

VAIU - VB

AIR VALVE



ANGODOS
Válvulas

"From 1970 close to our clients"

ANGODOS

Since 1970 **ANGODOS** has been technological leader in valves industry, manufacturing everything in Madrid (Spain) and commercializing high performance valves internationally for different application fields.

ANGODOS Manufacturing range is pretty wide, covering a variety of application for different fields as waste water, drinking water, desalination, sanitation, irrigation system, mining, industry, gas and petroleum. from PN6 to PN100 and from DN40 to DN3000.

Since the creation of **ANGODOS**, the main objective has been providing Taylor-made solutions for the customers, developing a wide range of butterfly valves with different construction types and actuators, overspeed valves, check valves, air valves, and discharge valves solutions as howell-bunger valves.

Constant innovation and technological development allows **ANGODOS** to be the reference for the professionals interested in quality, safety, ease of use and installation and of course durability. **ANGODOS** has established a quality system for valves manufacturing, which has been approved by Lloyd's Register in accordance with the quality management system standard ISO 9001.



ANGODOS valve AG1 DN900 PN100



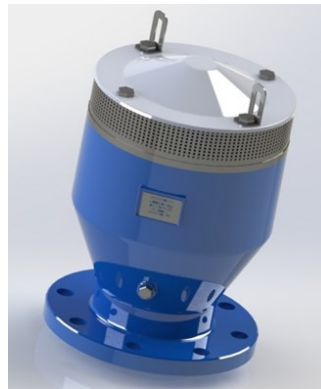
ANGODOS valve model AG1-CT with dismantling joint



Overspeed valve DN2000 PN25, double arm



Interior plant view – big diameter valves



DN150 PN25 air release valve



Check valves DN900 PN16 with hydraulic shock absorber

Certificates

CERTIFICATE OF APPROVAL

This is to certify that the Quality Management System of:

ANGODOS, S.L.
C/ San Juan, 21-23, Pol. Ind. El Palomo
28946 Fuenlabrada, Madrid
Spain

has been approved by Lloyd's Register Quality Assurance to the following Quality Management System Standard:

ISO 9001:2008

The Quality Management System is applicable to:

Development, production, sale and service of valves, accessories and operation and control equipment.

Approval Certificate No: SGI 2199125

Original Approval: 01 July 1999
Current Certificate: 07 December 2016
Certificate Expiry: 14 September 2018

Issued by: LRQA España, S.L.
For and on behalf of: Lloyd's Register Quality Assurance Limited

C/ Proseca, 29 - 1^o - 28028 Madrid, España
For and on behalf of: Trinity Park, Bicknell Lane, Birmingham B37 7YS, United Kingdom
This approval is conditional upon compliance with the applicable standards and conditions contained in the referenced standard.
The use of the UKAS Accreditation Mark indicates Accreditation in respect of those activities covered by the Accreditation Certificate Number 01.

ISO 9001

EU CERTIFICATE OF CONFORMITY

In accordance with the requirements of the Pressure Equipment Directive 2014/68/EU and the Pressure Equipment (Safety) Regulations 2016, UK Statutory Instrument 2016 No. 1105

This is to certify that the Quality Management System of:

ANGODOS, S.L.
C/San Juan nº 21/23
28946 – Fuenlabrada (Madrid)
Spain

has been assessed against the requirements of Annex III, Module H of the Pressure Equipment Directive 2014/68/EU, and Schedule 4, Module H of The Pressure Equipment (Safety) Regulations 2016 and conforms to the requirements for the products shown below:

Design and Manufacture of Industrial Valves (see attached schedule)

Approval is subject to the continued maintenance of the quality system in accordance with the requirements of the above Directive and Regulations for the products listed on the attached schedule.

Authorisation is hereby given to use the LRV Notified Body Identification Number in accordance with the requirements of the specified Directive and Regulations in relation to the products as identified above.

Certificate No: 0038PEDMAD0140
Original Approval: 31 January 2014
Current Certificate: 23 January 2017
Certificate Expiry: 31 January 2020
LRV Notified Body Number 0038

Lloyd's Register Verification Limited
Teresa Souto
28002017
Madrid

Teresa Souto on behalf of Lloyd's Register Verification

PRESSURE EQUIPMENT 2014/68/EU

AENOR Product Certificate
Isolating valves for water supply

B18/000006

AENOR, Spanish Association for Standardization and Certification, certifies that the organization

ANGODOS, S.L.

registered office: C/ San Juan nº 21-23, Polígono Industrial El Palomo 28946 Fuenlabrada (Madrid - España)

supplies: Isolating valves for water supply

in compliance with: UNE-EN 1074-1:2001 [EN 1074-1:2000]
UNE-EN 1074-1:2001 ERRATUM:2008
UNE-EN 1074-2(A):2004 [EN 1074-2:2000(A):2004]
UNE-EN 1074-2:2001 [EN 1074-2:2000]

