

Application of pressure gauges on board

1. Scope This Japanese Industrial Standard specifies the types, sizes, maximum scale graduation, application, outline and installation of Bourdon tube pressure gauges specified in JIS B 7505 when they are used in the machinery of ships.

Remarks: This standard makes reference to the following standards:

JIS B 7505 Bourdon tube pressure gauges

JIS F 7021 Shipbuilding - Auxiliary machines - gauge boards

2. Outlines of Bourdon tube pressure gauges used onboard ships

2.1 Outlines of Bourdon tube pressure gauges shall be as classified into the following three divisions as given in Table 1, among those specified in JIS B 7505.

Table 1 Outlines of Bourdon tube pressure gauge

Division	Shape symbol
Round flange type	B
Trimmed flanged type	B2
Flush mounting type	D

2.2 Types, sizes and maximum scale graduations of Bourdon tube pressure gauges shall be as given in Table 2, among those specified in JIS B 7505.

Table 2 Types, sizes and maximum scale graduations of Bourdon tube pressure gauges

Type	Size mm	Maximum scale graduation of pressure part MPa	Maximum scale graduation of vacuum part MPa
Pressure gauge	60	— 0.1, 0.16, 0.25, 0.4, 0.6, 1, 1.6, 2.5, — — — — — — — — — —	—
	75	— 0.1, 0.16, 0.25, 0.4, 0.6, 1, 1.6, 2.5, 4, 6, — — — — — — — — — —	—
	100	0.06 0.1, 0.16, 0.25, 0.4, 0.6, 1, 1.6, 2.5, 4, 6, 10, 16, — — — — — — — — — —	—
Compound gauge (2)	150	0.06 0.1, 0.16, 0.25, 0.4, 0.6, 1, 1.6, 2.5, 4, 6, 10, 16, — — — — — — — — — —	—
	60	— 0.1, 0.16, 0.25, 0.4, 0.6, 1, — — — — — — — — — —	—0.1
	75	— 0.1, 0.16, 0.25, 0.4, 0.6, 1, — — — — — — — — — —	—
Vacuum gauge	100	— 0.1, 0.16, 0.25, 0.4, 0.6, 1, 1.6, — — — — — — — — — —	—
	150	— 0.1, 0.16, 0.25, 0.4, 0.6, 1, 1.6, — — — — — — — — — —	—
	100	— — — — — — — — — — — — — — — —	—0.1

2.3 Applications of Bourdon tube pressure gauges shall be as given in Table 3.

Table 3 Applications of Bourdon tube pressure gauge

Division by application	Symbol	Application				
		Ambient temperature	Vibration at installed location	Sharp pressure change	Remarks	
Ordinary type	I.6	—	45°C~~5°C	Insignificant	None	For general use
For Steam, ordinary type		M	50°C~10°C	Insignificant	None	—
Heat-resistant type		H	80°C~~5°C	Insignificant	None	—
Vibration-resistant type		V	45°C~~5°C	Significant	None	—
					Subjected to cycled pressure changes at all times.	For those used in areas where gauges are subjected to particularly sharp pressure changes, appropriate throttles or other damping means shall be provided.
For steam, vibration-resistant type	MV	50°C~10°C	Significant	None	Vibration-resistant type for service at ambient temperatures of 50°C or below	
				Subjected to cycled pressure changes at all times.	For those used in areas where gauges are subjected to particularly sharp pressure changes, appropriate throttles or other damping means shall be provided.	
Heat- and vibration-resistant type	HV	80°C~~5°C	Significant	None	Subjected to cycled pressure changes at all times.	
				Requirements for both heat-resisting and vibration-resisting services shall be satisfied.	For those used in areas where gauges are subjected to particularly sharp pressure changes, appropriate throttles or other damping means shall be provided.	

2.4 Threads at joint connections of Bourdon tube pressure gauges shall be as given in Table 4. However, other threads may be used according to the purchaser's request.

Table 4 Threads at joint connection of Bourdon tube pressure gauge

Outline	Size mm	Joint thread size	
		Nominal designation of pipe thread	Outside dia. mm
B, B2	60	G1/4	13.157
B, B2	75	G3/8	16.662
B, B2	100, 150	G1/2	20.955
B, B2, D	75, 100, 150	G3/8	16.662
D	100, 150	G1/2	20.955

2.5 The geometric shapes of Bourdon tube pressure gauges at joint connections shall be flared round broach (symbol U), square (symbol T), or hexagonal (symbol S), and width across flats shall be as given in Table 5.

Table 5 Width across flats

Width across flats	Unit: mm					
	12	14	17	19	22	24
Permissible dimensional deviation		0			0	
		-0.43			-0.84	

2.6 Holes for machine screws for fixing Bourdon tube pressure gauges shall conform to JIS F 7021.

2.7 Bourdon tube pressure gauges shall be designated by type, outline, division of application, nominal designation of thread at joint connection, size and maximum scale graduation in the order specified in JIS B 7505.

Example: Round flange-form vacuum gauge, Grade I.6 ordinary type, nominal size of pipe thread of G 1/2, size 150 mm, maximum scale graduation of -0.1MPa
JIS B 7505 Vacuum gauge B 1.6 1/2 × 150 × (-)0.1 MPa

3. **Shipboard installation of Bourdon tube pressure gauges** Shipboard installation of Bourdon tube pressure gauges shall be in accordance with Attached Table I.

