

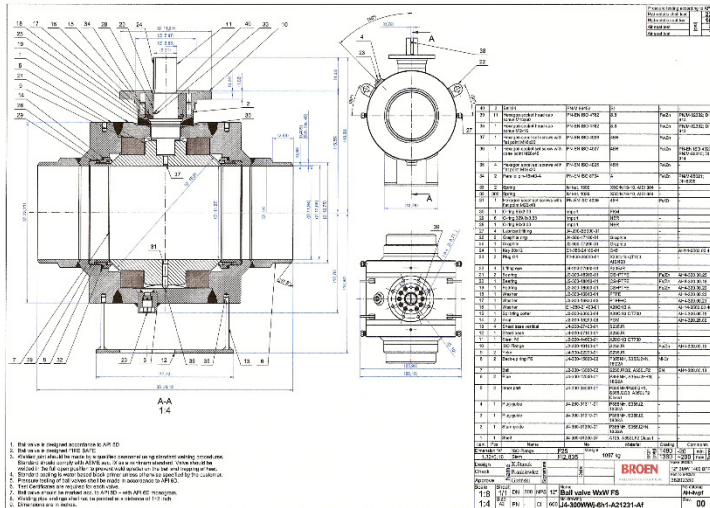
QUALITY ASSURANCE

BROEN
VALVE TECHNOLOGIES

BALLOMAX[®]

API 6D CERTIFIED BALL VALVES

Double Block & Bleed, with Emergency Sealant Injection Ports



Technical Manual

Revised: Aug, 2019

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I. INTRODUCTION

Technical Manual Release date

BROEN
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All information contained in this manual is the exclusive property of **BROEN Inc.** Any reproduction or use of the calculations, drawings, photographs, procedures, or instructions, either expressed or implied, is forbidden without the written permission of **BROEN Inc.** or its authorized agent.

Initial Release: June 16, 1997
Latest revision: August, 2019. Prepared by: Tommy Peddycord

Approved By:

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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 Flagship products for BROEN Inc. are the **BALLOMAX®** Ball Valves for Natural Gas Industry. Our **API 6D Certified Valves** represent the state of the art for trunnion mounted ball valve technology. The valves are Double Block and Bleed with emergency sealant injection ports, ANSI 150, ANSI 300, and ANSI 600.

Code and Compliance

BROEN Inc BALLOMAX® API 6D Certified Ball Valves are produced in accordance with API 6D and strictly adheres to API Monogrammed requirements. Conforming to requirements of API Q1 and ISO 9001 Quality Management Systems. All Ballomax valve are fully traceable, meet or exceed the requirements of ANSI dimensions, Fire Tested to ISO FT (10497) harmonized to API 6D 6FA General Standard, and API 607 standards for primary soft seat, MSS-SP 72, and DOT Title 49, part 192. Each valve produced are Hydrostatically Tested per API 6D with a supplementary air test per ISO 5208. Test Certificates are available for every valve. We operate under the API license # 6D-0378.

Applicable Standards and Specifications

The **latest edition** of the following specifications and standards will be used to establish the basic requirements referenced throughout this pre-qualification for the specific type of valves being inspected and tested.

Unless specifically designated by date, the latest edition of each publication shall be used together with any amendments, supplements, or revisions.

API - AMERICAN PETROLEUM INSTITUTE

Spec. Q1	Specification for Quality Programs.
Spec. 6D	Specification for Pipeline Valves.
6 FA	Specification for Fire Test for Valves.
Std. 598	Valve Inspection and Testing.
Spec. RP6F	Recommended Practice for Fire Test for Valves
Std. 607	Fire Test for Soft-Seated Quarter- Turn Valves.

ANSI - AMERICAN NATIONAL STANDARD INSTITUTE

B 16.5	Pipe Flange and Flanged Fittings.
B 16.10	Face-to-Face and End -to-End Dimensions of Valves.
B 16.25	Butt Welding Ends.
B 16.34	Valves-Flanged, Threaded and Welding Ends.
B 31.3	Chemical Plant and Petroleum Refinery Piping.
B 31.4	Liquid Transportation Systems for Hydrocarbons, Liquid Petroleum Gas, Anhydrous Ammonia and Alcohols
B 31.8	Gas Transmission and Distribution Piping Systems.

ASTM - AMERICAN SOCIETY OF TESTING MATERIALS

ASTM VOLUME 01.01	Steel Piping, Tubing, Fitting.
ASTM VOLUME 01.02	Ferrous Casting, Ferroalloys.
ASTM VOLUME 01.05	Steel Bars, Forgings, Bearings, Chain, Springs.

ASME - AMERICAN SOCIETY OF MATERIALS ENGINEERS

ASME B 1.20.1	Pipe Thread and Flanged Fittings.
ASME B 16.5	Steel Pipe Flanges and Flanged Valves and Fittings.
ASME B 16.11	Forged Steel Fitting, Socket Welding & Threaded.
ASME B 16.20	Ring Joint Gasket & Grooves.
ASME B 16.25	Butt Welding Ends.
ASME B 16.34	Valves Flanged, Threaded and Welding Ends.
ASME B 16.47	Large Diameter Steel Flanges, NPS 26 through NPS 60.
ASME Sect. V	Non-destructive Examination.
ASME Sect. VIII	Rules for Construction of Pressure Vessels (Division 1).
ASME Sect. IX	Welding and Brazing Qualifications.

ISO - INTERNATIONAL STANDARD ORGANIZATION

228 Part 1	Pipe Threads, Designation, Dimensions and Tolerances.
5208	Pressure Testing to Valve 17121 Flanged Steel Ball Valves.
5210	Industrial Valves-Multi- Turn Valve Actuator Attachments.

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5211-1	Partial Turn Valves Actuator Attachment-Part 1 : Flange Dimensions
5752	Face to Face and Center to Face Dimensions.
10497	Testing of Valves: Fire Type Testing Requirements.

