



Bermad Water Technologies

PRODUCT APPRAISAL REPORT 1614 Issue 3

Bermad C70 Combination Air Valves for Water Applications
DN 50 to DN 200

AS 4956:2017 Air valves for water supply

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Overview of WSAA

The Water Services Association of Australia (WSAA) is the peak industry body representing the urban water industry. Our members provide water and sewerage services to over 20 million customers in Australia and New Zealand and many of Australia's largest industrial and commercial enterprises.

Based around our vision of 'customer driven, enriching life', WSAA facilitates collaboration, knowledge sharing, networking and cooperation within the urban water industry. We are proud of the collegiate attitude of our members which has led to industry-wide approaches to national water issues.

WSAA can demonstrate success in the standardisation of industry performance monitoring and benchmarking, as well as many research outcomes of national significance. The WSAA Executive retains strong links with policy makers and legislative bodies and their influencers, to monitor emerging issues of importance to the urban water industry.

WSAA was formed in 1995 as a non-profit organisation to foster the exchange of information between industry, government and the community, and to promote sustainable water resource management.

The urban water industry is committed to anchoring its services to customers' values, and to enrich communities where water services have broad economic, environmental and social values. In line with this our main activities focus on four areas:

1. influencing national and state policies on the provision of urban water services and sustainable water resource management
2. promoting debate on environmentally sustainable development and management of water resources and the community health requirements of public water supplies
3. improving industry performance and establishing benchmarks and industry leading practices for water service processes; and
4. fostering the exchange of information on education, training, research, water and wastewater management and treatment and other matters of common interest.

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1 EXECUTIVE SUMMARY

Bermad Australia Pty Ltd, trading as Bermad Water Technologies, has been operating in Australia since 1989 and is a fully owned subsidiary of Bermad CS Ltd. Bermad CS Ltd is a private company established in 1965 in Evron, Israel and manufactures valves for a worldwide market servicing waterworks, irrigation, fire protection, mining and building services industries.

Distribution of the range of C70 air valves is via the Bermad Water Technologies network of distributors throughout Australia.

This Appraisal is for a range of Bermad C70 metallic bodied combination (double orifice) air valves for water applications in sizes DN 50 to DN 200, manufactured to AS 4956:2017 *Air valves for water*.

This Issue 3 is to advise that Bermad Australia Pty Ltd is now fully owned by Bermad CS Ltd. The distribution arrangements for the range of valves have also been amended.

Issue 2 was a replacement for the previous version of the appraisal which had reached its 5-year expiry date.

The valves, suitable for water applications in pump stations and pipelines, evacuate air during pipeline filling, allow release of air pockets from pressurized pipes and enable large volumes of air intake in the event of network draining.

The Bermad C70-SP air valve version incorporates an anti-slam device for surge protection.

The valves are available with pressure classification PN 16 or PN 35 with flanges to AS/NZS 4087 Figure B5 or B6, respectively. DN 50 valves are also available with a BSP threaded connection.

The range of air valves is detailed in Section 3.

Bermad CS Ltd has ISO 9001 Quality Management System certification.

The Bermad C70 air valves have ISO Type 5 StandardsMark Product Certification to AS 4956:2017.

This Appraisal has determined that the Bermad C70 air valves as detailed in this report meet the requirements of WSA PS-265 *Air Valves for Pressure Applications – Water Supply* and are considered as 'fit-for-purpose'.

1.1 Recommendations

It is recommended that WSAA members, subject to any specific requirements of the member accept or authorise the Bermad range of C70 combination air valves, as detailed in this report, for use in water supply provided they are installed in accordance with applicable WSAA codes and manufacturers' requirements, where specified.

2 THE APPLICANT

The Applicant is Bermad Australia Pty Ltd trading as Bermad Water Technologies.

2.1 The Supplier

Bermad Australia Pty Ltd, trading as Bermad Water Technologies, is an Australian company originally established in 1989 and today is a fully owned subsidiary of Bermad CS Ltd. The company has grown to become a leading supplier of a wide range of specialist valves that control, protect or measure. Products include control valves, pressure regulators, solenoid valves, diaphragm valves, pressure reducing valves, flow meters, and air release valves servicing the waterworks, mining, irrigation, fire protection and building markets. Many of the products are designed, engineered and assembled in Australia.

For more information see: <http://www.bermad.com.au/>.

2.2 The Manufacturer

Bermad CS Ltd is a private company established in 1965 in Evron, Israel to manufacture valves for the irrigation market. It has grown to become a well-respected global leader in the manufacture and supply of valves for control solutions for water supply, irrigation and fire protection. The company has approximately 550 employees and is active in more than 80 countries around the world. The company specialises in supply of Automatic Hydraulic Control Valves and Air Control Valves.

Bermad has a strong commitment to Research and Development and is well known as an innovator in the control valve and instrumentation field.

3 THE PRODUCT

This Appraisal is for a range of Bermad C70 metallic bodied combination (double orifice) air valves for water applications in sizes DN 50 to DN 200, manufactured to AS 4956:2017 *Air valves for water*.

The metallic bodied range of automatic air valves submitted for appraisal includes flanged valves in sizes DN 50, DN 80, DN 100, DN 150 and DN 200 with pressure classifications of PN 16 and PN 35. Flanges comply with AS/NZS 4087 Figure B5 (PN16) or Figure B6 (PN 35). DN 50 valves are also available with a 2" BSP threaded connection, rated as PN 16 or PN 35, however these valves are not included in the StandardsMark product schedule.

The Bermad C70-SP air valve version incorporates an anti-slam device for surge protection.



FIGURE 1 BERMAD C70 COMBINATION AIR VALVE

A summary of the Bermad C70 air valve range is provided in Table 1 and additional information is provided in the product brochure attached in Appendix A.

TABLE 1 BERMAD C70 AIR VALVE RANGE

| DN | End Connection | Pressure Classification | C70 | C70-SP Anti-slam |
|-----|----------------|-------------------------|-----|------------------|
| 50 | BSP | PN 16 | ✓ | ✓ |
| | | PN 35 | ✓ | ✓ |
| 50 | Flange | PN 16 | ✓ | ✓ |
| | | PN 35 | ✓ | ✓ |
| 80 | Flange | PN 16 | ✓ | ✓ |
| | | PN 35 | ✓ | ✓ |
| 100 | Flange | PN 16 | ✓ | ✓ |
| | | PN 35 | ✓ | ✓ |

| | | | | |
|-----|--------|-------|---|---|
| 150 | Flange | PN 16 | ✓ | ✓ |
| | | PN 35 | ✓ | ✓ |
| 200 | Flange | PN 16 | ✓ | ✓ |
| | | PN 35 | ✓ | ✓ |

Other features of the valve include:

- straight through body with equal inlet and outlet nominal sizes;
- ductile iron body coated with fusion bonded epoxy;
- designed to seal at low pressures (10 kPa);
- optional outlet types: side, down or mushroom. See Figure 2.



Side Outlet



Down Outlet



Mushroom Outlet

FIGURE 2 AIR VALVES SHOWING OPTIONAL OUTLETS

The air valves, suitable for water applications in pump stations and pipelines, evacuate air during pipeline filling, allow release of air pockets from pressurized pipes and enable large volumes of air intake in the event of network draining.

4 SCOPE OF THE APPRAISAL

The scope of this appraisal includes Bermad C70 PN 16 and PN 35 combination air valves for water applications as detailed in Section 3.

5 APPRAISAL CRITERIA

5.1 Quality Assurance Requirements

The WSAA Product Appraisal Technical Advisory Group accepts air valves manufactured in compliance with AS 4956:2017 *Air valves for water supply* and duly certified by means of an ISO Type 5 product certification scheme undertaken by a JAS-ANZ accredited Conformity Assessment Body (CAB) or by an international accreditation system recognised by JAS-ANZ.

