DAFRAM

no bloc

DAFRAM S.p.A. Milano

VALVOLE A SFERA - BALL VALVES

Trunnion mounted ball valves

Trunnion mounted ball valves

to API 6D and BS 5351

Class 150 to 2500

(PN 20 to 420)

CE 1370

RINA QUACER ISO 9001 CERTIFICATO N. 4/89

P/T

INTRODUCTION

DAFRAM S.p.A., founded in 1956, was the first company to manufacture floating ball valves in Italy. The long experience gathered during its more than 50 years of activity ensures that DAFRAM are one of the most famous and competitive companies in the world.
DAFRAM's factory is located in Urbisaglia (Macerata), the centre of Italy on an industrial complex covering 32.000 square meters, 12.000 of which are covered workshops. The factory consists of commercial, technical and engineering offices and of two extremely modern workshops the lastest of which, 4200 square meters, 10 meters high, completed in February 2008, allows the production, assembly, testing, sandblasting and painting of ball valves up to extremely large sizes and weights.
The Dafram design and production staff includes highly qualified engineers with a long experience in all technical standards and meeting customer's special requirements. Modern design methods are employed to analyse specific stresses and deformation limits of valve bodies and main valve components.
The manufacturing process is continually improved and changed using the most advanced manufacturing technologies such as: multi-function machining centers and several computer controlled lathes.
Special testing centers are used for testing of all products and are specifically for high pressure and large size TRUNNION MOUNTED valves. Both vertical and horizontal testing machines as well as equipment used to determine valve operating torques, testing valves at low and high temperatures, allow DAFRAM's prototypes to be checked and verified on site and 100% of production to be tested, checked and certified before leaving DAFRAM's plant.

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QUALITY SYSTEM

Dafram Quality Assurance System was certified for the first time in 1988 by RINA. Today the whole Dafram ball valves design, manufacturing and testing process is covered by a quality assurance program certified and continuously audited by accredited inspection authorities in accordance with:

- ISO 9001-2000 for Design, production and after sales of ball valves
- API Specification Q1
- Pressure equipment directive 97/23/EC (PED)
- SIL 3 for functional safety
- Directive 94/9/EC for equipments and protective systems intended for use in potentially Explosive atmospheres (ATEX)
- ISO 14001- 2004 for the environmental management system of the company organization

INSPECTION & TESTING

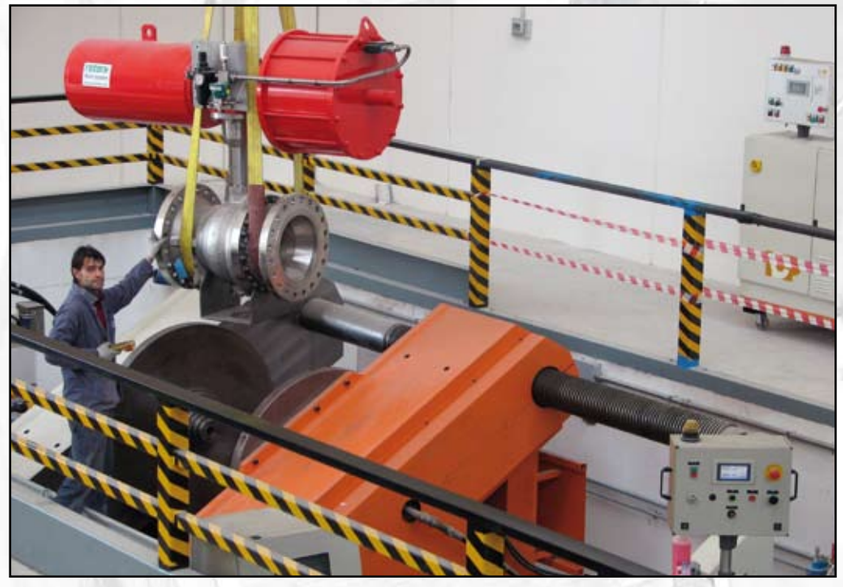
According to written procedures the whole manufacturing process of ball valves is continuously monitored by the following inspections and tests performed during:

- Customer evaluation and monitoring
- Checking of raw incoming materials certification
- Inspection of manufactured of valve components
- Pressure tests
- Functional tests
- Non destructive tests
- Final inspection of finished valves

STANDARD TESTS

- Pressure test

Every Dafram ball valve is pressure tested in accordance with API 6D requirements, including Double Block & Bleed and Double Piston Effect tests, where applicable.



SPECIAL TESTS

If specified by the purchaser , for different purposes, to verify valve properties and performance, and to verify material chemical composition or mechanical properties, or to qualify valves for special working conditions or extended working life, many different tests can be performed as detailed below:

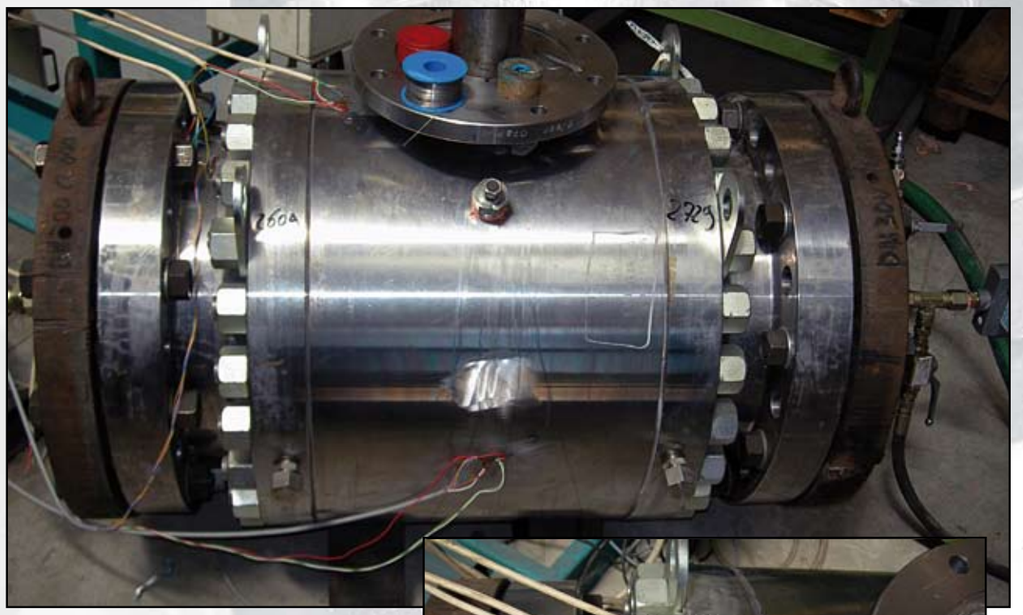
VALVE TESTS

Pressure test at high/low temperatures
Low & High pressure seat gas test in accordance with Annex C of API 6D
On customer request, pressure tests can be performed in accordance with other standards such as API 598 and EN 12266-1.
Anti static test
Torque test. Torque value is verified during this test as well.
Functional valve test or functional valve and actuator test.
Fugitive emission test to ISO 15848 or to other standards
Paint dry film thickness check
Insulating coat testing by holiday detector
Cavity relief test
Cryogenic test down to minus 196° C
Strain gauge test.

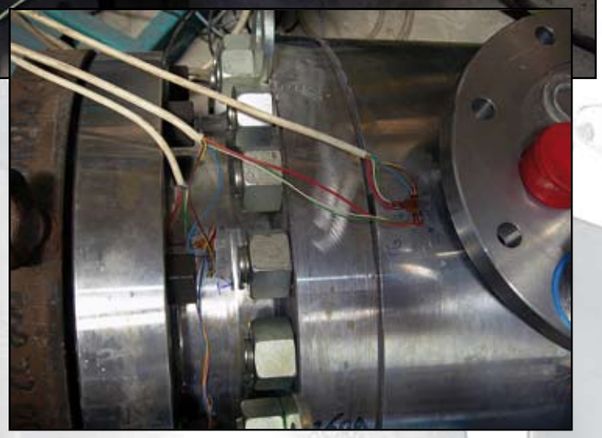
Torque test

Insulating coat testing

Cryogenic test



Strain gauge test



NON DESTRUCTIVE MATERIAL TESTS

All tests performed by qualified personnel, certified in accordance with EN 473 or SNT-TC-1A

Radiographic examination (RT), X-Ray or Gamma-ray

Magnetic particle examination (MT)

Ultrasonic examination (UT)

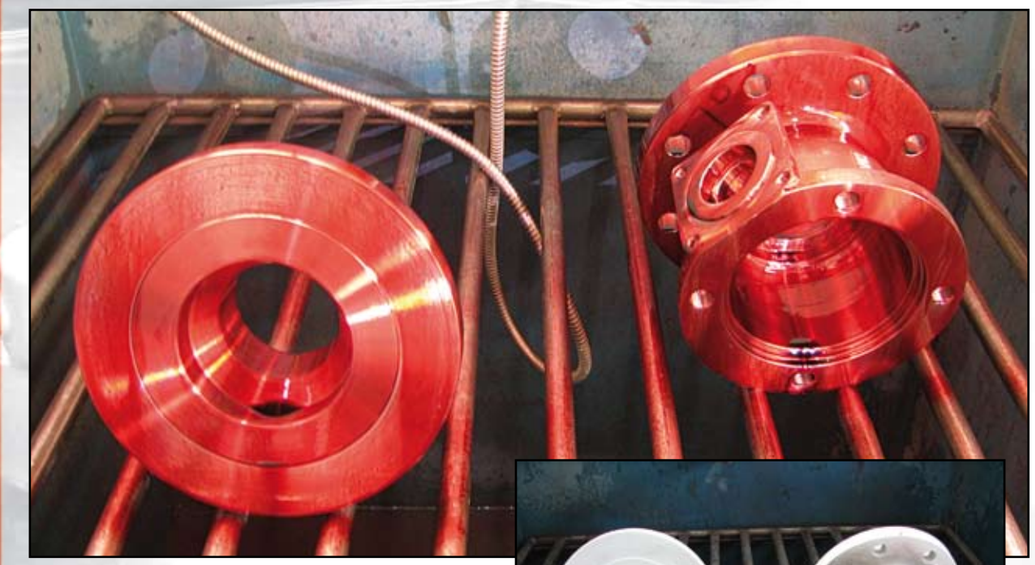
Dye penetrant examination (DP)

Positive material identification (PMI)

Hardness test

Magnetic particle examination (MT)

Magnetic particle examination (MT)



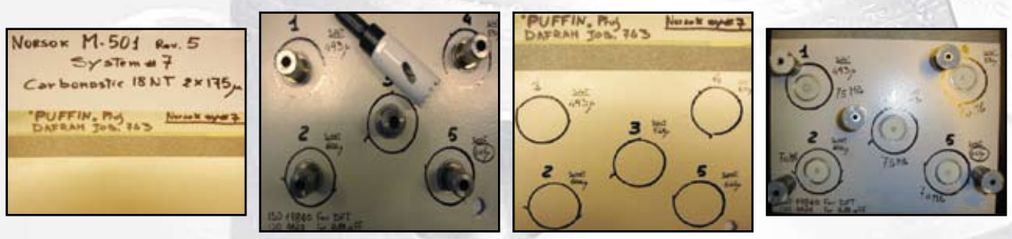
Dye penetrant examination (DP)

Positive material identification (PMI)

Positive material identification (PMI)

DESTRUCTIVE MATERIAL TESTS

Mechanical tests, hardness test and Impact test down to – 196°C
Chemical analysis of carbon, stainless steels, duplex, superduplex and high alloys using spectrometer
Corrosion tests (e.g. Pitting, SSCC, Huey, Crevice)
Micro examinations by electronic microscope up to x500 magnifications
Ferrite check to E562
Hydrogen-induced cracking test
Pull-off test for paint adhesion check



Pull-off test

QUALIFICATION TESTS

Fire tests according to BS5351 P.2, API 607, ISO 10497, API 6FA
Fugitive emission tests to ISO 15848
High pressure gas tests
High and low temperature tests
Delayed torque tests
Cycle operational and pressure tests

CERTIFICATION

Every Dafram valve, which is, identified by a unique Serial Number, will be delivered complete with an EN 10204 3.1 material certificate for pressure containing parts and 3.1 certificate of pressure tests. In addition, all other certificates for special valve tests, destructive or non destructive material certificates and qualification tests according to customer purchase order requirements will be included.
On customer request a third party inspector can witness every test and issue a certificate in accordance with EN 10201 3.2.

