

BROEN BALLOMAX®
FLOATING BALL VALVES



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I. INTRODUCTION

Technical Manual Release Date

BROEN

BALLOMAX®

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Initial Release: June, 1997

Latest Revision: February 8, 2024. Prepared by: Bryan Ham

Approved By:

Mogens Laursen, CEO BROEN A/S

BROEN A/S

Ben Marchisio, President

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BROEN Inc.
6421 Lozano Dr
Houston TX 77041
Phone: 713-300-0480
www.broen.us

BROEN A/S and BROEN Inc.

BROEN A/S was founded in 1948 in Denmark. Today it is part of the Aalberts Industries Group of the Netherlands. BROEN A/S is a global leader manufacturer of valves for District Heating and for the Natural Gas Industry. Recently BROEN A/S acquired Clorius, a manufacturer of products for temperature and pressure control.

BROEN Inc, Birmingham, Alabama was created in 1995 to provide the North American market production of Ball Valves to better serve our customers. We moved to **Houston, Texas** in 2016 to a new and larger facility, with greater capacity, to continue to provide fast deliveries, broader product range, and technical assistance when needed.

The Product

The products in scope for this document are the **BALLOMAX®** Floating Ball Valves for Natural Gas. We produce the following valves:

Regular and Full Port, Carbon Steel all welded body, maintenance free ball valves. The valves are available in 285 PSI / ANSI 150 and 740 PSI / ANSI 300

These **BALLOMAX®** Floating Ball Valves are made with three “style” options:

- PIPELINE: our flagship product, with endless configurations.
- PREMIUM: compact and extra strong body made with forged ends, Full Port.
 - BALLOTAP: this is a special type of PREMIUM valves that feature a threaded end that accepts a special BALLOTAP flange designed to couple with the common drilling and tapping machines. The flange is equipped with an O-ring allowing for pressure test of weld prior to tapping.
- UTILITY: the most cost competitive option, with flanged ends and Regular Port.

Code and Compliance

All BROEN BALLOMAX® floating ball valves are designed using an internationally recognized design code, which is **ASME BPVC VIII Div. 1**

All valves are tested in accordance to **API 6D 25th edition**.

For all BROEN BALLOMAX® floating ball valves the Pressure-Temperature ratings conform to **ASME B16.34**.

Flanges for PIPELINE and PREMIUM valves comply with **ASME B16.5** Edition 2013. Flanges for UTILITY valves comply with AD2000 B7 and B8 and their bolt pattern meets ASME B16.5 requirements.

Butt weld ends comply with **ASME B16.25** requirements.

Welds comply with the requirements of **ASME IX** or **API 1104** or **DIN EN ISO 15614-1**.

All BROEN BALLOMAX® floating ball valves meet the requirements of **DOT Title 49, part 192** for Natural Gas Distribution.

BROEN Inc is **ISO 9001** certified.



II. QUALITY ASSURANCE AND CONTROL

The BROEN Quality Management System

BROEN VALVE GROUP was originally certified according to EN 29001/ ISO 9001 on September 9, 1994. Audits are periodically performed to ensure certification validity.

BROEN VALVE Group's Quality Management System is now described by an electronic document, accessible to all relevant employees, continuously updated and improved, and used for both internal and external audit purposes.

ISO 9001 Certificate



BROEN A/S

Skovvej 30, 5610 Assens, Denmark

This is a multi-site certificate, additional site(s) are listed on the next page(s)
Bureau Veritas Certification Holding SAS – UK Branch certifies that the Management System of the above organisation has been audited and found to be in accordance with the requirements of the management system standards detailed below

ISO 9001:2015

Scope of certification

Development, manufacturing, engineering and delivery of valves to District Energy & Gas, Building Installations & Control, Industrial Installations & Control, & Control valve solutions to Marine, Power & Energy.

Original cycle start date:	10-07-1991
Expiry date of previous cycle:	NA
Certification / Recertification Audit date:	NA
Certification / Recertification cycle start date:	16-09-2021
Subject to the continued satisfactory operation of the organization's Management System, this certificate expires on:	15-09-2024

Certificate No.: **DK014631** Version: **2** Issue date: **03-02-2022**



0008

Certification Body Address: 5th Floor, 66 Prescott Street, London, E1 8HG, United Kingdom

Local Office: Bureau Veritas Certification Denmark A/S, Oldenborggade 25-31, 7000 Fredericia

Further clarifications regarding the scope and validity of this certificate, and the applicability of the management system requirements, please call: (+45) 77 311 000.