MSS - MANUFACTURERS STANDARDIZATION SOCIETY

SP 25	Standard Marking Systems for Valves, Fittings, and Flanges.
SP 44	Steel Pipe Line Flanges.
SP 45	Bypass and Drain Connections.
SP 53	Quality Standard for Steel Castings for Valves, and Flanges.
SP 61	Pressure Testing of Steel Valves.
SP 72	Ball Valves with Flanged or Butt-Welding Ends for General.
SP 76/001	Surface Finish of Flange Gasket Contact Faces.
SP 77/302	Materials, Non-Destructive Examination and Certification.
SP 77/315	Electro- Nickel Plating for Improved Corrosion Resistance.
SP 77/316	Electro- Nickel Plating for Improved Wear Resistance.
SP 82	Valve Pressure Testing Methods.
SP 84	Steel Valve Socket Welding and Threaded.
SP 92	Valve User Guide.
SP 93	Quality Standard for Steel Castings and Forgings for Valves.
SP 94	Quality Standard for Ferritic and Martensitic Steel Castings.

NACE - NATIONAL ASSOCIATION OF CORROSION ENGINEERS

* NACE Materials are optional and must be specified on purchase orders.

MR-01-75	Sulfide Stress Cracking Resistant Metallic Material.
MT -01-77	Laboratory Corrosion Testing of Metals for the Process Industries

TEST & INSPECTION SPECIFICATIONS**HYDROSTATIC/PNEUMATIC PRESSURE TEST (SHELL, SEAT)**

API STD 598	Valve Inspection and Testing.
ANSI B 16.37	Valves -Hydrostatic Test.
ANSI B 16.104	Seat Leakage Test
ANSI/FCI 70.2	Seat Leakage Class for Valves.
BS 5146	Inspection and Test of Valves.
BS 6755 Part 1	Pressure Test.
MSS SP-61	Pressure Testing of Steel Valves.
MSS SP-82	Valve Pressure Testing of Methods.
ISO 5208	Industrial Valves Pressure Testing.

VISUAL & DIMENSIONAL INSPECTION

ANSI B 16.5	Steel Pipe Flanges and Flanged Valves and Fittings.
ASME B 16.47	Large Diameter Steel Flanges, NPS 26 through NPS 60.
API 605	Large Diameter Carbon Steel Flanges.
ANSI B 16.25	Valves - Flanged. Thread and Welding End.

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ANSI B 16.10	Face-to-Face and End -to-End Dimension of Valves.
ANSI B 16.34	Valves - Flanged and Butt-Welding Ends.
MSS SP-6	Standard Finishes for Contract Faces of Pipe Flanges, Connection End Flanges of Valves and fittings.
MSS SP- 25	Standard Marking System of Valves, Fittings, etc.
MSS SP- 55	Quality Standard for Steel Castings - Visual Method.
MSS SP- 72	Ball Valve - Port Type, Full Bore, Regular Bore.
BS 1560	Circular Flanges for Pipes, Valves and Fittings.
BS 2080	Specification for Face to Face, Center to Face, End to End, and Center to End Dimension of Valves.

NONDESTRUCTIVE EXAMINATION (NDE. NDT)

ANS1816.34	Valves- Flanged, Thread and Welding End
ASTM E94	Recommended Practice for Radiographic Testing.
ASTM E165	Practice for Liquid Penetrant Inspection.
ASTM E709	Practice for Magnetic Particle Inspection.
ASTM E114	Practice for Ultrasonic Inspection.
ASTM E142	Standard Method for Controlling Quality of Radiographic Testing.
ASME Sec. V	Nondestructive Examination.

MECHANICAL TEST

ASTM A370	Specification for Test Methods and Definitions for Mechanical Testing of Steel Products.
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SULFIED STRESS CRACKING RESISTANCE TEST

NACE-MR-O1-75 Metallic Materials for Sour Oil & Gas Field Equipment.

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**API Q1 Certified
ALL WELDED BALL VALVES
Double Block and Bleed with
Emergency Sealant Injection Ports**



II. QUALITY ASSURANCE AND CONTROL

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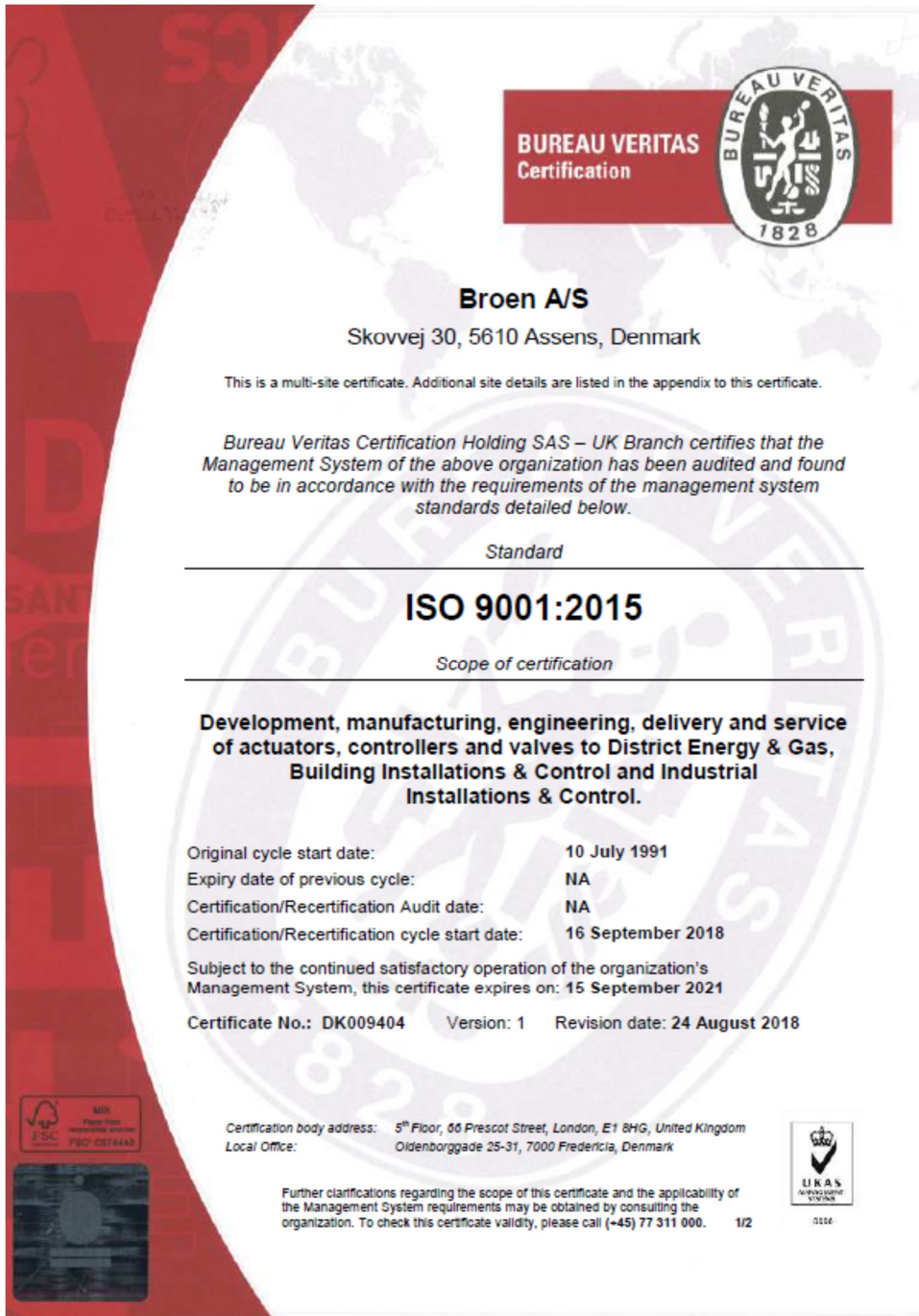
The BROEN Quality Management System