References: Specified in Annex to the Certificate

Production site: C/ San Juan nº 21-23, Polígono Industrial El Palomo 28946 Fuenlabrada (Madrid - España)

Certification scheme: In order to grant this Certificate, AENOR has tested the product and has verified the quality system implemented for its manufacture. AENOR performs these tasks periodically while the Certificate has not been cancelled, in accordance with Specific Rules RP B18.01

This certificate supersedes B18/000006, dated 2014-06-07

First issued on: 2014-04-07
Modified on: 2014-07-23
Validity date: 2019-04-07

Avelino BRITO
Chief Executive Officer

AENOR Asociación Española de Normalización y Certificación | Góndiz, 7, 28004 Madrid, España | Tel. 902 303 201 - www.aenor.es

AG1 BC 1074-1/2 PRODUCT CERTIFICATE

AENOR Product Certificate
Isolating valves for water supply

B18/000007

AENOR, Spanish Association for Standardization and Certification, certifies that the organization

ANGODOS, S.L.

registered office: C/ San Juan nº 21-23, Polígono Industrial El Palomo 28946 Fuenlabrada (Madrid - España)

supplies: Isolating valves for water supply

in compliance with: UNE-EN 1074-1:2001 [EN 1074-1:2000]
UNE-EN 1074-1:2001 ERRATUM:2008
UNE-EN 1074-2(A):2004 [EN 1074-2:2000(A):2004]
UNE-EN 1074-2:2001 [EN 1074-2:2000]

References: Specified in Annex to the Certificate

Production site: C/ San Juan nº 21-23, Polígono Industrial El Palomo 28946 Fuenlabrada (Madrid - España)

Certification scheme: In order to grant this Certificate, AENOR has tested the product and has verified the quality system implemented for its manufacture. AENOR performs these tasks periodically while the Certificate has not been cancelled, in accordance with Specific Rules RP B18.01

First issued on: 2014-07-23
Validity date: 2019-07-23

Avelino BRITO
Chief Executive Officer

AENOR Asociación Española de Normalización y Certificación | Góndiz, 7, 28004 Madrid, España | Tel. 902 303 201 - www.aenor.es

AG1 VC 1074-1/2 PRODUCT CERTIFICATE

Certificates

AENOR
AENOR Product Certificate
Air valves for water supply

B18/000008
AENOR certifies that the organization
ANGODOS, S.L.
registered office: Cl San Juan nº 21-23, Polígono Industrial El Palomo 28946 Fuenlabrada (Madrid - España)
supplies: Air valves for water supply
in compliance with: UNE-EN 1074-1:2001
UNE-EN 1074-1:2001 ERRATUM 2008
UNE-EN 1074-2:2001
References: Specified in Annex to the Certificate
Production site: Cl San Juan nº 21-23, Polígono Industrial El Palomo 28946 Fuenlabrada (Madrid - España)
Certification scheme: In order to grant this Certificate, AENOR has tested the product and has verified the quality system implemented (or its manufacture). AENOR performs these tests periodically while the Certificate has not been cancelled, in accordance with Specific Rules RP B18.02.
First issued on: 2017-03-21
Validity date: 2022-03-21

[Signature]
Avelino BRITO
General Manager

VAIU 1074-1/4 PRODUCT CERTIFICATE

Our Ref: HL/M130483
Test Report: MAT/LAB 7110/2

WRAS
Water Regulations Advisory Scheme

22nd February 2013

Compounds AG,
Baroldstrasse 1,
CH-8330 Pfäfers 2H,
Switzerland

WATER REGULATIONS ADVISORY SCHEME (WRAS) MATERIAL APPROVAL

The material referred to in this letter is suitable for contact with wholesome water for domestic purposes having met the requirements of BS 6903-3:2000 'Suitability of plastic products for use in contact with water intended for human consumption with regard to their effect on the quality of the water'.

The reference relates solely to its effect on the quality of the water with which it may come into contact and does not signify the approval of its mechanical or physical properties for any use.

ETHYLENE PROPYLENE DIENE MONOMER (EPDM) - MATERIAL ONLY **5365**

Sunaflex T 8165, Black coloured, compression moulded EPDM sheet material. Shore hardness 70A. Tested in radius size 1.0mm. For use with water up to 65°C.

APPROVAL NUMBER: 1302524
APPROVAL HOLDER: COMPOUNDS AG

The Scheme reserves the right to review approval. This approval is valid between February 2013 and February 2018.

An entry, as above, will accordingly be included in the Water Fittings Directory on-line under the section headed, 'Materials which have passed full tests of effect on water quality'.

The Directory can be found at www.wras.co.uk/directory

Yours faithfully,
[Signature]
Jason England
Approval & Enquiries Manager
Water Regulations Advisory Scheme

11.10.2016
Compounds AG
Baroldstrasse 1
CH-8330 Pfäfers

EPDM certificate

Product certificate
K11557/14

Issued: 2018-03-01
Revision: K11557/13
Page: 1 of 3

Coating systems for potable water applications

STATEMENT BY KIWA
With this product certificate, issued in accordance with the Kiwa Regulations for Product Certification, Kiwa declares that legitimate confidence exists that the products supplied by
Akzo Nobel Powder Coatings GmbH
as specified in this product certificate and marked with the Kiwa®-mark in the manner as indicated in this product certificate may, on delivery, be relied upon to comply with Kiwa evaluation guideline BRL-K759 'Coating systems for drinking-water applications' dated 2012-02-01.