The manufacturer is generally expected to have a production management and control system that has been duly accredited in accordance with AS/NZS ISO 9001 as a prerequisite to undergoing a product certification audit.

The ISO Type 5 Product Certification Scheme shall meet the criteria described in WSA TN-08.

5.2 Performance Requirements

The Bermad C70 air valves have been appraised for compliance with the material and performance requirements of AS 4956:2017 *Air valves for water supply*.

Appraisal criteria are also determined by the WSAA Product Appraisal Technical Advisory Group and regularly reviewed to ensure that the criteria reflect the requirements of WSAA members.

The following Product Specification is also relevant to this application:

WSA PS-265 *Air Valves for Pressure Applications – Water Supply*

A copy of the Product Specification is available at the following link:

<https://www.wsaa.asn.au/shop/product/60961>

6 COMPLIANCE WITH APPRAISAL CRITERIA

6.1 Compliance with Quality Assurance Requirements

Bermad has submitted the following quality certificates:

- ISO 9001:2015 Certificate of Registration No.IL-86237 issued to Bermad CS LTD by The Standards Institution of Israel.
- AS 4956:2017 ISO Type 5 StandardsMark Product Certification Licence No. SMKP 25537 issued to Bermad Water Technologies by SAI-Global.

Copies of the primary Quality Assurance and Product Certification licences have been included in Appendix B and are also available from WSAA.

Copies of Quality Assurance certificates have also been submitted for the major component suppliers and are held on file by WSAA.

6.2 Compliance with Performance Requirements

6.2.1 Components material list

The Bermad C70 air valves material specifications for the components are detailed below and are deemed to meet the minimum requirements specified in AS 4956. Material test certificates have been submitted for the critical components to demonstrate compliance.

TABLE 2 BERMAD C70 AIR VALVES COMPONENT MATERIAL LIST

| Component | Material | Standard | Grade | C70 Air Valves |
|--------------------------|-----------------|------------|-----------------|---------------------|
| Body and cover | Ductile iron | AS 1831 | 500-7 or 400-12 | 450-10 ¹ |
| Float | Plastics | - | - | Polypropylene |
| Resilient seal | Elastomer | AS1646 | EPDM or NBR | EPDM |
| Seat | Stainless steel | ASTM A743M | CF-8M | CF-8M ² |
| Lever, linkages and pins | Stainless steel | ASTM A276 | 316 | 316 |
| Spring | Stainless steel | ASTM A313M | 302, 316 | NA |
| O-rings | Elastomer | AS 1646 | EPDM or NBR | EPDM |
| Fasteners | Stainless steel | ASTM A276 | 316 | 316 |
| Drain valve | Stainless steel | ASTM A276 | 316 | 316 |
| Insect screen | Stainless steel | ASTM A240M | 304 | 304 |

¹Deemed acceptable ²CF-8M is the cast equivalent of Grade 316.

6.2.2 Flanges

The flange outlets on the valves comply with AS/NZS 4087 Figure B5 (PN 16) or Figure B6 (PN 35).

WSAA recommends flanged joints to be assembled in accordance with Drawing WAT-1313 included in the Water Supply Code of Australia – WSA 03 (as amended) and that gasket materials comply with Industry Standard WSA-109.

6.2.3 Polymeric thermal bonded coatings

Bermad ductile iron valve bodies and covers are coated with Akzo Nobel Resicoat R4, a thermosetting fusion bonded epoxy powder coating applied by the fluidised bed method.

Resicoat R4 has ISO Type 5 StandardsMark Product Certification to AS/NZS 4158. A copy of the current certification is held on file by WSAA.

A copy of Bermad's coating application and quality control procedures have been submitted to demonstrate compliance to AS/NZS 4158. The process is also audited by SAI-Global in conjunction with periodic StandardsMark certification audits.

6.2.4 Type tests

AS 4956 specifies a comprehensive suite of performance tests to be undertaken on a representative valve no smaller than DN50, in order to demonstrate compliance with the standard.

Tests specified are:

- Static
- Body strength
- Seat leakage at high pressure
- Seat sensitivity at low pressure
- Endurance
- Long term unseating capability
- Dynamic
- Air discharge capacity
- Air intake capacity

The equipment required to conduct these tests is highly specialised and not available in commercial testing laboratories. The Bermad Testing Laboratory in Israel has been formally recognised by SAI-Global as a competent testing laboratory for air valves to AS 4956:2017.

Copies of test report have been submitted by Bermad to demonstrate compliance of the DN 50 PN16 and PN35 C70 air valves with the type test requirements of AS 4956:2017.

6.2.5 Contact with drinking water

AS 4956 requires compliance with AS/NZS 4020 *Testing of products for use in contact with drinking water*. Bermad has submitted Test Report Number 291979 dated 22 September 2020 from the Australian Water Quality Centre for a DN 50 C70 air valve to demonstrate compliance with AS/NZS 4020:2018

7 FITTING INSTRUCTIONS, TRAINING AND INSTALLATION

A comprehensive Installation, Operation and Maintenance Manual is included in Appendix A.

In addition, Bermad offers full technical assistance to water agencies and designers in regard to the location and sizing of valves for specific pipeline and pump station designs and can assist with Auto-Cad drawings for a specific valve build. Customised seminars can be arranged to assist in design, operation and selection of air valves. They also offer operator training and assistance with the commissioning of valves in the field.

8 PRODUCT MARKING

Bermad air valves are marked in accordance with AS 4956:2017 as described below. The manufacturers name and nominal size are cast on the body whilst the remaining information is marked on name plates attached to the valve.

Manufacturers Name: Bermad

Nominal Size: DN XXX

Year of manufacture: XXXX

Pressure class: PN 16, PN 35

Standard number: AS 4956

Serial Number:

Standards Mark logo: 

9 PACKAGING AND TRANSPORTATION

Bermad air valves are suitably packed to prevent damage to components, including protective coatings, during handling, transportation and storage. Valves are fitted with covers to protect the face of the flanges during transportation and storage.

10 PRODUCT WARRANTY

The products are covered by the normal commercial and legal requirements of the *Competition and Consumer Act 2010 (Cth)* and details of Bermad's warranty is included in their Standard Conditions of Sale.

11 WATER AGENCY EXPERIENCE WITH THE PRODUCT OR FIELD-TESTING REPORT

Bermad air valves have been utilised by Australian Water Agencies for many years. It is considered unnecessary to request further field trials for the purpose of this Appraisal.

12 OUTCOMES OF EXPERT PANEL PRODUCT REVIEW

There are no outstanding issues.

13 FUTURE WORKS

No future works have been identified.

14 DISCLAIMER

This Product Appraisal Report (Report) is issued by the Water Services Association of Australia Limited on the understanding that:

This Report applies to the product(s) as submitted. Any changes to the product(s) either minor or major shall void this Report.

To maintain the recommendations of this Report any such changes shall be detailed and notified to the Product Appraisal Manager for consideration and review of the Report and appropriate action. Appraisals and their recommendations will be the subject of continuous review dependent upon the satisfactory performance of products.

WSAA reserves the right to undertake random audits of product manufacture and installation. Where products fail to maintain appraised performance requirements the appraisal and its recommendations may be modified and reissued. Appraisal reports will be reviewed and reissued at regular intervals not exceeding five (5) years.

The following information explains a number of very important limits on your ability to rely on the information in this Report. Please read it carefully and take it into account when considering the contents of this Report.

Any enquiries regarding this report should be directed to the Program Manager, Carl Radford, email carl.radford@wsaa.asn.au.

