



Series ESP - Model SA for Water Applications

## AIR RELEASE AND VACUUM BREAK VALVES INCORPORATING VARIABLE ORIFICE TECHNOLOGY



FOR UNCOMPLICATED AND EFFICIENT AIR MANAGEMENT AND SURGE PROTECTION



a.

Air enters the valve and flows through the annular space between the floats and the valve body and discharges from the large orifice into atmosphere.

The discharging air immediately impacts the Variable Orifice Shuttle which rises as the air differential pressure increases across the large orifice.



b.

In reaction to increased air flow, the Variable Orifice Shuttle rises further forcing air through a narrower path, resulting in the uniform deceleration of the approaching water due to the resistance of rising air pressure in the valve.

The magnitude and amplitude of surge and water hammer is reduced more rapidly and more uniformly with the Variable Orifice principle than conventional anti slam devices.



c1.

Liquid enters the valve and the floats are buoyed so that the Large Orifice is closed. The valve will then become internally pressurised. Air released from solution rises through the liquid and accumulates in the valve.



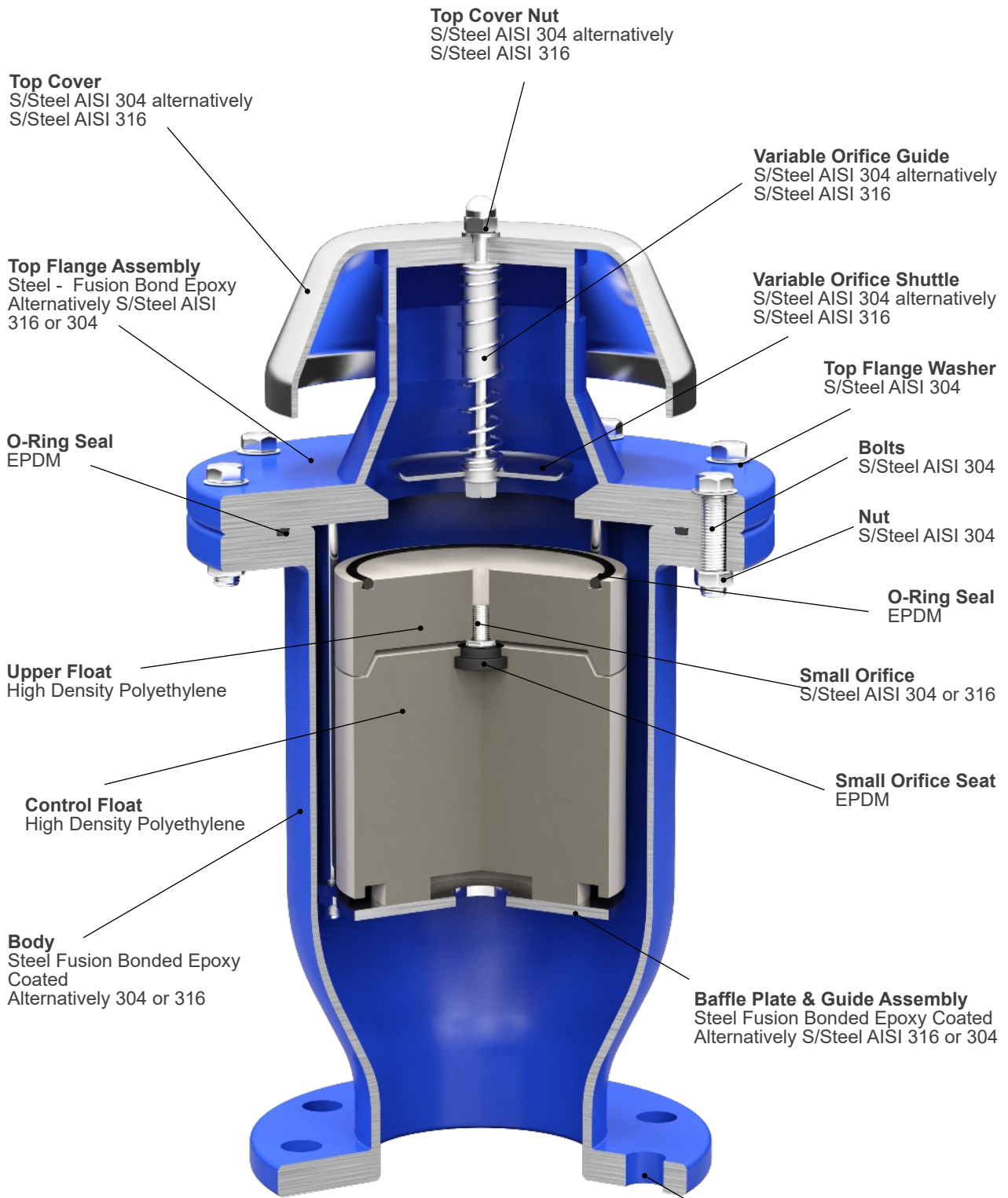
c2.