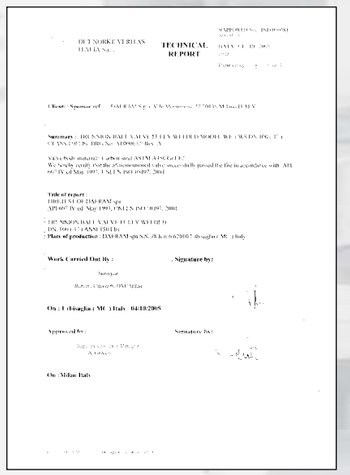
GENERAL INFORMATION

DESIGN

DAFRAM Trunnion mounted ball valves design, manufacturing and materials comply with the requirements of the 97/23/EC Directive (PED), API 6D and ASME VIII. Pressure/Temperature ratings and the flange design conforms to ASME B16.5 although seat ratings are set according to insert material. Wall thicknesses comply with ASME B16.34.
The ball and stem are independent to minimize the effect of the side thrust generated by the pressure acting on the ball.

FIRE SAFETY

The DAFRAM Trunnion mounted ball valves have been designed to meet the Fire Safe requirements of BS6755 P.2, API 607 and ISO 10497. Fire qualification tests have been witnessed by independent inspectors covering the whole production range.


BUREAU VERITAS

TECHNICAL REPORT


ATTESTATION

The undersigned G.GRASSELLI , Surveyor of Bureau Veritas Italia Central & Southern area, acting within the scope of the general conditions of the Industrial Branch of Bureau Veritas and upon request *

of Applicant DAFRAM S.p.A.
Manufacturer DAFRAM S.p.A. Viale Monte Nero , 17 20135 Milano (Italy)
Factory DAFRAM S.p.A. S.S. 78 Km 6 62010 Urbisaglia (MC) Italy
Order R1163/02/AM/lc

attests

that did attend from 02.12.2002 at DAFRAM workshop Urbisaglia (MC) Italy to the fire tests on the following ball valve selected by random

Description :

FIRE RESISTANT BALL VALVES
Type : 150 TM DN 150

In compliance with Standard ref. : BSI-BS 6755 Part 2- 1987 and amd. 6272-6712

After satisfactory results of the above mentioned tests and documentation review , we have no further comments.

The present Report is issued for the ends and purpose which is intended for.

Terni (TR) Italy on , 23.12.2002

BV Stamp :

Issued by
G.GRASSELLI

Inspection Center : BV. Naples
Central & Southern Area Italy

Diffusion
☒ Client

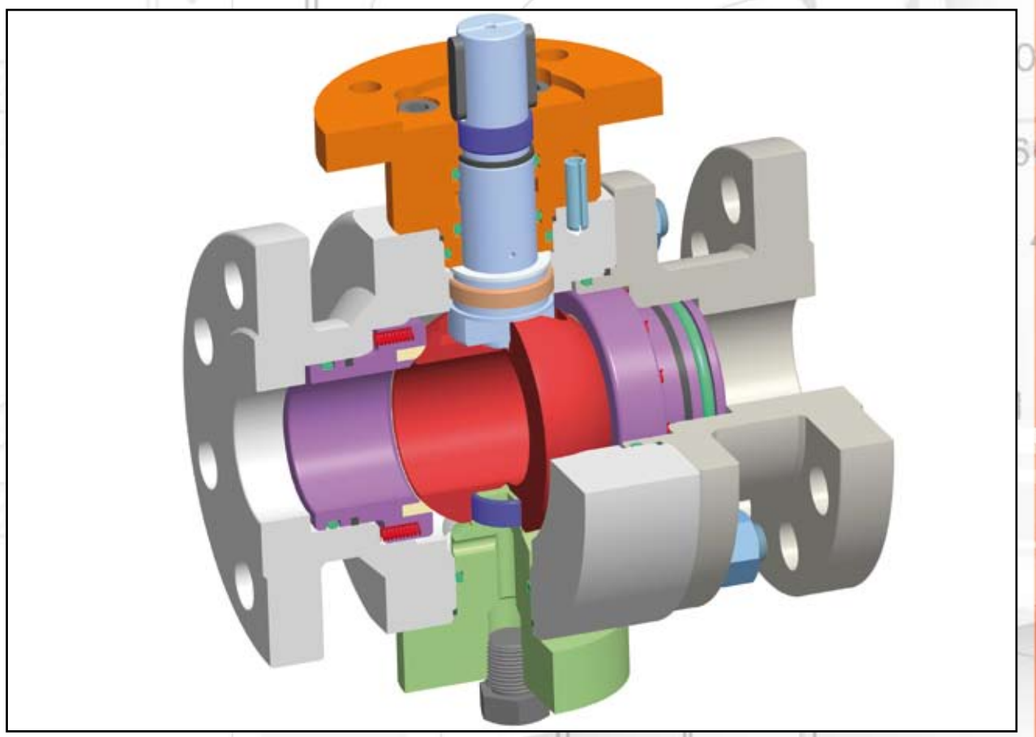
TECHNICAL DATA

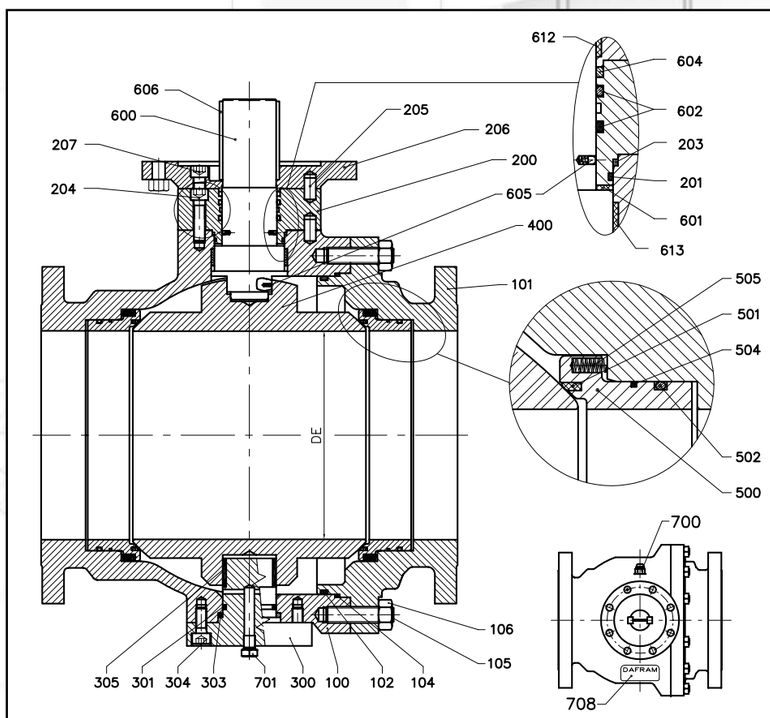
Sizes	: DN 25 to DN 1200, 1” to 48”, Full and Reduced bore
Pressure rating	: ANSI Class 150 to Class 2500
Temperature range	: -196°C to +500°C
Seat leakage rate	: ISO 5208 Rate D and A, ANSI/FCI 70-2 Class V and VI
End flange connection	: ASME B16.5 (1” to 24”), ASME B16.47 Series A (26” and above)
Buttweld ends	: ASME B16.25
Mechanical joints	: to customer requirements
Top Flange	: ISO 5211

PRODUCT RANGE

TYPE S:

Forged or cast body, Full or Reduced Bore, Pressure Class 150 to 2500. Two piece construction, pin trunnion, side-entry, asymmetric bolted body. Flanged or Butt-welding ends.