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



API 6D certificate



2018-151 | Digital

Certificate of Authority to use the Official API Monogram
License Number: 6D-0378 **ORIGINAL**

The American Petroleum Institute hereby grants to

BROEN POLAND SP. Z O.O.
Ul. Wojska Polskiego 4
Rogozno
Republic of Poland

the right to use the Official API Monogram® on manufactured products under the conditions in the official publications of the American Petroleum Institute entitled API Spec Q1® and **API-6D** and in accordance with the provisions of the License Agreement.


In all cases where the Official API Monogram is applied, the API Monogram shall be used in conjunction with this certificate number: **6D-0378**

The American Petroleum Institute reserves the right to revoke this authorization to use the Official API Monogram for any reason satisfactory to the Board of Directors of the American Petroleum Institute.

The scope of this license includes the following: Ball Valves

QMS Exclusions: No Exclusions Identified as Applicable

Effective Date: APRIL 23, 2019
Expiration Date: APRIL 23, 2022


Vice President of Global Industry Services

To verify the authenticity of this license, go to www.api.org/compositelist.

III. ENGINEERING DETAILS

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Valve Data Sheet

Specifications Required: API-6D latest edition; MSS-SP-72; DOT 192 title 49; DOT 192-145

Valve Size: ¾ inch – 36 inch

Port: Full Port

Traceability: all valves with individual Serial Numbers

Service: Natural Gas Distribution and Compliance Pipeline, Bypass lines, Hot Tapping for Natural Gas Service. Transmission Service

Flow direction: fully bi-directional

Location: Above Ground and Below grades for direct burial.

Maximum Operating Pressure: 285 PSI (ANSI 150), 740 PSI (ANSI 300), 1480 PSI (ANSI 600)

Maximum Field Test Pressures: (see API-6D Paragraph 3): 1.5 times MAOP with valve in Fully Open position, 1.1 times MAOP with valve in full closed position.

Pressure Class: ANSI 150, ANSI 300 and ANSI 600

Maximum Service Temperature: 212° F (100° C)

Minimum Service Temperature: -40° F (-40° C)

Service: Natural Gas or Propane

Type of Valve: Double Block and Bleed with Emergency Sealant Injection Ports Valve, Trunnion Mounted, Lubricated, Quarter Turn with multi-turn Gear Operator.

Torque information, Pressure Loss information (Cv), weight data, and any other additional technical information is either included on the drawing for each individual valve or will be provided upon request.

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Valve components and materials**Body**

The BALLOMAX® API Certified Ball Valves can be manufactured in two versions:

- all welded construction, designed and built to attain maximum strength and minimum weight, minimizing the potential leak paths.
- Three piece bolted body.

The body is manufactured of either heavy wall seamed carbon steel pipe, Cast Steel Pipe, A-105 Forged Steel, or A350 LF2 material depending on Pressure, Media, and or Temperature. The valve is suitable for both above ground and direct buried applications.

Ball

The ball is full port (API 6D), made of High strength Carbon Steel A-350 LF2, ground to specific tolerances, with Electroless Nickel Plating (ENP). Additional special materials available upon request.

Trunnion mounted ball design

All BROEN Ballomax API 6D certified valves are all Trunnion Mounted type. The sealing principle is that the trunnion supported ball surface mates with the piston spring loaded HNBR seats on both sides of the Ball creating a double blocking design. This is especially desirable in High Differential pressure applications to eliminate high torque in the operations of the valve. BALLOMAX Standard Trunnion Mounted valves come equipped with a Bleed / Drain port to vent the body of the valve in 100% open or closed position.

Vent and Drain

A vent port on the upper quadrant and drain port in the lower quadrant are provided to be able to test the integrity of sealing and drain the valve body, in the full open or full closed position, or to remove any external materials from the seats area.

Seat

We offer two seat designs:

- SPE, single piston effect, with self-relieving seats: an over-pressure in the body cavity is release across the seat on the side of lower pressure (typically downstream).
- DPE, double piston effect: an over-pressure in the body cavity is trapped and not released. The installation of an external relief system is recommended.

Both seats are PMSS (Primary Metal and Secondary Soft Seats), where the primary metal seats protects the soft materials from external materials in the fluid, thus ensuring extended valve lifespan. The soft HNBR o-ring ensures bubble tight operations, even at cold temperature (-40°F/-40°C).

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Metal-to-metal seats are available upon request.

All seats are spring loaded.

Fire safe design is ensured by a graphite ring and the metal to metal primary seal.

Lubrication system

The BALLOMAX API 6D certified valves are provided with Emergency Sealant Injection ports.

Our standard design includes an internal check valve located after the Injection fittings (both threaded into the body) to ensure no leakage, even after removal of the Injection fitting.

The lubrication system is designed to accomplish three goals:

- I. Flushing: remove any external materials from the interstice between the ball and the seat;
- II. Lubrication: reduce the friction between ball and seat, minimizing the torque required to operate the valve;
- III. Emergency sealing: allow for sealants to be pumped into the seating area to stop leaks.