BUREAU
VERITAS

Bureau Veritas Certification

BROEN A/S

ISO 9001:2015

Scope of certification

Site Name/Location	Site Address	Site Scope
BROEN A/S (Head Office)	Skovvej 30, 5610 Assens, Denmark	Development, manufacturing, engineering and delivery of valves to District Energy & Gas, Building Installations & Control, Industrial Installations & Control, & Control valve solutions to Marine, Power & Energy.
BROEN Clorius (Clorius Controls)	ul. Strefowa 19, pl-58-200 Dzierzoniow, Poland	Manufacturing, engineering, and delivery of control valve solutions to Marine, Power & Energy. Manufacturing and assembly of valves to Building Installations & Control.
BROEN Inc. (USA)	6421 Calle Lozano Dr., 77041 Houston, USA	Development, manufacturing, engineering, delivery and service of valves actuators and controllers to District Energy & Gas, Building Installations & Control and Industrial Power & Energy
BROEN POLAND sp. z o.o. (Pleszycka)	ul. Pleszycka 10, pl-58-200 Dzierzoniow, Poland	Development, manufacturing, engineering and delivery of valves to District Energy & Gas, Building Installations & Control and Industrial Installations & Control.

Certificate No.: **DK014631** Version: **2** Issue date: **03-02-2022**

Phil Absalonen



0008

Certification Body Address: 5th Floor, 66 Prescott Street, London, E1 8HG, United Kingdom

Local Office: Bureau Veritas Certification Denmark A/S, Oldenborggade 25-31, 7000 Fredericia

Further clarifications regarding the scope and validity of this certificate, and the applicability of the management system requirements, please call: (+45) 77 311 000.



III. ENGINEERING DETAILS

Design Features

Valve service: on-off service (no throttling) for distribution of natural gas, liquids, and other industrial applications. Not for use as blowdown valve.

Valves size range: ¾" up to 8".

Pressure rating: MAOP 285 psi/ ANSI 150; MAOP 740 psi/ ANSI 300

Temperature range: -20°F to 266°F (-29°C to 130°C)

Painting/coating:

The standard paint is a non-toxic water-based black primer.

We can offer valves coated with the 3M 323+ epoxy coating.

Other specialty coatings are available upon request.

All Valves have a permanently stamped and affixed label compliant with API-6D requirements, with a unique individual serial number.

All Valves are equipped with a locking flange (Lock on/Lock off) which can accommodate a standard barrel lock or standard pad locks.

All Valves are furnished with a visible means of position indication.

All Valves are subject to a hydrostatic shell and seat test per API 6D requirements. Test certificates are available for each valve. Additional custom testing is available at the customer's request.

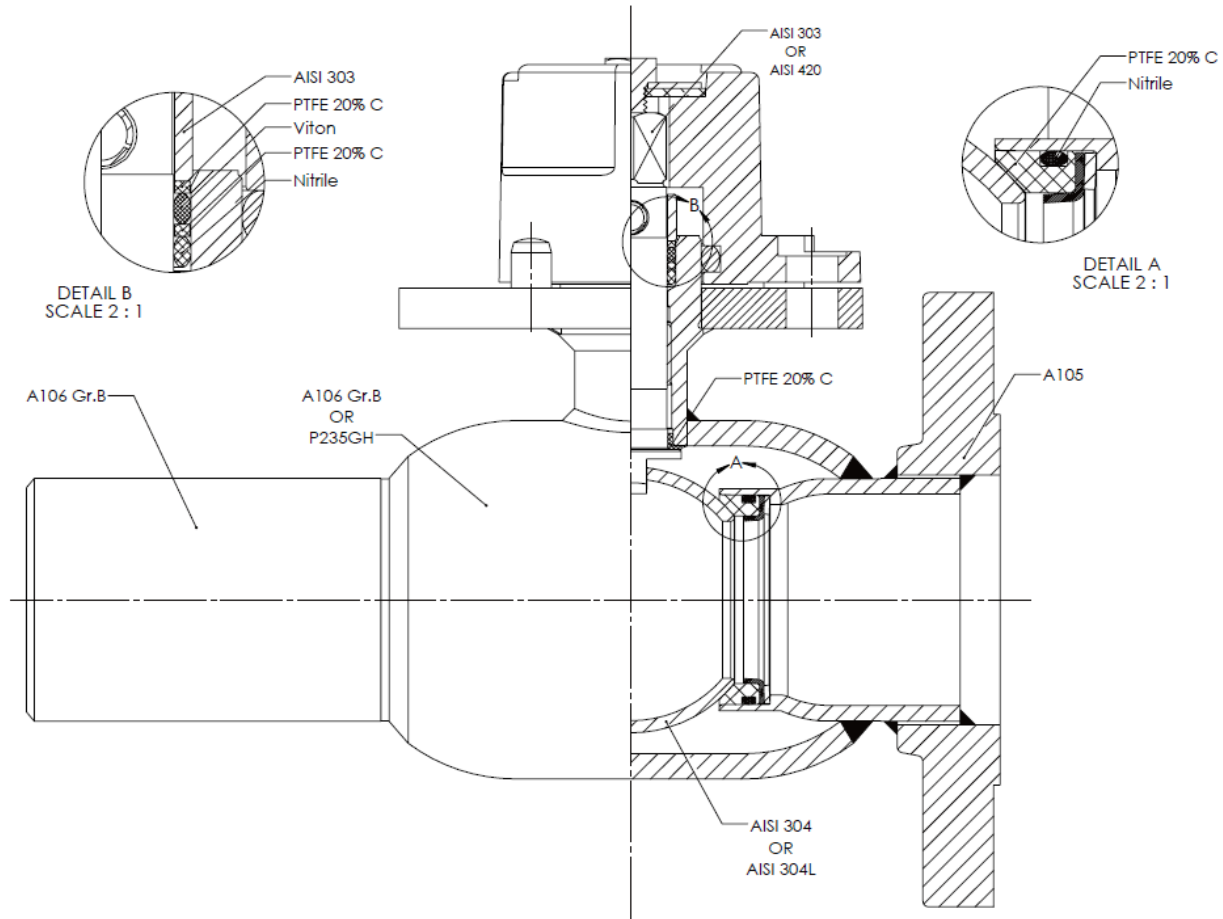
All Valves are equipped with a "Safety grounded stem" as "UL" requires for flammable gasses. This removes any potential for a static build-up and resulting arc. The stem grounding feature is provided by the zinc coated stem bearings that insures electrical continuity so that no static charge build-up occurs.

