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Guidance on Industry Standard for Ball, Plug, and Other Quarter-Turn Valves - Common Material

GIS 62-016

BP GROUP
ENGINEERING TECHNICAL PRACTICES

Foreword

This is the first issue of Engineering Technical Practice (ETP) GIS 62-016. This Guidance on Industry Standard (GIS) is based on parts of heritage documents from the merged BP companies as follows:

Amoco (ACES)

A PN-VA-GS-E	Piping—Valves—General Service—Selection Specification.
A PN-VA-GS-G	Piping—Valves—General Service—Selection Guide.

ARCO (APCES)

ES 203-98	Ball Valve Procurement Specification.
ES 206-98	Valve Procurement Specification.

BP Oil US (Refining Practices)

RP 5-3-1	Valve Design and Selection Criteria.
RP 5--3-10	Ball Valves.

British Petroleum (RPSE)

RP 62-1	Guide to Valve Selection.
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Table of Contents

	Page
Foreword	2
1. Scope	3
2. Normative references.....	3
3. High pressure valves	3
4. Large diameter flanges	3
5. Alternative body/bonnet joints	3
6. Valve operation.....	3
7. Weld end valves	3
8. Materials	3
8.1. General.....	3
8.2. Trim	3
8.3. Bolting for body bonnet/shell	3
8.4. Gland packing/seals.....	3
8.5. Gearbox housings.....	3
9. Impact (toughness) test	3
10. Welding.....	3
11. Repairs	3
12. Functional testing.....	3
13. Non-destructive examination (NDE).....	3
13.1. General.....	3
13.2. Extent of examination	3
14. Pressure testing.....	3
15. Storage and shipping	3
16. Cryogenic application.....	3
17. Pressure Equipment Directive (PED)	3
18. Valve stem	3

List of Tables

Table 1 - Sizes (DN (NPS)) at and above which a gearbox is required	3
Table 2 - NDE requirements	3
Table 3 - NDE of weldments	3
Table 4 - Surface examination acceptance standards.....	3



1. Scope

This GIS provides guidance on industry standards for ball, plug, and other quarter-turn valves that is common to more than one valve type. Aspects covered include design, materials, fabrication, inspection, testing, documentation, and preparation for shipment. Clauses of this document are referenced in GIS for specific valve types that should be regarded as the primary reference documents.

2. Normative references

The following normative documents contain requirements that, through reference in this text, constitute requirements of this technical practice. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this technical practice are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies.

American Petroleum Institute (API)

API 6A718	Specification of Nickel Base Alloy (UNS N07718) for Oil and Gas Drilling and Production Equipment.
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American Society of Mechanical Engineers (ASME)

ASME B31.1	Power Piping.
ASME B31.3	Process Piping.
ASME B16.34	Valves - Flanged, Threaded, and Welding End.
ASME B16.47	Large Diameter Steel Flanges NPS 26 Through NPS 60.
ASME Sec V	Non-Destructive Examination.
ASME Sec VIII, Div 1	Pressure Vessels.
ASME Sec IX	Welding and Brazing Qualifications.

American Society for Nondestructive Testing (ASNT)

ASNT SNT-TC-1A	Recommended Practice.
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American Society for Testing and Materials (ASTM)

ASTM A193/A193M	Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
ASTM A194/A194M	Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
ASTM A275	Method for Magnetic Particle Examination of Steel Forgings.
ASTM A320/A320M	Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for Low-Temperature Service.
ASTM E165	Practice for Liquid Penetrant Inspection Method.
ASTM E562	Standard Test Method for Determining Volume Fraction by Systematic Manual Point Count.
ASTM E709	Practice for Magnetic Particle Examination.
ASTM G48	Standard Test Methods for Pitting and Crevice Corrosion Resistance of Stainless Steels and Related Alloys by Use of Ferric Chloride Solution.



British Standards Institute (BSI)

BS 6364 Specification for Valves for cryogenic service.

CSWIP Certification Scheme for Welding Inspection Personnel**European Standard (EN)**

EN 12570 Industrial valves - Method for sizing the operating element.

