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पोतनिर्माण — समुद्री वाल्व और कॉक के
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(पहला पुनरीक्षण)

Indian Standard

SHIPBUILDING — GUIDELINES FOR
SELECTION OF MARINE VALVES AND COCKS

(*First Revision*)

UDC 629.12.061 : 621.646.21.6

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Shipbuilding Sectional Committee had been approved by the Transport Engineering Division Council.

This standard is one of the series of Indian Standards on valves. Other standards in the series shall cover details of each type of valve, such as globe valves, gate valves, check valves, butterfly valves and diaphragm valves individually.

This standard was first issued in 1984 and was based on JIS F 7300-1975 'Application standard for marine valves and cocks', issued by the Japanese Industrial Standards Committee (JISC). The present revision is based on specific comments received from the Shipbuilding Industry and also from users on the various requirements stipulated in the 1984 version. Some of the salient features of this revision are given below:

- Classification of piping systems has been introduced based on media handled, pressure and temperature;
- Provision for remote operation arrangement for the valves for certain duties;
- Various clauses under grouping of valves and cocks according to piping system have been considerably revised; and
- The clauses pertaining to installation guidelines have been considerably revised.

The Committee responsible for the preparation of this standard is given in Annex A.

*Indian Standard***SHIPBUILDING — GUIDELINES FOR
SELECTION OF MARINE VALVES AND COCKS***(First Revision)***1 SCOPE**

This Indian Standard gives guidelines for the selection of valves and cocks, used in ships general pipings, based on their function, pressure and temperature ranges and various piping systems.

2 REFERENCES

The following Indian Standards are necessary adjuncts to this standard:

<i>IS No.</i>	<i>Title</i>
3233 : 1965	Glossary of terms for safety and relief valves and their parts
4854 (Part 1) : 1969	Glossary of terms for valves and their parts: Part 1 Screw-down stop, check and gate valves and their parts
4854 (Part 2) : 1969	Glossary of terms for valves and their parts: Part 2 Plug valves and cocks and their parts
4854 (Part 3) : 1984	Glossary of terms for valves and their parts: Part 3 Butterfly valves

3 TERMINOLOGY

For the purpose of this standard, the definitions given in the following Indian Standards shall apply:

- IS 3233 : 1965;
- IS 4854 (Part 1) : 1969;
- IS 4854 (Part 2) : 1969; and
- IS 4854 (Part 3) : 1984.

4 GENERAL**4.1 Classification of Piping Systems**

Piping systems are classified based upon the media handled, pressure and temperature as given in Table 1.

4.1.1 Remote operation arrangement shall be provided for the valves for certain duties as

required by Regulatory/Classification Authorities.

4.2 Materials**4.2.1 Cast Iron Valves/Cocks**

Cast iron valves/cocks are not to be used for application below:

- a) Boiler blow down systems and other piping systems subject to shock or vibration;
- b) Ship-side valves and fittings;
- c) Valves on collision bulkhead; and
- d) Outlet valves of fuel tanks with static head.

4.2.2 It is recommended that bronze/gun metal valve bodies should not be used for Class I piping systems.

4.2.3 Copper and copper alloy valves and fittings over 25 NB size are not to be used for fuel oil systems.

4.2.4 Spindles of all underwater valves shall be of non-corrosive materials.

4.2.5 The following materials are recommended for fittings:

<i>Piping</i>	<i>Valves</i>	
	<i>Body</i>	<i>Internals</i>
Carbon steel	Carbon steel	Gunmetal
	Cast iron	Stainless steel
	Gunmetal	Aluminium Bronze
Copper	Gunmetal	Gunmetal High tensile brass
Copper Nickel	Gunmetal	Gunmetal
Iron	Bronze	Aluminium Bronze

5 GROUPING OF VALVES AND COCKS BY THEIR FUNCTION AND APPLICATION

The valves and cocks in this standard shall be grouped as follows according to their function and application.

Table 1 Classification of Piping Systems
(Clause 4.1)

Piping Systems	Class 1		Class 2		Class 3	
	Pressure Bar (MPa)	Design Temp°C	Pressure Bar (MPa)	Design Temp°C	Pressure Bar (MPa)	Design Temp°C
Steam	> 16 (1.6)	> 300	≤ 16 (1.6) > 7 (0.7)	≤ 300	≤ 7 (0.7)	≤ 170
Fuel oil	> 16 (1.6)	> 150	≤ 16 (1.6) > 7 (0.7)	≤ 150	≤ 7 (0.7)	≤ 160
Other media	> 40 (4.0)	> 300	≤ 40 (4.0) > 16 (1.6)	≤ 300	≤ 16 (1.6)	≤ 200

5.1 Globe Valves and Angle Valves

These valves find wide application generally in flow regulation duties and also applicable to duties under high temperature and pressure. Globe valves are designed to be useful in linear portions of pipings and angle valves in bent portions. Discs for straight and angle type of valves shall be provided with guide for seating in all positions particularly for large sizes.

