Trunnion mounted ball valves

to API 6D and BS 5351
Class 150 to 2500
(PN 20 to 420)
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.

CONTENTS

Introduction .......................................................................................................................... 3
Quality System ..................................................................................................................... 4
Inspection & Testing ............................................................................................................. 5
Special Tests ........................................................................................................................ 6
General Information ............................................................................................................. 10
Type S Valve Assembly and Cross section ......................................................................... 11
Type P Valve Assembly and Cross section ......................................................................... 12
Type D Valve Assembly and Cross section ......................................................................... 13
Type W Valve Assembly and Cross section ......................................................................... 14
Product Range ..................................................................................................................... 15
Construction, Standard Features ......................................................................................... 16
Construction, Special Features ............................................................................................ 17
Dimensions & Weights ......................................................................................................... 20
Actuation .............................................................................................................................. 26
Engineering .......................................................................................................................... 28
Special Applications ............................................................................................................. 29
Surface Protection ................................................................................................................ 31
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 G1
- 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 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.

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 (UT)
Positive material identification (PMI)
Hardness test
SPECIAL TESTS

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

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.

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.
**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.

**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.
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.
CONSTRUCTION / STANDARD FEATURES

BODY

**CONSTRUCTION.** 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.

**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

**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).

**BLEED VALVE.** Other types of vent valve connection, such as welded or flanged, are available according to purchaser requirements.

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

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

<table>
<thead>
<tr>
<th>DN</th>
<th>SIZE</th>
<th>A (mm)</th>
<th>A (inches)</th>
<th>B min.</th>
<th>C (inches)</th>
<th>D (inches)</th>
<th>E (inches)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>65</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>80</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>125</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### CLASS 300

<table>
<thead>
<tr>
<th>DN</th>
<th>SIZE</th>
<th>A (mm)</th>
<th>A (inches)</th>
<th>B min.</th>
<th>C (inches)</th>
<th>D (inches)</th>
<th>E (inches)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>65</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>80</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>125</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Notes

1. Dimensions to be agreed. For dimensions and weights in larger sizes consult the factory.
2. Dimensions C, D, and E are subject to change without notice.
3. Approximate weights are relevant to forged flanged end valves.
## CLASS 600

<table>
<thead>
<tr>
<th>DN</th>
<th>SIZE</th>
<th>A</th>
<th>B min.</th>
<th>B1</th>
<th>C (i)</th>
<th>D (i)</th>
<th>E (i)</th>
<th>Weight (i)</th>
<th>Approx Kg (i)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>24</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
</tr>
<tr>
<td>30</td>
<td>26</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
</tr>
<tr>
<td>40</td>
<td>30</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
</tr>
<tr>
<td>50</td>
<td>30</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
</tr>
<tr>
<td>60</td>
<td>36</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
</tr>
<tr>
<td>80</td>
<td>36</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
</tr>
<tr>
<td>100</td>
<td>43</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
</tr>
<tr>
<td>500</td>
<td>173</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
</tr>
<tr>
<td>600</td>
<td>198</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
</tr>
</tbody>
</table>

## CLASS 900

<table>
<thead>
<tr>
<th>DN</th>
<th>SIZE</th>
<th>A</th>
<th>B min.</th>
<th>B1</th>
<th>C (i)</th>
<th>D (i)</th>
<th>E (i)</th>
<th>Weight (i)</th>
<th>Approx Kg (i)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>24</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
</tr>
<tr>
<td>30</td>
<td>26</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
</tr>
<tr>
<td>40</td>
<td>30</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
</tr>
<tr>
<td>50</td>
<td>30</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
</tr>
<tr>
<td>60</td>
<td>36</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
</tr>
<tr>
<td>80</td>
<td>36</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
</tr>
<tr>
<td>100</td>
<td>43</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
</tr>
<tr>
<td>500</td>
<td>173</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
</tr>
<tr>
<td>600</td>
<td>198</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
</tr>
</tbody>
</table>

(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.

---

### Dimensions & Weights

<table>
<thead>
<tr>
<th>DN</th>
<th>SIZE</th>
<th>A</th>
<th>B min.</th>
<th>B1</th>
<th>C (i)</th>
<th>D (i)</th>
<th>E (i)</th>
<th>Weight (i)</th>
<th>Approx Kg (i)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>24</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
</tr>
<tr>
<td>30</td>
<td>26</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
</tr>
<tr>
<td>40</td>
<td>30</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
</tr>
<tr>
<td>50</td>
<td>30</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
</tr>
<tr>
<td>60</td>
<td>36</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
</tr>
<tr>
<td>80</td>
<td>36</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
</tr>
<tr>
<td>100</td>
<td>43</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
</tr>
<tr>
<td>500</td>
<td>173</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
</tr>
<tr>
<td>600</td>
<td>198</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
<td>214</td>
</tr>
</tbody>
</table>