International Organization for Standardization (ISO)

ISO 9606-1 Approval testing of welders - Fusion welding - Part 1: Steels.
 ISO 10423 Petroleum and natural gas industries – Drilling and production equipment –wellhead and christmas tree equipment (API SPEC 6A).
 ISO 12094 Welded steel tubes for pressure purposes - Ultrasonic testing for the detection of laminar imperfections in strips/plates used in the manufacture of welded tubes.
 ISO 15156 Petroleum and natural gas industries—Materials for use in H₂S-containing environments in oil and gas production (NACE MR0175).
 ISO 15607 Specification and qualification of welding procedures for metallic materials - General rules.
 ISO 15609 Specification and qualification of welding procedures for metallic materials - Welding procedure specification.
 ISO 15614 Specification and qualification of welding procedures for metallic materials - Welding procedure test.

Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS)

MSS SP-55 Quality Standard for Steel Castings for Valves, Flanges, Fittings and Other Piping Components - Visual Method for Evaluation of Surface Irregularities.
 MSS SP-91 Guidelines for Manual Operation of Valves.

NACE International (NACE)

NACE MR0103 Materials Resistant to Sulphide Stress Cracking in Corrosive Petroleum Refining Environments.
 NACE TM0284 Evaluation of Pipeline and Pressure Vessel Steels for Resistance to Hydrogen-Induced Cracking.

Standards Norway (NORSOK)

NORSOK M-630 Material data sheets for piping.
 NORSOK M-650 Qualification of manufacturers of special materials.

3. High pressure valves

For high pressure valves that are outside the scope of the reference standard, relevant clauses of the reference standard shall apply and valves shall be rated and designed in accordance with one of the following alternatives:

- a. ASME B16.34 standard ratings up to and including Class 4500.
- b. For weld end and compact connector valves, an ASME B16.34 intermediate rating up to Class 4500.



- c. ISO 10423 (API SPEC 6A) 10 000 or 15 000 rating (PSL2 minimum) except that for austenitic, superaustenitic, duplex, and superduplex stainless steels the allowable stress limit S_m shall be the lower of $2/3 S_y$ at design temperature or $1/3 S_u$ at design temperature. If the piping system is designed in accordance with ASME B31.3 allowable stress limits shall be as specified in that standard.

The allowable stress limits of API 6A are unconservative in the case of materials that do not exhibit a yield point and can result in "cold creep" if working or test stresses are high. The allowable stress values listed in ASME B31.3 are generally lower than those listed in ASME VIII.

Valves so designed shall be pressure tested in accordance with the applicable GIS and meet the material traceability requirements and all other relevant requirements of the applicable GIS. The API 6A monogram shall not be applied unless all requirements of that standard are also met. Weld end and compact connector valves may be designed to an intermediate API 6A pressure rating but in this case the API monogram shall not be applied.

API 6A makes no provision for intermediate ratings but this can often provide a useful weight/cost saving.

4. Large diameter flanges

For valves greater than or equal to DN 650 (NPS 26), flanges shall meet ASME B16.47 series A unless otherwise specified.

5. Alternative body/bonnet joints

Clamp type joints incorporating proprietary metal gaskets of the "Graylok" or "Techlok" type may be used on pressure ratings greater than Class 600 subject to purchaser approval.

6. Valve operation

- a. Valves shall be operated by handwheel or lever or pneumatic, hydraulic, or electric motor power actuators as indicated.
- b. Valve actuators shall meet the requirements specified.
- c. Valves shall be capable of opening and closing against a differential pressure equal to the maximum rated pressure of the valve unless otherwise advised.
- d. Unless otherwise agreed handwheel operating forces shall not exceed those specified in EN 12570 or, alternatively, those specified in MSS SP-91 with a factor of 0.5.
- e. The lever length shall not exceed twice the face to face dimensions of the valve. Maximum handwheel diameter shall be 1000 mm (40 in). Levers shall be parallel to the pipe axis with the valve in the open position and incorrect orientation relative to the position of the ball, plug, or disc, etc. shall be impossible.
- f. If a gearbox is necessary, this shall be clearly stated in the bid along with the number of handwheel turns required for a full stroke of the valve.
- g. Valves having sizes equal to or greater than those specified in Table 1 shall be provided with gearboxes unless otherwise agreed. In the case of reduced bore ball valves the nominal sizes may be increased by 50 mm (2 in).

