INTERNATIONAL STANDARD

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Bolted bonnet steel gate valves for the petroleum, petrochemical and allied industries

Robinets-vannes en acier à chapeau boulonné pour les industries du pétrole, de la pétrochimie et les industries connexes

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 10434 was prepared by Technical Committee ISO/TC 153, *Valves*, Subcommittee SC 1, *Design, manufacture, marking and testing* in collaboration with Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*, Subcommittee SC 6, *Processing equipment and systems*.

This second edition cancels and replaces the first edition (ISO 10434:1998), which has been technically revised.

Introduction

The purpose of this International Standard is to establish the basic requirements and practices for flanged and butt-welding end steel gate valves of bolted bonnet construction that parallel those given in American Petroleum Institute API Standard 600, eleventh edition, 2001 (ISO 10434:1998). It is not the purpose of this International Standard to replace ISO 6002 or any other International Standard that is not identified with petroleum refinery, petrochemical or natural gas industry applications.

Bolted bonnet steel gate valves for the petroleum, petrochemical and allied industries

1 Scope

This International Standard specifies the requirements for a heavy-duty series of bolted bonnet steel gate valves for petroleum refinery and related applications where corrosion, erosion and other service conditions would indicate a need for full port openings, heavy wall sections and large stem diameters.

This International Standard sets forth the requirements for the following gate valve features:

— bolted bonnet;

— outside screw and yoke;

— rising stems;

— non-rising handwheels;

— single or double gate;

— wedge or parallel seating;

— metallic seating surfaces;

— flanged or butt-welding ends.

It covers valves of the nominal sizes DN:

— 25; 32; 40; 50; 65; 80; 100; 150; 200; 250; 300; 350; 400; 450; 500; 600;

corresponding to nominal pipe sizes NPS:

— 1; 1 1/4; 1 1/2; 2; 2 1/2; 3; 4; 6; 8; 10; 12; 14; 16; 18; 20; 24;

and applies for pressure Class designations:

— 150; 300; 600; 900; 1500; 2500.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 7-1, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation*

ISO 5208, *Industrial valves — Pressure testing of valves*

ISO 5209, *General purpose industrial valves — Marking*

ISO 5210, *Industrial valves — Multi-turn valve actuator attachments*

ISO 5752, *Metal valves for use in flanged pipe systems — Face-to-face and centre-to-face dimensions*

ISO 9606-1, *Approval testing of welders — Fusion welding — Part 1: Steels*

ISO 15607, *Specification and qualification of welding procedures for metallic materials — Part 1: General rules*

ISO 15609-1, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 1: Arc welding*[1)]

ISO 15610, *Specification and qualification of welding procedures for metallic materials — Qualification based on tested welding consumables*

ISO 15614-1, *Specification and qualification of welding procedures for metallic materials — Welding procedure test — Part 1: Arc and gas welding of steels and arc welding of nickel and nickel alloys*

ISO 15614-2, *Specification and qualification of welding procedures for metallic materials — Welding procedure test — Part 2: Arc welding of aluminium and its alloys*[2)]

ASME B1.1, *Unified inch screw threads (UN and UNR thread form)*

ASME B1.5, *Acme screw threads*

ASME B1.8, *Stub acme screw threads*

ASME B1.12, *Class 5 interference-fit thread*

ASME B1.20.1, *Pipe threads, general purpose (inch)*

ASME B16.5, *Pipe flanges and flanged fittings*

ASME B16.10, *Face-to face and end-to-end dimensions of valves*

ASME B16.11, *Forged fittings, socket-welding and threaded*

ASME B16.34:1996, *Valves — Flanged, threaded and welding end*

ASME B18.2.2, *Square and hex nuts — Inch series*

ASME BPVC-IX, *BPVC Section IX — Welding and brazing qualifications*

ASTM A193, *Standard specification for alloy-steel and stainless steel bolting materials for high temperature service*

ASTM A194, *Standard specification for carbon and alloy steel nuts for bolts for high pressure or high temperature service, or both*

1) To be published. (Replaces ISO 9956-2:1995)

2) To be published. (Replaces ISO 9956-4:1995)

ASTM A307, *Standard specification for carbon steel bolts and studs, 60 000 PSI tensile strength*

MSS-SP-55, *Quality standard for steel castings for valves, flanges and fittings and other piping components — Visual method for evaluation of surface irregularities*

3 Terms and definitions

For the purposes of this document, the definitions for pressure designation, Class, and nominal valve size NPS given in ASME B16.34, and the following apply.

3.1
DN
alphanumeric designation of size for components of a pipework system, which is used for reference purposes, comprising the letters DN followed by a dimensionless whole number which is indirectly related to the physical size, in millimetres, of the bore or outside diameter of the end connections

[ISO 6708:1995, definition 2.1]

4 Pressure/temperature ratings

4.1 The pressure/temperature ratings applicable to valves specified in this International Standard shall be in accordance with those specified in the tables of ASME B16.34 for Standard Class for the applicable material specification and the applicable Class. Restrictions of temperature and pressure, for example, those imposed by special soft seals or special trim materials, shall be marked on the valve identification plate, see 8.4.

4.2 The temperature for a corresponding pressure rating is the maximum temperature of the pressure-containing shell of the valve. In general, this temperature is the same as that of the contained fluid. The use of a pressure rating corresponding to a temperature other than that of the contained fluid is the responsibility of the user.

4.3 For temperatures below the lowest temperature listed in the pressure/temperature tables (see 4.1), the service pressure shall be no greater than the pressure for the lowest listed temperature. The use of valves at lower temperatures is the responsibility of the user. Consideration should be given to the loss of ductility and impact strength of many materials at low temperature.

4.4 Double seated valves, in some design configurations, may be capable of trapping liquid in the centre cavity of the valve when in the closed position. If subjected to an increase in temperature, an excessive build-up of pressure may occur leading to a pressure boundary failure. Where such condition is possible it is the responsibility of the user to provide, or require to be provided, means in design, installation or operating procedure to assure that the pressure in the valve does not exceed that allowed by this International Standard for the resultant temperature.

5 Design

5.1 Body wall thickness

5.1.1 A valve body schematic is shown as Figure 1. The minimum body wall thickness, t_m, at the time of manufacture shall be as given in Table 1, except as indicated in 5.1.2 for butt-welding valve ends. Additional metal thickness needed for assembly stresses, stress concentrations, and shapes other than circular shall be determined by individual manufacturers, since these factors vary widely.