End connections

Weld Ends are in A105, S355 J2, or A350 LF2 machined per ANSIB16.25, machined to industry standards wall thicknesses. At the customer's request the ends can be counter bored to match piping.

Flanged Ends are in ASTM A 105 Forged Steel per ANSI B16.5.

Anti-static device

All BROEN Ballomax API 6D valves come with an anti-static device on their stem in order to avoid sparks and prevent problems when handling flammable fluid, in compliance with API 6D requirements.

Stem material and sealing design

The Stem is made of X20Cr13/AISI 420 High strength steel, Electroless Nickel Plating (ENP).

The Stem sealing is provided by a four level barrier, using two Upper HNBR o-rings, and a Lower FKM (Viton®) o-ring. The stem sealing design also includes a PTFE stem packing.

The stem assembly is designed including an **anti-blow out system** in compliance with API 6D requirements.

ISO mounting plate

All Standard Trunnion Mounted Valves require Gear Operators or Actuators. We offer both, Horizontal Gear or Vertical Gear Operators properly sized to optimize operations. Full range of actuators available, upon request.

Paint

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Standard paint is a Non-Toxic water based prime. BROEN can provide specialty coatings in house such as 3M 323, or Coal Tar Epoxy. Contact us for any special coating requirement you may have.

Gear Operators

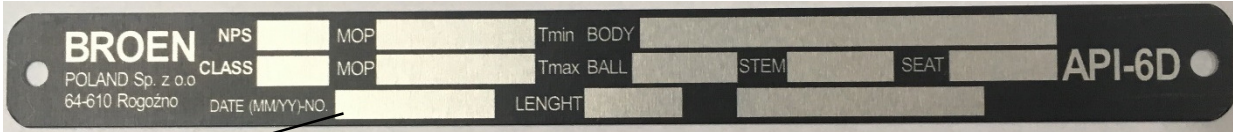
Valves can be supplied with Horizontal Gear with Hand-wheel or Vertical Gear, both with 2" Ductile Iron nut. All gears are sized to optimize performance. Suitable for above ground or Direct Burial.

Actuators

Valves can be supplied with any type of actuator. Please provide all relevant actuator specs and controls requirements when requesting an automated valve package.

The API 6D nameplate

Every BALLOMAX API Certified valve has a permanently affixed API licensed Label per API 6D code. It provides you with critical information permanently stamped to insure no misapplication of correct valve pressure rating is used for the application that it is intended:



This is the unique Serial Number used by BROEN to ensure valve identification and traceability

A separate nameplate includes the API monogram, the unique API number assigned to BROEN and the manufacturing date:




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API 6D Certified Trunnion Mounted Ball Valves - Technical Manual

Extract from Catalogue


WELD X WELD – 740 PSI – ANSI 300



Size	Catalog number	Port	Length	Wall	Weight
2"	2BMW740BFPTRQ114S	2.01	8.50	0.154	47
3"	3BMW740BFPTRQ114S	2.99	11.14	0.216	78
4"	4BMW740BFPTRQ1HGS	4.02	12.00	0.219	150
6"	6BMW740BFPTRQ1HGS	5.98	17.99	0.312	424
8"	8BMW740BFPTRQ1HGS	8.00	20.51	0.322	466
10"	10BMW740BFPTRQ1HGS	10.00	22.00	0.366	640
12"	12BMW740BFPTRQ1HGS	12.00	25.00	0.375	858
16"	16BMW740BFPTRQ1HGS	15.00	33.00	0.375	2,546
18"	18BMW740BFPTRQ1HGS	17.00	36.00	0.375	3,483
20"	20BMW740BFPTRQ1HGS	19.00	39.00	0.375	4,299
24"	24BMW740BFPTRQ1HGS	23.00	45.00	0.375	6,283

Shown with optional vertical gear operator.

FLANGE X FLANGE – 740 PSI – ANSI 300



Size	Catalog number	Port	Length	ANSI	Weight
2"	2BMF740BFPTRQ114S	2.01	8.50	300	*
3"	3BMF740BFPTRQ114S	2.99	9.50	300	*
4"	4BMF740BFPTRQ1HGS	4.02	12.00	300	*
6"	6BMF740BFPTRQ1HGS	5.98	15.86	300	*
8"	8BMF740BFPTRQ1HGS	8.00	19.76	300	*
10"	10BMF740BFPTRQ1HGS	10.00	22.36	300	*
12"	12BMF740BFPTRQ1HGS	12.00	25.50	300	*
16"	16BMF 740BFPTRQ1HGS	15.00	33.00	300	2,546
18"	18BMF740BFPTRQ1HGS	17.00	36.00	300	3,483
20"	20BMF740BFPTRQ1HGS	19.00	39.00	300	4,299
24"	24BMF740BFPTRQ1HGS	23.00	45.00	300	6,283

Shown with standard horizontal gear operator.

*Note: Information based on request

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SOCKET WELD – 1480 PSI – ANSI 600

Size	Catalog number	Port	Length	Wall	Weight
3/4"	3/4BMSW1480BFPTRQ101S				

No photo available – call for illustration.

WELD X WELD – 1480 PSI – ANSI 600

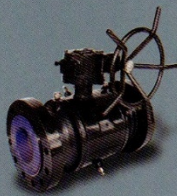
Size	Catalog number	Port	Length	Wall	Weight
3/4"	3/4BMW1480BFPTRQ101S				
1"	1BMW1480BFPTRQ114S	1.00	8.50	0.174	31
2"	2BMW1480BFPTRQ114S	2.01	11.50	0.214	51
3"	3BMW1480BFPTRQ114S	2.99	14.00	0.250	109
4"	4BMW1480BFPTRQ1HGS	4.02	17.00	0.237	212
6"	6BMW1480BFPTRQ1HGS	5.98	22.00	0.312	532
8"	8BMW1480BFPTRQ1HGS	8.00	25.98	0.322	551
10"	10BMW1480BFPTRQ1HGS	10.00	30.98	0.365	761
12"	12BMW1480BFPTRQ1HGS	12.00	33.00	0.375	1.169
14"	14BMW1480BFPTRQ1HGS	13.00	35.00	0.375	2.535
16"	16BMW1480BFPTRQ1HGS	15.00	39.00	0.375	2.998
18"	18BMW1480BFPTRQ1HGS	17.00	43.00	0.375	4.674
20"	20BMW1480BFPTRQ1HGS	19.00	47.00	0.375	5.843
24"	24BMW1480BFPTRQ1HGS	23.00	55.00	0.375	8.267
30"	30BMW1480BFPTRQ1HGS	29.00	66.30	0.375	13.220
36"	36BMW1480BFPTRQ1HGS	34.50	82.00	0.375	22.046



Shown with optional vertical gear operator.