When the volume of air is sufficient to displace the water, the control float will no longer be buoyant and will move downwards thereby opening the small orifice and allow accumulated air to be discharged into atmosphere.



d.

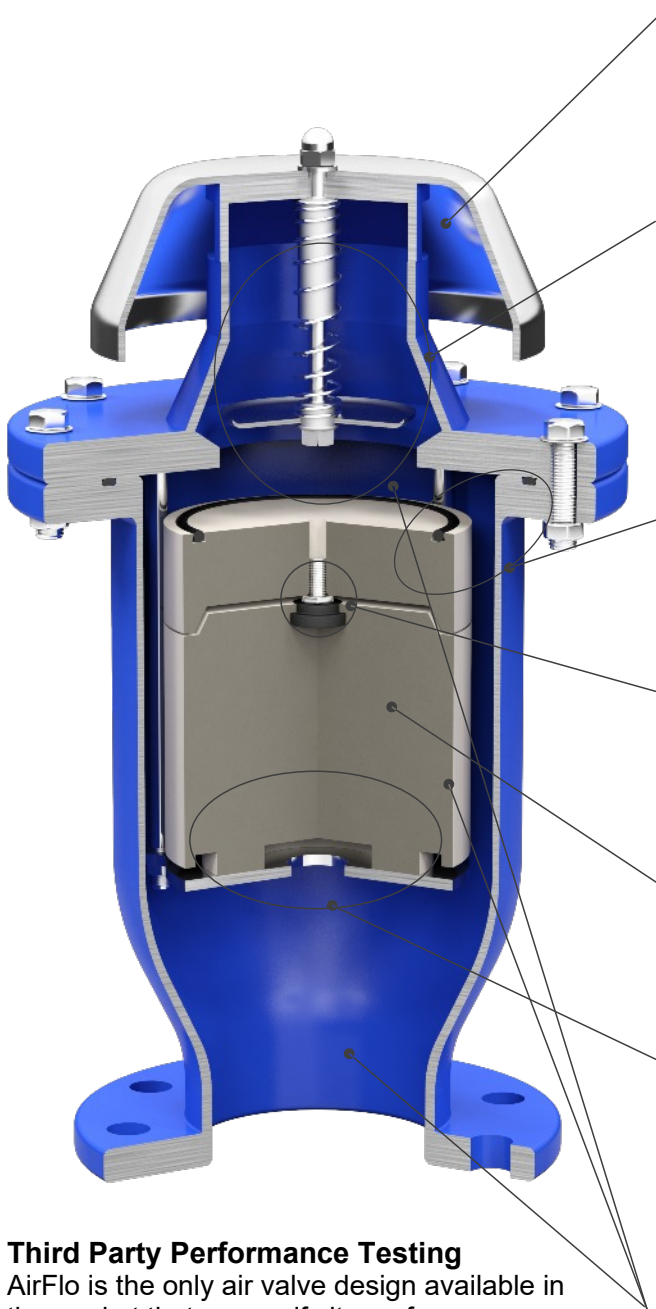
Drainage of liquid from the valve causes Floats to move downwards onto the Baffle Plate assembly, thereby allowing atmospheric air through the valve to rapidly displace draining water in the pipeline and prevent potentially damaging internal partial vacuum conditions.