5.2 Gate Valves

Gate valves are not suited for flow regulation duties and those with inside screw type are not suited for duties under high temperature and pressure on account of their construction. Generally, gate valves are used either being fully opened or closed. These types of valves have smaller resistance against fluids. Because of shorter distance between flange faces than that of globe valves, gate valves are better suited for applications in pipings where spaces are limited. Gate valves are more economic than the globe valves for larger sizes. These types of valves are not considered suitable for Class 1 piping systems.

5.3 Check Valves

Check valves are designed to be installed in sections where counterflow must be prevented. Their use varies in screw-down check valves, lift check valves and swing check valves. These types of valves are not considered suitable for Class 1 steam piping systems.

5.3.1 Screw-down check valves are used in positions where both counterflow check and flow regulations including positive closing are required and may be re-grouped into globe valves and angle valves.

5.3.2 Lift check valves are used in positions where only counterflow check is required and again can be re-grouped in globe valves and angle valves.

5.3.3 Swing check valves are used in positions where it is required that the valves are opened and closed by small difference in pressure and that the resistance against fluid is small when

it passes through the valves. Swing check valves, however, are not suited for duties under high temperature and pressure on account of their construction.

5.4 Cocks

Cocks are used in positions where quick opening and closing of passage or switching of flow direction is required. Especially for switching flow direction, threeway cocks are useful. Another application of cocks is where there are space restrictions since cocks can be fitted directly to the bodies of such items as filters, chests, etc. These types of fittings are not considered suitable for Class 1 piping systems.

5.5 Ball and Plug Valves

Ball and plug valves should be selected for on/off duties where low pressure drop and minimal turbulence are important.

5.6 Butterfly Valves

Butterfly valves are generally used for on/off duties in sizes 100 mm and over. Below this restriction due to disc thickness becomes excessive.

5.6.1 For sea inlets butterfly valves are to be not less than 150 mm size due to possibility of this type of valve becoming fouled with sea weed. However, the use of butterfly valves for sea inlets is not preferable.

5.7 Where valves are not operated for long periods the starting torque may be very high. In such cases use of screw down or diaphragm type valves may be considered.

6 PRESSURE RANGES

6.1 The valves shall be suitable for pressure ranges of 6, 10, 16, 25 and 40 bars (1 bar = 100 kPa).

7 APPLICATION OF VALVES AND COCKS ACCORDING TO PIPING SYSTEM

7.1 Steam Pipings

7.1.1 When screwed bonnet type valves of smaller aperture are to be used in steam pipings,

union bonnet type shall be preferred so as not to cause any loose engagement in threads by opening and closing of the valves. In case screwed bonnet type valves are used for smaller apertures, the same shall be provided with locking arrangement.

7.1.2 For systems having comparatively large number of drains or for larger apertures, cast steel valves are recommended for safety even for working pressures around 10 bars (1 MPa).

7.1.3 Cocks shall be used only with drains of saturation temperature of lower and shall be used up to maximum working pressure of 10 bars (1 MPa).

7.1.4 For drain pipings on higher pressure level to trap, globe valves and angle valves shall be used.

7.2 Fresh Water Pipings and Feed Water Pipings

7.2.1 Temperature conditions shall be considered when butterfly valves are to be used. Generally, those having rubber valve seat shall preferably be used under temperature 70°C.

7.2.2 Cocks may be used with non-shock water of 120°C or lower up to a maximum working pressure of 25 bars (2.5 MPa).

7.3 Sea Water Pipings and Ship Side Valves and Cocks

7.3.1 General Sea Water Pipings

7.3.1.1 Cocks may be used with non-shock water up to a maximum pressure of 25 bars (2.5 MPa).

7.3.1.2 Types of valves and pressure ranges application for sea water pipings shall also be applicable to bilge pipings and ballast sea water pipings, as sea water accounts for quite a large rate in these pipings. It is convenient to connect these valves to distribution valves with connecting pieces or to use manifold valves. Manifold valves may be used in respect of non-shock water up to a maximum working pressure of 6 bars (0.6 MPa).

7.3.1.3 For fire hose connections, it is convenient to use hose connections and fittings with globe valves and angle valves of nominal diameters 65 mm.

7.3.2 Ship Side Valves and Cocks

7.3.2.1 Materials with elongation less than 12 percent are not to be used for ship side valves and cocks.

7.3.2.2 Globe valves, angle valves and gate valves may be used for ship side valves. Cocks may be used for special applications such as boiler water blow-off.