[Signature]
Luc Leroy
Kiwa

Publication of the certificate is allowed.
Advice: consult www.kiwa.nl in order to ensure that this certificate is still valid.

Supplier:
Akzo Nobel Powder Coatings GmbH
Markenstrasse 50
72770 NEULINGEN
Germany
Tel. +49 7121 / 519130
Fax +49 7121 / 5191 99
info@rescoat.com
www.rescoat.de

Certification process consists of initial and regular assessment of:
• quality system
• product

Epoxy certificate

CERTIFICADO DE CALIBRACIÓN
Certificate of Calibration

ENAC
N.º 1157/A.012.113

Número: 8852-3667
Página 1 de 3 páginas
Page of pages

CALTEX SISTEMAS, S.L.
LABORATORIO DE CALIBRACIÓN
Av. Juan de La Cerda, nº 10 - 46980 Paterna (VALENCIA)
Tel.: 96 182 99 02 - Fax: 96 143 82 72
E-mail: calibracion@caltex.com - www.calibracion.com

MANÓMETRO DE PRESIÓN RELATIVA
DIGITAL

MARCA: SIKA
Model: E2 400 bar

IDENTIFICACION: CÓDIGO: NO CONSTA
Nº SERIE: 1189PB2

SOLICITANTE: Angodos S.L.
Applicant: P Ind El Palomo - CS San Juan, 21-23 28946 Fuenlabrada MADRID

FECHAS DE CALIBRACIÓN: 22/10/2013
Date/s of calibration

Signatarios autorizados / Authorized signatories: *[Signature]*
Fecha de emisión / Date of issue: martes, 22 de octubre de 2013

Responsable del centro: Firmado digitalmente por Rafael Juan Jiménez Villar. Motivo: He revisado este documento. Fecha: 2013-10-22 16:06:02-0200

Este certificado es expedido de acuerdo con las condiciones de la acreditación concedida por ENAC que no comprende las capacidades de medida y su trazabilidad a patrones nacionales o internacionales.
ENAC es el Entidad del Acuerdo de Reconocimiento Múltiple (MRA) de calibración de European Cooperation for Accreditation (EA) de International Laboratory Accreditation Cooperation (ILAC).
Este certificado no puede ser reproducido parcialmente sin la aprobación por escrito del laboratorio de calibración CALTEX SISTEMAS.
This certificate is issued in accordance with the conditions of accreditation granted by ENAC which has assessed the measurement capability of the laboratory and its traceability to national standards.
ENAC is one of the signatories of the Multilateral Agreement of the European Cooperation for Accreditation (EA) and the International Laboratory Accreditation Cooperation (ILAC).
This certificate may not be partially reproduced, except with the prior written permission of the issuing laboratory CALTEX SISTEMAS.

© CALTEX sistema con el medio ambiente. IMPRESIÓN A DOBLE CARA. LP-DEC-03-01 Ver. 34

CALIBRATION CERTIFICATES

Epoxy coating system

Epoxy Powder is the standard coating material for **ANGODOS** valves. This coating guarantees high corrosion and abrasion resistance while shows outstanding impact resistance. Also excellent bonding with ductile iron is ensured for long service life without servicing the valves.

Application process

ANGODOS Just applies the best epoxy powder, and always following the procedures carefully to ensure the quality and maintain the properties of the coating.

The process comprises four steps:

- Pre-Blasting cleaning of the element.
- Blasting grade SA 2 1/2 according to UNE-EN-ISO 8503 "Preparation of steel substrates before application of paints and related products - Surface roughness characteristics of blast-cleaned steel substrates".
- Heating elements to 180°C.
- Electrostatic spray is applied assuring 300 microns thick creating a polymerized, continue, and airtight film all over the valve.

Coating performance

- Perfect airtight, zero porosity.
- Minimum coated thickness 300 microns.
- High adhesion to metal (min. 12 N/mm²).
- High resilience never cracking.
- Smooth surface (makes incrustation more difficult).
- Suitable for drinking water and food use. WRAS certificate.



Manual blasting cabin 4.5x4.5 meters



Polymerization ovens, 3x3x5 meters



Manual powder coating, cabin 4x4 meters

Polyurethane coating system

Polyurethane (PU) coating is an optional coating material for all **ANGODOS** valves. This coating guarantees high corrosion and abrasion resistance while having more flexibility than epoxy coating higher impact resistance. Also excellent bonding with ductile iron is ensured for long service life without servicing the valves. Polyurethane coating shows outstanding wear resistance and the advantage of being U.V stable, this means that it won't yellow like epoxy does when exposed to small amounts of sunlight over a period of time

Application process

ANGODOS Just applies the best polyurethane and always following the procedures carefully to ensure the quality and maintain the properties of the coating.