**NOTE:**  
There may be some variations in shape and components for sizes DN150 to DN300 valves.

**End Connection**  
DN25 & DN50:  
Flanged or Screwed BSP Female  
DN80 to DN300:  
Flanged

AIRFLO Variable Orifice Air Valves are designed for high performance and low maintenance. The principle of the design is to ensure, through the integrity of the materials of construction, and the performance characteristic of each function that the optimum pipeline performance is achieved with every installed air valve. Some of the features of AIRFLO include:



**S/Steel Cover:**

Does not deteriorate with time. Cannot be damage by Maintenance Staff stepping on it. Designed for efficient air intake whilst preventing debris and insects entering the valve.

**Patented Variable Orifice Technology:**

Infinitely and progressively controls air discharge and adjusts orifice outlet relative to pipeline conditions to ensure optimum Surge protection while providing effective air release.

Design also enhances vacuum protection by 30% or more in comparison to other designs of the same nominal size.

**O-Ring Seal and Seat :**

Dynamic seal and seat arrangement that ensures drip-tight sealing without failure regardless of operating pressure or size range.

**Direct Acting Small Orifice :**

Ensures effective pressurised air release regardless of operating pressure.

Unique keying of rubber seat to prevent draw-out under high pressure conditions

**Solid Cylindrical Floats :**

No distortion or wear of the float with time

**Impact Zone:**

Ensures driptight sealing under low pressure conditions.

Enhances surge protection under operating conditions.

**Full Flow Areas :**

Flow areas equal the nominal size of the valve. There is no restriction to air intake and a smooth transition of flow due to the shape of the valve body and overall profile of the of the valve.

The valve configuration also enhances the surge protection by 30% or more in comparison to other designs.

**Third Party Performance Testing**

AirFlo is the only air valve design available in the market that can verify its performance through 3<sup>rd</sup> party comparative and performance testing conducted by SABS. (Tests: 12H050 and 13H197).





**DESIGN TYPE**

Variable Orifice Air Release and Vacuum Break Valve with Automatic Surge Protection

**ACCEPTABLE MEDIA**

Potable Water and Strained Raw Water

**OPERATING PRESSURE RANGE**

PN 16, PN 25 and PN 40  
PN 64 and PN 100 Available on Request

**OPERATING TEMPERATURE RANGE**

-5° TO 80°

**SIZE RANGE**

DN25 to DN100

**STANDARD FACTORY TESTS**

Low Head - 2 metres; Body 1.5 times PN

**MATERIALS OF CONSTRUCTION**

Steel Assembly, Fusion Bonded Epoxy Coated to 300 microns. S/Steel 304 Bolts, Nuts, Washers and Trim. Seals in EPDM. Floats in Food Grade HDPE

**END CONNECTIONS**

Screwed BSP - DN25 and DN50 only  
Flanged SABS 1123 or BS 4505 or, EN 1092 or ANSI B16.5

**STANDARD DESIGN**

AIRFLO's standard design provides for functions as standard namely:

- Unrestricted Air Intake - Pipeline Draining
- Controlled Air Discharge
- Pressurised Air Discharge
- Surge Management under rapid filling and pump trip conditions