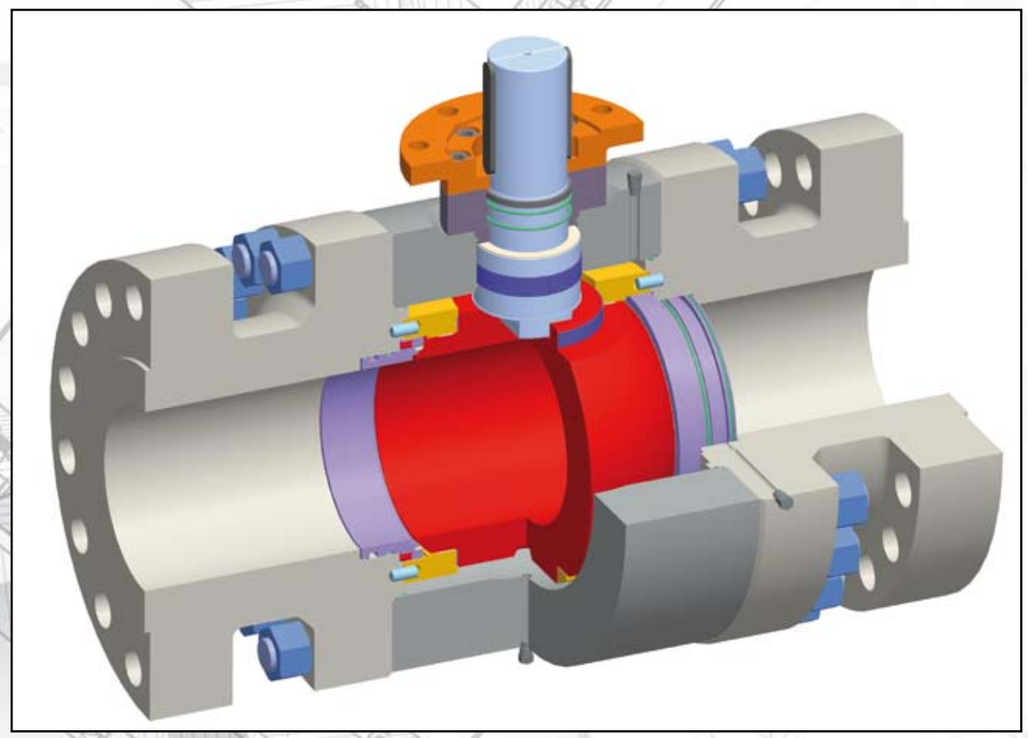


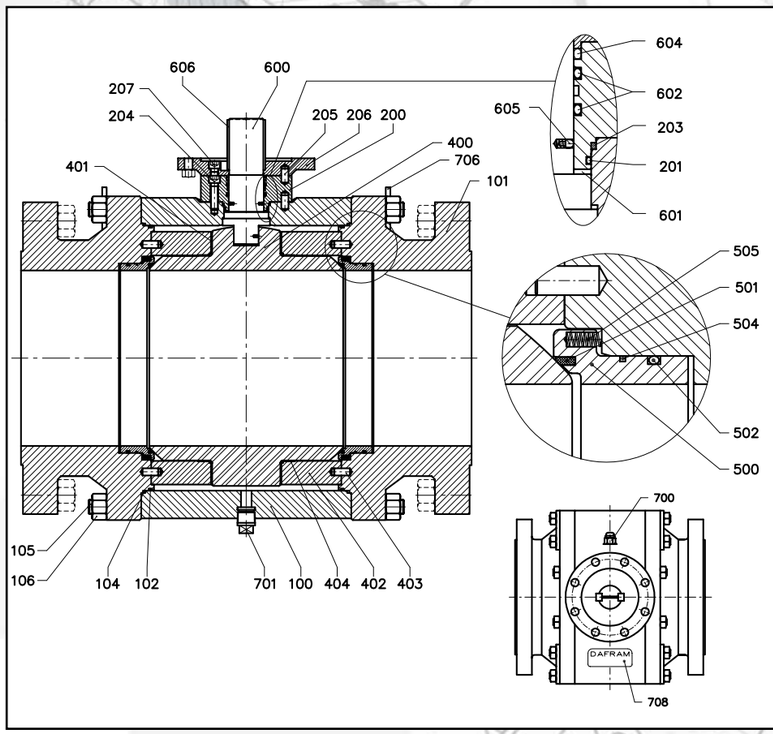
PART LIST	
708	IDENTIFICATION PLATE
701	DRAIN PLUG
700	BLEED VALVE
613	LOWER STEM BUSH
612	UPPER STEM BUSH
606	STEM KEY
605	ANTISTATIC DEVICE
604	UPPER STEM SEAL
602	STEM O-RING
601	LOWER STEM SEAL
600	STEM
505	COIL SPRINGS
504	FIRE SAFE SEAT SEAL
502	SEAT O-RING
501	SEAT INSERT
500	SEAT RING
400	BALL
305	TRUNNION BUSH
304	TRUNNION SCREWS
303	TRUNN. SECOND. GASKET
301	TRUNN. PRIMARY GASKET
300	TRUNNION
207	ADAPTER FLANGE SCREWS
206	ADAPTER FLANGE
205	TOP FLANGE PINS
204	TOP FLANGE SCREWS
203	TOP FLANGE SECONDARY GASKET
201	TOP FLANGE PRIMARY GASKET
200	TOP FLANGE
106	NUTS
105	BOLTS
104	SECONDARY BODY GASKET
102	PRIMARY BODY GASKET
101	BODY CONNECTOR
100	VALVE BODY

PRODUCT RANGE

TYPE P:

Forged body, Full or Reduced Bore, Pressure Class 150 to 2500. Three piece construction, plate trunnion, side-entry, symmetric bolted body. Flanged or Butt-welding ends.



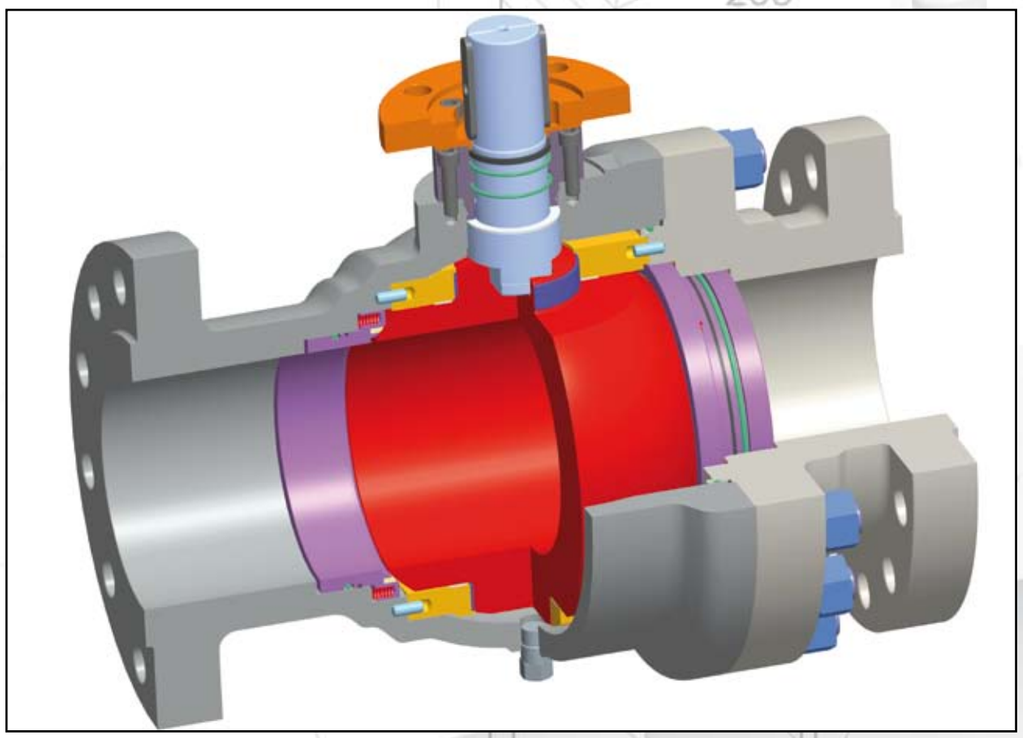


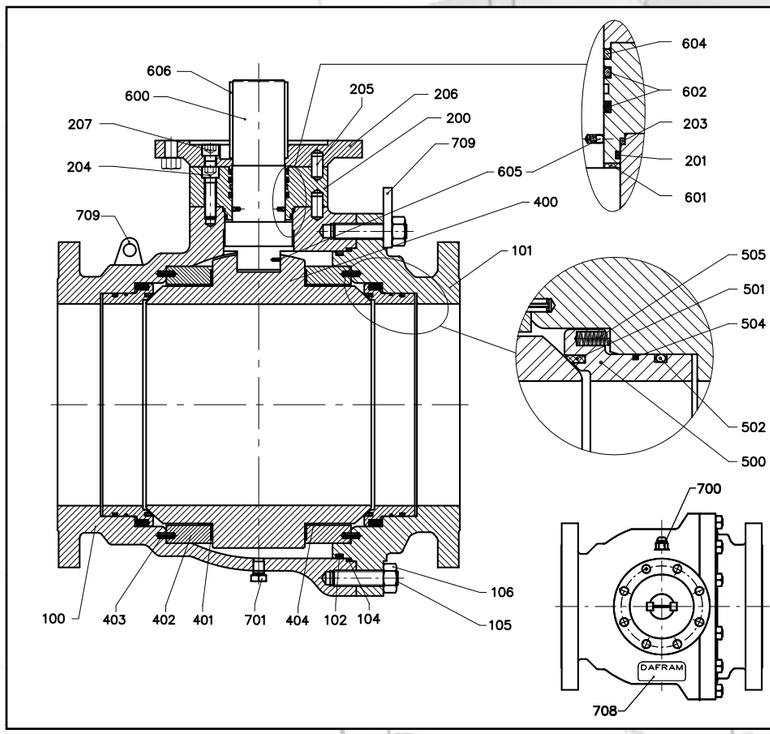
PART LIST	
708	IDENTIFICATION PLATE
706	EYE BOLT
701	DRAIN PLUG
700	BLEED VALVE
606	STEM KEY
605	ANTISTATIC DEVICE
604	UPPER STEM SEAL
602	STEM O-RING
601	LOWER STEM SEAL
600	STEM
505	COIL SPRINGS
504	FIRE-SAFE SEAT SEAL
502	SEAT O-RING
501	SEAT
500	SEAT RING
404	BALL ANTIFRICTION BEARING
403	BEARING RETAINER PIN
402	BEARING RETAINER
401	BALL BEARING
400	BALL
207	ADAPTER FLANGE SCREWS
206	ADAPTER FLANGE
205	TOP FLANGE PIN
204	TOP FLANGE SCREWS
203	TOP FLANGE SECONDARY GASKET
201	TOP FLANGE PRIMARY GASKET
200	TOP FLANGE
106	NUTS
105	BOLTS
104	SECONDARY BODY GASKET
102	PRIMARY BODY GASKET
101	BODY CONNECTOR
100	VALVE BODY

PRODUCT RANGE

TYPE D:

Cast body, Full or Reduced Bore, Pressure Class 150 to 2500. Two piece construction, plate trunnion, side-entry, asymmetric bolted body. Flanged or Butt-welding ends.