All Valves are equipped with POWERSTOPS that allow for excessive input torque up to 600 ft/lb. on ¾" through 6", and up to 1750 ft/lb. on 8" valves, preventing any damage to the valve.

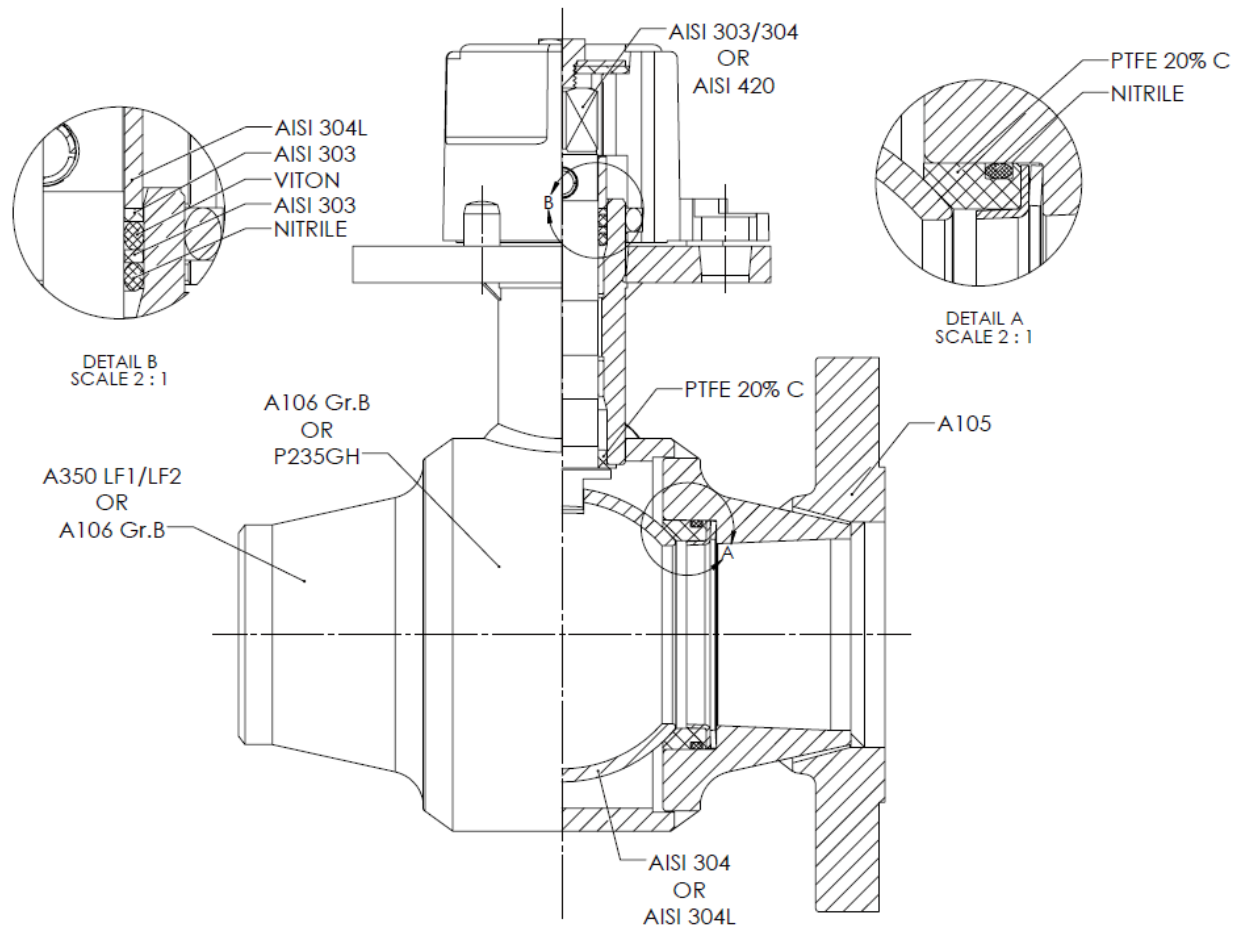
Materials

Materials selection may vary depending on availability and price. The different steel grade options have comparable mechanical properties and the same welding requirements.

