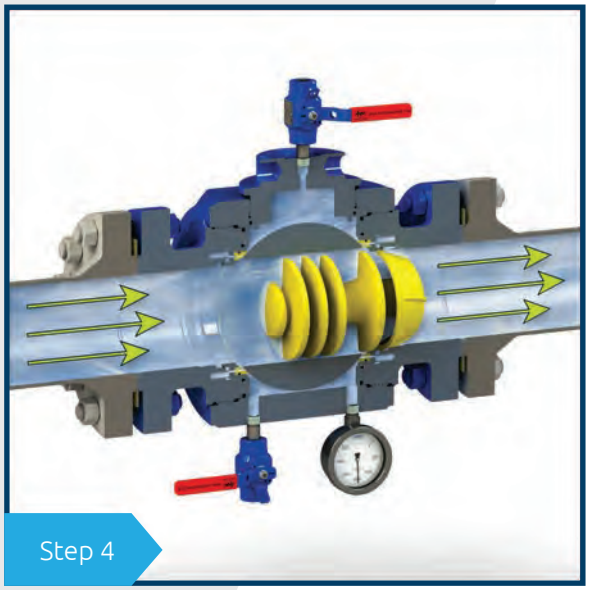
In the **closed** position, vent and/or drain the Argus Pig Valve body cavity. The pressure gauge will drop to zero.



Remove the entry cap (with the non-impact wrench) and insert a pig.

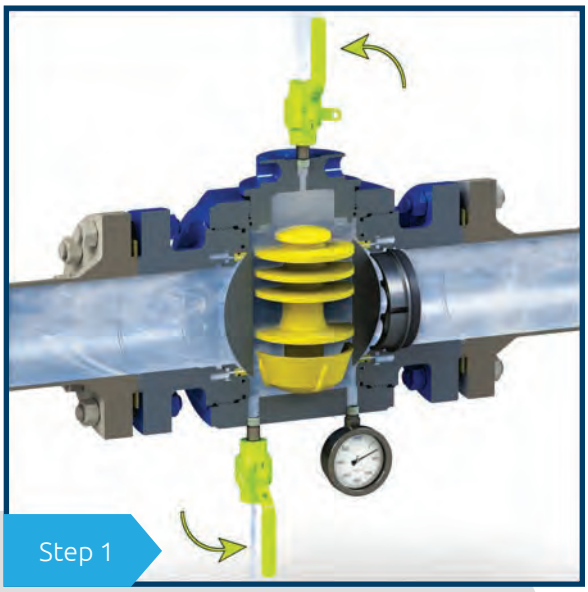


With the entry cap replaced and fully tightened (with the non-impact wrench), close all vent and/or drain valves.

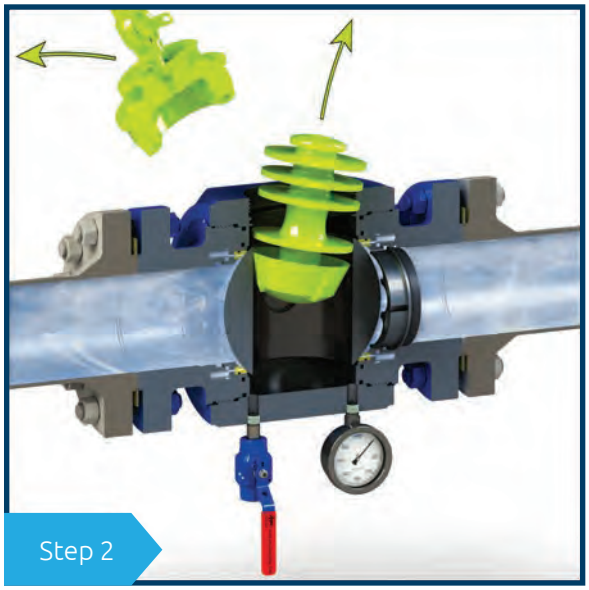


Now in the **open** position, pipeline flow and pressure moves the pig downstream.