The process comprises three steps:

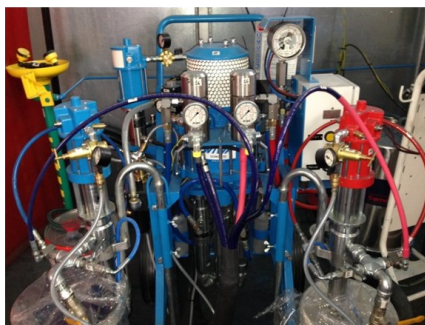
- Pre-Blasting cleaning of the element.
- Blasting grade SA 2 1/2 according to UNE-EN-ISO 8503 "Preparation of steel substrates before application of paints and related products - Surface roughness characteristics of blast-cleaned steel substrates".
- Polyurethane is applied assuring minimum 300 microns thick creating a polymerized, continue, and airtight film all over the valve, but the thickness could be up to 1000 microns.

Coating performance

- Perfect airtight, zero porosity.
- Minimum coated thickness 300 microns but can reach 1000 microns as desired.
- Very good adhesion to metal (min. 10 N/mm²).
- High resilience never cracking, very flexible, tolerates large temperatures swing.
- High scratch resistance.
- Smooth surface (makes incrustation more difficult).
- Suitable for drinking water and food use. WRAS certificate.



Manual blasting cabin 4.5x4.5 meters



Equipment for corrosion protection with polyurethane coating



Manual powder coating, cabin 4x4.meters

Triple function air valve

ANGODOS VAIU-VB is an innovative full bore and triple function + vacuum breaker air valve. Made with a single chamber body, it discharges air during pipeline filling, evacuate air pockets during working condition, and the vacuum breaker system allows the adduction of large volumes of air during draining or pipeline bursts at pre-set differential pressure values.

The design allows a smooth passage for air flow, maximizing the air flow rate, due to aerodynamic inner lines and full bore.

The innovative venting system allows an automatic air release during working condition, maximizing the piping system capacity.

Optionally anti-slam system or inflow system can be fitted to the valve.