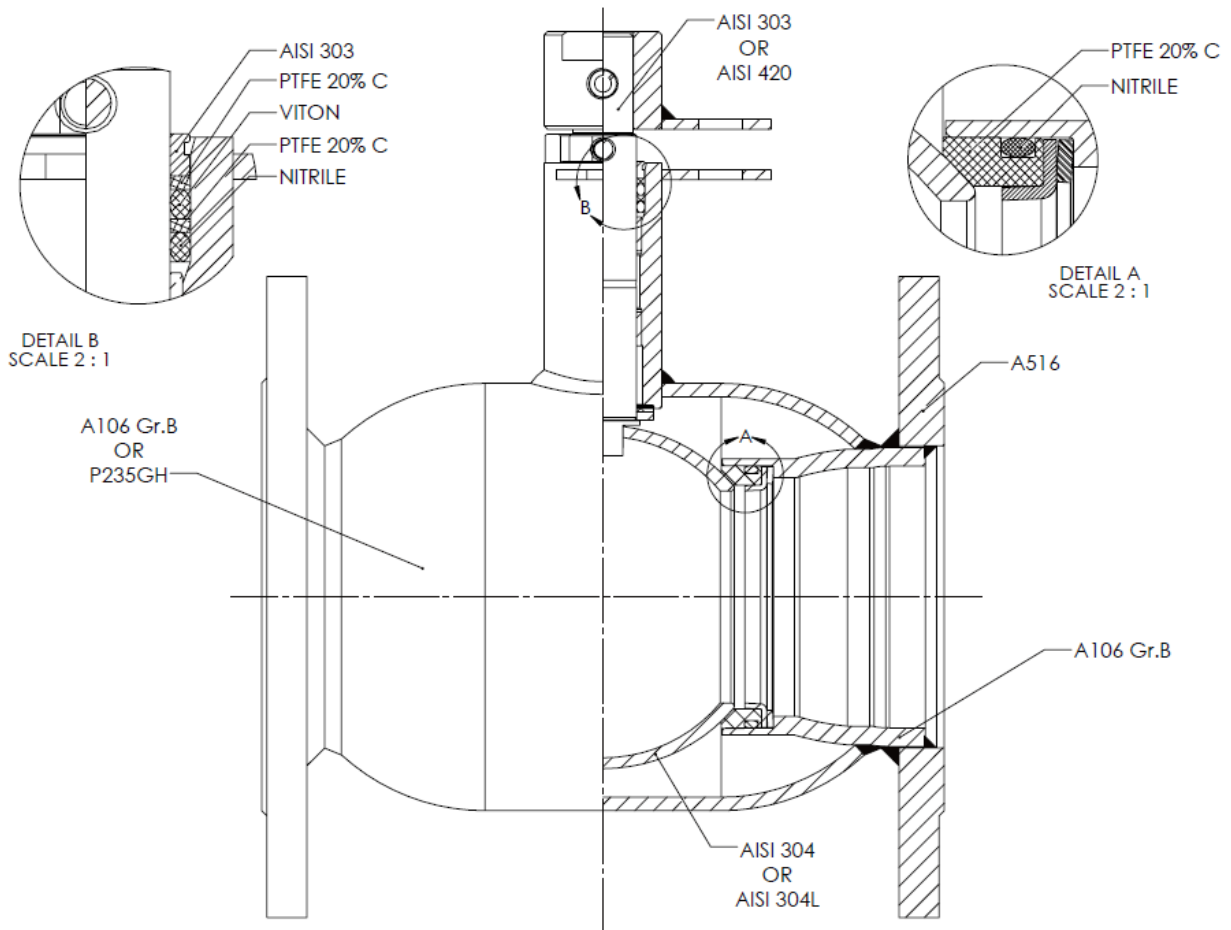
PIPELINE Valves



PREMIUM Valves

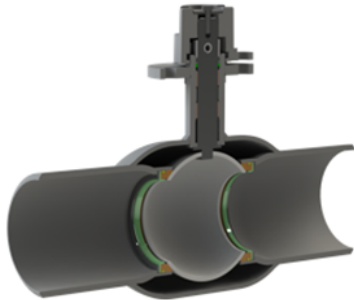


UTILITY Valves



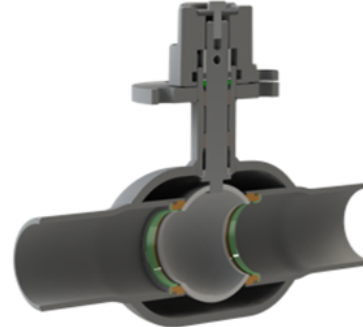
Port Options

Regular Port Concave Ball



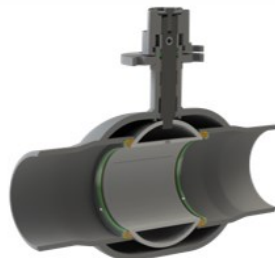
- Smaller/lighter valve, ideal when weight and space constraints are driving the decision (for example: in meter sets)
- Most cost-effective solution
- Available in all Pipeline and Utility sizes

Full Port Concave Ball

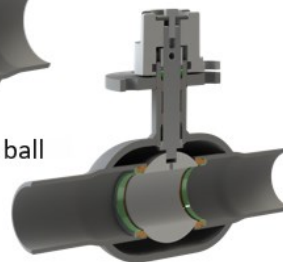


- Larger/heavier valve (same as straight ball)
- Reduced pressure drop through the valve
- Higher Pipeline valve price
- Available in all Premium sizes and selected Pipeline sizes (2", 4", 6")

Full Port Straight Ball



Hollow ball



Solid ball

- Larger/heavier valve (same as concave ball)
- Negligible pressure drop through the valve
- Highest Pipeline valve price
- Available in selected Pipeline sizes (2", 4", 6")

IV. TESTING CODE AND COMPLIANCE

Test Procedure According to API-6D Section 10 with ISO 5208 Rate A Acceptance Criteria

We hereby detail our test procedures according to API-6D section 10 with ISO 5208 rate A acceptance criteria.

These tests are performed and certified prior to leaving our manufacturing facility. Each valve is documented and has a test certificate which is available upon request.

No test procedure will be started until the valve is at room temperature.

All **BROEN BALLOMAX®** Valves are tested in accordance with the procedures described below.