**3<sup>rd</sup> PARTY PERFORMANCE VERIFICATION TESTING**

SABS Tests 12H050 and 13H197

**BLEED PORT**

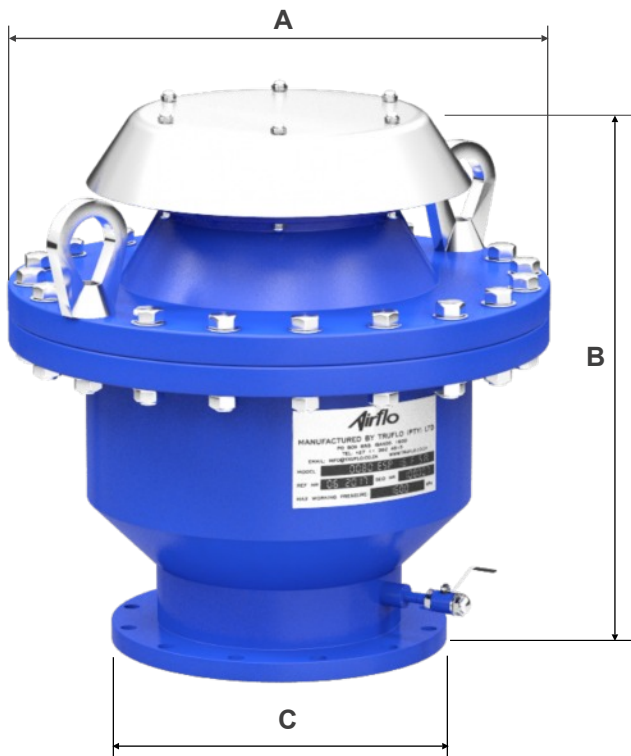
Valve supplied as standard without a Bleed Port. A Bleed Port can be provided upon request.

**Note:**

Air Valves for Rand Water are supplied complete with a Bleed Cock.

Rand Water Board valves are coated in a Gun Metal Grey coating to Rand Water specifications

Size DN	Press. Rating	Model No:	End Connection	A	B	C	Weight kg
80	PN16	80 ESP 16F SA	Flanged	246	380	200	21
100	PN16	100 ESP 16F SA	Flanged	264	405	220	23
25	PN25	25 ESP 25F SA	Flanged	168	305	115	4.9
50	PN25	50 ESP 25F SA	Flanged	198	360	165	9.4
80	PN25	80 ESP 25F SA	Flanged	246	380	200	21
100	PN25	100 ESP 25F SA	Flanged	264	405	235	23
25	PN40	25 ESP 40F SA	Flanged	168	355	115	5.3
50	PN40	50 ESP 40F SA	Flanged	198	360	165	9.9
80	PN40	80 ESP 40F SA	Flanged	246	400	200	22.5
100	PN40	100 ESP 40F SA	Flanged	264	420	235	26



**Note:**

Air Valves for Rand Water are supplied complete with a Bleed Cock.

Rand Water Board valves are coated in a Gun Metal Grey coating to Rand Water specifications

**DESIGN TYPE**

Variable Orifice Air Release and Vacuum Break Valve with Automatic Surge Protection

**ACCEPTABLE MEDIA**

Potable Water and Strained Raw Water

**OPERATING PRESSURE RANGE**

PN 16, PN 25 and PN 40  
PN 64 and PN 100 Available on Request

**OPERATING TEMPERATURE RANGE**

-5° TO 80°

**SIZE RANGE**

DN150 to DN300

**STANDARD FACTORY TESTS**

Low Head - 2 metres; Body 1.5 times PN

**MATERIALS OF CONSTRUCTION**

Steel Assembly, Fusion Bonded Epoxy Coated to 300 microns. S/Steel 304 Bolts, Nuts, Washers and Trim. Seals in EPDM. Floats in Food Grade HDPE

**OPTIONS IN MATERIALS OF CONSTRUCTION**

Valves can be supplied in all Stainless Steel 304 or 316

**END CONNECTIONS**

Flanged SABS 1123 or BS 4505 or, EN 1092 or ANSI B16.5

**STANDARD DESIGN**

AIRFLO's standard design provides for functions as standard namely:

- Unrestricted Air Intake - Pipeline Draining
- Controlled Air Discharge
- Pressurised Air Discharge
- Surge Management under rapid filling and pump trip conditions

**3<sup>rd</sup> PARTY PERFORMANCE VERIFICATION TESTING**

SABS Tests 12H050 and 13H197

**BLEED PORT**

Valve supplied as standard without a Bleed Port. .A Bleed Port can be provided upon request.