14.1 Issue of Report

This Report has been published and/or prepared by the Water Services Association of Australia Limited and nominated Project Manager and peer group of technical specialists (the Publishers).

The Report has been prepared for use within Australia only by technical specialists that have expertise in the function of products such as those appraised in the Report (the Recipients).

By accepting this Report, the Recipient acknowledges and represents to the Publisher(s) and each person involved in the preparation of the Report that the Recipient has understood and accepted the terms of this Disclaimer.

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Recipients should seek independent evidence of any matter which is material to their decisions in connection with an assessment of the Product and consult their own advisers for any technical information required. Any decision to use the Product should take into account the reliability of that independent evidence obtained by the Recipient regarding the Product.

Recipients should also independently verify and assess the appropriateness of any recommendation in the Report, especially given that any recommendation will not take into account a Recipient's particular needs or circumstances.

WSAA has not evaluated the extent of the product liability and professional indemnity insurance that the provider of the product maintains. Recipients should ensure that they evaluate the allocation of liability for product defects and any professional advice obtained in relation to the product or its specification including the requirements for product liability and professional indemnity insurance.

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Neither the Publisher(s) nor any person involved in the preparation of this Report [has] [have] any obligation to notify you of any change in the information contained in this Report or of any new information concerning the Publisher(s) or the Product or any other matter.

14.4 No Warranty

The Publisher(s) do[es] not, in any way, warrant that steps have been taken to verify or audit the accuracy or completeness of the information in this Report, or the accuracy, completeness or reasonableness of any recommendation in this Report.

APPENDIX A - PRODUCT LITERATURE



COMBINATION AIR VALVE

Model C70

BERMAD C70 is a high quality combination air valve for a variety of water networks and operating conditions. It evacuates air during pipeline filling, allows efficient release of air pockets from pressurized pipes, and enables large volume air intake in the event of network draining.

With its advanced aerodynamic design, double orifice and Surge Protection (Anti-slam / slow closing) device, this valve provides excellent protection against air accumulation, vacuum formation and pressure surges, with improved sealing in low pressure conditions. The valve minimizes water spraying during air release.

Typical Applications

- Pumping stations and deep well pumps: Air relief, surge protection and vacuum prevention.
- Pipelines: Protection against air accumulation and vacuum formation at elevations, slope change points and at road/river crossings.
- Water networks: Protection against vacuum formation, surge and water hammers at points likely to experience water column separation.

Features & Benefits

- Straight flow body with nominal (equal) inlet and outlet size: Higher than usual flow rates.
- Aerodynamic full-body kinetic shield: Prevents premature closing without disturbing air intake or discharge.
- Dynamic sealing: Prevents leakage under low pressure conditions (1.5 psi; 0.1 bar).
- Minimizes water spraying during air release: Innovative 2-step function, automatic orifice (Patent Pending).
- Three optional outlets (sideways, downwards, circular-surround mushroom configuration) that can swivel 360°: Easy to install in a variety of site conditions.
- Compact, simple, robust and reliable structure with fully corrosion-resistant parts: Lower maintenance and increased life span.
- Designed in compliance with functional standards and water service standards.
- Factory approval and Quality Control: Performance and specification tested and measured with specialized test bench, including vacuum pressure conditions.



All images in this catalog are for illustration only



Model C70

Additional Features & Accessories

- Built in or optional slow closing (anti slam) devices: Controlled air relief for preventing damage to the valve and the system:
 - Surge Protection - the kinetic orifice is partially closed during the second stage of the air relief (C70-SP).
 - Assisted Closing - the kinetic orifice is set to be partially closed (C70-AC) or fully closed during air relief. When the kinetic orifice is fully closed during air relief, the air valve performs as a Vacuum Breaker.
- Inflow Prevention: Prevents intake of atmospheric air in cases where this could lead to damaged pumps, required re-priming, or disruption of siphons; prevents intake of flood water or contaminated water into potable water networks (C70-IP).
- Service Port fitted with 1/4"; DN6 plug (codes P, U)
- Drainage Valve (code 7)
- Insect Screen (code S)

Materials

- Body and Cover:
 - Cast Ductile Iron (C70-C), for 2-10"; DN50-250
 - Stainless Steel (C70-N), for 2-6"; DN50-150
 - Cast Steel / WCB (C70-S), for 2-6"; DN50-150
 - Polyethylene Mushroom Cover (C70-J) for 2-8"; DN50-200
- Coating: Fusion Bonded Epoxy, Blue
- Top Plate: Stainless Steel, Ductile Iron
- Float Assembly: Polypropylene, Glass-reinforced Nylon
- Automatic Orifice: Stainless Steel
- Elastomers: EPDM

Operational Data

- Pressure Rating: 230 psi; ISO PN16, 360 psi; ISO PN25, 580 psi; ISO PN40
- Minimum operating pressure: 1.5 psi; 0.1 bar
- Maximum operating pressure: 230 psi; 16 bar, 360 psi; 25 bar, 580 psi; 40 bar
- Media and operating temperature: Water, 33-140°F; 1-60°C

Valve Selection

| | 2"; DN50 | 3"; DN80 | 4-6"; DN100-150 | 8"; DN200 | 10"; DN250 |
|--|---|-----------------------|---|--------------|------------|
| Body construction | Ductile iron, stainless steel, cast steel (WCB) | | | Ductile iron | |
| inlet connection type | Threaded (female), flanged | Flanged | | | |
| Outlets | Down, side, mushroom | | | | Mushroom |
| Connection to drainage pipeline | Side outlet (female threaded) | Side outlet (grooved) | | | - |
| Additional Features | SP, AC, IP (IP with side outlet only) | | | SP, AC | SP |
| Optional Accessories | Insect screen (down or side outlet only), 90-degree elbow (threaded), service port, drainage needle valve | | Insect screen (down or side outlet only), service port, drainage needle valve | | |



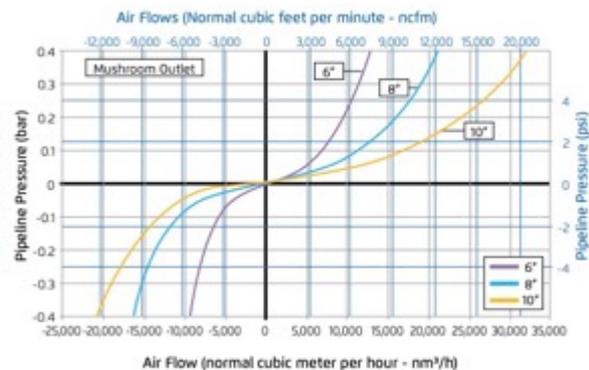
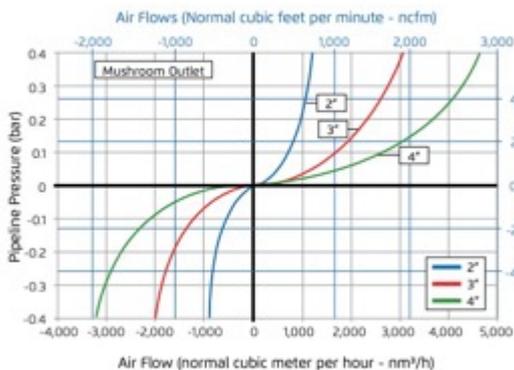
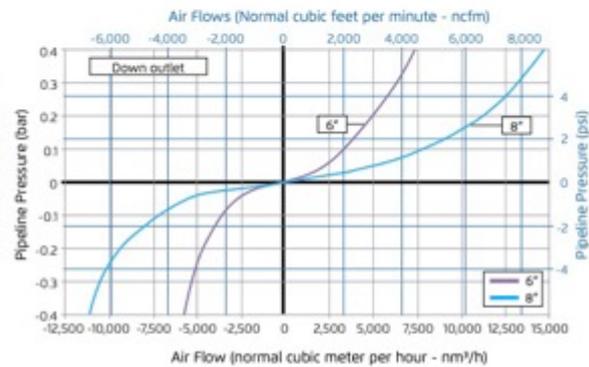
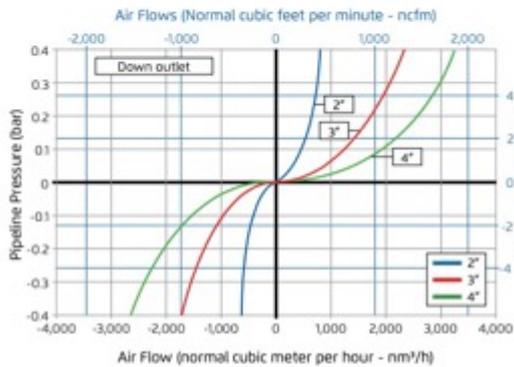
Model C70