(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

<table>
<thead>
<tr>
<th>DN</th>
<th>A</th>
<th>B min.</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>1</td>
<td>254</td>
<td>254</td>
<td>254</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>20</td>
<td>1½</td>
<td>305</td>
<td>305</td>
<td>305</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>25</td>
<td>2</td>
<td>365</td>
<td>365</td>
<td>365</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>32</td>
<td>2½</td>
<td>415</td>
<td>415</td>
<td>415</td>
<td>38</td>
<td>38</td>
</tr>
<tr>
<td>40</td>
<td>3</td>
<td>465</td>
<td>465</td>
<td>465</td>
<td>38</td>
<td>38</td>
</tr>
<tr>
<td>50</td>
<td>3½</td>
<td>515</td>
<td>515</td>
<td>515</td>
<td>38</td>
<td>38</td>
</tr>
<tr>
<td>65</td>
<td>4</td>
<td>595</td>
<td>595</td>
<td>595</td>
<td>49</td>
<td>49</td>
</tr>
<tr>
<td>80</td>
<td>4½</td>
<td>645</td>
<td>645</td>
<td>645</td>
<td>49</td>
<td>49</td>
</tr>
<tr>
<td>100</td>
<td>5</td>
<td>715</td>
<td>715</td>
<td>715</td>
<td>49</td>
<td>49</td>
</tr>
<tr>
<td>125</td>
<td>5½</td>
<td>765</td>
<td>765</td>
<td>765</td>
<td>49</td>
<td>49</td>
</tr>
<tr>
<td>150</td>
<td>6</td>
<td>835</td>
<td>835</td>
<td>835</td>
<td>49</td>
<td>49</td>
</tr>
<tr>
<td>200</td>
<td>8</td>
<td>1075</td>
<td>1075</td>
<td>1075</td>
<td>74</td>
<td>74</td>
</tr>
<tr>
<td>250</td>
<td>10</td>
<td>1225</td>
<td>1225</td>
<td>1225</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>300</td>
<td>12</td>
<td>1375</td>
<td>1375</td>
<td>1375</td>
<td>144</td>
<td>144</td>
</tr>
<tr>
<td>400</td>
<td>16</td>
<td>1755</td>
<td>1755</td>
<td>1755</td>
<td>144</td>
<td>144</td>
</tr>
<tr>
<td>500</td>
<td>20</td>
<td>2075</td>
<td>2075</td>
<td>2075</td>
<td>192</td>
<td>192</td>
</tr>
<tr>
<td>600</td>
<td>25</td>
<td>2225</td>
<td>2225</td>
<td>2225</td>
<td>192</td>
<td>192</td>
</tr>
<tr>
<td>750</td>
<td>30</td>
<td>2405</td>
<td>2405</td>
<td>2405</td>
<td>238</td>
<td>238</td>
</tr>
</tbody>
</table>

### CLASS 2500

<table>
<thead>
<tr>
<th>DN</th>
<th>A</th>
<th>B min.</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>1</td>
<td>284</td>
<td>284</td>
<td>284</td>
<td>28</td>
<td>28</td>
</tr>
<tr>
<td>20</td>
<td>1½</td>
<td>345</td>
<td>345</td>
<td>345</td>
<td>38</td>
<td>38</td>
</tr>
<tr>
<td>25</td>
<td>2</td>
<td>405</td>
<td>405</td>
<td>405</td>
<td>38</td>
<td>38</td>
</tr>
<tr>
<td>32</td>
<td>2½</td>
<td>465</td>
<td>465</td>
<td>465</td>
<td>38</td>
<td>38</td>
</tr>
<tr>
<td>40</td>
<td>3</td>
<td>515</td>
<td>515</td>
<td>515</td>
<td>42</td>
<td>42</td>
</tr>
<tr>
<td>50</td>
<td>3½</td>
<td>565</td>
<td>565</td>
<td>565</td>
<td>42</td>
<td>42</td>
</tr>
<tr>
<td>65</td>
<td>4</td>
<td>635</td>
<td>635</td>
<td>635</td>
<td>42</td>
<td>42</td>
</tr>
<tr>
<td>80</td>
<td>4½</td>
<td>685</td>
<td>685</td>
<td>685</td>
<td>52</td>
<td>52</td>
</tr>
<tr>
<td>100</td>
<td>5</td>
<td>755</td>
<td>755</td>
<td>755</td>
<td>52</td>
<td>52</td>
</tr>
<tr>
<td>125</td>
<td>5½</td>
<td>805</td>
<td>805</td>
<td>805</td>
<td>52</td>
<td>52</td>
</tr>
<tr>
<td>150</td>
<td>6</td>
<td>855</td>
<td>855</td>
<td>855</td>
<td>52</td>
<td>52</td>
</tr>
<tr>
<td>200</td>
<td>8</td>
<td>1045</td>
<td>1045</td>
<td>1045</td>
<td>74</td>
<td>74</td>
</tr>
<tr>
<td>250</td>
<td>10</td>
<td>1235</td>
<td>1235</td>
<td>1235</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>300</td>
<td>12</td>
<td>1425</td>
<td>1425</td>
<td>1425</td>
<td>144</td>
<td>144</td>
</tr>
<tr>
<td>400</td>
<td>16</td>
<td>1825</td>
<td>1825</td>
<td>1825</td>
<td>192</td>
<td>192</td>
</tr>
<tr>
<td>500</td>
<td>20</td>
<td>2125</td>
<td>2125</td>
<td>2125</td>
<td>192</td>
<td>192</td>
</tr>
<tr>
<td>750</td>
<td>30</td>
<td>2625</td>
<td>2625</td>
<td>2625</td>
<td>238</td>
<td>238</td>
</tr>
</tbody>
</table>

Notes:
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.
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

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.
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 DAFFRAM 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
- 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, 1903, 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 assure 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°C), 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 updated 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 which is given in good faith and is based on specific tests, but does not represent in any way a warranty.
DAFRAM SpA
Registered office: via Tito Vignoli, 9
20146 Milano - Italy
Headquarters and plant: S.S.78 - km 6 - 62010 Urbisaglia (Mc) Italy
Phone: +39.0733.51191
Fax: +39.0733.50196
E-mail (general): info@dafram.it
E-mail (sales office): sales@dafram.it
www.dafram.it