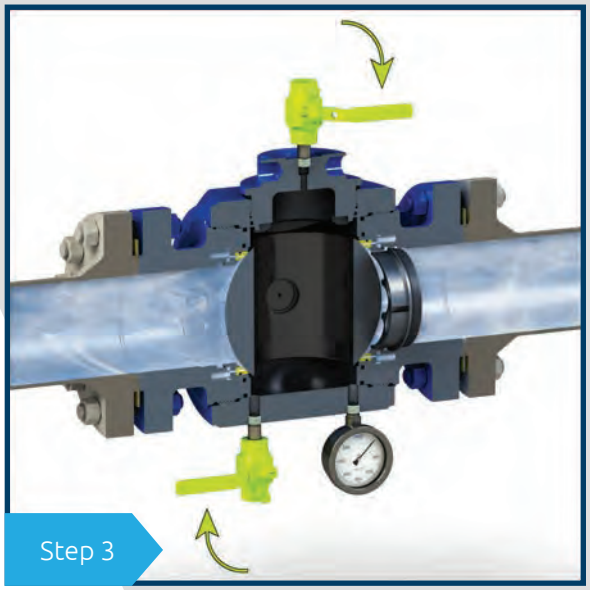
Receiving



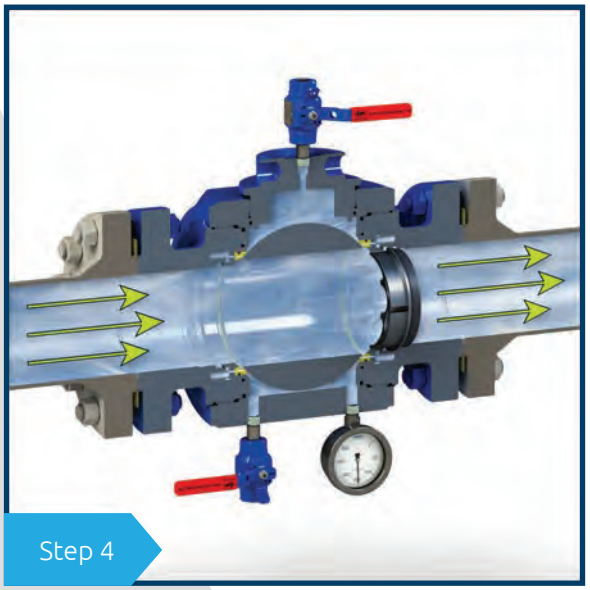
After receiving a pig, and with the Argus Pig Valve in the **closed** position, vent and/or drain the body cavity. The pressure will drop to zero.



Remove the entry cap (with the non-impact wrench) and remove the pig.