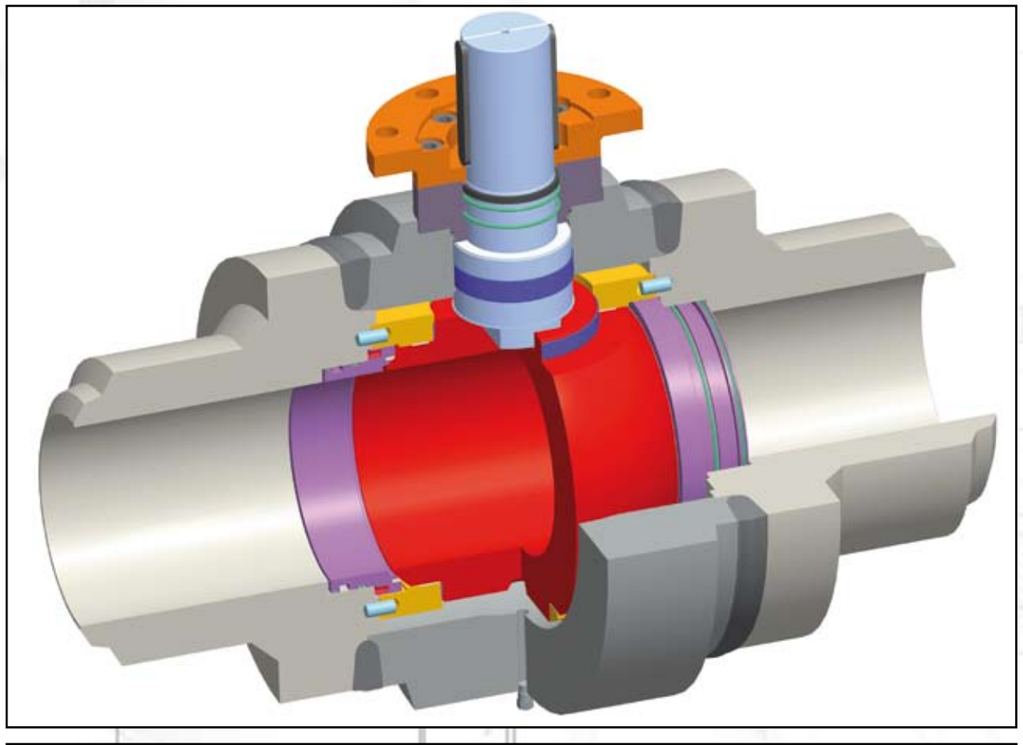


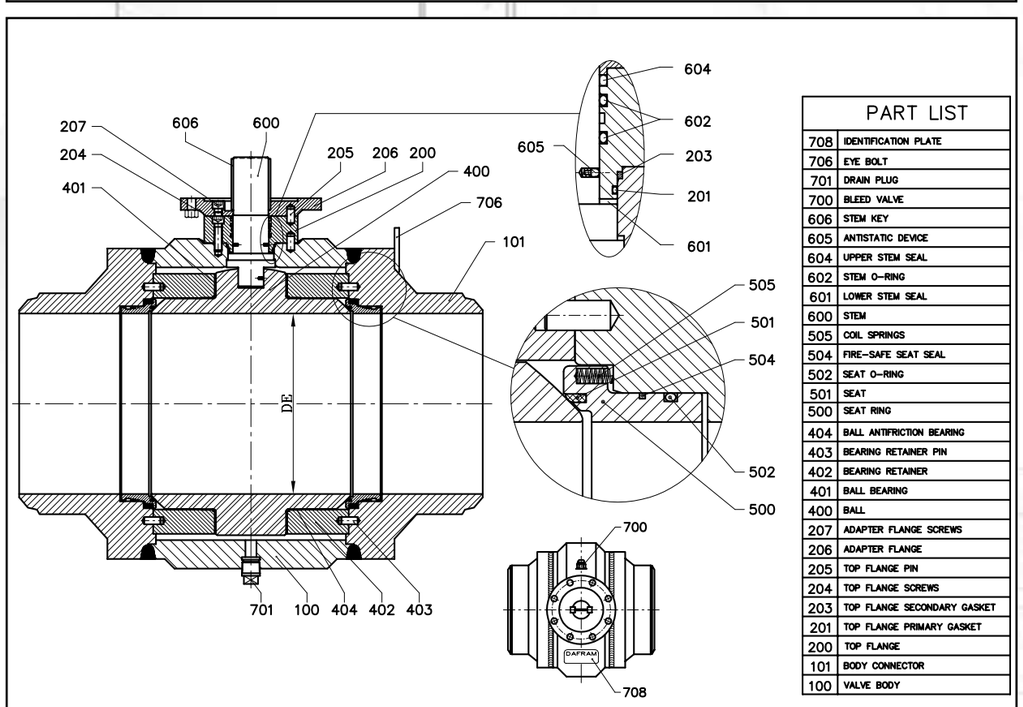
PART LIST	
709	EYE BOLT
708	IDENTIFICATION PLATE
701	DRAIN PLUG
700	BLEED VALVE
606	STEM KEY
605	ANTISTATIC DEVICE
604	UPPER STEM SEAL
602	STEM O-RING
601	LOWER STEM SEAL
600	STEM
505	COIL SPRINGS
504	FIRE SAFE SEAT SEAL
502	SEAT O-RING
501	SEAT INSERT
500	SEAT RING
404	BALL ANTIFRICTION BEARING
403	BEARING RETAINER PIN
402	BEARING RETAINER
401	BALL BEARING
400	BALL
207	ADAPTER FLANGE SCREWS
206	ADAPTER FLANGE
205	TOP FLANGE PINS
204	TOP FLANGE SCREWS
203	TOP FLANGE SECONDARY GASKET
201	TOP FLANGE PRIMARY GASKET
200	TOP FLANGE
106	NUTS
105	BOLTS
104	SECONDARY BODY GASKET
102	PRIMARY BODY GASKET
101	BODY CONNECTOR
100	VALVE BODY

PRODUCT RANGE

TYPE W:

Forged body, Full or Reduced Bore, Pressure Class 150 to 600. Three piece construction, plate trunnion, side-entry, symmetric fully welded body. Flanged or Butt-welding ends.





PART LIST	
708	IDENTIFICATION PLATE
706	EYE BOLT
701	DRAIN PLUG
700	BLEED VALVE
606	STEM KEY
605	ANTISTATIC DEVICE
604	UPPER STEM SEAL
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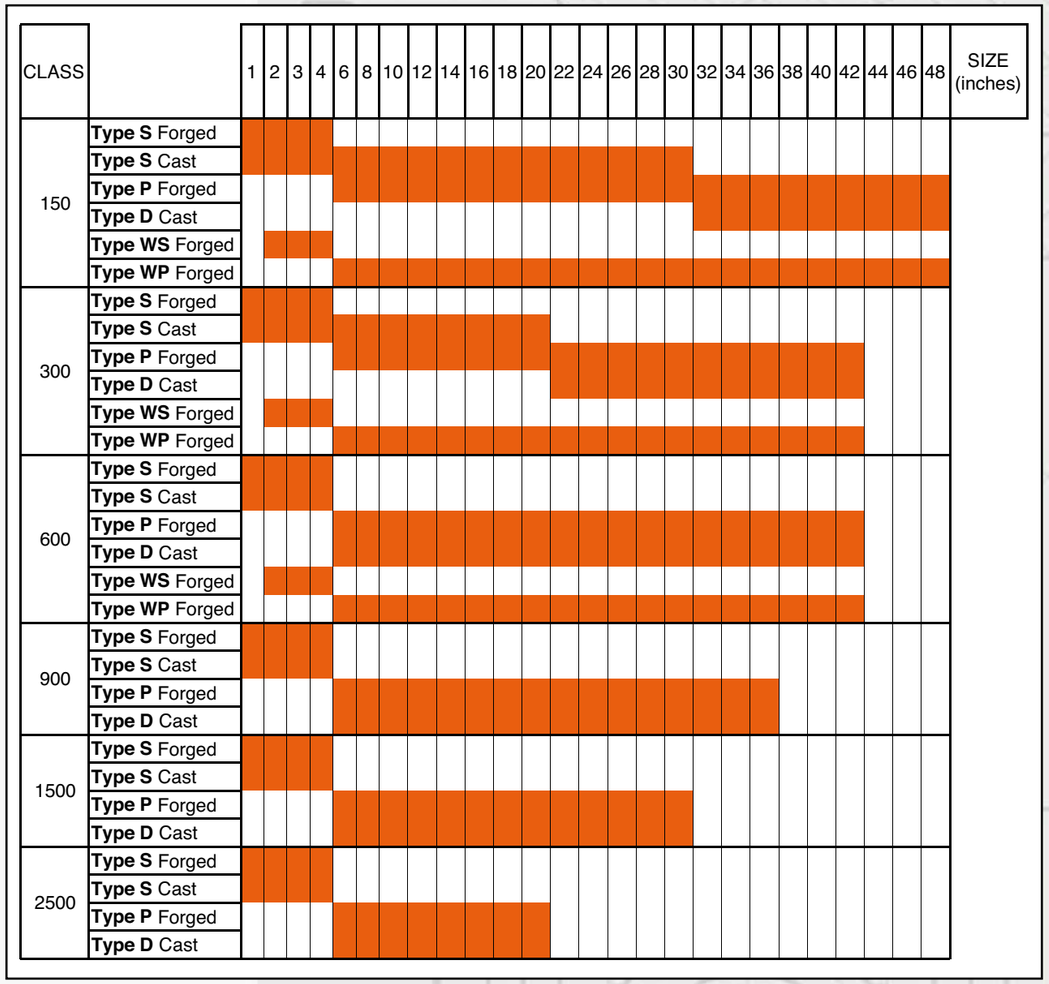
600	STEM
505	COIL SPRINGS
504	FIRE-SAFE SEAT SEAL
502	SEAT O-RING
501	SEAT
500	SEAT RING
404	BALL ANTIFRICTION BEARING
403	BEARING RETAINER PIN
402	BEARING RETAINER
401	BALL BEARING
400	BALL
207	ADAPTER FLANGE SCREWS
206	ADAPTER FLANGE
205	TOP FLANGE PIN
204	TOP FLANGE SCREWS
203	TOP FLANGE SECONDARY GASKET
201	TOP FLANGE PRIMARY GASKET
200	TOP FLANGE
101	BODY CONNECTOR
100	VALVE BODY

PRODUCT RANGE



CONSTRUCTION / STANDARD FEATURES

BODY

COSTRUCTION. Two or three piece bolted construction designed for maximum rigidity against pipeline forces. Bolted construction allows easy service and on site maintenance.
BODY SEALING. A primary positive sealing action of O-rings and a secondary fire-proof graphite gasket assure no leakage in all static body joints
PRESSURE RELIEF (API 6D, 6.8). All standard trunnion ball valves shall be provided with self relieving seats, allowing automatic body cavity relief exceeding 1,33 times the valve pressure rating at 38°C.
DRAIN SYSTEM. All Dafram trunnion mounted ball valves have a drilled and threaded drain connection as per API 6D.
BLEED VALVE. All Dafram trunnion mounted ball valves will be fitted with a threaded vent anti-blow-out valve as per API 6D.
VALVE ENDS (API 6D, 6.7). Standard end flanges shall be furnished in accordance with ASME B16.5 for sizes up to and including DN 600 (NPS 24), except MSS SP-44 for DN 550 (NPS 22) and ASME B16.47 Series A for DN 650 (NPS 26) and larger sizes
Standard welding ends shall conform to ASME B31.8 or ASME B31.8 and ASME B16.25

BALL

The ball is fixed and the two spring loaded seat rings are floating, free to move along the valve axis, always in contact with the ball to provide an effective tight seal also at low differential pressures.
BALL POSITION AND POSITION INDICATORS. Proper position stops assure fully open and fully closed position of the ball. Valves fitted with manual or powered actuators shall be furnished with position stops adjusted in the factory. Wrenches or gear and actuator indicators shall indicate the ball position. Stems have proper provisions for the verification of open and close alignment with the wrench, gear or actuator removed.
LOW FRICTION BUSHING Side load due to line pressure acting on the ball is supported by special dry maintenance free bearings

SEATS, SEAT INSERTS & SEAT SEALINGS

FLOATING SEAT RINGS Independent floating pressure loaded seat rings give a positive tightness of the valve. The action of the springs always pushes always the upstream seat ring in contact with the ball to provide an effective tight seal especially at low differential pressures.
SELF RELIEVING DESIGN According to API 6D definitions, the standard design for all DAFRAM trunnion mounted ball valves are bi-directional, twin-seat (with two seats, both seats uni-directional) valves. This means valves designed for blocking the fluid in both directions, with two SELF RELIEVING seats, each sealing in one direction (from the valve ends to the valve body cavity) are able to relieve the body cavity overpressure generally downstream.
SEAT INSERTS. Nylon seat inserts are used as standard in the Dafram ball valves for general services for service temperatures of -10 to + 120°C.

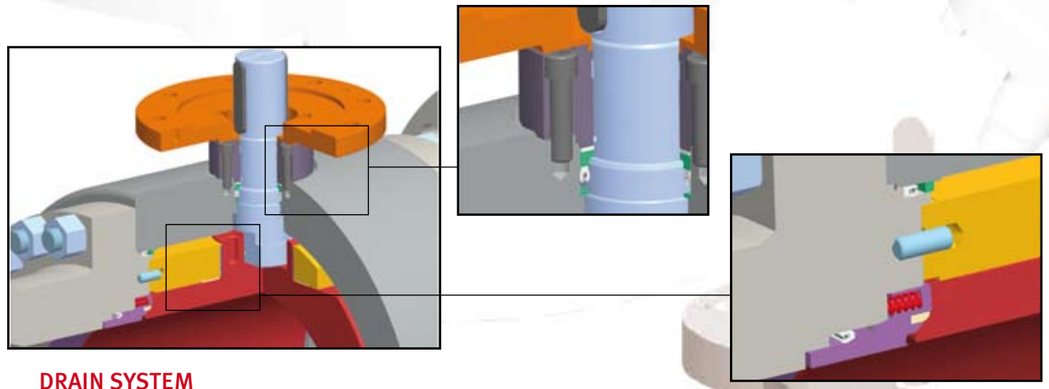
STEM & STEM SEALINGS

SEALINGS. Strict machining tolerances, accurate surface finish, and the primary positive sealing action of two O-rings and a secondary fire-proof graphite gasket assure zero leakage of the stem seals
STEM RETENTION (API 6D, 6.18) All valves have been designed with an anti-blow-out stem to prevent the ejection by internal pressure when the stem retainer has been removed. The stem design does not preclude replacement of damaged stem seals.
ANTI-STATIC DEVICE (API 6D, 6.20) In all DAFRAM ball valves an anti-static spring loaded device assures electric continuity, with controlled low resistance, between the ball and the valve body and between the stem and the valve body.