Size DN	Press. Rating	Model No:	End Connection	A	B	C	Weight kg
150	PN16	150 ESP 16F SA	Flanged	400	495	285	65
200	PN16	200 ESP 16F SA	Flanged	464	520	340	94
250	PN16	250 ESP 16F SA	Flanged	640	568	405	170
300	PN16	300 ESP 16F SA	Flanged	710	780	460	235
150	PN25	150 ESP 25F SA	Flanged	400	510	300	67
200	PN25	200 ESP 25F SA	Flanged	464	535	360	98
250	PN25	250 ESP 25F SA	Flanged	640	574	425	185
300	PN25	200 ESP 25F SA	Flanged	710	790	485	245
150	PN40	150 ESP 40F SA	Flanged	400	525	300	73
200	PN40	200 ESP 40F SA	Flanged	464	550	375	102
250	PN40	250 ESP 40F SA	Flanged	640	584	450	194
300	PN40	300 ESP 40F SA	Flanged	710	802	515	256

AIRFLO is a patented compact, single chamber design with minimum operating parts that enhances performance whilst simplifying operation and solves many of the shortcomings of conventional air valve designs such as:

- **Advanced Surge Protection** - Each AIRFLO valve is fitted with a Variable Orifice that automatically adjusts the discharge port to the most appropriate orifice size relevant to the pipeline conditions to uniformly decelerate water approaching at excessive speed, thereby limiting pressure rise upon valve closure. This feature distinguishes AIRFLO from the limitations of conventional anti-shock and anti-slam devices that are dependant on a fixed orifice or a specific switching pressure to activate their surge protection.
- **Vacuum Protection** - AIRFLO air valves feature an unobstructed large orifice and a smooth flow path for air intake ensuring effective vacuum breaking under pipe draining conditions. The AIRFLO design and flow path is such that it prevents the partial closure of the intake orifice under vacuum conditions thereby providing increased vacuum protection of more than 30% in comparison to other designs. AIRFLO intake and discharge characteristics has been verified by 3<sup>rd</sup> party comparative testing (SABS tests 12H050 and 13H197), allowing the engineer to confidently reference its performance.
- **Low Pressure Sealing and additional Surge Protection** - The AIRFLO control float is designed to maintain a specifically calculated buoyancy allowing for a specified amount of air to be trapped in the valve chamber. This feature ensures driptight sealing of the small orifice at extremely low operating heads. In addition, this feature provides a cushioning benefit for pressure transients of short duration.
- **Pressurised Air Release** - Pressurised air release in the AIRFLO design is achieved by the understanding of the relationship that exists between the size of the small orifice and the weight of the control float which ensures effective air discharge even under high pressure conditions.
- **Compact Design and Enhanced Performance** - AIRFLO is the most compact of all air valve designs currently available on the market. The compactness in the design is a result of the wider annular flow areas and streamlined body design. The performance of the AIRFLO as proven in 3<sup>rd</sup> party comparative testing is a minimum of 30% more efficient than other designs.
- **Design Flexibility , Size Range and Service** - AIRFLO provides the largest air valve range in terms of size, materials of construction and function of any manufacturer in South Africa. Our products are backed by excellent technical support and after sales service.



The AIRFLO series ESP Valve has four functions, namely:

**Large volume air intake** - vacuum conditions: The large orifice of the air valve is equal to or greater than the nominal diameter of the valve ensuring no restrictions during air intake. The characteristic of the valve is such that it prevents the fluttering of the float under intake conditions thereby maximising air intake.

**Intake Capacities of AIRFLO Series ESP Air Valves in nl/sec**

Bar	DN 50	DN 50	DN 80	DN100	DN 150	DN 200	DN 250	DN 300
-0.05	18	71	182	281	633	1120	1750	2520
-0.1	25	98	250	387	870	1539	2405	3463
-0.15	29	116	297	459	1034	1829	2857	4115
-0.2	33	130	332	514	1156	2044	3194	4600
-0.25	35	140	359	555	1248	2208	3450	4968
-0.3	37	148	378	585	1317	2330	3641	5243
-0.35	39	153	393	608	1367	2418	3779	5441

nl/sec = normal litres per second @ 20 degrees Celsius and 1.01325 bar absolute

**Note:** Choked orifice conditions commence at approximately 0.35 bar  $\Delta p$  under vacuum conditions. It is therefore imperative to ensure that the air valves are correctly sized for vacuum conditions, taking the limitations of the air valve, pipeline seals and pipeline material into account.

