

TECHNICAL SPECIFICATION

THROUGH CONDUIT SLAB AND EXPANDING GATE VALVES (AMENDMENTS/SUPPLEMENTS TO API 6D)

MESC SPE 77/131

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MESC SPECIFICATION DOCUMENT



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PART I INTRODUCTION

1.1 SCOPE

This MESC SPE specifies requirements for through conduit slab and expanding gate valves. This specification shall apply in addition to the applicable MESC Buying Description, purchase order or requisition sheet.

The requirements for operation and maintenance of trunnion-mounted ball valves are outside the scope of this MESC SPE.

This specification is written as amendments and supplements to API 6D:2014 (including Errata and Addendum 1), which are covered in Part II of this MESC SPE. The clause numbering of API 6D:2014 (including Errata and Addendum 1) has been retained and any amendments are identified as 'Add', 'Modify to read' or 'Delete'. Any clauses of API 6D:2014 (including Errata and Addendum 1) that are not amended or supplemented by this MESC SPE, shall apply as written..

1.2 DISTRIBUTION, INTENDED USE AND REGULATORY CONSIDERATIONS

Unless otherwise authorised by Shell GSI, the distribution of this MESC SPE is confined to Shell companies and, where necessary, to Contractors and Manufacturers/Suppliers nominated by them.

This MESC SPE is intended for use in oil refineries, chemical plants, gas plants, exploration and production facilities and, where applicable, supply/distribution installations.

If national and/or local regulations exist in which some of the requirements may be more stringent than in this MESC SPE the Contractor shall determine by careful scrutiny which of the requirements are the more stringent and which combination of requirements will be acceptable with regards to safety, environmental, economic and legal aspects. In all cases the Contractor shall inform the Principal of any deviation from the requirements of this MESC SPE which is considered to be necessary in order to comply with national and/or local regulations. The Principal may then negotiate with the Authorities concerned, the objective being to obtain agreement to follow this MESC SPE as closely as possible.

1.3 DEFINITIONS

The **Contractor** is the party that carries out all or part of the design, engineering, procurement, construction, commissioning or management of a project, or operation or maintenance of a facility. The Principal may undertake all or part of the duties of the Contractor.

The **Manufacturer/Supplier** is the party that manufactures or supplies equipment and services to perform the duties specified by the Contractor.

The **Principal** is the party that initiates the project and ultimately pays for its design and construction. The Principal will generally specify the technical requirements. The Principal may also include an agent or consultant authorised to act for, and on behalf of, the Principal.

The word **shall** indicates a requirement.

The word **should** indicates a recommendation.

1.4 CHANGES SINCE PREVIOUS EDITION

The previous edition of this MESC SPE was dated **February 2019**. **The change is to delete the requirement for design of quarter turn valve operating mechanism, as gate valves are not quarter turn valves, to remove the word slab in paragraph 9.4.3., add Hand-wheel diameter(s) requirement in section 5.13 and to add requirements for pup-pieces for butt-welding end valves with polymeric seats.**

1.5 COMMENTS ON THIS MESC SPE

Comments on this MESC SPE may be sent to the MESC SPE Administrator at MESC@shell.com.

PART II AMENDMENTS/SUPPLEMENTS TO API 6D:2014 (INCLUDING ERRATA AND ADDENDUM 1)

3.1 Terms and Definitions

3.1.31 pressure-containing parts

Modify to read:

1. A part whose failure to function as intended results in a release of contained fluid into the environment and as a minimum includes bodies, end connections, bonnets/covers, stems and shafts that pass through the pressure boundary.

4.1 Valve Types

4.1.1 Gate Valves

Add:

1. Slab (solid) gate valves are available in two designs :-
 - a. Through Conduit Slab Gate valve using a floating seat arrangement. This design creates a positive seal by moving the floating seat against the gate with the use of spring energized force, whether low line pressure or high line pressure. The valve is bi-directional without the risk of pressure lock. The design includes a back seat.
 - b. Through Conduit Slab Gate valve using a fixed-seat arrangement. This design depends on the flow-line pressure to effect a seal. The valve is bi-directional without the risk of pressure lock. The design includes a back seat.
2. Expanding (split) gate valves are available in four designs :-
 - a. The single expanding (expand in closed position) spring retained design, whereby the relative positioning of the male and female segments of the gate are controlled by a spring. The valve is bi directional, but has a preferred direction for operation with the driven segment (segment attached to the stem) on the low pressure (downstream) side of the valve. This eliminates the possibility of the non-driven segment jamming the valve. The design includes a back seat.
 - b. The double expanding (expand in open and closed position) spring retained design, whereby the relative positioning of the male and female segments of the gate are controlled by a spring. The design shall include a seal between the male and female segments to isolate the valve center cavity from pipeline debris. The valve is bi directional, but has a preferred direction for operation with the driven segment on the low pressure (downstream) side of the valve. This eliminates the possibility of the non-driven segment causing jamming of the valve. The design renders the back seat inoperable.
 - c. The single expanding (expand in closed position) design, whereby the relative position of the male and female segments of the gate are controlled by locking plates which are rigidly fixed to the driven segment. The valve is bi directional, and capable of being operated with driven segment upstream. However when the flow is unidirectional it is preferred to have the driven segment downstream, since this reduces the load on the locking plates. The valve cannot be expanded and seated in fully open position. The design includes a back seat.
 - d. The double expanding (expand in open and closed position) cam retained design, whereby the relative position of the male and female segments of the gate are controlled by an arrangement of cam plates and control guides. These allow the gate to expand and seat in both closed and open positions. The design shall include a seal between the male and female segments to

isolate the valve center cavity from pipeline debris. The valve is bidirectional, and capable of being operated with driven segment upstream. However when the flow is unidirectional, it is preferred to have the driven segment downstream, since this reduces the load on the locking mechanism. The design renders the back seat inoperable.