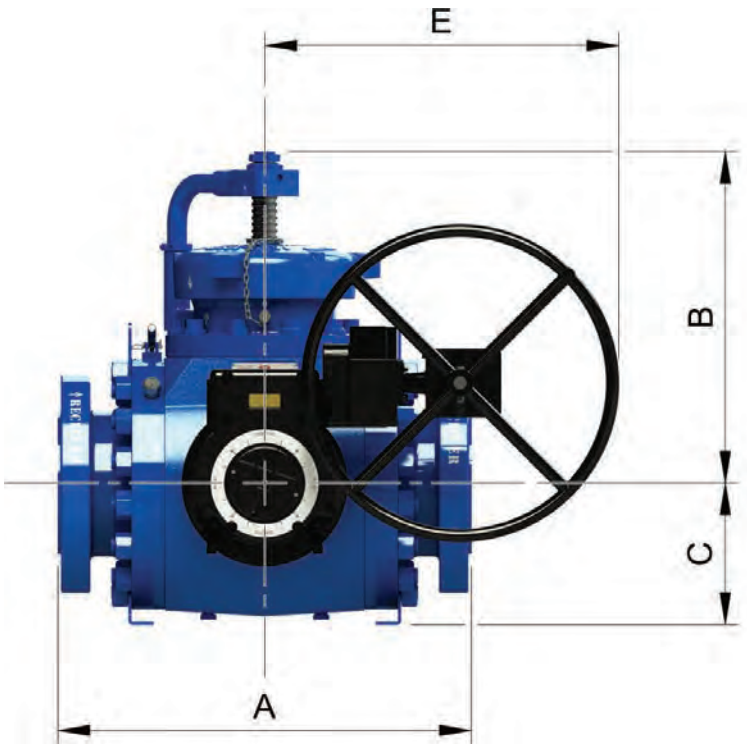


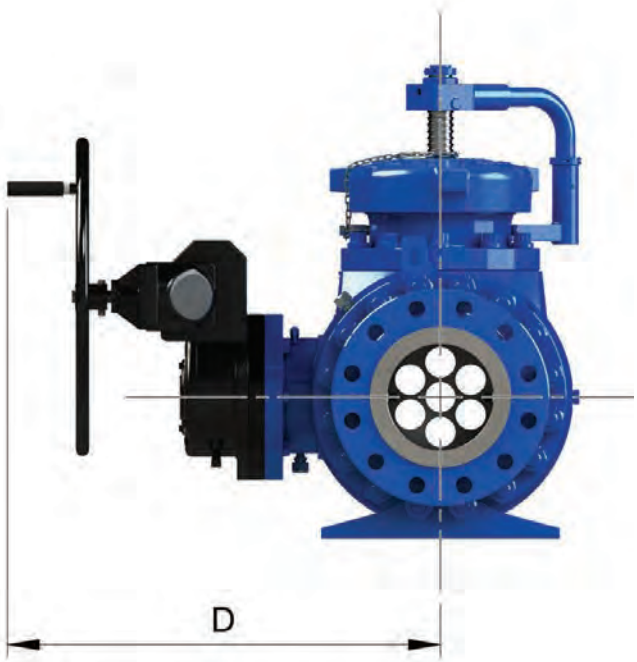
With the entry cap replaced and fully tightened (with the non-impact wrench), close all vent and/or drain valves.



Now in the **open** position, pipeline media flows through the Argus Pig Valve.

DIMENSIONS
6" 900 ASME & ABOVE



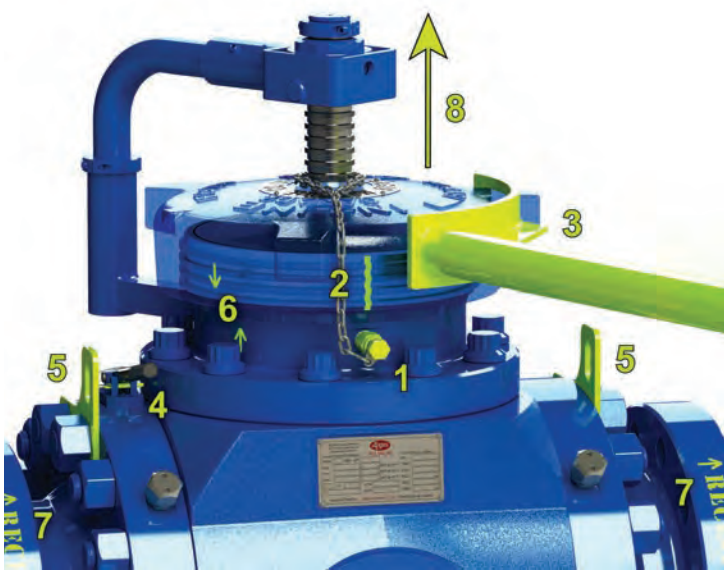


PIG VALVE		A (FACE TO FACE LENGTH) [1]				B		C		D		E		VALVE BORE		BALL CORE ID		ENTRY PLUG BORE		APPROX. WT.	
		RF		RTJ																	
Size	*ASME*	*in*	*mm*	*in*	*mm*	*in*	*mm*	*in*	*mm*	*in*	*mm*	*in*	*mm*	*in*	*mm*	*in*	*mm*	*in*	*mm*	*lbs*	*kg*
6"	900[1]	29.00	737	29.12	740	22.38	568	8.79	223	29.97	761	24.65	626	6.00	152	6.63	168	6.75	171	1460	662
	1500[1]	35.00	889	35.25	895	25.11	638	11.11	282	32.71	831	26.72	679	6.00	152	6.63	168	6.75	171	2600	1179
8"	150[1]	28.50	724	*	*	23.37	594	10.67	271	32.70	831	26.72	679	8.00	203	9.00	229	8.75	222	1937	878
	300[1]	28.50	724	29.00	737	23.37	594	10.67	271	32.70	831	26.72	679	8.00	203	9.00	229	8.75	222	2075	941
	600[1]	31.20	792	31.32	796	23.37	594	10.67	271	32.70	831	26.72	679	8.00	203	9.00	229	8.75	222	2225	1009
	900[1]	35.00	889	35.12	892	24.65	626	11.24	285	33.34	847	31.72	806	8.00	203	8.88	226	8.75	222	2785	1263
	1500[1]	42.00	1067	42.38	1076	31.51	800	12.74	324	35.61	904	32.33	821	8.00	203	8.88	226	8.75	222	4150	1882
10"	150[1]	35.36	898	35.86	911	26.09	663	12.00	305	34.56	878	32.33	821	10.00	254	11.00	279	10.75	273	2985	1354
	300[1]	35.36	898	35.86	911	26.09	663	12.00	305	34.56	878	32.33	821	10.00	254	11.00	279	10.75	273	3225	1463
	600[1]	37.12	943	37.25	946	26.09	663	12.00	305	34.56	878	32.33	821	10.00	254	11.00	279	10.75	273	3400	1542
	900[1]/1500[1]	*																			
12"	150[1]	40.75	1035	41.25	1048	29.15	740	14.17	360	38.88	988	32.33	821	12.00	305	13.00	330	12.75	324	4593	2083
	300[1]	40.75	1035	41.25	1048	29.15	740	14.17	360	38.88	988	36.67	931	12.00	305	13.00	330	12.75	324	5120	2322
	600[1]	42.06	1068	42.19	1071	29.15	740	14.17	360	38.88	988	36.67	931	12.00	305	13.00	330	12.75	324	5300	2404
	900[1]	47.00	1194	47.12	1197	32.15	817	15.38	391	37.67	957	32.33	821	12.00	305	13.00	330	12.75	324	6340	2875
	1500[1]	*																			
14"	600[1]	45.00	1143	45.12	1146	49.00	1245	16.31	414	44.84	1139	36.70	932	13.25	337	14.25	362	14.25	362	7062	3203
16"	150[1]	47.62	1210	*	*	48.51	1232	17.12	435	41.57	1056	36.67	931	15.25	387	16.25	413	16.25	413	7598	3446
	300[1]	54.00	1372	54.50	1384	48.51	1232	17.12	435	41.57	1056	36.67	931	15.25	387	16.25	413	16.25	413	8860	4018
	600[1]	54.00	1372	54.12	1375	48.51	1232	17.12	435	41.57	1056	36.67	931	15.25	387	16.25	413	16.25	413	9035	4098
	900[1]/1500[1]	*																			
18"	150[1]	48.50	1232	*	*	48.28	1226	17.78	452	45.14	1147	36.69	932	17.25	438	18.25	464	18.25	434	6887	3123
20"	150[1]	49.38	1254	*	*	50.15	1274	19.43	494	47.63	1210	36.69	932	19.25	489	20.25	514	20.25	514	7525	3413