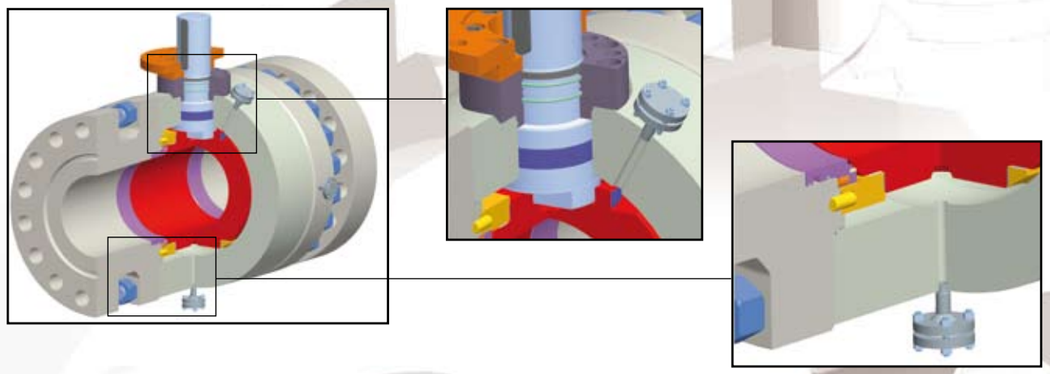
CONSTRUCTION / SPECIAL FEATURES

BODY

WELDED BODIES
When maintenance is not required, fully welded valves with no leak paths through the body are available for a safer solution.
TOP ENTRY BODIES
When maintenance in line is required, top-entry ball valves are available. With the stem in the vertical position this valve design permits disassembly, replacement of the all internal parts and seals and reassembly without removing the valve from the line.
BODY SEALING
For valves working with gas on pressure Classes ≥ 600, the standard O-ring will be replaced with Anti Explosive decompression (AED) ones.
For special service conditions (i.e. cryogenic, or high temperatures) O-rings can be replaced by alternative gaskets suitable for the service conditions (e.g. lip seals)



DRAIN SYSTEM
Other types of drain connection, such as welded or flanged, are available according to purchaser requirements.



BLEED VALVE
Other types of vent valve connection, such as welded or flanged, are available according the purchasers requirements.
VALVE ENDS
Other end connections such as special flanges, e.g. Norsok L-005 compact flanged connections, hub ends, welding ends (pup pieces) or other mechanical joints, may be supplied when specified by the purchaser.
TRANSITION PIECES
Valves with buttweld ends are often required complete with transition pieces (pups). After selection of suitable materials depending on pipe thickness, pipe and valve body material, Dafram can weld transition pieces to the valve during manufacturing process.

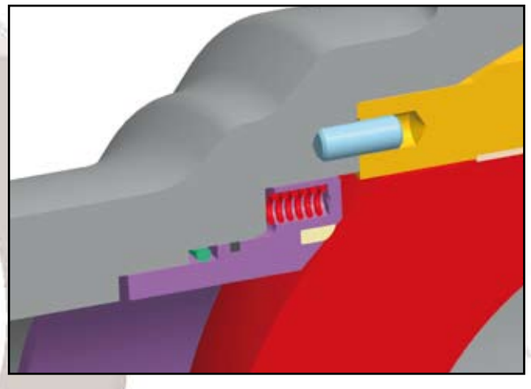
CONSTRUCTION / SPECIAL FEATURES

SEATS, SEAT INSERTS & SEAT SEALINGS

On request, two other Trunnion mounted valve designs are available:

DOUBLE PISTON EFFECT DESIGN

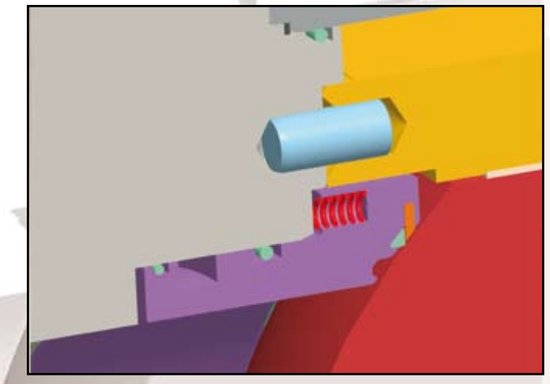
bi-directional, twin seats valve (with two seats, both seats are bi-directional).
This means valves designed for blocking the fluid in both downstream and upstream directions, with two seats, each sealing in both directions: from the valve ends to the valve body cavity and from the body cavity to the valve ends. This valve design improves the sealing capability of the valve adding a double seating surface in line, but an external safety relief valve is needed to allow the release of the cavity over-pressure.



DOUBLE-BLOCK-AND-BLEED (DBB). According to API 6D definition: Valves with two seating surfaces which, when in the closed position, block flow from both valve ends and allow the cavity between the seating surfaces to be vented through a bleed connection provided on the body cavity.
UPSTREAM SELF RELIEVING DESIGN: uni-directional, twin-seat valve with the upstream seat uni-directional and the downstream seat bi-directional. This combination maintains the sealing capability of the valve in the event of failure of the upstream seat. In addition, as the upstream seat automatically releases the body cavity over-pressure, no safety relief valve is needed for this purpose.

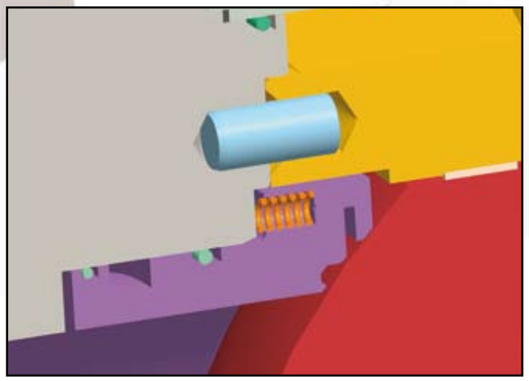
SEAT INSERTS

Other seat insert materials are available on customer request or for special applications:
SPECIAL NYLON (for temperature range greater than – 10 / + 120°C)
PEEK (for temperature range up to 250°C)
PTFE or RPTFE (for special fluids)
PCTFE (for cryogenic applications)
FKM (suggested for valves working with natural gas at design pressure up to Class 600)



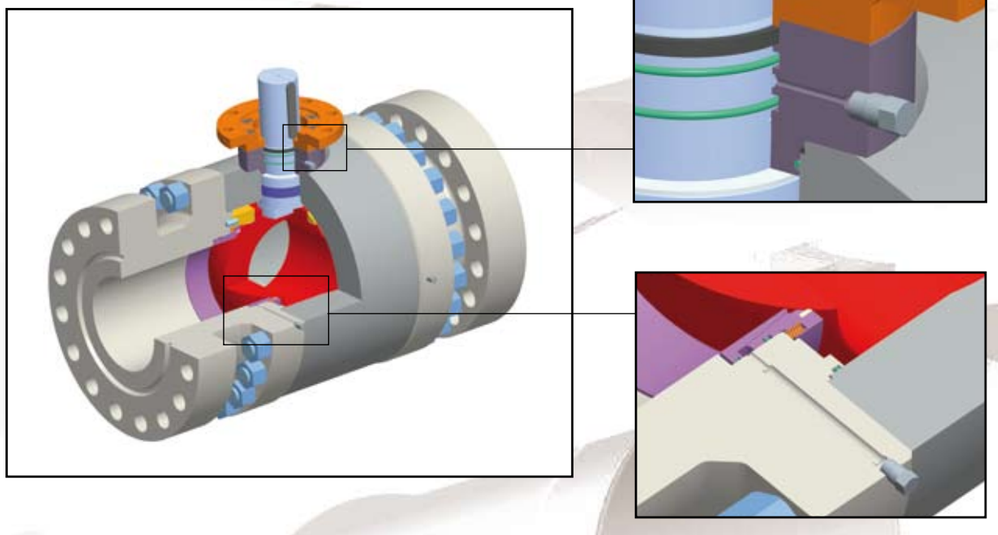
CONSTRUCTION / SPECIAL FEATURES

METAL SEATING. Hardfaced Ball and seats to provide a positive seating action in case of abrasive service or in case that the high service temperature does not allow the use of any kind of soft seat insert material.



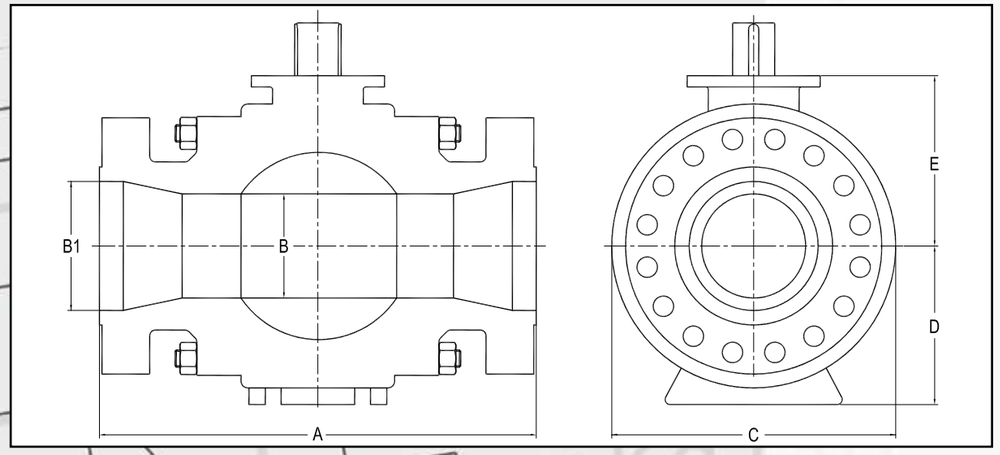
EMERGENCY SEALING INJECTION. Dafram ball valves can be equipped with ports to inject a suitable sealant to restore seat sealing in the event of damage to the soft seat inserts.

EMERGENCY GREASE SEALING. Dafram ball valves can be equipped with ports to inject a suitable sealant to restore stem sealing in the event of damage to the soft stem seals.



STEM EXTENSION. Extended bonnets and stems are available for valves working in extreme low or high temperatures (below – 46°C and above 200°C) to increase the distance between the body and the sealing area of the stem.

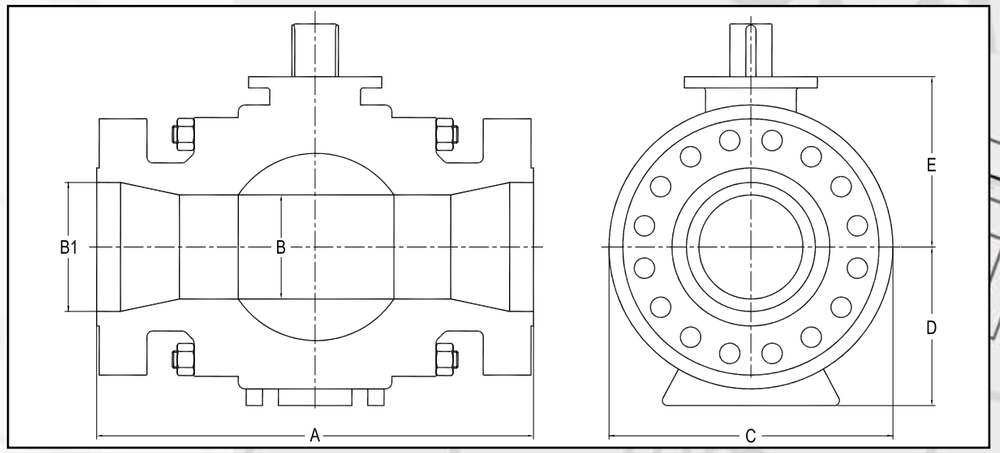
STEMS FOR BURIED SERVICE. For valves to be installed underground, suitable extended stems are available. In this case all drain, vent and emergency sealant lines are extended and the relevant pipes are firmly attached to the stem extension.