Orifice Specifications

| Inlet Size | Automatic Orifice Area | | | Kinetic Orifice | | Surge Protection | | |
|------------|------------------------|-----------------|-----------------|-----------------|---------|--------------------|------------------|------------|
| | 230 psi PN16 | 360 psi PN25 | 580 psi PN40 | Diameter | Area | Number of holes | Hole Diameter | Total Area |
| | Sq Inch | Sq Inch | Sq Inch | Inch | Sq Inch | | Inch | Sq Inch |
| 2" | 0.002 | 0.001 | 0.001 | 2.0 | 3.142 | 4 | 0.197 | 0.122 |
| DN50 | 1.1 | 0.6 | 0.4 | 50 | 1,963 | | 5 | 79 |
| 3" | 0.004 | 0.002 | 0.002 | 3.0 | 7.069 | 4 | 0.315 | 0.312 |
| DN80 | 2.5 | 1.5 | 1 | 80 | 5,027 | | 8 | 201 |
| 4" | 0.005 | 0.003 | 0.002 | 4.0 | 12.566 | 4 | 0.394 | 0.487 |
| DN100 | 3.1 | 2 | 1.3 | 100 | 7,854 | | 10 | 314 |
| 6" | 0.014 | 0.009 | 0.005 | 6.0 | 28.274 | 4 | 0.591 | 1.096 |
| DN150 | 9.1 | 5.7 | 3.5 | 150 | 17,671 | | 15 | 707 |
| 8" | 0.034 | 0.022 | 0.012 | 8.0 | 50.265 | 4 | 0.787 | 1.948 |
| DN200 | 22.1 | 14.5 | 8 | 200 | 31,416 | | 20 | 1,257 |
| 10" | 0.044 | 0.030 | - | 10.0 | 78.540 | 4 | 0.866 | 2.357 |
| DN250 | 28.2 | 19.6 | - | 250 | 49,087 | | 22 | 1,521 |

Air Flow Performance Charts

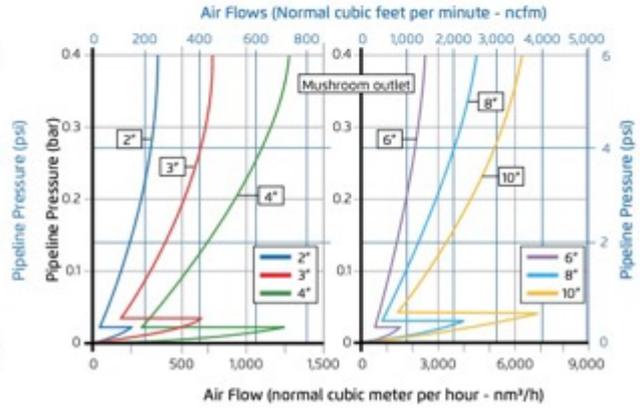
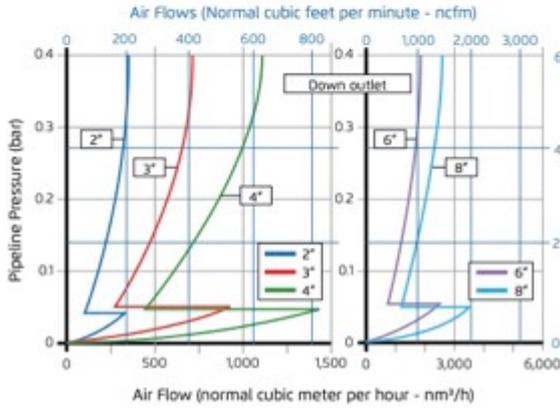
Air Relief and Intake (Pipeline Filling, Draining and Vacuum Conditions)



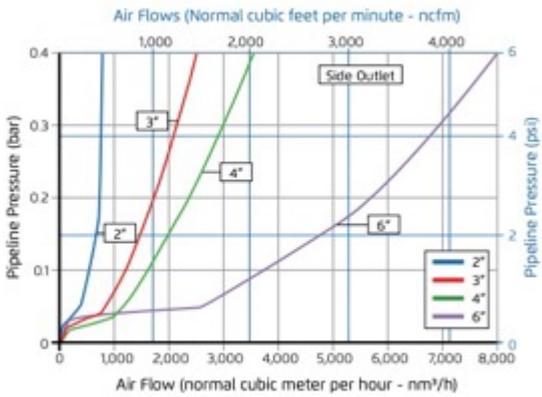


Model C70

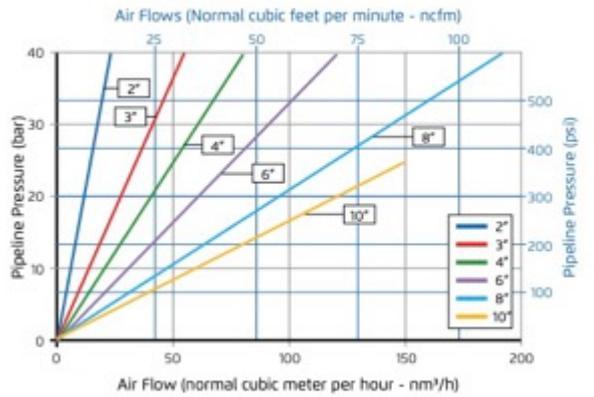
Air Relief with Surge Protection (Pipeline Filling)



Air Relief with Inflow Prevention (Pipeline Filling)



Air Release (Pressurized Operation)



For higher automatic air release capacity, Please consult with BERMAD.

Data for C70 with Surge Protection Features

| Inlet Size | C70-SP Switching Value | | | C70-SP/AC Air relief at 6 psi; 0.4 bar | | |
|------------|------------------------|------|------|--|-------|-------|
| | Mushroom | Side | Down | Mushroom | Side | Down |
| inch | psi | psi | psi | ncfm | ncfm | ncfm |
| mm | bar | bar | bar | nm³/h | nm³/h | nm³/h |
| 2" | 0.29 | 0.57 | 0.68 | 239 | 200 | 200 |
| DN50 | 0.02 | 0.04 | 0.05 | 420 | 350 | 350 |
| 3" | 0.44 | 0.78 | 0.88 | 450 | 399 | 399 |
| DN80 | 0.03 | 0.05 | 0.06 | 790 | 700 | 700 |
| 4" | 0.29 | 0.71 | 0.80 | 730 | 627 | 627 |
| DN100 | 0.02 | 0.05 | 0.06 | 1,280 | 1,100 | 1,100 |
| 6" | 0.29 | 0.64 | 0.83 | 1,402 | 958 | 958 |
| DN150 | 0.02 | 0.04 | 0.06 | 2,460 | 1,680 | 1,680 |
| 8" | 0.36 | 0.73 | 0.73 | 2,565 | 1,471 | 1,471 |
| DN200 | 0.03 | 0.05 | 0.05 | 4,500 | 2,580 | 2,580 |
| 10" | 0.41 | - | - | 3,578 | - | - |
| DN250 | 0.03 | - | - | 6,278 | - | - |

Air relief and intake charts for inlet sizes 2-8"; DN50-200 are based on actual measurements, measured during 2014-2015 in Bermad Air Flow test bench, according to EN-1074/4 standard and recognized by AS-4598 (2008) standard. For Side outlet air flow performance, please consult with BERMAD. Use Bermad Air software for optimized Sizing & Positioning of Air Valves

Combination Air Valve

Model C70/C70-SP/C70-AS



Installation, Operation and Maintenance Manual (IOM)



IOM C70, C70-SP, C70-AS

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IOM C70, C70-SP, C70-AS

General

The BERMAD C70 is a high quality combination Air Valve for a variety of water networks and operating conditions. It evacuates air during pipeline filling, allows efficient release of air pockets from pressurized pipes, and enables large volume air intake in the event of network draining.