**Large volume low pressure air discharge** - normal filling conditions: The air valve will discharge large volumes of low pressure air under normal filling conditions. The Variable Orifice works in such a manner that it will automatically adjust the outlet discharge to the differential pressure across the large orifice

**Surge Protection - excessive filling conditions, re-joining columns subsequent to pump trip** - The operation of the AIRFLO Variable Orifice is such that the orifice progressively reduces in size as the differential pressure across the large orifice increases. The orifice therefore decreases from a full port at atmospheric pressure until it reaches its smallest discharge port at 0.05 bar  $\Delta p$ . AIRFLO therefore behaves differently to “Anti-Shock” or “Anti-Slam” designs in that it does not require a specific switching point but is constantly in a surge protection mode, eliminating the potential slam that can occur with conventional designs in the sub-critical phases of discharge and provides a more holistic surge protection comparatively.

**Pressurised air discharge** - The valve will automatically release pressurised air once the pipeline is hydraulically full. The small orifice is design to fully opens up to the valve’s maximum working pressure.

**AIRFLO Inlet and Discharge Orifices**

Valve Size DN	Inlet Orifice & Flow Path in mm	Variable Orifice Diameters in mm at 0.05 bar $\Delta p$	Small Orifice Diameters in mm
25	25	5	1.5
50	50	10	2
80	80	15	2.5
100	100	18	2.5
150	150	25	5
200	200	35	5
250	250	42	8
300	300	54	8

Please consult with REXUS for more detailed information on the transitioning orifice sizes of the Variable Orifices at varying deferential pressures across the large orifice or for assistance with Air Valve Sizing and Positioning and Surge and Waterhammer Analysis



Series ESP Model CA Variable Orifice Air Valve is a triple function valve with automatic surge protection for use in potable and strained raw water applications.

Valves are manufactured in full Stainless Steel 304 or 316 as standard. Valves can also be manufactured in Duplex or Super Duplex on request.

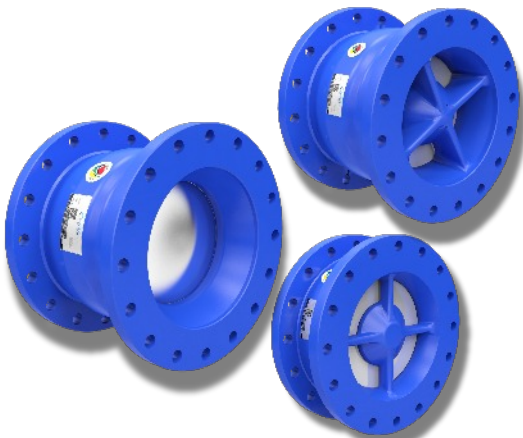
Valves are available in sizes DN25 to DN300 and for pressure ratings PN10 to PN100



Series ERP Variable Orifice Air Valves is a compact, triple function valve design with automatic surge protection for Sewer and Slurry applications.

Valves are manufactured in Stainless Steel 304 or 316 as standard or epoxy coated Steel with Stainless Steel 304 or 316 trim. Flush ports are optional extras.

Valves are available in sizes DN50 to DN300 and for pressure ratings PN16 and PN25



CHECKFLO Nozzle Check Valves are available in the reliable Central Shaft design as well as the Annular Disc design for superior surge protection and efficient low head pipeline operation.

Valves are available in a variety of materials and trim options in both short and long face to face dimensions

Valves are available in sizes DN50 to DN1200 and for pressure ratings PN10 to PN63



CHECKFLO Silent Check Valves are of a conical disc design with metal to metal or soft seal options for cost effective surge protection.

CHECKFLO Silent Check Valves are available in a variety of materials and trim options.

Valves are available in sizes DN80 to DN1000 and for pressure ratings PN10 to PN40

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