- e. The double expanding designs can also incorporate a gas tight seal between the male and female segments which allows for cavity isolation in the fully open position. This feature, allows for seat performance verification in the fully open position via a cavity bleed.
- 3. All four expanding gate valve designs shall be engineered to eliminate the possibility of the segments jamming and preventing operation of the valve.
 - 4. All six designs shall eliminate potential galling of all sliding components.
 - 5. Valves having a preferred flow direction for operation shall be clearly marked as per para 11.

4.2 Valve Configurations

4.2.2 Reduced-opening Valves

Add the following 3rd bullet:

- 1. Valves above DN 600 (NPS 24): three sizes below nominal size of valve with bore according to Table 1;
- 2. The minimum and maximum internal bore dimensions shall be stated in the quotation.

5.1 Design Standards and Calculations

Add:

- 1. The body to bonnet bolt sizing shall be in accordance with ASME VIII or ASME B16.34.
- 2. For bonnet/cover attachment by bolting, the mating flange between the body and bonnet/cover shall be of a suitable shape to provide adequate strength.
- 3. Bonnet/cover flange bolting shall be of the stud or stud bolt type:
 - a. not less than four bolts shall be used in any flange;
 - b. no bolting shall be less than 10 mm (3/8 in) in diameter.
- 6. The manufacturer shall inform the Principal of any limitations.

5.2 Pressure and Temperature Rating

Add:

- 1. The valve body shall have sufficient rigidity to withstand a compressive axial thrust exerted by the connected piping, equal to the design pressure multiplied by the area of the maximum valve bore, without permanent distortion of the body or affecting the free movement and sealing of the obturator and the seats.
- 2. Valves with non-metallic (soft) seat and seal materials shall be fully rated for Class 150, 300, 600, 900, and 1500 valves in accordance with the appropriate class as specified in ASME B 16.34 or ASME B 16.5 for temperatures up to 150 °C (302°F), 120°C (248°F) for PCTFE and Class 2500 up to 120 °C (248°F) all materials.
- 3. At temperatures higher than 150 °C (302 °F), the manufacturer shall specify the rating for valves containing polymeric seat or sealing materials.
- 4. The valve shall withstand vacuum drying at pressures of 500 Pa (0.07 psia).
- 5. For non-metallic materials other than graphite, the rated pressure at the upper and lower design temperatures shall be specified on the general arrangement drawing.

5.4 Face-to-face and End-to-end Dimensions

Replace 2nd Paragraphs as follows:

1. Face-to-face and bore dimensions not covered by API Spec 6D shall be subject to prior agreement, and be stated in the quotation.
2. A short pattern ball valve shall not be furnished.

5.5 Valve Operation

Add:

1. Valve actuators shall be capable of opening and closing valves against one of the following:
 - a. Maximum specified pressure differential that can occur across the valve in service;
 - b. Differential pressure equal to the pressure rating of the valve determined in accordance with (5.2) for material at 38 °C (100 °F) in case it is specified that the cavity can be in the depressurized state.
2. All valves and all manual operators (handwheel) and all gearboxes shall be capable of opening and closing against the following:
 - a. Differential pressure equal to the pressure rating of the valves determined in accordance with (5.2) for material at 38 °C (100 °F).

5.6 Pigging

Add:

1. If specified, full bore valves shall be capable of being pigged, sphered and scraped regularly without damage to the soft seat, if fitted.
 - a. The bore of the valve in the open position shall present as smooth a profile as possible to a passing pig or scraper, verified as follows:
 - i. Pass a drift mandrel through the valve bore after the valve has been assembled, operated and pressure-tested.
 - ii. The drift mandrel length being equal to the face-to-face length of the valve.
 - iii. The drift mandrel diameter being equal to the minimum ID tolerance of the governing line pipe specification.
 - iv. The drift mandrel shall pass completely through the valve bore.

5.7 Valve Ends

5.7.1 Flanged Ends

5.7.1.1 General

Replace the 1st sentence:

1. Standard end flanges shall be furnished with a raised face or ring joint faces (raised face or full face) as specified by the Principal.
2. At least 2/3 of the change in diameter of a billet used to manufacture a flanged component shall be achieved by forging and less than 1/3 by machining.
3. The surface plane of the nut bearing area at the backside of flanged valves shall be parallel to the machined flange face within 1°.

Add:

4. For valves with heavy wall sections, flanges with nut stops in accordance with Mandatory Appendix 2, Figure 2-4 (Sketch 12 or 12a) of ASME BPVC, Section VIII, Division 1 may