Any additional customer specified test will be evaluated, performed and certified in accordance with provided written requirements. BROEN Inc. reserves the right to review same for additional charges.

Hydrostatic Shell Test

1. The BROEN BALLOMAX® valve is placed in the testing bench.
2. The valve is opened half way and water (or other test media) at ambient temperature is pumped into it.
Pressure is built up to 1.5 times MAOP.
3. At the test pressure the operator is observing the valve in the specified testing time.

Testing time for 4" and smaller:	2 Minutes
Testing time for 6" thru 10":	5 Minutes
Testing time for 12" thru 18":	15 Minutes
Testing time for 20" and larger:	30 Minutes

4. No visible leakage is permitted: the valve is rejected if any leakage is detected.

Hydrostatic Seat Test

1. The BROEN BALLOMAX® valve is placed in the testing bench.
2. The valve is opened half way and water (or other test media) at ambient temperature is pumped into it. Pressure is built up to 1.1 times MAOP.
3. The valve is closed, and the test machine valve is closed between the valve and the machine pump. A manometer is observed while one side of the valve is drained and vented. After 15 seconds, the pressure is registered, and with any pressure loss the valve is rejected. The specified testing time is as follows:

Testing time 4" and smaller:	2 minutes
Testing time 6" to 18":	5 Minutes
Testing time 20" and larger:	10 minutes

- Paragraph 3 is now repeated for the other connection end of the valve.
- The test media is evacuated from the valve.