FLANGE X FLANGE – 1480 PSI – ANSI 600

Size	Catalog number	Port	Length	ANSI	Weight
2"	2BMF1480BFPTRQ114S	2.01	11.50	600	*
3"	3BMF1480BFPTRQ114S	2.99	14.00	600	*
4"	4BMF1480BFPTRQ1HGS	4.02	17.00	600	*
6"	6BMF1480BFPTRQ1HGS	5.98	22.00	600	*
8"	8BMF1480BFPTRQ1HGS	8.00	25.98	600	*
10"	10BMF1480BFPTRQ1HGS	10.00	30.98	600	*
12"	12BMF1480BFPTRQ1HGS	12.00	33.00	600	*
14"	14BMF1480BFPTRQ1HGS	13.00	35.00	600	2.535
16"	16BMF1480BFPTRQ1HGS	15.00	39.00	600	2.998
18"	18BMF1480BFPTRQ1HGS	17.00	43.00	600	4.674
20"	20BMF1480BFPTRQ1HGS	19.00	47.00	600	5.843
24"	24BMF1480BFPTRQ1HGS	23.00	55.00	600	8.267
30"	30BMF1480BFPTRQ1HGS	29.00	65.00	600	13.220
36"	36BMF1480BFPTRQ1HGS	34.50	82.00	600	22.046

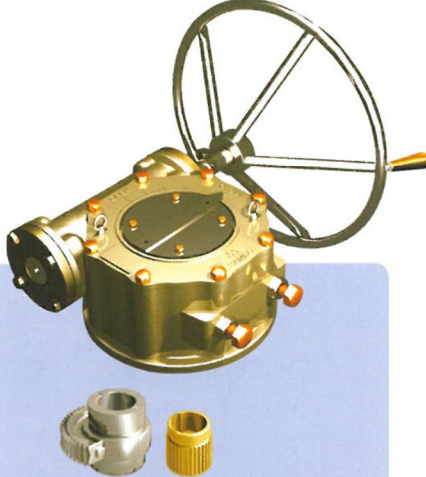


Shown with standard horizontal gear operator.

*Note: Information based on request

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HORIZONTAL INPUT

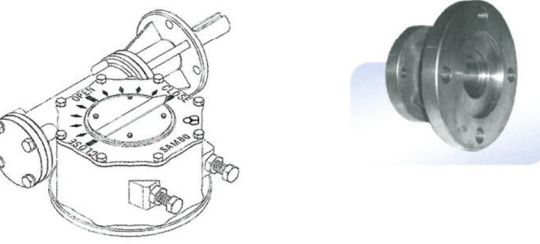


FEATURE

Bushing Type
Splines permit accurate alignment of valve stem key

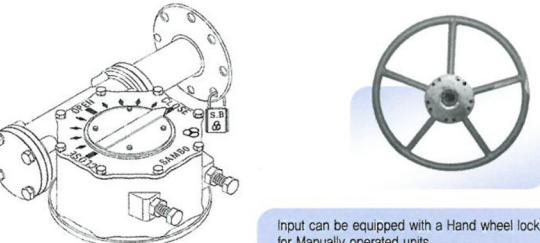
- All mounting bases conform to ISO 5210/1 Standards
- All castings are Ductile iron, Class 65-45-12
Excellent strength and impact resistance
- Worm Gear material is available in two options
 - Ductile iron, Class 80-55-06
 - Aluminum bronze, B148-C95800
- Worm is 4140 Heat Treated Alloy Steel
- Removable splined Bushing to permit accurate positioning between gear drive and valve stem
- Options include hand wheels, chain wheels, etc

M. O. V option



Worm Gear can be provided with Motor actuator Input flanges to accept standard ISO Mounting Base

Locking Device option



Input can be equipped with a Hand wheel locking Device for Manually operated units

SELECTION CHART FOR MANUAL OPERATORS

MODEL	SIZE	GEAR RATIO	MAX. Stem Acceptance	Mounting option & Standard	MAX. Torque Capacity		WEIGHT
					N · m	Fl · lbf	
SBWG-BF		32 : 1	20 (6x6)	F-07	310	229	4
SBWG-0		36 : 1	28 (6x7)	F-07, F-10	600	443	6
SBWG-00		38 : 1	36 (10x8)	F-10, F-12	1000	738	9
SBWG-01		42 : 1	46 (14x9)	F-12, F-14	1550	1143	13
SBWG-02		48 : 1	60 (18x11)	F-14, F-16	2400	1770	21
SBWG-03		52 : 1	75 (20x12)	F-16, (F-20)	4300	3172	30
SBWG-04		56 : 1	95 (25x14)	(F-20), F-25	7700	5680	62
SBWG-05		60 : 1	115 (32x18)	F-25, F-30	14800	10916	88
SBWG-06		64 : 1	140 (38x20)	F-30, F-35	26700	19693	162
SBWG-07		68 : 1	180 (45x25)	F-35, F-40	51100	37690	268
SBWG-08		58 : 1	225 (50x28)	F-40, F-48	106000	78182	510
SBWG-09		62 : 1	280 (63x32)	F-48, F-60	167000	123173	930
SBWG-10		64 : 1	320 (70x36)	F-60	250000	184390	1515
SBWG-11		68 : 1	360 (80x40)	F-60	370000	272897	2145
SBWG-12		72 : 1	400 (90x45)	F-60, (F-80)	540000	398283	3130

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SINGLE REDUCTION

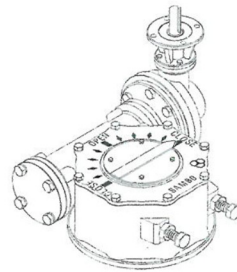


■ FEATURE

- All mounting bases conform to ISO 5210/1 Standards
- All castings are Ductile iron, Class 65-45-12
Excellent strength and impact resistance
- Worm Gear material is available in two options
 - Ductile iron, Class 80-55-06
 - Aluminum bronze, B148-C95800
- Worm is 4140 Heat Treated Alloy Steel
- Removable Splined Bushing to permit accurate positioning between gear drive and valve stem
- Options include hand wheels, chain wheels, etc