CLASS 150

DN	SIZE	A			B min.	B1	C (2)	D (2)	E (2)	Weight (2)
mm	inches	mm			mm	mm	mm	mm	mm	approx.Kg (3)
		RF	RTJ	WE						
25	1	127	140	165	25	25	125	72	79	18
40x25	1½x1	165	178	190	25	38	127	72	79	20
40	1½	165	178	190	38	38	156	95.5	115.5	20
50x40	2x1½	178	191	216	38	49	152.4	95.5	115.5	22
50	2	178	191	216	49	49	165	101	121	23
80x50	3x2	203	216	283	49	74	190.5	101	121	28
80	3	203	216	283	74	74	205	123	142	38
100x80	4x3	229	241	305	74	100	228.6	123	142	45
100	4	229	241	305	100	100	256	153	177	65
150x100	6x4	394	406	457	100	150	279.4	153	177	95
150	6	394	406	457	150	150	316	258	220	149
200x150	8x6	457	470	521	150	201	342.9	258	220	158
200	8	457	470	521	201	201	413	306.5	274	286
250x200	10x8	533	546	559	201	252	413	306.5	274	313
250	10	533	546	559	252	252	496	358	317	454
300x250	12x10	610	622	635	252	303	496	358	317	470
350x250	14x10	686	699	762	252	334	533.4	358	317	521
300	12	610	622	635	303	303	581	390	361	680
400x300	16x12	762	775	838	303	385	596.9	390	361	834
350	14	686	699	762	334	334	608	404	374	843
400	16	762	775	838	385	385	664	432	430	1080
450x400	18x16	864	876	914	385	436	664	432	430	1120
500x400	20x16	914	927	991	385	487	698.5	432	430	1480
450	18	864	876	914	436	436	750	475	463	1490
500	20	914	927	991	487	487	840	520	560	1930
600x500	24x20	1067	1080	1143	487	589	840	520	560	2270
650x500	26x20	1143	(1)	1245	487	633	870	520	560	2375
550	22	(1)	(1)	(1)	538	538	930	565	600	2650
600	24	1067	1080	1143	589	589	980	590	650	3000
700x600	28x24	1245	(1)	1346	589	684	980	590	650	3560
750x600	30x24	1295	(1)	1397	589	735	984.2	590	650	3730
650	26	1143	(1)	1245	633	633	1070	635	664	3840
800x650	32x26	1372	(1)	1524	633	779	1060.5	635	664	5350
700	28	1245	(1)	1346	684	684	1140	670	708	4540
750	30	1295	(1)	1397	735	735	1228	714	749	5340
800x750	32x30	1372	(1)	1524	735	779	1228	714	749	6550
900x750	36x30	1524	(1)	1727	735	874	1228	714	749	6740
800	32	1372	(1)	1524	779	779	1320	760	800	6690
850	34	1473	(1)	1626	830	830	1390	795	830	7830
900	36	1524	(1)	1727	874	874	1400	800	837	8960
1000	40	(1)	(1)	(1)	976	976	1600	900	930	12300
1050	42	(1)	(1)	(1)	1020	1020	1680	940	970	13330
1200	48	(1)	(1)	(1)	1166	1166	1940	1050	1090	20880

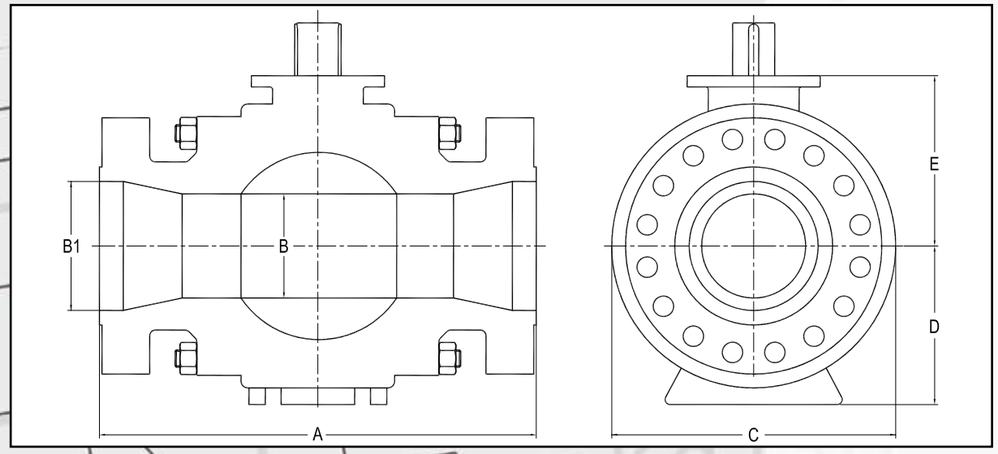
(1) : Dimensions to be agreed. For dimensions and weights in larger sizes consult the factory.
(2) : Dimensions C,D,E and weight are subject to change without notice.
(3) : Approximate weights figures are relevant to forged flanged end valves.



CLASS 300

DN	SIZE	A			B min.	B1	C (2)	D (2)	E (2)	Weight (2)
mm	inches	mm			mm	mm	mm	mm	mm	approx.Kg (3)
		RF	RTJ	WE						
25	1	165	178	165	25	25	125	72	79	22
40x25	1½x1	190	203	190	25	38	155.4	72	79	24
40	1½	190	203	190	38	38	156	95.5	115.5	24
50x40	2x1½	216	232	216	38	49	165.1	95.5	115.5	25
50	2	216	232	216	49	49	165	101	121	25
80x50	3x2	283	298	283	49	74	209.6	101	121	42
80	3	283	298	283	74	74	205	123	142	46
100x80	4x3	305	321	305	74	100	254	123	142	62
100	4	305	321	305	100	100	256	153	177	93
150x100	6x4	403	419	457	100	150	317.5	153	177	115
150	6	403	419	457	150	150	316	258	220	172
200x150	8x6	502	518	521	150	201	381	258	220	196
200	8	502	518	521	201	201	413	306.5	274	309
250x200	10x8	568	584	559	201	252	444.5	306.5	274	350
250	10	568	584	559	252	252	496	348	317	478
300x250	12x10	648	664	635	252	303	520.7	348	317	552
350x250	14x10	762	778	762	252	334	584.2	348	317	644
300	12	648	664	635	303	303	581	390.5	361	720
400x300	16x12	838	854	838	303	385	647.7	390.5	361	908
350	14	762	778	762	334	334	608	404	374	1015
400	16	838	854	838	385	385	685	442.5	430	1365
450x400	18x16	914	930	914	385	436	711.2	442.5	430	1500
500x400	20x16	991	1010	991	385	487	774.7	442.5	430	1600
450	18	914	930	914	436	436	750	475	463	1793
500	20	991	1010	991	487	487	850	525	560	2350
600x500	24x20	1143	1165	1143	487	589	914.4	525	560	2940
650x500	26x20	1245	1270	1245	487	633	971.5	525	560	3580
550	22	1092	1114	1092	538	538	940	510	560	2795
600	24	1143	1165	1143	589	589	986	593	650	3550
700x600	28x24	1346	1372	1346	589	684	1035	593	650	3800
750x600	30x24	1397	1422	1397	589	735	1092	593	650	4430
650	26	1245	1270	1245	633	633	1060	630	664	4380
800x650	32x26	1524	1553	1524	633	779	1149	630	664	5960
700	28	1346	1372	1346	684	684	1146	673	708	5300
750	30	1397	1422	1397	735	735	1230	715	745	6233
800x750	32x30	1524	1553	1524	735	779	1230	715	745	6340
900x750	36x30	1727	1756	1727	735	874	1230	715	745	7520
800	32	1524	1553	1524	779	779	1302	751	770	7420
850	34	1626	1654	1626	830	830	1390	795	815	8330
900	36	1727	1756	1727	874	874	1431	815	862	9160
1000	40	(1)	(1)	(1)	976	976	1640	920	950	13300
1050	42	(1)	(1)	(1)	1020	1020	1700	950	980	15000

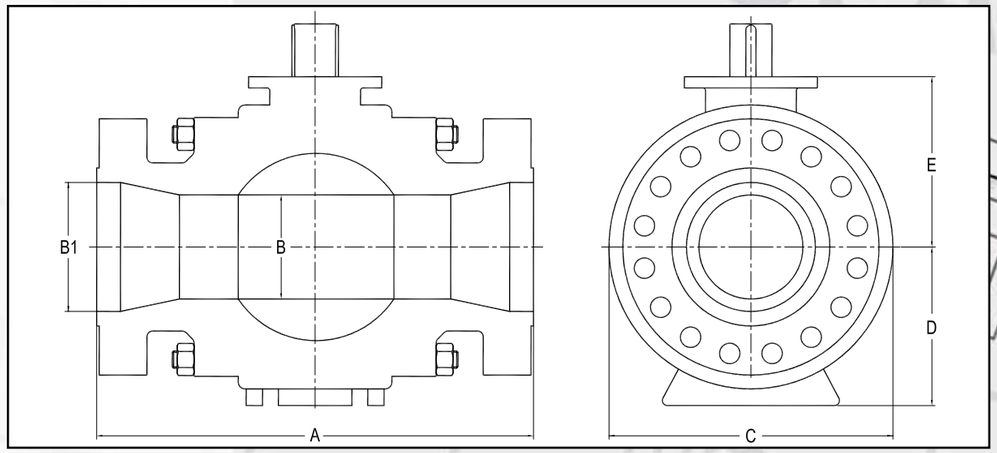
(1) : Dimensions to be agreed. For dimensions and weights in larger sizes consult the factory.
(2) : Dimensions C,D,E and weight are subject to change without notice.
(3) : Approximate weights figures are relevant to forged flanged end valves.