7.3.2.3 For boiler water blow-off cocks may be used.

7.4 Cargo Oil Piping

7.4.1 Cocks may be used up to a maximum working pressure of 16 bars (1.6 MPa).

7.4.2 For application with crude oil, both cast iron valves and cast steel valves may be used.

7.4.3 Butterfly valves may be used instead of gate valves.

7.5 Compressed Air Pipings

7.5.1 Globe valves and angle valves may be used up to a maximum working pressure of 40 bars (4 MPa).

7.5.2 Gate valves, swing check valves and cocks shall not be used in compressed air pipings.

7.5.3 Hose globe valves and angle valves may also be used for cleaning and other services up to a maximum working pressure of 10 bars (1 MPa).

8 INSTALLATION

8.1 Globe Valves and Angle Valves

8.1.1 Preferably, these valves shall be so installed that the stems stand upright, but may be installed in any direction according to the circumstances in piping.

8.1.2 Usually, they shall be so installed that the flow is directed upward from under the valve seat, that is, in the direction of arrow head as indicated on the valves.

8.2 Check Valves

8.2.1 Screw-down check valves shall be so installed that the stem stands upright. However, if they are spring loaded type, they may be installed in any position.

8.2.2 Lift check valves shall be installed as mentioned in **8.2.1**, though they are not equipped with handle or stem.

8.2.3 Swing check valves shall normally be installed with the bonnet being oriented upward but when the valves are to be installed onto vertical pipings, the bonnet may be oriented sideways so that the disc opens upward. Where downward disc opening is required, disc is to be provided with the counter weight.

8.2.4 In all cases, arrow head on valves must be carefully indicated so that the flow is directed from under the disc to upward.

8.3 Cocks

8.3.1 Cocks shall be installed preferably with the plug being oriented upward but may be

installed in any direction according to the circumstances in piping. However, type of the plug shall be so selected that it may not be opened due to vibration.

8.3.2 In respect of direction of flow, screwed cocks shall be installed with the fitting screwed side being oriented to inlet, while in union and flanged type cocks the flow direction may be determined from either side.

8.4 Selection of Packing

8.4.1 Gaskets for valve bonnet and packing for stem shall be selected in accordance with its compatibility with fluid and its conditions.

8.5 Bonnet Locking

8.5.1 Union bonnet type valves are so designed that the bonnet does not normally come out of its position even without being provided with locking.

8.6 Remote Control

8.6.1 Open/shut indicators for various valves and cocks shall be provided at local/remote operating positions.

8.7 Name Plate and Markings

8.7.1 It is not possible to specify the particulars to be inscribed on the name plate since

such particulars are to be determined according to the use of each valve. But it is desirable that such particulars may be marked indelibly, especially the arrow head for opening the valve and the use thereof.

8.7.2 The direction of the flow for all valves, particularly non-return check valves, etc, are to be cast on the valve body externally.

8.8 Valve Opening Indicator

For rising stem type valves, normally no opening indicator is provided as it can be ascertained by seeing the position of the handle. Such indicators are provided for valves of non-rising stem type and for ships side valves.

8.9 Piping Connections

8.9.1 Valves and cocks are available in screwed, union and flanged types for connection with pipings.

8.9.2 Hose valves are designed for connection with hose and purported for special applications.

8.9.3 For pipings for duties under high temperature and pressure, valves of socket welding end and butt welding end are also in use.

ANNEX A*(Foreword)***COMMITTEE COMPOSITION**

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Marine Piping Subcommittee, TE 17 : 1

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BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002

Telephones : 331 01 31, 331 13 75

Telegrams : Manaksanstha
(Common to all Offices)

Regional Offices :

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg
NEW DELHI 110002

Telephone

{ 331 01 31
331 13 75

Eastern : 1/14 C. I. T. Scheme VIII M, V. I. P. Road, Maniktola
CALCUTTA 700054

{ 37 84 99, 37 85 61
37 86 26, 37 86 62

Northern : SCO 335-336, Sector 34-A, CHANDIGARH 160022

{ 60 38 43,
60 20 25,

Southern : C. I. T. Campus, IV Cross Road, MADRAS 600113

{ 235 02 16, 235 04 42
235 15 19, 235 23 15

Western : Manakalaya, E9 MIDC, Marol, Andheri (East)
BOMBAY 400093

{ 632 92 95, 632 78 58
632 78 91, 632 78 92

Branch : AHMADABAD. BANGALORE. BHOPAL. BHUBANESHWAR. COIMBATORE.
FARIDABAD. GHAZIABAD, GUWAHATI. HYDERABAD. JAIPUR. KANPUR
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