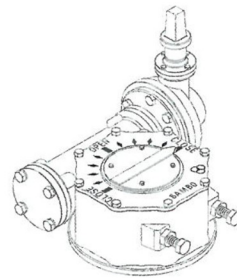
Bushing Type
Splines permit accurate alignment of valve stem key

M. O. V option



Worm Gear can be provided with Motor actuator input flanges to accept standard ISO Mounting Base

Square Nut option



Should state that Optional Square nut can be provided on input shaft

SELECTION CHART FOR MANUAL OPERATORS

MODEL	SIZE	GEAR RATIO	MAX. Stem Acceptance	Mounting option & Standard	MAX. Torque Capacity		WEIGHT
					N • m	Ft lbf	
SBWG-00-2B		76 : 1	36 (10x8)	F-10, F-12	1000	738	15
SBWG-01-2B		84 : 1	46 (14x9)	F-12, F-14	1550	1143	19
SBWG-02-2B		120 : 1	60 (18x11)	F-14, F-16	2400	1770	29
SBWG-03-2B		130 : 1	75 (20x12)	F-16, (F-20)	4300	3172	38
SBWG-04-2B		182 : 1	95 (25x14)	(F-20), F-25	7700	5680	78
SBWG-05-2B		195 : 1	115 (32x18)	F-25, F-30	14800	10916	104
SBWG-06-2B		256 : 1	140 (36x20)	F-30, F-35	26700	19693	195
SBWG-07-2B		272 : 1	180 (45x25)	F-35, F-40	51100	37690	301
SBWG-08-2B		319 : 1	225 (50x28)	F-40, F-48	106000	78182	598
SBWG-09-2B		372 : 1	280 (63x32)	F-48, F-60	167000	123173	1048
SBWG-10-2B		416 : 1	320 (70x36)	F-60	250000	184390	1693
SBWG-11-2B		442 : 1	360 (80x40)	F-60	370000	272897	2323
SBWG-12-2B		504 : 1	400 (90x45)	F-60, (F-80)	540000	398283	3397

IV. TESTING AND CODE COMPLIANCE

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Test Procedure according to API-6D, section 5, DIN 3230, section 3, and ISO 5208.

We hereby detail our test procedures according to API-6D, section 5 and DIN 3230, section 3, part BO, leak rate 1 and ISO 5208. **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" 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

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registered, and with any pressure loss the valve is rejected. The specified testing time is as follows:

Testing time up to 4": 2 minutes
Testing time 6" and larger: 5 Minutes

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

Air seat and stem test according to DIN3230 (ISO 5208)

1. The **BROEN BALLOMAX®** valve is placed in the testing bench.
2. The Valve is closed, and 80 PSI air is delivered to one end.
3. If there is any flow through the valve it will be measured and recorded.
4. The Stem is tested for possible leakage by means of a leak test solution.
5. Paragraph 2 and 3 are now repeated for the other end of the valve.
6. Any **BROEN BALLOMAX®** valve is rejected if any leakage is recorded.

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

Valve documentation and example of a test certificate

All BROEN API 6D 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			
BROEN, Inc.			
Customer: [customer name]		Order no.: [mm/dd/yyyy]	
Serial no.: [7 digits unique number]			
Test article:	Ball valve,	Welding - Welding	
Welding end:	Steel,	ASTM A105	ANSI B 36.10
Welding end:	Steel,	ASTM A105	ANSI B 36.10
Valve body:	Steel,	A106-B	API 5L-Gr. X52
Stem:	Stainless steel,	AISI 420	
Ball:	Carbon steel	A350LF2	with ENP
Seat:		HNBR	
Operations:	Gear operator	2" NUT	Vertical # of Turns: 43.5
Type:	API Ballomax	Welding - Welding	Quantity: 4
Size:	12"		
MOP:	740 psig		Drawing no.: 3/B300WW983 EXT
Technical requirements / Demand:			
Testing ball valve according to API specification 6D, section 11, 23rd Edition, April 2008			
Section 11.3, Hydrostatic Shell Test		Test Pressure (psig)	Shell test duration (minutes)
		1110	15
Section 11.4, Hydrostatic Seat Test		Test Pressure (psig)	Seat test duration (minutes)
		815	5
Supplementary test according to API 6D, Annex B, sec.3.			
Low-pressure gas seat test with air.		Test Pressure (psig)	Seat test duration (minutes)
Acceptable leakage: ISO 5208:1993 Rate A (No visible leakage)			
- B.3.2. Type I		10	5
- B.3.3. Type II		90	5
Label: API - 6D			
Houston [mm/dd/yyyy]		Inspector: Ken Porter	
BROEN, Inc. 27657 Commerce Oaks Dr Oak Ridge North, TX 77385		Telephone (713) 300-0480	

V. STANDARD VALVE PROCEDURES

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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.

You should always Store valves 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.

If the valves are stored for an extended time, we recommend to periodically (every 6months) flush, clean, lubricate and operate the valve, before re-storing it in fully open position.

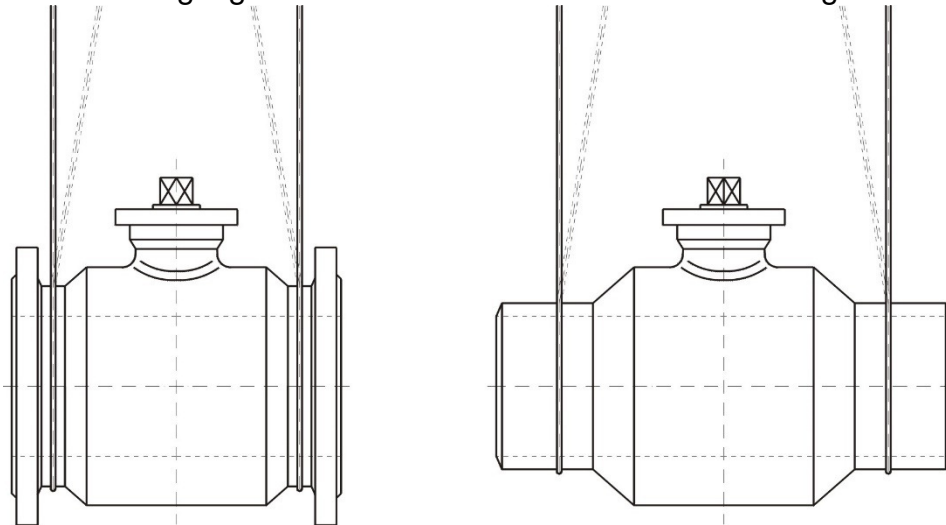
Valves are shipped in a durable environmentally-friendly packaging. Disposal of valve packaging is under responsibility of BROEN's customers.