CLASS 600

DN	SIZE	A			B min.	B1	C (2)	D (2)	E (2)	Weight (2)
mm	inches	mm			mm	mm	mm	mm	mm	approx.Kg (3)
		RF	RTJ	WE						
25	1	216	216	216	25	25	125	72	79	26
40x25	1½x1	241	241	241	25	38	155.4	72	79	28
40	1½	241	241	241	38	38	163	95.5	115.5	31
50x40	2x1½	292	295	292	38	49	165.1	95.5	115.5	33
50	2	292	295	292	49	49	165	101	121	38
80x50	3x2	356	359	356	49	74	209.6	101	121	44
80	3	356	359	356	74	74	205	123	142	63
100x80	4x3	432	435	432	74	100	273	123	142	85
100	4	432	435	432	100	100	256	153	177	147
150x100	6x4	559	562	559	100	150	355.6	153	177	169
150	6	559	562	559	150	150	316	258	220	261
200x150	8x6	660	664	660	150	201	419.1	258	220	280
200	8	660	664	660	201	201	413	306.5	274	445
250x200	10x8	787	791	787	201	252	508	306.5	274	520
250	10	787	791	787	252	252	496	348	317	655
300x250	12x10	838	841	838	252	303	558.8	348	317	790
350x250	14x10	889	892	889	252	334	603.3	348	317	960
300	12	838	841	838	303	303	581	390.5	361	990
400x300	16x12	991	994	991	303	385	685.8	390.5	361	1250
350	14	889	892	889	334	334	630	415	401	1287
400	16	991	994	991	385	385	705	452.5	440	1640
450x400	18x16	1092	1095	1092	385	436	743	452.5	440	1840
500x400	20x16	1194	1200	1194	385	487	812.8	452.5	440	2177
450	18	1092	1095	1092	436	436	794	497	529.5	2268
500	20	1194	1200	1194	487	487	874	537	572	2830
600x500	24x20	1397	1407	1397	487	589	939.8	537	572	3560
650x500	26x20	1448	1461	1448	487	633	1016	537	572	4085
550	22	1295	1305	1295	538	538	960	580	520	3590
600	24	1397	1407	1397	589	589	1034	617	650	4400
700x600	28x24	1549	1562	1549	589	684	1073	617	650	5570
750x600	30x24	1651	1664	1651	589	735	1130	617	650	5200
650	26	1448	1461	1448	633	633	1132	666	698	5455
800x650	32x26	1778	1794	1778	633	779	1193.8	666	698	7580
700	28	1549	1562	1549	684	684	1222	711	753	7610
750	30	1651	1664	1651	735	735	1340	770	814	8420
800x750	32x30	1778	1794	1778	735	779	1193.8	770	814	8650
900x750	36x30	2083	2099	2083	735	874	1314.5	770	814	9900
800	32	1778	1794	1778	779	779	1330	785	825	9230
850	34	1930	1946	1930	830	830	1400	800	840	10970
900	36	2083	2099	2083	874	874	1591	895	938	13000
1000	40	(1)	(1)	(1)	976	976	1650	925	965	17370
1050	42	(1)	(1)	(1)	1020	1020	1760	980	1020	19850

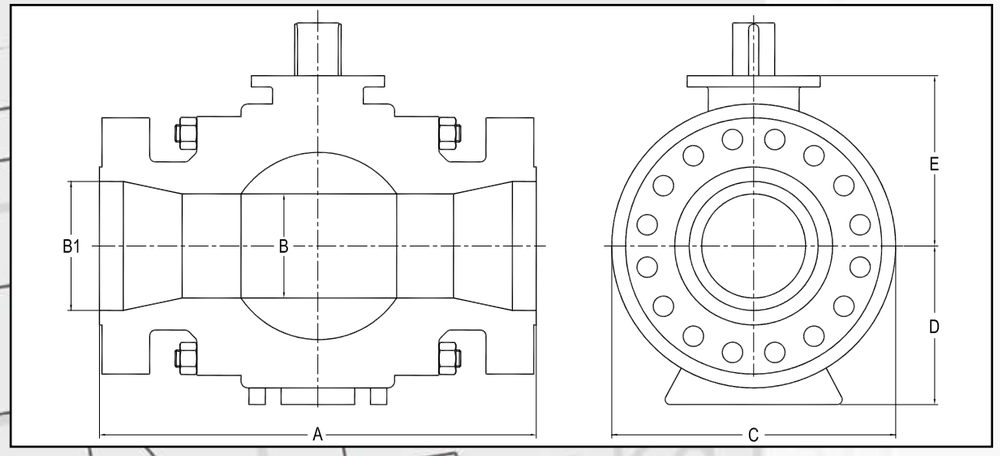
(1) : Dimensions to be agreed. For dimensions and weights in larger sizes consult the factory.
(2) : Dimensions C,D,E and weight are subject to change without notice.
(3) : Approximate weights figures are relevant to forged flanged end valves.



CLASS 900

DN	SIZE	A			B min.	B1	C (2)	D (2)	E (2)	Weight (2)
mm	inches	mm			mm	mm	mm	mm	mm	approx.Kg (3)
		RF	RTJ	WE						
25	1	254	254	254	25	25	148	81	114	24
40x25	1½x1	305	305	305	25	38	177.8	81	114	26
40	1½	305	305	305	38	38	185	95.5	115.5	38
50x40	2x1½	368	371	368	38	49	215.9	95.5	115.5	40
50	2	368	371	368	49	49	176	101	121	56
80x50	3x2	381	384	381	49	74	241.3	101	121	56
80	3	381	384	381	74	74	210	123	142	78
100x80	4x3	457	460	457	74	100	292.1	123	142	97
100	4	457	460	457	100	100	270	153	177	150
150x100	6x4	610	613	610	100	150	381	153	177	220
150	6	610	613	610	150	150	335	267.5	230	340
200x150	8x6	737	740	737	150	201	469.9	267.5	230	436
200	8	737	740	737	201	201	432	316	283	570
250x200	10x8	838	841	838	201	252	546.1	316	283	650
250	10	838	841	838	252	252	526	363	332	912
300x250	12x10	965	968	965	252	303	609.6	363	332	1050
350x250	14x10	1029	1038	1029	252	322	641.4	363	332	1230
300	12	965	968	965	303	303	623	412	391	1325
400x300	16x12	1130	1140	1130	303	373	704.9	412	391	1700
350	14	1029	1038	1029	322	322	662	431	462	1610
400	16	1130	1140	1130	373	373	750	475	507	2150
450x400	18x16	1219	1232	1219	373	423	787.4	475	507	2550
500x400	20x16	1321	1334	1321	373	471	857.3	475	507	2630
450	18	1219	1232	1219	423	423	833	517	550	3450
500	20	1321	1334	1321	471	471	930	565	594	4250
600x500	24x20	1549	1568	1549	471	570	1041.4	565	594	5030
550	22	(1)	(1)	(1)	522	522	1030	615	630	4350
600	24	1549	1568	1549	570	570	1110	655	680	6080
750x600	30x24	(1)	(1)	(1)	570	712	1145	670	680	8730
650	26	(1)	(1)	(1)	617	617	1160	680	710	7280
700	28	(1)	(1)	(1)	665	665	1280	740	760	9170
750	30	(1)	(1)	(1)	712	712	1320	780	810	11270
900x750	36x30	(1)	(1)	(1)	712	855	1380	820	810	15385
800	32	(1)	(1)	(1)	760	760	1390	825	835	11820
850	34	(1)	(1)	(1)	808	808	1495	880	890	16000
900	36	(1)	(1)	(1)	855	855	1565	910	920	18180

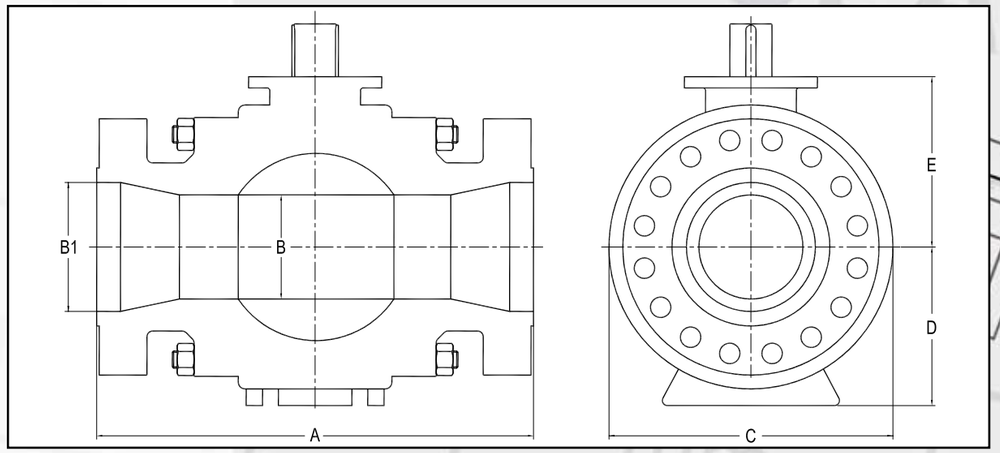
(1) : Dimensions to be agreed. For dimensions and weights in larger sizes consult the factory.
(2) : Dimensions C,D,E and weight are subject to change without notice.
(3) : Approximate weights figures are relevant to forged flanged end valves.



CLASS 1500

DN	SIZE	A			B min.	B1	C (2)	D (2)	E (2)	Weight (2)
mm	inches	mm			mm	mm	mm	mm	mm	approx.Kg (3)
		RF	RTJ	WE						
25	1	254	254	254	25	25	148	81	114	24
40x25	1½x1	305	305	305	25	38	177.8	81	114	26
40	1½	305	305	305	38	38	185	95.5	115.5	38
50x40	2x1½	368	371	368	38	49	215.9	95.5	115.5	40
50	2	368	371	368	49	49	176	101	121	56
80x50	3x2	470	473	470	49	74	266.7	155	121	104
80	3	470	473	470	74	74	270	155	180	170
100x80	4x3	546	549	546	74	100	311.2	189	180	195
100	4	546	549	546	100	100	320	189	206	210
150x100	6x4	705	711	705	100	144	393.7	290	206	270
150	6	705	711	705	144	144	380	290	261	495
200x150	8x6	832	841	832	144	192	482.6	350	261	586
200	8	832	841	832	192	192	500	350	345	880
250x200	10x8	991	1000	991	192	239	584.2	391	345	1010
250	10	991	1000	991	239	239	583	391	377	1360
300x250	12x10	1130	1146	1130	239	287	673.1	391	377	1760
350x250	14x10	1257	1276	1257	239	315	749.3	440	377	2010
300	12	1130	1146	1130	287	287	680	440	440	2280
400x300	16x12	1384	1407	1384	287	360	825.5	472	440	2860
350	14	1257	1276	1257	315	315	745	530	490	3000
400	16	1384	1407	1384	360	360	860	530	555.5	3816
450x400	18x16	1537	1559	1537	360	371	914.4	530	555.5	5030
500x400	20x16	1664	1686	1664	360	416	984.3	554	555.5	5380
450	18	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
500	20	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
600x500	24x20	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
600	24	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
650	26	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
700	28	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
750	30	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)

(1) : Dimensions to be agreed. For dimensions and weights in larger sizes consult the factory.
(2) : Dimensions C,D,E and weight are subject to change without notice.
(3) : Approximate weights figures are relevant to forged flanged end valves.



CLASS 2500

DN	SIZE	A			B min.	B1	C (2)	D (2)	E (2)	Weight (2)
mm	inches	mm			mm	mm	mm	mm	mm	approx.Kg (3)
		RF	RTJ	WE						
40	1½	384	387	387	38	38	200	120	142	62
50x40	2x1½	451	454	451	38	42	235	120	142	75
50	2	451	454	451	42	42	230	135	148	110
80x50	3x2	578	584	578	42	62	304.8	135	148	157
80	3	578	584	578	62	62	308	179	202	218
100x80	4x3	673	683	673	62	87	355.6	179	202	260
100	4	673	683	673	87	87	355	194	218	391
150x100	6x4	914	927	914	87	131	482.6	194	218	548
150	6	914	927	914	131	131	495	347	335	1030
200x150	8x6	1022	1038	1022	131	179	552.5	347	335	1100
200	8	1022	1038	1022	179	179	588	394	411	1570
250x200	10x8	1270	1292	1270	179	223	673.1	394	411	1890
250	10	1270	1292	1270	223	223	722	461	494	2550
300x250	12x10	1422	1445	1422	223	265	762	461	494	2850
350x250	14x10	(1)	(1)	(1)	223	279	(1)	461	494	3820
300	12	(1)	(1)	(1)	265	265	777	488	522	3872
400x300	16x12	(1)	(1)	(1)	265	305	(1)	(1)	522	4880
350	14	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
400	16	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
450	18	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
500	20	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)

(1) : Dimensions to be agreed. For dimensions and weights in larger sizes consult the factory.
(2) : Dimensions C,D,E and weight are subject to change without notice.
(3) : Approximate weights figures are relevant to forged flanged end valves.