With its advanced aerodynamic design, double orifice and anti-slam/slow closing device, this valve provides excellent protection against air accumulation, vacuum formation and surges, while minimizing undesirable leakage and spraying.

This document serves as the Installation, Operation and Maintenance Manual (IOM) of this valve; it describes the procedures required for proper usage of the valve.

Safety

Since Air Valves operate in pressurized water systems you are required to carefully read this manual before using the valve. Handle the valve with care and make sure to comply with all the relevant required safety instructions and standards, general and local.

Operational Data

| | |
|---------------------------|---|
| Pressure rating: | ISO PN16/PN25/PN35/PN40 |
| Operating pressure range: | 0.1 - 16bar, 0.1 - 25bar, 0. - 35bar, 0.1 - 40bar or 1.5 - 230 psi, 1.5 - 360 psi, 1.5 - 580 psi |
| Operating temperature: | Water up to 60° C / 140° F |

Materials and Connections

- Body Material: Standard – Cast ductile iron; Optional - Stainless Steel, Bronze
- Coating: Baked epoxy, blue
- Inlet sizes: DN50, DN80, DN100, DN150, DN200 (2", 3", 4", 6", 8")
- Connections: Threaded Female BSPT / NPT – only for DN50 (2"), Flanged ISO PN16/25/40 or ANSI 150/300, AS16/35
- Outlets: Sideways, downwards, mushroom configuration
- Additional features: Surge Protection (C70-SP), Adjustable Surge Protection (C70-AS), Inflow Prevention (C70-IP)

IOM C70, C70-SP, C70-AS

C70, C70-SP, C70-AS Versions

Please note the difference in the automatic float assembly and the Surge Protection disc between the earlier version (PN16 / 230psi, 2012-2013) and later version (PN16, PN25, , PN40 / 230, 360, 580psi from 2013). In each version the dimension of the float, automatic disc and surge protection disc are different.

| Earlier Versions | Later Version |
|---|--|
| <ul style="list-style-type: none"> ■ The automatic orifice is part of the plug, they are connected above the automatic disc ■ Casts are being marked with AZ or ATM ■ Width of the Polypropylene parts are bigger on ATM version Vs AZ | <ul style="list-style-type: none"> ■ The automatic orifice is part of the automatic disc. ■ Casts are being marked with ATM |
| <div style="text-align: center;">  </div> <p>Automatic float assembly, view from the top</p> | <div style="text-align: center;">  </div> <p>Automatic float assembly, view from the top</p> |
| Earlier Versions | Later Version |
| <div style="text-align: center;">  </div> <p>Automatic disc, view from the side</p> | <div style="text-align: center;">  </div> <p>Automatic disc, view from the side</p> |
| <div style="text-align: center;">  </div> <p>Shape of the Surge Protection Disc</p> | <div style="text-align: center;">  </div> <p>Shape of the Surge Protection Disc</p> |

It is recommended to specify model, cast mark (AZ or ATM) and serial number when ordering the following Polypropylene parts – float, automatic disc, Surge Protection disc.



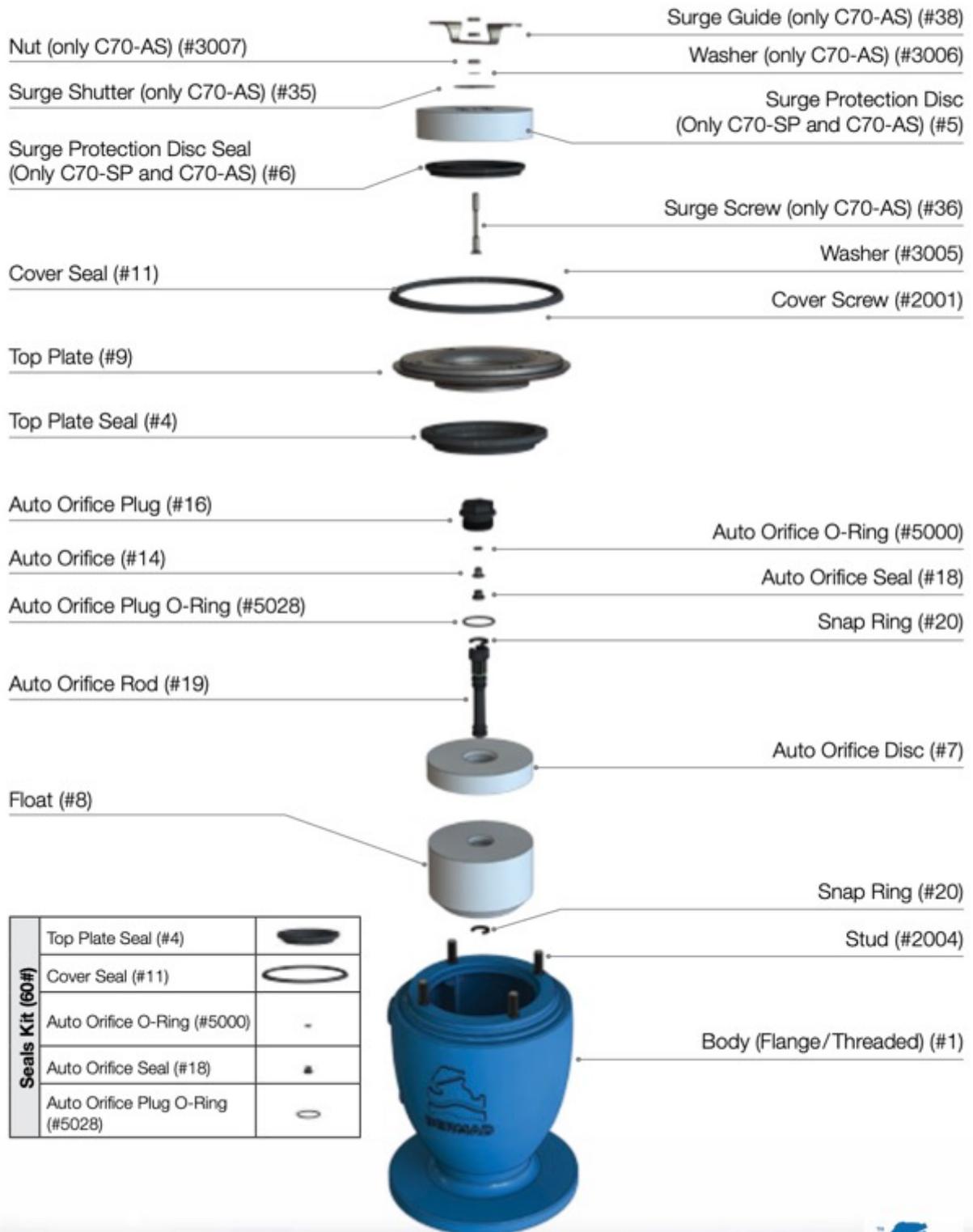
IOM C70, C70-SP, C70-AS

Earlier Version (PN16 / 230psi, 2012-2013)