Valve handling, transportation, and shipment

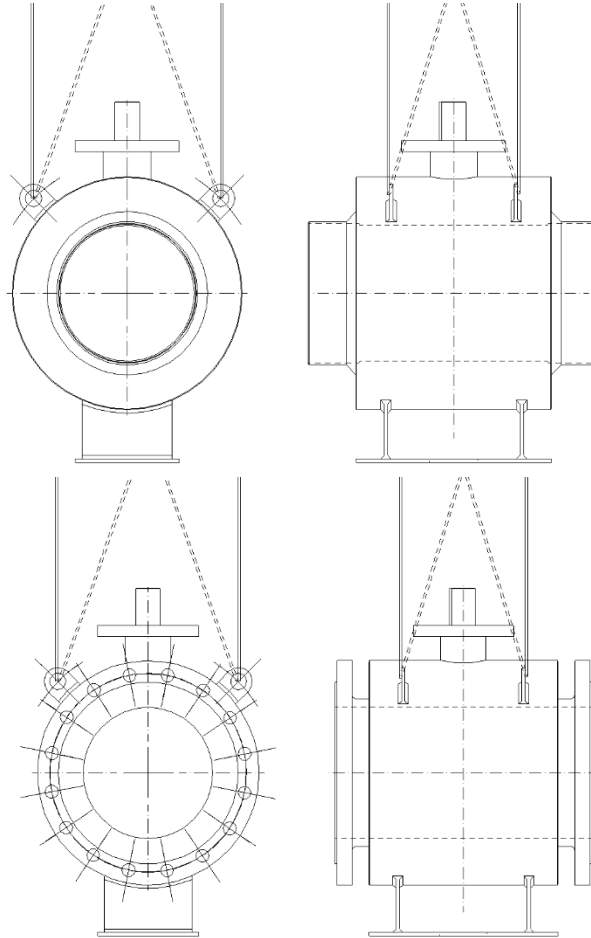
All BROEN BALLOMAX® Valves are to be shipped in the FULL OPEN position. Gear Operators are factory set and should not be removed or adjusted before or during construction without consulting a factory representative.

Valves are to be handled with extreme caution.

Valves without lifting lugs are to be lifted as shown in the following illustration:



Valves with lifting lugs are to be lifted as shown in the following illustrations:

BALLOMAX®
API 6D Certified Trunnion Mounted Ball Valves - Technical Manual**Standard installation procedures**

Keep the API Q1 Certified Ball Valve in the Fully OPEN position During Installation. The Fully 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 splatter or weld beads attaching and possibly scratching the ball.

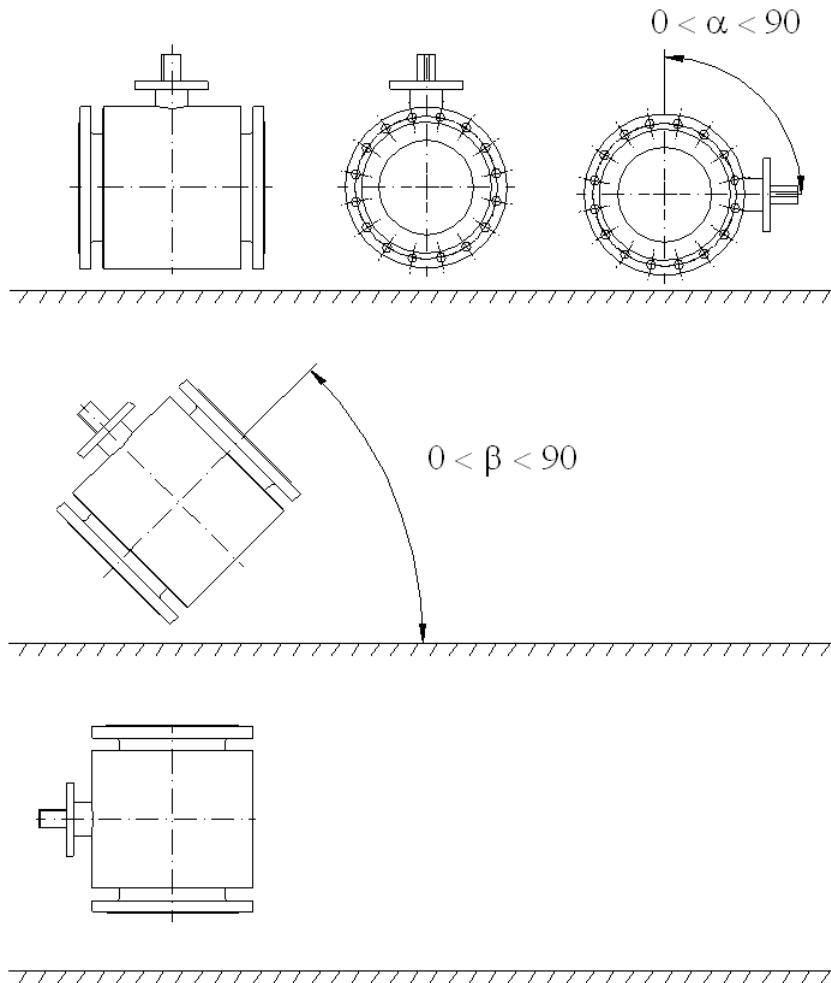
Do Not leave the Valve in any Partial Open or Closed Position. This allows for the edge of the ball to rest on the soft seat which may temporarily cause an indentation until it has time to cold flow back into proper position. It also exposes the seats to heat and potential weld splatter.

A closed Ball Valve leave open the surface of the Ball Valve that can be damaged by weld splatter. Especially important when welding in the vertical position.