ACTUATION

Dafram valves are suitable for manual operation by wrench or by gear when the force required at the wrench rim exceeds 300 N. Locking facility (API6D, 6.11) is available for both wrench and gear operators.

According to customer requirements cast iron, steel or stainless steel gears can be supplied suitable for different service conditions such as

- Low temperature (-60°C to +100 °C)
- Waterproof
- Marine
- Fire Safe
- Buried service
- Submersible

ACTUATION

When valves are required with power operation, Dafram can assemble the valves with specific actuators as per customer requirements (i.e. Electric, Pneumatic, Hydraulic or Gas over oil actuators), and will perform the proper functional tests and issue the related torque records and certificates.

ENGINEERING

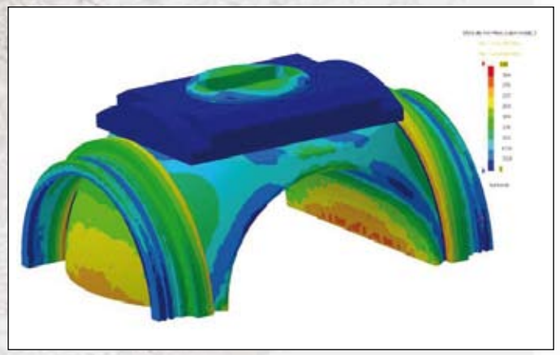
Dafram's engineering department is continually working to innovate, refine and improve products.
Our engineers can work with the most advanced engineering software applications such as Autocad, Pro-Engineer, Pro-Mechanica.

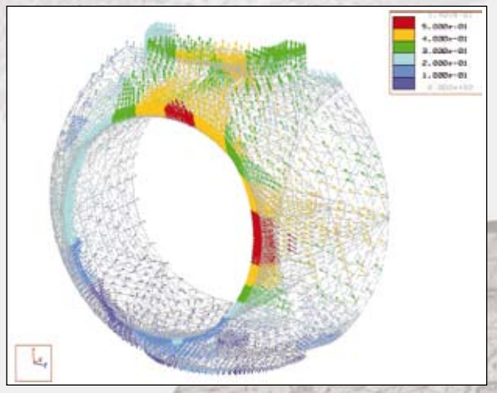
These advanced software applications are combined in Dafram with extensive experience of more than 50 years in critical applications in the chemical, oil, gas and refining industries to design superior quality valves that meet the most demanding performance requirements of our customers.

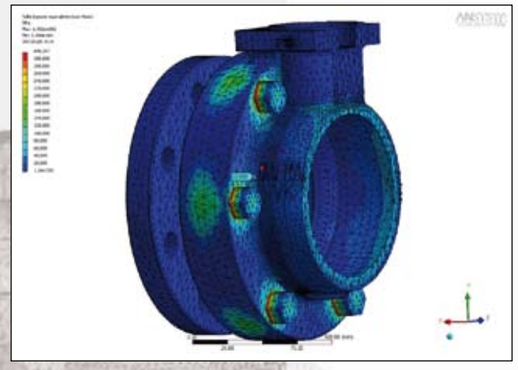
All main components of DAFRAM valves are designed in accordance with the applicable international standards.
Prediction by Finite Element analysis of stress levels and deflection is part of our standard procedures to design and verify the components and the valve assembly.
Stress tests by strain gauges are also carried out to validate FE models.
In the case of new products a prototype is checked by extensive physical testing using research & development department internal facilities and procedures.

According to customer's requirements valves can be designed, manufactured and tested to the following international standards:

- API: 6A, 6D, 607, 598
- ASME: B16.5, B16.10, B16.25, B16.34, B31.3, B31.4, B31.8
- MSS: SP25, SP44, SP53, SP54, SP55, SP61, SP72, SP82
- BS: 1503, 1504, 1560, 2080, 4504, 5146, 5351, 6755
- ISO: 14313, 14723, 15156
- ASME: Section V, Section VIII Div.1 and 2 Section IX
- ASTM: E94, E142, E165, E280, E446, E709
- NACE: MR 01-75
- EN: 558, 1503, 1626, 1983, 5211, 12266, 12516, 12567, 12570, 12627,12982







SPECIAL APPLICATIONS

ABRASIVE SERVICE.
If solid particles are contained in the fluid, valves are provided with Tungsten Carbide (WC) coated metal seats to avoid the erosion of soft seats.

HIGH TEMPERATURE SERVICE. Some processes require valves able to be operated and to assured leakage rates within specified limits at high temperatures. In these cases Dafram provides a special valve designs including extended bonnet (recommended for use at temperatures higher than 250°C), gaskets and seals and material selection suitable for high temperature service. For applications where soft seats would be unsuitable, Tungsten Carbide (WC) or Chromium Carbide (CrC) coated metal seats are used.

CRYOGENIC SERVICE.
Some gas treatment processes require valves to be operated and to give assured leakage rates within specified limits at low temperatures. In this case Dafram provides special valve designs including extended bonnet (recommended for use at temperatures below minus 50°), gaskets and seals and material selection suitable for cryogenic service.

SPECIAL APPLICATIONS

SOUR SERVICE (API 6D, 7.7).
Materials for pressure-containing parts of valves used in H2S-containing environments in oil and gas production, shall meet the requirements of ISO 15156 (NACE) if sour service is specified. HIC and SSCC corrosion test certificates can be provided on request.

CORROSIVE SERVICE
High Alloy, Duplex (22Cr – 2 Ni) and Super Duplex (25 Cr – 5 Ni) can be supplied according to corrosion resistance requirements as per special material standards (i.e. Norsok MDS D46 and D44 for Duplex, D56 and D54 for Super Duplex, or similar standards). In addition Electroless Nickel Plating (ENP) and 316L SS or Alloy 625 weld overlay are frequently used to enhance corrosion resistance of balls, seats, stems, seat pockets and stem sealing areas, in corrosive service,

EMISSION FREE VALVES.
Ball valves are often required as “emission free valves” enabling them to comply with new and up dated regulations which require very low rates of emission from the valve to the atmosphere. In this case special valve stem sealing designs including high body and stem surface finishing and suitable seals are available.

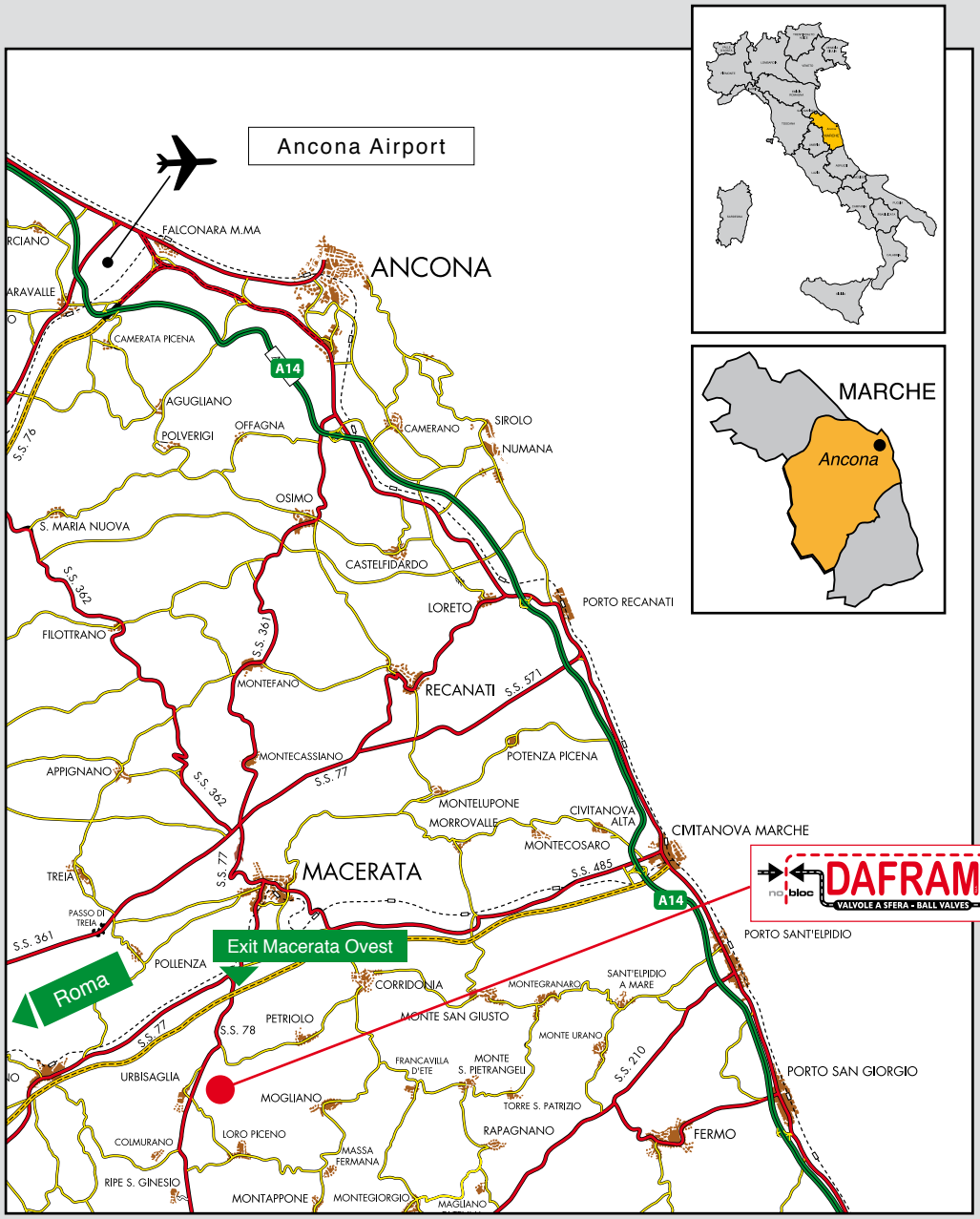
EXPLOSIVE DECOMPRESSION Anti explosive decompression O-rings or Lip seals are used to eliminate the possibility of O-ring explosion due to the sudden decompression of gas absorbed into the molecular structure of elastomeric sealing elements.

PARTICULAR FLUIDS: Carbon Dioxide, Chlorine, Oxygen
Valves working with particular fluids, must meet some special requirements according to Dafram special procedures. To avoid risk of explosive decompression in Carbon Dioxide (CO2) service special O-rings or Lip-seals are used. Valves to be used with Chlorine need special features and full degreasing and decontamination. Valves for Oxygen service also require also special features to eliminate the risk of ignition.

SPECIAL VALVE PATTERN
On customer request Dafram are able to design and manufacture special valve patterns such as three-way Trunnion mounted ball valves or valves incorporating different special design features.

SURFACE PROTECTION

Design changes
Because of the constant technical review of our products, we reserve the right to modify those products within the specified Standards criteria, such modifications to be made notwithstanding the technical data contained in this booklet wich is given in good faith and is based on specific tests, but does not represent in any way a warranty.



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