Supplementary Air Seat Test According to API 6D L.19 Type I and II (ISO 5208 Rate A)

Low-pressure Gas Seat Testing-Type I

- The **BROEN BALLOMAX**[®] valve is placed in the testing bench.
- The valve is opened half way, the closure member and leakage measurement connection port shall be purged with air, and air at ambient temperature is pumped into it at 10 psi.
- The valve is closed, and the test machine valve is closed between the valve and the machine pump. A manometer is observed while one side of the valve is drained and vented. After a period of 2 minutes of constant pressure, the stabilization period begins. The stabilization period can be extended in case stabilization is not achieved. The stabilization period is as follows:

Stabilization time 4" and smaller:	5 minutes
Stabilization time 6" to 10":	10 Minutes
Stabilization time 12" to 18":	15 Minutes
Stabilization time 20" and larger:	15 minutes

- Following stabilization, the test begins. The pressure is registered, and with any pressure loss the valve is rejected. The specified testing time is as follows:

Testing time 4" and smaller:	2 minutes
Testing time 6" to 18":	5 Minutes
Testing time 20" and larger:	10 minutes

- Paragraphs 3 & 4 are now repeated for the other connection end of the valve.
- The test media is evacuated from the valve.

The test benches are calibrated four times per year according to procedures described in the quality control system of BROEN A/S.

Low-pressure Gas Seat Testing-Type II

- The **BROEN BALLOMAX**[®] valve is placed in the testing bench.
- The valve is opened half way, the closure member and leakage measurement connection port shall be purged with air, and air at ambient temperature is pumped into it at 90 psi.
- The valve is closed, and the test machine valve is closed between the valve and the machine pump. A manometer is observed while one side of the valve is drained and vented. Pressure shall be identified

as stabilized when the rate of change is no more than 5% of the test pressure within 5 minutes. (87.75-92.25 psi range).

4. Following stabilization, the test begins. The pressure is registered, and with any pressure loss the valve is rejected. The specified testing time is as follows:

Testing time 4" and smaller:	2 minutes
Testing time 6" to 18":	5 Minutes
Testing time 20" and larger:	10 minutes

5. Paragraphs 3 & 4 are now repeated for the other connection end of the valve.
6. The test media is evacuated from the valve.

The test benches are calibrated four times per year according to procedures described in the quality control system of BROEN A/S.

Valve Documentation

All BROEN BALLOMAX valves are supplied with a test certificate related to the pressure test (hydrotest and air test).

Additional MTRs (including chemical compositions and mechanical properties of the materials, etc.) are available upon request.

Test Certificate Example

Test Certificate		BROEN <small>VALVE TECHNOLOGIES</small>	
Customer: [Customer Name]	Order No.: [Order Number]		
Serial No.: [Unique Serial Number]			
Test article: Ball valve Port size: Regular Port End connections: Welding - Flange Size: 2" Quantity: 50 MAOP: 285 PSI Drawing no.: 771040505184800			
Materials			
Valve Component		Material Type, Material Grade or P-number per ASME BPVC IX	
Welding end:		Carbon steel, P1 group per ASME BPVC IX	
Flange end:		Carbon steel, ASTM A105	
Valve body:		Carbon steel, P1 group per ASME BPVC IX	
Stem:		Stainless steel, AISI 303	
Ball:		Stainless steel, AISI 304	
Seat:		PTFE	
Operation Means: Manual 2inch square nut Gear Orientation: N/A # of Turns: N/A			
Pressure Test			
Testing ball valve according to API specification 6D, Sec.10 25th Edition, November 2021			
Hydrostatic Test		Test Pressure (Psig)	Test Time (Minutes)
Section 10.3, Shell Test		430	2
Section 10.4, Seat Test - Seat A		315	2
Section 10.4, Seat Test - Seat B		315	2
Supplementary Test according to API 6D, Annex L			
Low-Pressure Gas Seat Test With Air			
Acceptable Criteria: ISO 5208, Rate A, No Visible Leakage.		Test Pressure (Psig)	Test Time (Minutes)
- L.19.1 Type I - Seat A		10	2
- L.19.1 Type I - Seat B		10	2
- L.19.2 Type II - Seat A		90	2
- L.19.2 Type II - Seat B		90	2
Label: STD			
Houston, TX		Date: 5/25/2023	Inspector: Gustavo Perez
BROEN, Inc. 6421 Lozano Dr. Houston TX, 77041		Telephone: (713) 300-0480 Email: info@broen.com	

V. STANDARD VALVE PROCEDURES

Valve Preservation and Storage

The internal surfaces of the valve are protected against corrosion with a protection film. This protects the valve for a period of 6 months.

We recommend to store the valve on a flat surface in a dry, clean area, protected against weather conditions and corrosive agents.

The valves should always be stored in their full open position to prevent damage to the balls.