IOM C70, C70-SP, C70-AS

Earlier Version (PN16 / 230psi, 2012-2013)



| | | |
|------------------------|----------------------------------|---|
| Seals Kit (60#) | Top Plate Seal (#4) | |
| | Cover Seal (#11) | |
| | Auto Orifice O-Ring (#5000) | - |
| | Auto Orifice Seal (#18) | |
| | Auto Orifice Plug O-Ring (#5028) | |



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Later Version (PN16, PN25, PN40 / 230, 360, 580psi from 2013)

Eye Bolt (#2002)



Outlet - Down (#2a), Side (#2b)
Mushroom (#2c)



Cover Seal (#11)



Top Plate (#9)



Top Plate Seal (#4)



Surge Protection Assembly
(Only C70-SP and C70-AS) (#5a)



Float Assembly (#8a)

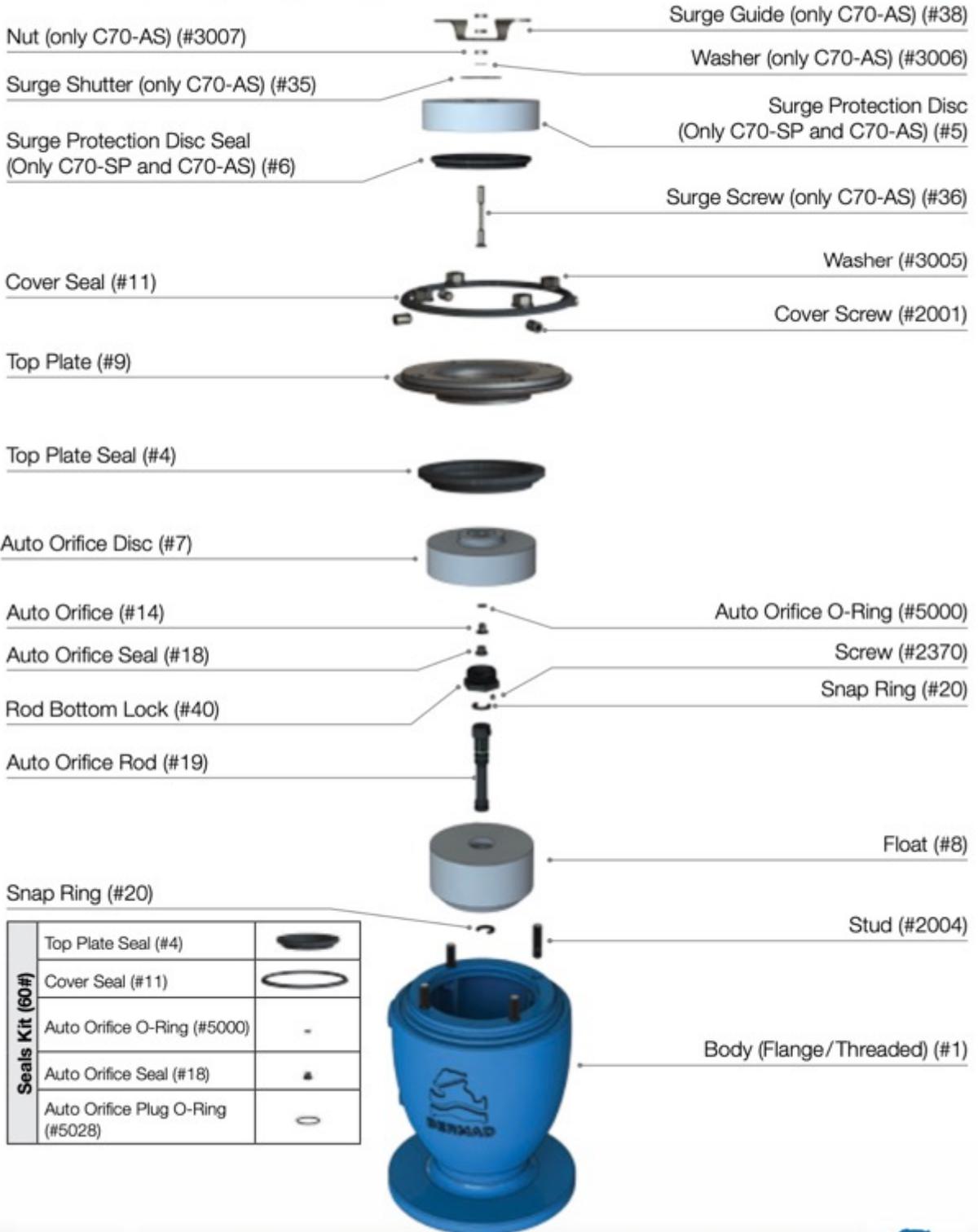


Body (Flange/Threaded) (#1)



IOM C70, C70-SP, C70-AS

Later Version (PN16, PN25, PN40 / 230, 360, 580psi from 2013)



IOM C70, C70-SP, C70-AS

Unpacking and post shipment inspection

- Make sure that until the actual installation the valve remains dry and clean in its original package.
- Unpack the valve and make sure that all the wrapping materials are removed.
- Before installation it is necessary to inspect that no damage to the valve occurred during shipment; **do not install a damaged valve!**
- Verify that the valve to be installed meets the design specifications of the specific installation site; take extra care in making sure that the expected system pressure complies with the pressure rating of the valve.

Site Preparation

- Air Valves located above ground should be protected from freezing, contamination and vandalism.
- If the valve is to be installed in a pit, make sure that the pit has proper drainage and sufficient dimensions for servicing the valve.
- Flush the pipeline prior to the Air Valve installation in order to prevent damage to the valve internals due to large debris carried by the water during startup.
- The C70 Air Valves are not to be used in systems containing high suspended solids; consider selecting other BERMAD Air Valve models for such water type.

Installation

Typical Applications

- Pipelines – Protection against air accumulation and vacuum formation at elevations, slope change points and road/river crossings
- Water networks – Protection against air accumulation and vacuum formation
- In proximity to control valves and water meters – Prevention of biased readings and inaccurate pressure regulation due to air flow through devices
- Industrial and residential networks – Protection against air accumulation.

Please note:

1. If required, a connection to a Drainage Pipe can be fitted to the valve's Side outlet.
2. Depending on the specific installation requirements a Surge Protection (SP) or an Inflow Prevention (IP) device may be added to the air valve.

Installation instructions

- Install the Air Valve as close as possible to the pipe, at a high point of its circumference, in

IOM C70, C70-SP, C70-AS

vertical position (within 5 degrees of vertical alignment) and with its inlet facing down.

- The diameter of the pipe connecting the Air Valve with the pipeline should be at least equal to the Air Valve inlet diameter.
- Install a shutoff valve between the Air Valve and the pipeline for allowing easy inspection and maintenance.

Start-up and first operation

- Open the shutoff valve and verify that the Air Valve connections are not leaking; if needed follow the troubleshooting instruction section of this document. Please note that at the first time the valve is filled up some water may exit through its outlet port.
- Prevent water hammer during startup and pipeline filling by maintaining the velocity lower than 0.5m/sec (1.6 feet/sec). Consider adding the Surge Protection feature in systems where higher velocity is expected.



Principles of Operation

Pipeline Filling

During the filling process of a pipeline, high air flow is forced out through the kinetic orifice of the Air Valve. Once water enters the valve's chamber, the float buoyed upward causes the kinetic orifice to close. The unique aerodynamic structure of the valve body and float ensures that the float cannot be closed before water reaches the valve.