[1] Face to Face Length does not meet API Spec. '6D', ASME 'B16.10', or CSA Z245.15.
** Contact Argus for dimensional details.*
Note: Design specifications subject to change without prior notice.

SAFETY FEATURES
6" 900 ASME & ABOVE

1	**Pressure Alert Valve** Must be opened before the entry cap will fully open and can audibly warn the operator of existing pressure.
2	**Pressure Alert Groove** Safety redundancy in the unlikely event the pressure alert valve malfunctions that will also audibly warn the operator.
3	**Non-Impact Wrench and Entry Cap** Eliminates hammering on the entry cap and the associated material failure and sparking hazards.
4	**Equalization Valve Safety Pin** Prevents accidental operation of the pressure equalization valve during operation.
5	**Lifting Lugs** Allows for safe handling of the Argus Pig Valve during installation and repair.
6	**Entry Cap Alignment Arrows** High visibility painted arrows and tactile drive pins line up when the entry cap is closed and properly tightened.
7	**Flow Direction and Valve Type Labels** High visibility stenciling minimizes potential confusion or misapplication during installation.



8	**Entry Cap Orientation for Media Spillage** Vertical orientation of all Argus Pig Valve entry caps eliminates the threat of horizontal pressurized openings.
9	**Optional Interlock System (Not Shown)** Provides an enhanced level of safety by ensuring operators can only follow the safest process for operation.

TRIM MATERIALS

STANDARD TRIM MATERIALS FOR 6" 900 ASME & ABOVE	
Body	ASTM A350-LF2, Class 1
End Connections	ASTM A350-LF2, Class 1
Ball	ASTM A350-LF2 c/w 0.001" High-Phosphorus ENC
Entry Cap	ASTM A350-LF2, Class 1
Trunnion Bearing Plate	ASTM A516-Gr. 70
Seat Springs	Inconel X-750
Seat Support	ASTM A350-LF2 c/w 0.001" ENC
Seat Insert	Devlon 'V'
Primary Seals	Highly Saturated Nitrile (HSN)
Bolting - Pressure Containing	ASTM A320 L7M/ASTM A194 L7M

Note: Alternative trim materials available upon request.

OPERATIONAL SEQUENCE
6" 900 ASME & ABOVE

Launching

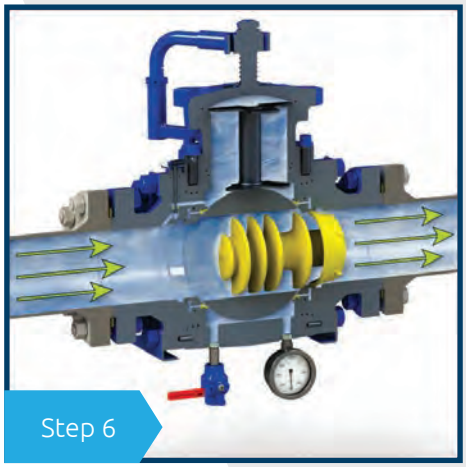
In the **closed** position, vent and/or drain the Argus Pig Valve body cavity. The pressure gauge will drop to zero.