The valves are supplied with end caps to protect the beveled ends or the flange surface. These protection caps are to be kept until valve installation.

Valves are shipped in a durable environmentally-friendly packaging. Disposal of valve packaging is under responsibility of BROEN's customers.

Valve Handling, Transportation, and Shipment

All BROEN BALLOMAX® Valves are to be shipped in the FULL OPEN position.

Gear Operators, if installed, are factory set and should not be removed or adjusted before or during construction without consulting a factory representative.

Standard Installation Procedures

Keep the BROEN Floating Ball Valve in the Fully OPEN position During Installation. The Full Open position best protects the soft seats from potential high heat and weld splatter. We suggest protecting the area where the ball and seat seals join to prevent weld spatter or weld beads attaching and possibly scratching the ball.

Do Not leave the Valve in any Partial Open or Closed Position. This allows for the edge of the ball to rest on the soft PTFE seat which may temporarily cause an indentation in the soft seat until it has time to cold flow back into proper position. It also exposes the seats to heat and potential weld splatter.

A closed Ball Valve leaves the surface of the ball exposed which can be damaged by weld splatter. The ball surface is especially vulnerable when welding in the vertical position.

BROEN Floating Ball Valves are bi-directional valves.

Installation Position: The BROEN BALLOMAX Ball Valves operate in any position, with either vertical or horizontal stem.

Valves with stem extensions (high end extensions) must be installed with vertical stem only. Please note that stem extensions must not be exposed to bending forces or torques.

Field Welding:

The welding ends of the valve are ANSI B 16.25 prepared for API 1104 standard arc welding procedures and are of a length to allow for arc welding without any unusual precautions. Gas welding is not recommended because it may cause excessive heat to build up that can burn the seats.

The valve should be welded in the Fully Open position, and the inside sealing surface area should be protected against weld spatter or weld beads in the sealing area.

While welding, avoid excessive heating to avoid damaging the seats.

After welding, avoid operating the valve until all parts are cooled to ambient temperature. As a rule, wait 15 minutes on valves up to 4" and 30 minutes for larger valves.

Pups: Valves with pups prepared in a valve shop prior to installation may be preferable in some applications. The pups allow for a longer distance between the weld location and the soft seats, decreasing the likelihood of damage. The pups allow the site welds to weld the same pipe as the rest of the pipeline, following the same welding procedure. The increased length can also help with alignment during installation.

On Gear Operated Valves it is advisable to fully cycle the operator before installation, while observing operation and the proper set points of the travel stops in Fully Open and Fully Closed positions. The travel stops are measured and set at the factory and marked.

Testing of welds can be performed by Hydrostatic testing or Nitrogen testing as is normal construction practice. The valve has already undergone API Hydrostatic Shell Testing at the factory. To check the integrity of your welds, review the dedicated section "Testing of Field Welds".

Testing of Field Welds

After welding, you may desire to test the welds hydrostatically or with nitrogen as is common practice in the Industry. Below are our procedures.

a) Hydro Testing:

The valve has already undergone API certification at the factory and the test certificates if requested from the factory show the results of these tests. Never Test Against a Closed Ball Valve.

Field Hydrostatic testing should be as follows:

1. Fill the Pipeline with clean water, with the Valves in the FULLY OPEN position. Filling the pipeline with valves in the partial open position allows for rust scale and trash to enter the valve body.
2. Once filled, you can move the ball to ½ open position to allow the cavity of the valve to fill with water.
3. Pressurize the line and perform test.

4. Valves should be returned to Fully Open position before draining the Pipeline. This prevents rust scale and trash entering the valve body and building up in the soft seat area which may cause damage to seats.
5. Note: if the valve has been left in the partial open position for an extended period, the valve should be exercised several times and left in the Full Open or Fully Closed position for the Soft Seat material to cold flow back into position for 100% shut off.
6. It is important not to use this newly installed valve for a blowdown valve or throttling valve. A sacrificial valve should be installed downstream for blowing down your line.

b) Nitrogen Testing

We understand that Nitrogen Testing is a common construction practice. This testing should be performed under careful practices that include heating of the nitrogen to prevent the valves plasticized components from freezing and damage.

This valve is designed for Natural Gas Service. We do not perform Nitrogen testing on our valves. We test to API-6D standards. When testing with Nitrogen you must respect that you are testing your welds, not the sealing ability of the soft seated valve. The molecules of Nitrogen, which are dry and very cold, are many times smaller than that of Natural Gas, which has natural lubricating properties. If your Nitrogen is not preheated, you can destroy the seats of the valve. Never test with unheated Nitrogen with the valve in the partial open position and never where the test media is lower than -40F.