4. Precautions when installing Bourdon tube pressure gauges

4.1 When the internal temperature of a Bourdon tube pressure gauge is likely to exceed 50°C due to the effects of the temperature of the working fluid, it is desirable to maintain the temperature of the working fluid at low temperatures by the following means:

- (1) A loop as shown in Fig. 1 shall be provided at the lower portion of the Bourdon tube pressure gauge.
- (2) The Bourdon tube pressure gauge shall be installed at the location as shown in Fig. 2 (e.g., a Bourdon tube pressure gauge is located at a position lower than the fitted position of the pressure gauge connection on the boiler shell), so that drain in the pressure gauge leading pipe is not affected by convection of boiler water.
- (3) A water seal pot as shown in Fig. 3 shall be provided below the Bourdon tube pressure gauge.

Fig. 1 Loop seal

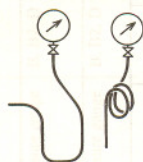


Fig. 2 U-tube

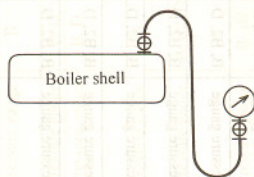
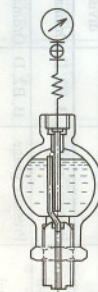


Fig. 3 Water seal pot



4.2 It is necessary to arrange the leading pipe of a vacuum gauge so that drain will not remain inside.

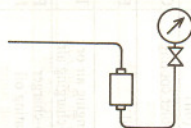
4.3 Where pressures are to be measured, either a master valve or a master cock shall be provided, and an additional valve or cock for a Bourdon tube pressure gauge shall be provided. In the following cases, however, the valve or cock for the Bourdon tube pressure gauge may be omitted:

- (1) When the distance between the detecting end and the Bourdon tube pressure gauge is small.
- (2) When a master valve or a master cock is provided at a location that is convenient for valve- or cock-handling.
- (3) When swing motions of a gauge pointer are unlikely.

4.4 If the gauging object is liquid, the difference in elevation between the installed location of the Bourdon tube pressure gauge and the detecting end is large, and significant effects on the gauged results are expected, corrections to an indicated pressure are necessary.

4.5 If the gauging object is heated fuel oil, and there is a possibility that the fuel oil is likely to solidify due to the heat radiated from the leading pipe, a seal pot containing a liquid with a specific gravity that is different from a gauging object with less viscosity (ethylene glycol etc.) shall be provided at an intermediate point of the leading pipe. The properties (flash point, ignition point) of the sealed liquid shall be taken into account for the fuel oil temperature at the seal pot. An application example of a seal pot is shown in Fig. 4.

Fig. 4 Example of seal pod arrangement



Attached Table 1

Plant Division		Name	Measuring point	No. of gauges	Location of gauge (1)	Pressure gauge				
						Type	Outline	Application division (2)	Size (3) mm	Maximum scale graduation (4)
Internal combustion engine plant	Main internal combustion engine	Bearing lubricating oil	Bearing lubricating oil main	1 for each engine	Local gauge board /Remote control panel	Pressure gauge	B, B2, D	Ordinary or V	75, 100, 150	0.6MPa
		Crosshead lubricating oil	Lubricating oil inlet piping	1 for each engine	Local gauge board /Remote control panel	Pressure gauge	B, B2, D	Ordinary or V	75, 100, 150	0.6MPa, 1 MPa or 4.0 MPa
		Starting air	Before starting air stop valve	1 for each engine	Local gauge board /Remote control panel	Pressure gauge	B, B2, D	Ordinary or V	75, 100, 150	1.35 ~2.0 times the working pressure
		Cylinder cooling water	Cooling water main	1 for each engine	Local gauge board /Remote control panel	Pressure gauge	B, B2, D	Ordinary or V	75, 100, 150	0.6 MPa
		Piston cooling water (oil)	Piston cooling water (oil) main	1 for each engine	Local gauge board /Remote control panel	Pressure gauge	B, B2, D	Ordinary or V	75, 100, 150	0.6 MPa
		Fuel valve cooling water (oil)	Cooling water (oil) piping	1 for each engine	Local gauge board /Remote control panel	Pressure gauge	B, B2, D	Ordinary or V	75, 100, 150	0.6 MPa
		Air cooler cooling water	Cooling water inlet piping	1 for each engine	Local gauge board	Pressure gauge	B, B2, D	Ordinary or V	75, 100, 150	0.4 MPa
		Fuel oil	F.O. pump suction piping	1 for each engine	Local gauge board /Remote control panel	Pressure gauge	B, B2, D	Ordinary or V	75, 100, 150	1.35 to 2.0 times the working pressure
		Scavenging air or turbo-charging air	Turbo-charger outlet or main	1 for each engine	Local gauge board /Remote control panel	Pressure gauge	B, B2, D	Ordinary or V	75, 100, 150	0.4 MPa
		Turbo-charger lubricating oil	Pump outlet or turbo-charger lubricating oil main	1 for each engine	Local gauge board /Remote control panel in the vicinity of turbo-charger	Pressure gauge	B, B2, D	Ordinary or V	75, 100, 150	0.4 MPa
		Camshaft lubricating oil	Pump outlet or camshaft lubricating oil main	1 for each engine	Local gauge board /Remote control panel	Pressure gauge	B, B2, D	Ordinary or V	75, 100, 150	0.6MPa
		Manoeuvring air	Manoeuvring system inlet main	1 for each engine	Local gauge board /Remote control panel	Pressure gauge	B, B2, D	Ordinary or V	75, 100, 150	1.6 MPa