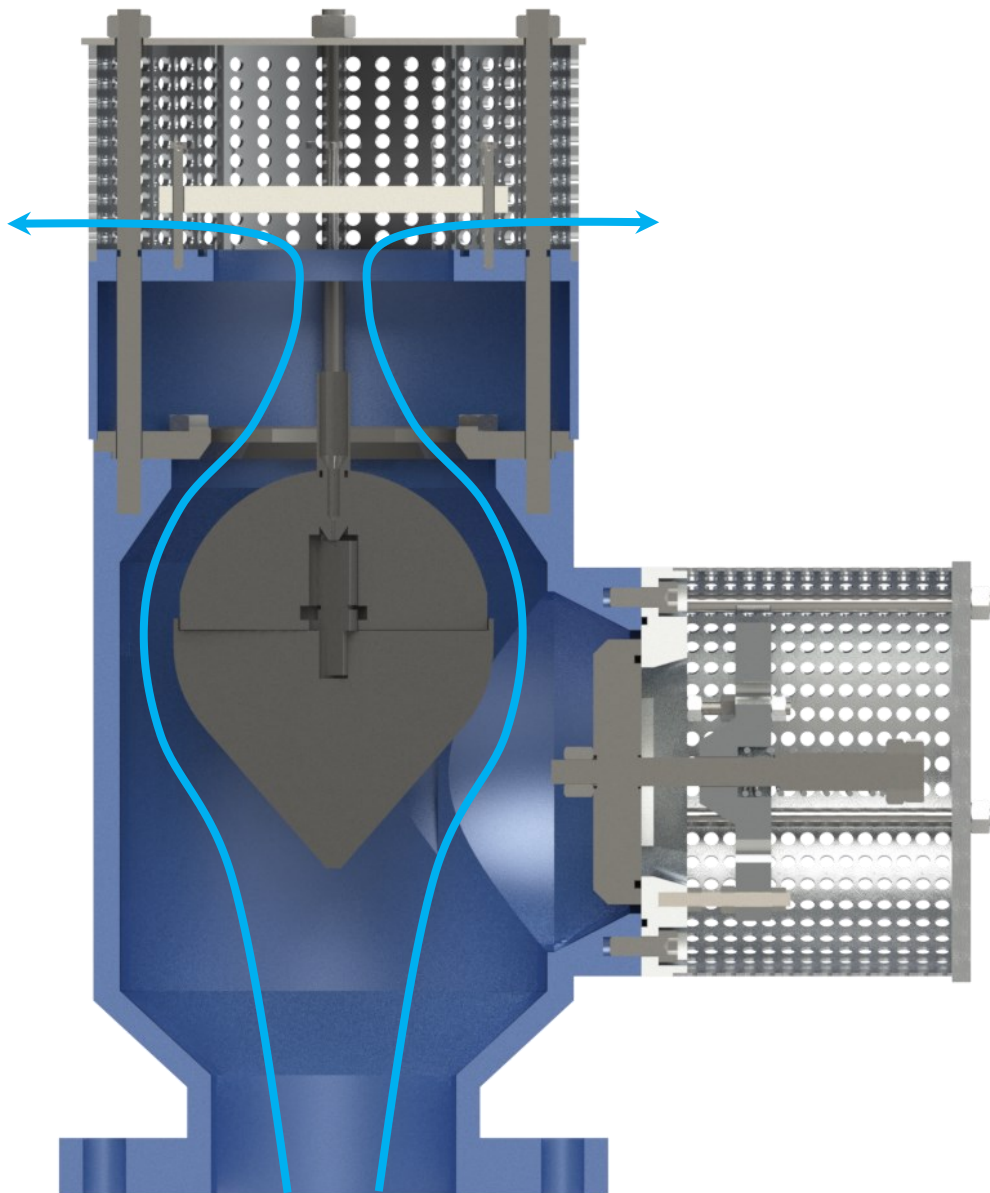
Product features

- Exclusive design, compact, no need to use a valve cluster.
- Vacuum breaker system opens in response to a 0,25 psi vacuum. (other vacuum values upon request)
- Product certificate according to UNE-EN 1074-4 (base model).
- Full bore with aerodynamic, compact and single chamber design.
- High flow rate vent during air discharge, adduction and air purge.
- High air velocities do not close the valve during the filling process.
- Variable air nozzle size according to the pipeline.
- Double guided float system to ensure the effectiveness of the sealing system minimizing axial displacement.
- Made with top quality materials, certified for drinking water and highly corrosion resistant.
- Designed in compliance with AWWA C-512.
- Slow closing system (optional)
- Insect screen.
- Vulcanized elastomers.
- Flange connection according to UNE-EN 1092 or ASME B16.5-2003.
- Threaded hole ($\frac{1}{4}$ "W) for pressure tap or valve draining for maintenance. (standard delivered with plugging).