Pressurized Operation

During pressurized operation of the pipeline, air accumulates in the upper part of the Air Valve chamber, causing the float to gravitate downwards. This in turn causes the automatic orifice to open, releasing the accumulated air. Once the air is discharged, the water level and float rise, causing the automatic orifice to close.

Pipeline Draining

When a pipeline is drained, a negative differential pressure is created causing atmospheric air to push the float down. The kinetic orifice stays open and air enters the valve chamber, preventing vacuum formation in the pipeline.

Surge Protection (Anti-slam)

In the event of a pressure surge, the surge protection (SP) disc rises, partially closing the valve's orifice. The approaching water column decelerates due to the resistance of the rising air pressure in the valve.

Inflow Prevention

The inflow prevention (IP) mechanism is a Normally Closed check disc mounted on the top of the valve's orifice preventing flow of atmospheric air into the valve.

Please note:

1. During initial pipeline filling as well as during the automatic air release some water may exit through the valve outlet.



IOM C70, C70-SP, C70-AS

Inspection & Troubleshooting

The valve does not require any specific maintenance, however a periodical inspection of the orifices and seals is recommended for removing debris and foreign objects.

Trouble shooting

| Symptom | Action |
|--|---|
| Leakage at the inlet connection | Tighten the valve connection, use thread sealant. |
| Leakage at the valve cover | Tighten the valve's cover, check the cover's O-Ring. |
| Leakage at the valve's outlet | Disassemble and inspect the valve's orifices, float and seals. Remove any foreign objects, check and replace any damaged part before re assumable the valve. |
| Valve does not release air or allow air intake | Verify that the operation pressure does not exceed the valve's rated working pressure. Check and removed foreign objects, clean the valve's internal parts, replace if necessary. Consult BERMAD if the symptom continues. |

Disassembling & Reassembling the valve

Disassembling the C70 Air Valve

1. Loosen the screws located on the Cover (Part #2). Separate the Cover (Part#2) from the Body Assembly (Part #1a).
2. Disassemble and take out the Surge Assembly (Part #5a) from the Body Assembly (Part #1a).
3. If necessary, replace the gaskets in the Body Assembly (Part #1a).
4. Take out the Combination Float Assembly (Part # 8a) from the Body Assembly (Part #1a).
5. Disassemble the Combination Float Assembly (Part # 8a) by turning counterclockwise the Auto Orifice Plug (Part #16).
6. If necessary, replace damaged seals and clean the Auto Orifice (Part #14).

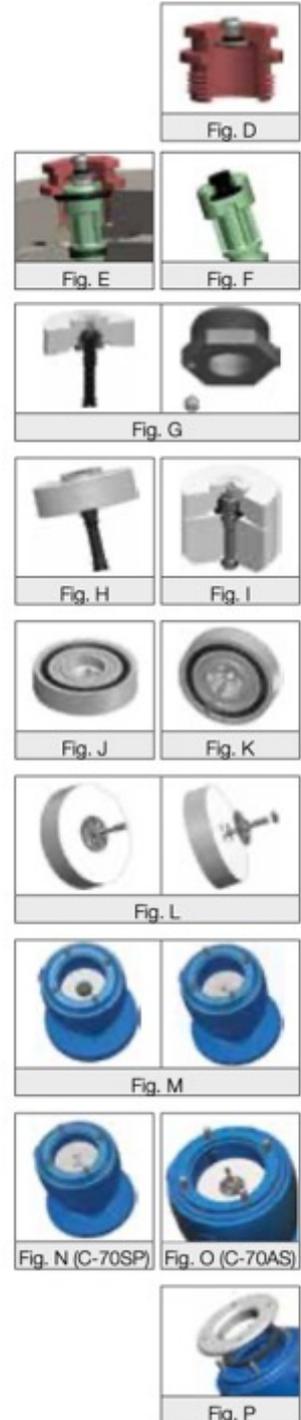
Reassembling the C70 Air Valve

1. Reassembling the Combination Float Assembly (Part # 8a) – earlier version, automatic orifice is connected with a plug above the automatic disc.
 - a. Insert the Auto Orifice Seal (Part #18) into the Auto Orifice Rod (Part #19), See Figure A.
 - b. Insert the Rod with the Auto Orifice Seal into Auto Orifice Disc (Part #7) and close the Snap Ring (Part #20) on the upper groove of the Auto Orifice Rod (Part #19), See Figure B.



IOM C70, C70-SP, C70-AS

- c. Insert rod with all the parts into the Float (Part #8) and close the second ring (Part #20) on the lower groove of Auto Orifice Rod (Part #19), See Figure C.
 - d. Take Auto Orifice Plug (Part #16) which includes the Orifice (Part #14) and it's O-Ring (Part #5000), See figure D.
 - e. Place O-Ring (Part #5028) over Auto Orifice Plug (Part #16) and screw it into the screw thread of Auto Orifice Disc (Part #7), See Figure E.
2. Reassembling the Combination Float Assembly (Part #8a) – later version, automatic orifice is part of the automatic disc.
- a. Insert Auto Orifice Seal (Part #18) greased into Auto Orifice Rod (Part #19), See Figure F.
 - b. Insert the automatic rod (part #18, #19) into the automatic disc (Part #7) and close with Rod Bottom Lock (Part #40), then close the screw (part #2370), See Figure G.
 - c. Add the snap ring (part 20) to the upper groove on the automatic rod, See Figure H.
 - d. Insert the Automatic disc with all the parts into the Float (Part #8) and close the second ring in the groove on the lower part of the automatic rod, See Figure I.
3. Assembly of the Surge Assembly (Part #5a) – C70-SP or C70-AS.
- a. Take the Surge Disk (Part #5) which includes the Surge Seal (Part # 6), See Figure J.
 - b. For Model C70-AS only – Insert Surge Screw (Part #36) into Surge Disk (Part #5), See Figure K.
 - c. For Model C70-AS only – Place the Surge Shutter (Part #35) over the Surge Screw (Part #36) and close with Nut (Part #3007) + Washer (Part # 3006) on the bottom part of the screwing. Make sure that at least two large holes are open, See Figure L.
4. Assembly of the Body (Part #1a).
- a. In case the valve has service ports, use Teflon to close the Service ports with the plugs.
 - b. Insert Float Assembly (Part #8a) into the Body Assembly (Part #1a), See Figure M
 - c. For Model C70-SP – Insert the Surge disc (Part #5, Part #6) into the element, above the float assembly, See Figure N.
 - d. For Model C70-AS – Insert Surge Assembly (Part #5a) with its parts into the element, above the float assembly, See Figure O.



IOM C70, C70-SP, C70-AS

- e. Place the Top Plate (Part # 9) over the Studs (Part #2004) while beforehand inserting the Top Plate Seal (Part # 4) into the rung etched in the Body (Part #1a), See Figure P.
 - f. For Model C70-AS only – Place the Surge Guide (Part # 38) over the two Studs (Part # 2004) and the Surge Screw (Part #36) and close with the aid of two Nuts (Part #3007) on the upper part of the screwing of them Surge Screw (Part #36), See Figure Q.
 - g. Fasten the Top Plate (Part #9) to the Body Assembly (Part #1a) with the aid of 4 Nuts.
 - h. (Part #3004) + Washers (Part #3005), add the cover seal (Part #11) to the Top Plate (Part# 9), See Figure R.
5. Assembly of the Outlet Cover (Part #2).
- a. Insert and screw the screws (Part #2001) it into the Cover (Part #2), See Figure S.
 - b. Place the Cover over the body. Close the screws evenly, by closing one screw opposite another until the cover touches the body, See Figure T.