Installation position: The API 6D Certified Ball Valve operates in any position, with either vertical or horizontal stem, as shown in the pictures below.

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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.

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 with out 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 splatter or weld beads in the sealing area

For valves with weld ends, please follow the proper WPS. Monitor the valve body temperature while welding, at a distance X from the welding point. Do not exceed 120°C (248°F).

Valve size	X [mm/inch]
Up to 4"	50/2
6" and above	100/4

On Gear Operated Valves it is advisable to fully cycle 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 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) Upon draining of the Pipeline, it is necessary to drain the valves using the drain in the bottom of the trunnion to remove all water from the cavity of the valve.
- 6) Note: if the valve has been left in the partial open position for an extended period, you need exercise the valve several times and leave the valve in the Full Open or Fully Closed position for the Soft Seat material to cold flow back into position for 100% shut off.

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- 7) 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 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 is dry and very cold, is 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.

Hot tapping

BALLOMAX® Standard Trunnion Mounted Weld X Flange Valves are Full Port Open Valves and are suitable for Hot Tapping Operations. Always Tap through the valve in the Fully open position. It is very important to remove all metal chips from the Tapping Operation prior to Closing the Valve. This is a soft seated valve and you will damage the seats with metal tapping chips.

With any Hot Tapping process, the valve must be in the OPEN position, and a blow down point down stream used to remove tapping chips. These valves cannot be throttled through and must not be used as a blow down valve. A sacrificial valve down stream and of suitable size to allow for proper blow down must be used.

We recommend you refer to the Tapping Equipment Manufacturers procedure for the Tapping operation and procedure.

Cautions:

- I. Always keep the valve in the fully open position to protect the seating area.
- II. Remove all metal chips from sealing area of valve prior to operating the valve to prevent damage to Ball and Seats.

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- III. Never use the newly installed valve for a blowdown valve. The valve should be in the fully open position before blowing down the line where metal chips may be present.

Valve operations

Your BROEN BALLOMAX® API 6D Certified Ball Valve is designed for On / Off service. The valve should never be used as a Throttling Valve or Blowdown Valve.

These valves are Gear Operated Valves 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 valve comes with a Gear Operator which 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® API Q1 Certified Valves are designed to be maintained and lubricated on a routine basis. The Valve requires lubricant to operate smoothly. After injecting lubricant, the valve must be operated to uniformly coat the surface of the ball. Venting the valve allows you to check for seat tightness. (See Recommended Valve Lubrication Procedure).

BROEN recommends **Sealweld Valve Cleaner Plus** for commissioning the valves. This will help to remove construction particles left from loose rust or welding procedures. For lubricant we recommend **Sealweld Equa Lube 80** for smooth operations. If necessary, **Sealweld 5050** or **Sealweld Total Lube #911** sealant for sealing leaking seats.

Recommended valve lubrication procedure

As it becomes necessary to maintenance your valve, the following items will be necessary to perform this task:

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- 10,000 PSI High Pressure Hydraulic Valve Lubrication Gun
- A recommend Valve Lubricant

BROEN recommends for newer valves that **Sealweld Valve Cleaner Plus** or equal be used for lubrication. If the valve is an older valve or used multiple times per year, and has more of a severe service nature, **Sealweld 7030** or equal would be recommended.

Note: There is a difference in Lubricating a valve and Sealing a Valve. A Valve Sealant should only be used in case Natural Gas is blowing by the Seat Seals, and 100% shut of is necessary. This normally means there is Seat Damage to the valve. Follow the instructions provided by the Lubrication Gun Manufacturer. Below are the basics:

STEP 1 Valve should be placed in the CLOSED position. If you cannot Close the valve because of disruption of service, you can lubricate the valve, but not as effectively. We recommend **Sealweld 5050** or **Sealweld Total Lube #911** Sealant to seal off leaking seats

STEP 2 The Valve will have 2 or 4 Big Button Head Lubrication Fittings on the Body. Your High-Pressure Lubrication Gun (depending on Brand) tells you to pump the lubricant into each fitting to approximately 4,000 PSI – 6,000 PSI and watch the gauge. For Newly installed valves this pressure will be significantly lower (inject the recommended amount of lubricant in the chart below. Refer to the Lubricant Manufacturers recommended pressures. At this point the valve is full. This procedure should be performed on both or all 4 fittings.

Note: If the valve has been lubricated before, we assume there is some lubricant in the valve. If the valve is completely void of lubricant the following amounts of lubricant are needed to replenish.

The amount of Cleaner, Lubricant or Sealant per valve is as follows:

4" Valve	2 ounces each side of valve
6" Valve	3 ounces each side of valve
8" Valve	4 ounces each side of valve
12" Valve	6 ounces each side of valve
16" Valve	8 ounces each side of valve
20" Valve	10 ounces each side of valve
24" Valve	12 ounces each side of valve
30" Valve	15 ounces each side of valve
36" Valve	20 ounces each side of valve

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STEP 3 This is the most important STEP. The Ball of the Valve should be rotated to the Open Position to evenly spread the lubricant over the surface of the Ball. If the valve is very dry or the line has a lot of rust scale. Rotating the ball multiple times may be necessary to obtain full shut off, and you must re-lubricate.

Note: If the Valve is dry and hard to turn at the start, you will notice quickly that the newly lubricated ball is easier to turn. As you rotate the ball you are using or replacing the missing lubricant. It is recommended that you re-lubricate the valve again after this initial procedure. This is regarded as Topping Off the reserve lubricant.

STEP 4 **For Valves with Stem Sealant Injectors. Only 1-2 pumps of the gun are required due to the small sealing area in the stem. This fitting should not be used unless there is a detectable Stem Leak!**

Troubleshooting

BROEN BALLOMAX API 6D Certified Valves are designed such that there are very few problems that can be experienced. If you do have issues, please call you Representative or our Office for assistance.

Few remarks:

- If the seats are SPE (self-relieving), allow for any over-pressure within the body cavity time to be released before checking for leaks.
- If the valve is not sealing, make sure that the valve is in fully closed position.
- If the torque to operate valve is high (especially if the valve was not operated for a long period), please flush and lubricate the valve using the lubrication ports and the proper fluids (see section on Recommended Valve Lubrication procedure).