- Air performance estimated using an advance CFD system (Computational Fluid Dynamics), validated using a test bench.
- Easy disassembly for cleaning and maintenance.
- Optimum performance in clean water systems up to 65°C.
- Easy installation due to the lifting attachments included.
- Wide standard range, DN50 to DN500 / PN10, PN16, PN25 and PN40.
- Special materials available upon request.
- Sea water available.

Operating principle.

Pipeline filling

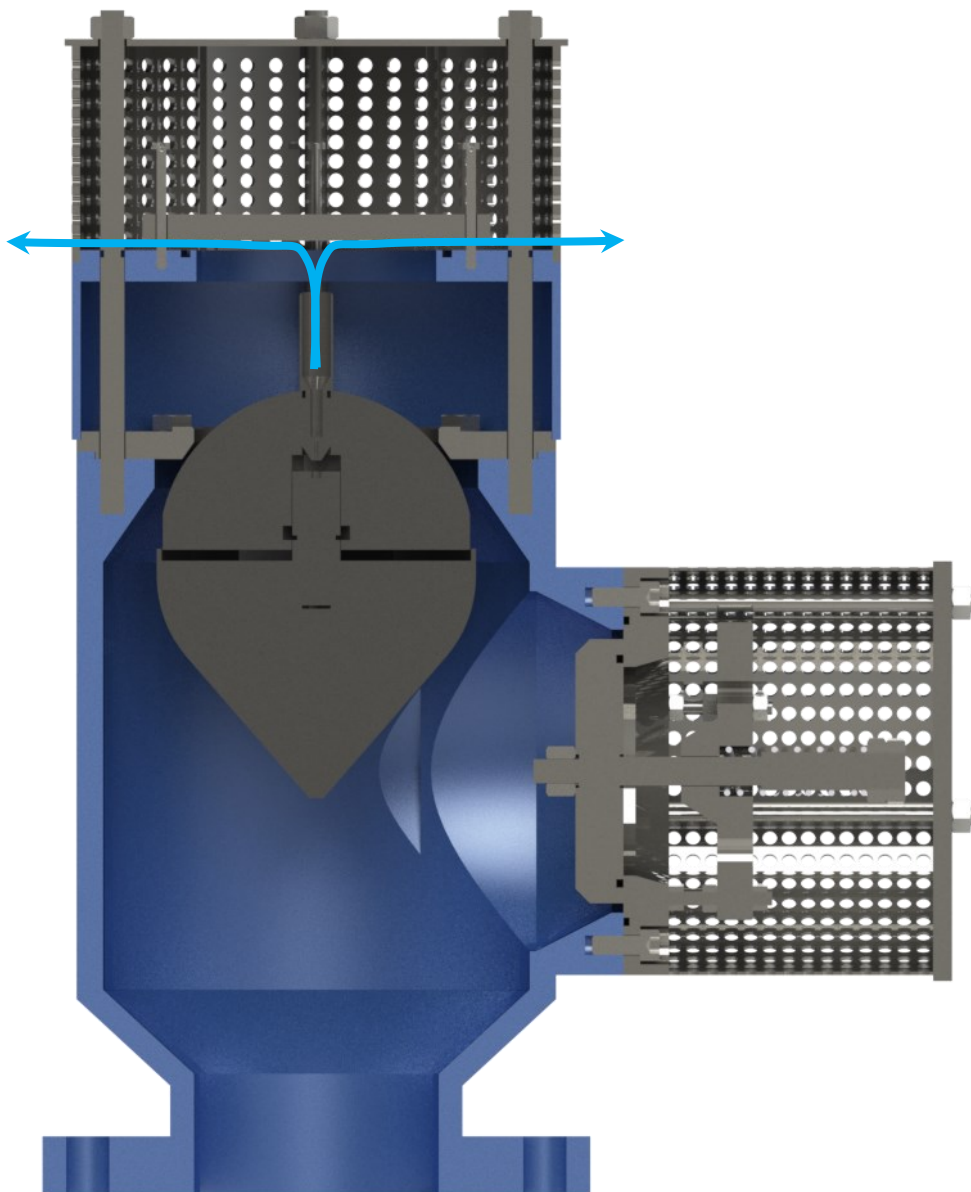
During the pipeline filling process the top part of the valve remains completely open allowing, due to the aerodynamic design of the body and the float system, air pass by the valve to the atmosphere through the large venting area. When water column reaches the valve, the polypropylene float raises closing the valve, ensuring the seal during operation. No premature closing of the valve will happen thanks to the aerodynamic design.