Be sure to thoroughly drain and dry the valve after test.

BALLOTAP Valve for Hot Tapping Service

BALLOMAX® Premium BALLOTAP Valves are Full Port Valves designed for Hot Tapping Operations. This valve features a weld-end on one side (the side of the existing and pressurized line) and a threaded end connection with a weld-end on the other side. This threaded connection allows for the mounting of a removable threaded flange that will connect with the tapping tool. The BALLOTAP valves are rated for 285 psi MAOP (class 150) and 740 psi MAOP (class 300). If pressure testing the valve after installation but before the coupon is cut, ensure that the test pressure does not exceed the current operating pressure of the line to prevent damage to the pipeline.

We recommend you refer to the Tapping Equipment Manufacturers procedure for the Tapping operation and procedure. Ensure the proper drilling tool is selected based on the port size, valve nest dimension, and overall length of the valve. As a general rule, the cutter size should be at least 0.5" smaller than the valve port size.

Hot Tapping Installation

Hot Tapping is the process of installing a new connection into a line without interrupting the pipeline's service. As with all operations that involve working with pressurized line, the proper procedure must be followed to ensure a safe installation.

Items Required:

- BROEN BALLOMAX Premium BALLOTAP Valve
- Special threaded flange provided by BROEN (set screws included)
- Method of coping hot tap weld end (Weld O-let recommended)
- Hot Tap drilling tool w/ mounting connection hardware.

To install the BALLOMAX® Premium BALLOTAP Valves into a line, follow the steps below:

1. Prepare the end of the valve **without** threads with a saddle connection. BROEN recommends a weld O-let connection to achieve the proper coping to fit up with the pipeline OD.
2. Weld the coped end of the valve to the pressurized line with the valve in the open position.
3. Assemble the special threaded flange provided by BROEN to the threaded end of the BALLOTAP valve, secure it in place with set screws when it is in position.
4. Assemble the drilling tool onto the flange.
5. Verify travel distance and that the valve can be closed with the drilling tool attached to the flange.
6. With the valve still in the open position, drill into the pressurized line.
7. Lift the drill bit and remove the drilled coupon, clear of the valve's ball.
8. Close the valve.

9. Release the gas trapped in the drilling tool, verify that no leak is present.
10. Remove the drilling tool.
11. Remove the flange.
12. Weld the new service line onto the beveled edge of the valve.

When the new line is ready to be brought into service, the valve can be opened.

Valve Operations

Your BROEN BALLOMAX® Floating Ball Valve is designed for On / Off service. The valve should never be used as a Throttling Valve or Blowdown Valve.

Typical BROEN BALLOMAX® Floating Ball Valves use a lock plate and 2" nut. The nut has an extrusion that serves as the indicator showing the valve's position. The valve is open when the extrusion is in-line with the direction of the pipeline. If the extrusion is perpendicular to the pipeline direction, the valve is closed. The lock plate includes mechanical stops to ensure the fully closed/open position is achieved.

Some BROEN BALLOMAX® Floating Ball Valves can come with Gear Operators and have a Rotating position indicator. The indicator clearly shows Open and Closed positions and provides you visually the travel direction of the valve stem.

The valve OPENS counter-clockwise and CLOSES clockwise. The valve is a quarter-turn operation. The valves are set on position: once you reach the stops do not apply any extra torque. Over-torquing a valve may damage it. Do not use a cheater bar when operating the valves.

The Gear Operator is multi-turn to slowly move the ball into the desired position. The number of turns is marked on the Gear.

The Gear Operator has positive stops incorporated into the unit for full open and full closed positions. The positions are set at the factory and determined by measurements based on the ball position. If you need to reposition in the field, please call your representative on the procedure.

Valve Maintenance

BROEN BALLOMAX® Floating Ball Valves are maintenance-free valves. However, in compliance with DOT Title 49, part 192.747 we recommend that each valve is checked and operated (opened-closed) at intervals not exceeding 15 months, but at least once each calendar year.

Troubleshooting

BROEN BALLOMAX Floating Ball Valves are designed such that there are very few problems that can be experienced. If you do have issues, please call your representative or our office for assistance.

Few remarks:

- Keep in mind that the floating design does not allow for Double Block and Bleed.
- If the valve is not sealing, make sure that the valve is in fully closed position.
- If the valve is leaking from the stem, please contact a BROEN representative before removing the valve from the system: stem O-rings can be replaced on site by our qualified technicians.

CONTACT BROEN IF YOU NEED ASSISTANCE WITH YOUR BALLOMAX® FLOATING BALL VALVES:

info@broen.com; +1 713 300 0480.