Remove the pressure alert valve stem to allow for opening of the entry cap.

Open the entry cap (with the non-impact wrench) and swing to the side. Remove the pig restrictor. Insert a pig then replace the pig restrictor over top.

Fully tighten the entry cap up to the alignment arrows (with the non-impact wrench), replace the pressure alert valve stem, and close all drain valves.

Remove the pressure equalization valve safety pin and depress the lever to equalize the cavity pressure. The pressure gauge will increase to relative downstream pressure. Replace the pin.

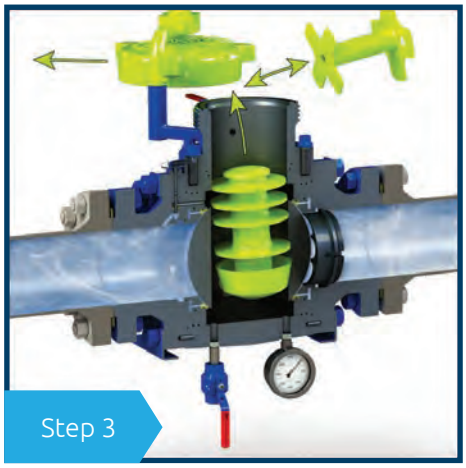


Now in the **open** position, pipeline flow and pressure moves the pig downstream.

Receiving

After receiving a pig, and with the Argus Pig Valve in the **closed** position, vent and/or drain the body cavity. The pressure gauge will drop to zero.

Remove the pressure alert valve stem to allow opening of the entry cap.



Open the entry cap (with the non-impact wrench) and swing to the side. Remove the pig restrictor and pig. Replace the pig restrictor.

Fully tighten the entry cap up to the alignment arrows (with the non-impact wrench), replace the pressure alert valve stem, and close all drain valves.

Remove the pressure equalization valve safety pin and depress the lever to equalize the cavity pressure. The pressure gauge will increase to relative downstream pressure. Replace the pin.

Now in the **open** position, pipeline media flows through the Argus Pig Valve.

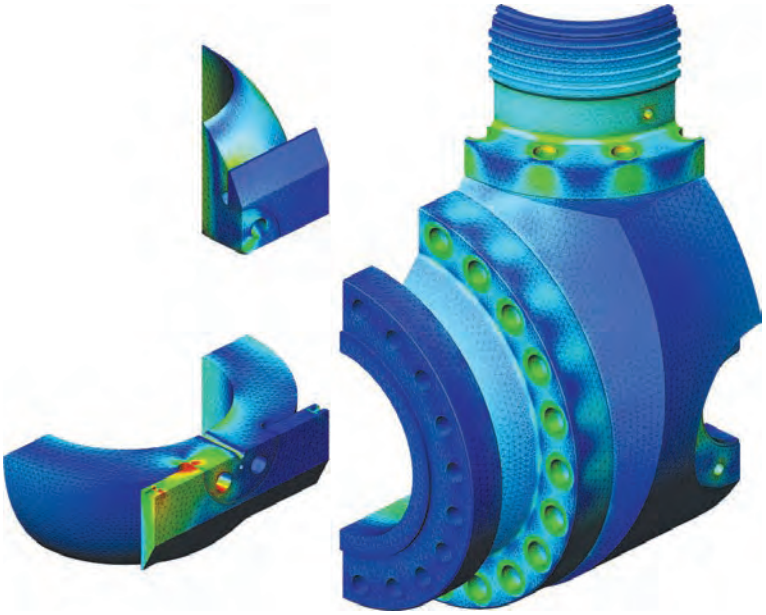
COMPLEX ANALYSIS

Argus Engineering leverages finite element analysis (FEA) in the design of Argus Pig Ball Valves.

This computational method allows for a comprehensive assessment of components under load. Compared to only using traditional analysis techniques, this method of analysis also provides greater insight into how these components function as an assembly.

Our expertise in this approach offers a number of unique benefits to the customer:

- Confidence for all applications, with stringent compliance to industry standards.
- More reliable, standardized, and predictable operation characteristics.
- Optimized geometry - reducing mass and cost of materials - while providing unmatched safety of the Argus Pig Ball Valve.



APPLICATIONS

3" 600 ASME
Bahia, Brazil

6" 600 ASME
United Arab Emirates

8" 600 ASME
Haynesville Shale Gas, Louisiana, USA

12" 600 ASME
Eagleford Shale Gas, Texas, USA