Air release during working conditions

The air dissolved in the water accumulates in the upper part of the closed valve. When the air pocket is big enough, the bottom float moves down leaving the upper float on the closed position due to the positive differential pressure. The gap between the two parts of the float allows the nozzle stay open, releasing the accumulated air under working pressure condition.

Once the air pocket is released, the water level resets, making the bottom float rise, closing the nozzle from 0,1 bar pressure.

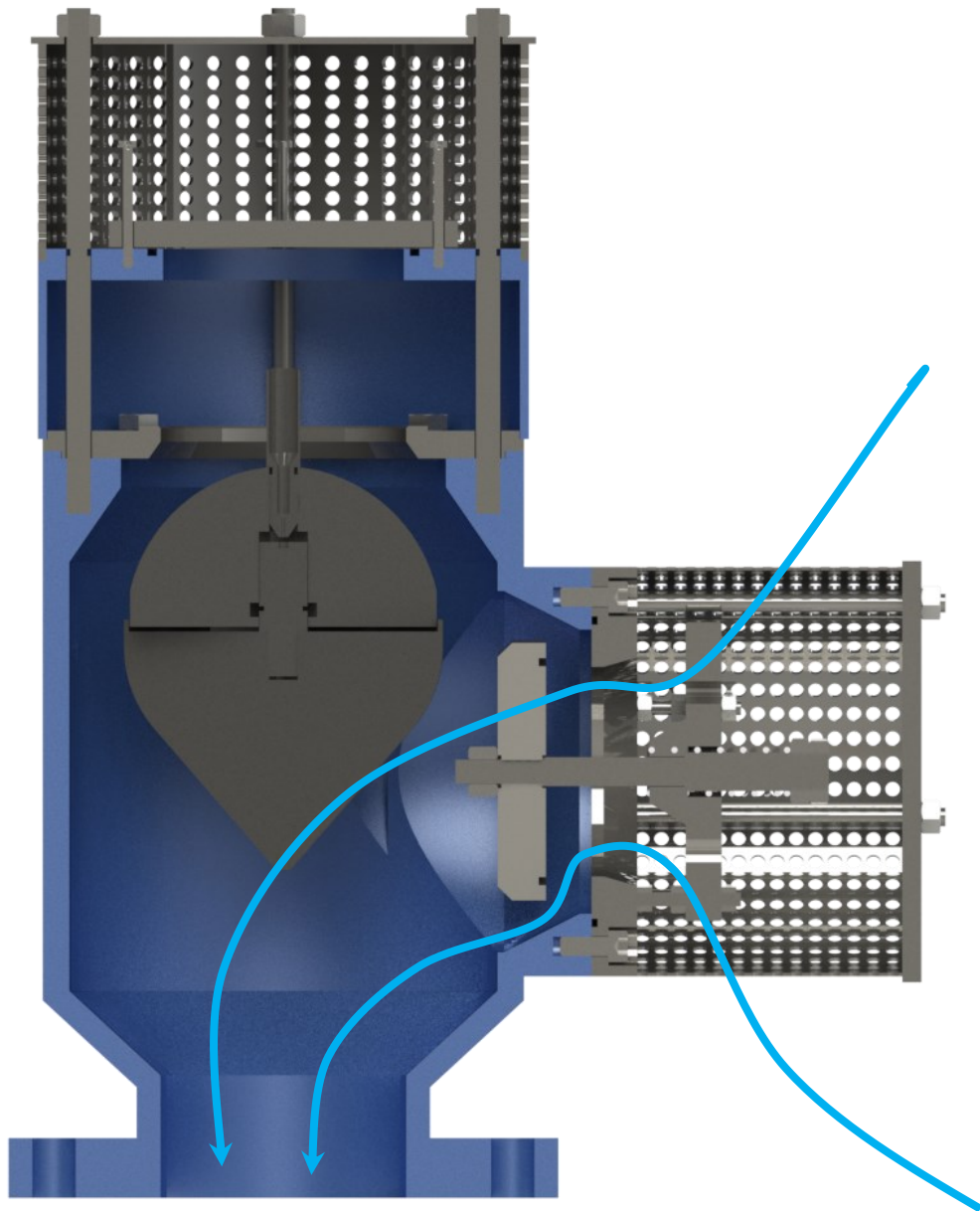


Vacuum breaker system.

If pipe draining needed or pipeline burst, negative differential pressure in the pipeline will force the float to go down. The air will not enter the valve by the top because of the air inflow protection system.

The vacuum breaker system located on the side of the valve will open when the vacuum pressure of the system reach the preset value. When the valve is open a high volume of air will pass through the venting area to the pipe system avoiding vacuum formation in the pipe.

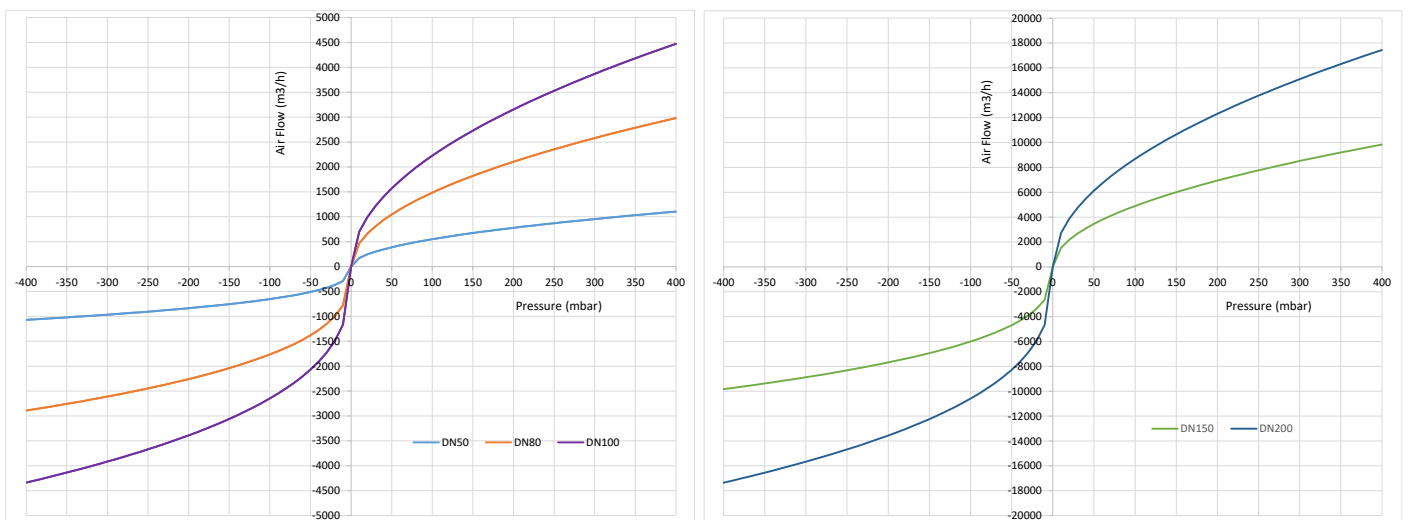
This system can be calibrated in order to allow vacuum working conditions on the pipeline.



Air flow performance

ANGODOS VAIU has been designed to maximize the air flow performance. To this end full bore has been ensured, it means that the minimum area of any individual inside section is at least as the area of the DN circle. Aerodynamics has also been taken into account in the design process of the interior of the body and the float system to maximize the air flow performance and minimize the turbulence possibilities.

A powerful tool (CFD) has been used to ensure the best valve design and to calculate the air performance (CFD). Moreover, air flow performance has been tested using a test bench to validate the charts and sealing of the valve.