Fig. Q



Fig. R



Fig. S



Fig. T

Attention – Make sure that all screws are tightened before lifting the Air Valves using the eye lift. w

APPENDIX B - QUALITY CERTIFICATIONS

Copies of the following Quality Certificates are also available from WSAA.

TABLE B1 BERMAD CS LTD- MANAGEMENT SYSTEMS

| Kibbutz Evron Israel | |
|-------------------------------|-------------------------------------|
| Quality Systems Standard | ISO 9001:2015 |
| Certification Licence No. | IL 86237 |
| Certifying Agency | The Standards Institution of Israel |
| First Date of Certification | 16 July 1995 |
| Current Date of Certification | 1 July 2021 |
| Expiry Date of Certification | 1 July 2024 |

TABLE B2 BERMAD WATER TECHNOLOGIES – PRODUCT CERTIFICATION

| 26 Brand Drive Thomastown Vic | |
|-------------------------------|---------------|
| Product Standard/Spec. | AS 4956:2017 |
| Certificate No. | SMKP25537 |
| Issuing Certification Body | SAI-Global |
| First Date of Certification | 19 April 2013 |
| Current Date of Certification | 22 May 2023 |
| Expiry Date of Certification | 18 April 2028 |



CERTIFICATE

THE STANDARDS INSTITUTION OF ISRAEL
has issued an IQNet recognized certificate that the organization:

Bermad Cs Ltd
Kibbutz Evron, Israel

Has implemented and maintains a Quality Management System

For the following scope:

Design, production and testing of control valves, metering valves, Water meters, valves for fire protection and air valves.

which fulfils the requirement of the following standard:

ISO 9001:2015

| | |
|---------------------------|------------|
| Issued on: | 01/07/2021 |
| Date of initial approval: | 16/07/1995 |
| Date of expiration: | 01/07/2024 |

This attestation is directly linked to the IQNet Partner's original certificate and shall not be used as a stand-alone document

Registration number: IL - 86237




Alex Stoichitoiu
President of IQNet


Avital Weinberg
Director, Quality & Certification Division 

IQNet Partners*:

AENOR Spain AFNOR Certification France APCER Portugal CCC Cyprus CISQ Italy
CQC China CQM China CQS Czech Republic Cro Cert Croatia DQS Holding GmbH Germany EAGLE Certification Group USA
FCAV Brazil FONDONORMA Venezuela ICONTEC Colombia Inspecta Sertifiointi Oy Finland INTECO Costa Rica
IRAM Argentina JQA Japan KFQ Korea MIRTEC Greece MSZT Hungary Nemko AS Norway NSAI Ireland
NYCE-SIGE México PCBC Poland Quality Austria Austria RR Russia SII Israel SIQ Slovenia
SIRIM QAS International Malaysia SQS Switzerland SRAC Romania TEST St Petersburg Russia TSE Turkey YUQS Serbia

* The list of IQNet partners is valid at the time of issue of this certificate. Updated information is available under www.iqnet-certification.com

www.sii.org.il



STANDARDSMARK LICENCE

SAI Global hereby grants:

Bermad Water Technologies

ABN 62 093 801 220

7 Inglewood Drive, Thomastown, VIC 3074, Australia

StandardsMark Licence

Manufactured to:

AS 4956-2017 - Air valves for water supply

"the StandardsMark Licensee" the right to use the STANDARDSMARK as shown below only in respect of the goods described and detailed in the Schedule which are produced by the Licensee or on behalf of the Licensee* and which comply with the appropriate Standard referred to above as from time to time amended. The Licence is granted subject to the rules governing the use of the STANDARDSMARK and the Terms and Conditions for certification and licence. The Licensee covenants to comply with all the Rules and Terms and Conditions.

Licence No: SMKP25537

Issued : 22 May 2023

Expires : 18 April 2028

Originally Certified : 19 April 2013

Current Certification : 22 May 2023

Calin Moldovean
President, Business Assurance
SAI Global Assurance



* For details of manufacture, refer to the licensee

The STANDARDSMARK is a registered certification trademark of SAI Global Pty Limited (A.C.N. 050 644 642) and is issued under licence by SAI Global Certification Services Pty Limited (ACN 108 716 669) ("SAI Global") 650 Lorimer Street, Port Melbourne VIC 3207, GPO Box 5420 Sydney NSW 2001. This certificate remains the property of SAI Global and must be returned to SAI Global upon its request. Refer to www.saiglobal.com, for the list of product models.



SCHEDULE TO STANDARDSMARK LICENCE

SAI Global hereby grants:

Bermad Water Technologies

7 Inglewood Drive, Thomastown, VIC 3074, Australia

StandardsMark Licence

Manufactured to:

AS 4956-2017 - Air valves for water supply

Model identification of the goods on which the STANDARDSMARK may be used:

| Model Name | Brand Name | Product Description | Product Type | Nominal Size (DN) | Pressure Classification (PN) | End Connection Designation | Material Designation | Date Endorsed |
|------------|------------|---------------------|----------------|-------------------|------------------------------|----------------------------|---|---------------|
| C10 | BERMAD | AIR RELEASE VALVE | DOUBLE ORIFICE | DN80 | PN10 | 3" FLANGED | PA 6 GF 33 BLACK + PA 6 GF30 GRAY | 24 Jun 2020 |
| C10 | BERMAD | AIR RELEASE VALVE | DOUBLE ORIFICE | DN50 | PN10 | 2" BSPT | PA 6 GF 33 BLACK + PA 6 GF30 GRAY | 24 Jun 2020 |
| C30 | BERMAD | AIR RELEASE VALVE | DOUBLE ORIFICE | DN80 | PN16 | 3" FLANGED | PA 6 GF 33 BLACK | 24 Jun 2020 |
| C30 | BERMAD | AIR RELEASE VALVE | DOUBLE ORIFICE | DN50 | PN16 | 2" BSPT | PA 6 GF 33 BLACK | 24 Jun 2020 |
| C70 | Bermad | Air Valve | Anti-Slam | 80 (3") | 16 and 35 | Flange | Ductile Iron | 22 May 2023 |
| C70 | Bermad | Air Valve | Anti-Slam | 100 (4") | 16 and 35 | Flange | Ductile Iron | 20 Oct 2021 |
| C70 | Bermad | Air Valve | Anti-Slam | 200 (8") | 16 and 35 | Flange | Ductile Iron | 20 Oct 2021 |
| C70 | Bermad | Air Valve | Double Orifice | 100 (4") | 16 and 35 | Flange | Ductile Iron | 20 Oct 2021 |
| C70 | Bermad | Air Valve | Anti-Slam | 50 (2") | 16 and 35 | Flange | Ductile Iron | 20 Oct 2021 |
| C70 | Bermad | Air Valve | Anti-Slam | 150 (6") | 16 and 35 | Flange | Ductile Iron | 20 Oct 2021 |
| C70 | Bermad | Air Valve | Double Orifice | 150 (6") | 16 and 35 | Flange | Ductile Iron | 20 Oct 2021 |
| C70 | Bermad | Air Valve | Double Orifice | 200 (8") | 16 and 35 | Flange | Ductile Iron | 20 Oct 2021 |
| C70 | Bermad | Air Valve | Double Orifice | 80 (3") | 16 and 35 | Flange | Ductile Iron | 20 Oct 2021 |
| C70 | Bermad | Air Valve | Double Orifice | 50 (2") | 16 and 35 | Flange | Ductile Iron | 20 Oct 2021 |

End of Record

Licence No: SMKP25537

Issued Date: 22 May 2023

This schedule supersedes all previously issued schedules



* For details of manufacture, refer to the licensee

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APPENDIX C - SUPPLIER CONTACTS

Bermad Water Technologies

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Email: info@bermad.com.au

Website: <https://www.bermad.com.au/>



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