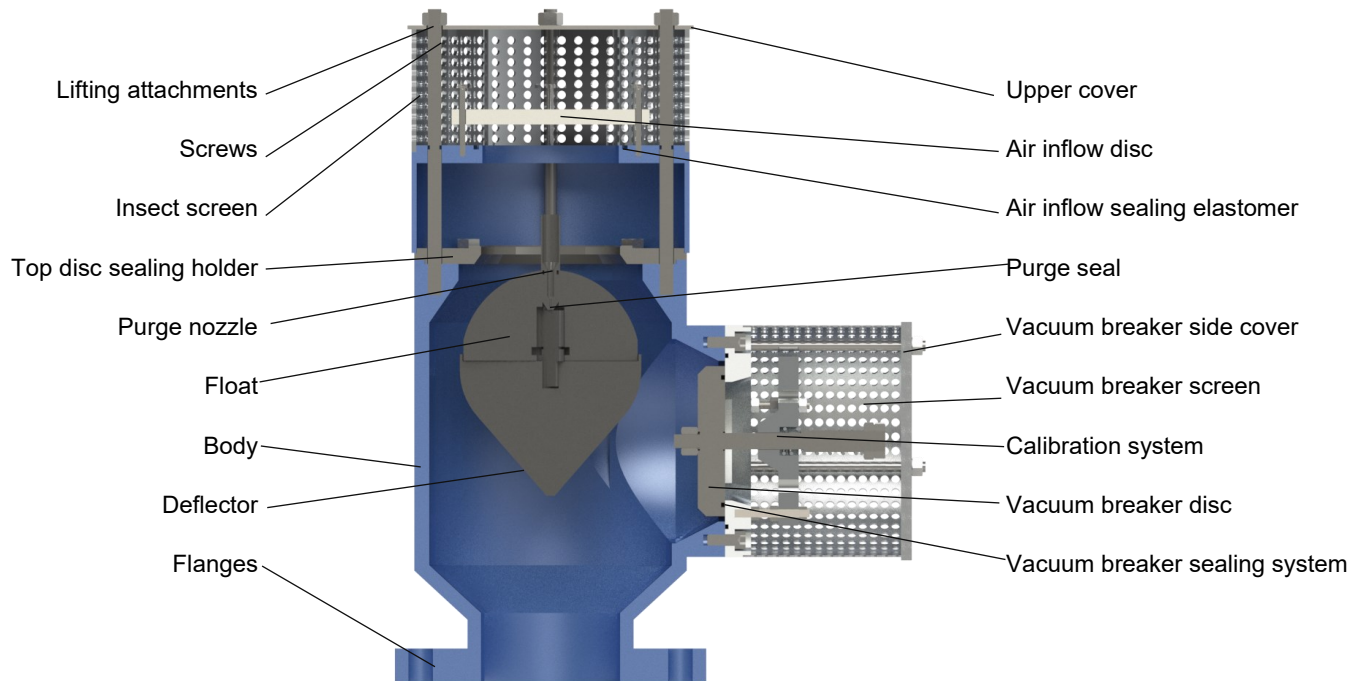
Air relief (+0.15 bar) and air intake (-0.35 bar) charts

DN	Air relief +0.15 bar		Air intake -0.35 bar	
	Q (l/s)	Q (m³/h)	Q (l/s)	Q (m³/h)
50	185	669	284	1,022
80	500	1,800	764	2,751
100	743	2,677	1,136	4,091
150	1,673	6,025	2,556	9,205
200	2,975	10,711	4,546	16,366

Air relief (Purge under pressure)

DN	PN10		PN16		PN25		PN40	
	Ø (mm)	Q (m³/h)	Ø (mm)	Q (m³/h)	Ø (mm)	Q (m³/h)	Ø (mm)	Q (m³/h)
50	1.6	24.1	1.2	33.9	1.0	60.6	0.8	111.5
80	3.0	84.7	2.4	135.5	1.9	218.9	1.5	392.0
100	3.0	84.7	2.4	135.5	1.9	218.9	1.5	392.0
150	4.7	208.0	3.7	322.2	3.0	545.7	2.4	1,003.5
200	8.1	617.9	6.4	964.1	5.1	1,577.8	4.1	2,928.7

Parts list and materials



Part	Material
1 Body, top body and flanges	Ductile cast iron GJS-500-7 according to UNE-EN 1563 (ASTM A536 GR.80-55-06) + 250µ Epoxy
2 Float and discs	Polypropylene according to UNE-EN ISO 19069-1
3 Orifice seal	Elastomer EPDM 70 Shore according to UNE-EN 681-1 vulcanized on AISI316 disc
4 Top plate sealing holder	Stainless Steel AISI 316
5 Purge nozzle	Stainless Steel AISI 303
6 All elastomer (sealing system)	Elastomer EPDM 70 Shore according to UNE-EN 681-1
7 Purge motion limiter	Elastomer EPDM 70 Shore according to UNE-EN 681-1
8 Upper Cover, vacuum breaker cover.	Stainless Steel AISI 316
9 Insect screen	Stainless Steel AISI 316
10 Screws	Stainless Steel AISI 316
11 Upper float guide	Stainless Steel AISI 316
12 Lifting attachments	Stainless Steel AISI 316
13 Plugging	Stainless Steel AISI 316

- Body: Cast Stainless Steel (AISI 316).
- Flanges: ANSI.
- Float: Covered of Stainless Steel (AISI 316).
- Nozzle: Stainless Steel (AISI 316).
- Coating: Polyurethane coating

Options: