

Shipbuilding - Internal wiring and piping of engine control console

1. Scope This Japanese Industrial Standard specifies internal wiring and piping for use between various devices mounted in marine control equipment intended mainly for engine control, monitoring, and alarms (hereinafter referred to as “control console”), and those between these devices and external wiring and piping connection points of the control console.

2. Reference standards The following standards form part of this Standard when quoted. The latest edition of these standards shall be applied.

JIS C 1610	Extension and compensating cables for thermocouples
JIS C 2805	Crimp-type terminal lugs for copper conductors
JIS C 3410	Cables and flexible cords for electrical equipment of ships
JIS F 7329	Shipbuilding - Forged steel 40 K globe valves
JIS F 7341	Shipbuilding - Forged steel 100 K pressure gauge valves
JIS F 7343	Shipbuilding - Bronze 20 K pressure gauge valves
JIS F 7379	Shipbuilding - Brass 30 K stop valves with bite joint(s)
JIS F 7387	Shipbuilding - Bronze 16 K cocks
JIS F 7388	Shipbuilding - Bronze 20 K globe valves
JIS F 8813	Shipbuilding - Crimp terminal boards
JIS G 3454	Carbon steel pipes for pressure service
JIS G 3456	Carbon steel pipes for high temperature service
JIS H 3300	Copper and copper alloy seamless pipes and tubes

3. Wiring

3.1 Wiring materials

Wires to be used shall conform to the requirements of **JIS C 3410**, or have equivalent mechanical and electrical performance, and in addition, conform to **Table 1** and the following requirements:

Table 1

Wire classification		Application	
Nominal sectional area, mm ²	Insulation	Voltage V	Circuit type
0.75 ~ 16	Polyvinyl chloride or equivalent	0.6/1 kV 250 V	General circuits (Applicable to circuits of 250 V or more) General circuits (Applicable to circuits of less than 250V)
1 ~ 2.5		150 V	a) Circuit for instrumentation, automation, ship internal communications, etc., having circuit protective devices.
0.5 ~ 1			b) Circuits without circuit protective devices, in which maximum short-circuit current does not exceed maximum permissible current of wires.

- Wires subject to motions shall have sufficient flexibility.
- Polyvinyl chloride (PVC) used for wire insulation shall be heat-resistant (temperature rating of 75°C).
- Wiring to a part which may reach a high temperature of 70°C or more shall be composed of wires for high temperature applications or shall be of wires with heat shield.
- Sizes (sectional area) of wires shall be selected with an ample allowance considering the passing current amperage and voltage drop involved.
- In principle, lead wires used for a temperature metering circuit employing a thermocouple or thermocouples shall be provided with compensation wires conforming to **JIS C 1610**.
- Wires used for a circuit that is likely to have an influence on or to be influenced by other circuits through electromagnetic or electrostatic induction, noise, etc., shall be provided with shields.
- Special consideration shall be given to the effects of impedance on special wires used for electronic equipment.

3.2 Terminal boards for external wire connections

A terminal board for external wire connections shall conform to the following requirements:

- A wire terminal shall conform to **JIS C 2805** or shall have equivalent mechanical and electrical performance.
- A terminal board terminal shall conform to **JIS F 8813** or shall have equivalent mechanical and electrical performance.
- Terminal boards shall be provided at a place that permits easy wire connection and maintenance, preferably grouped in each of the divided compartments of the control console.
- The arrangement of terminal boards shall be as shown in **Fig. 1** or **Fig. 2** to permit easy connection of external wires.

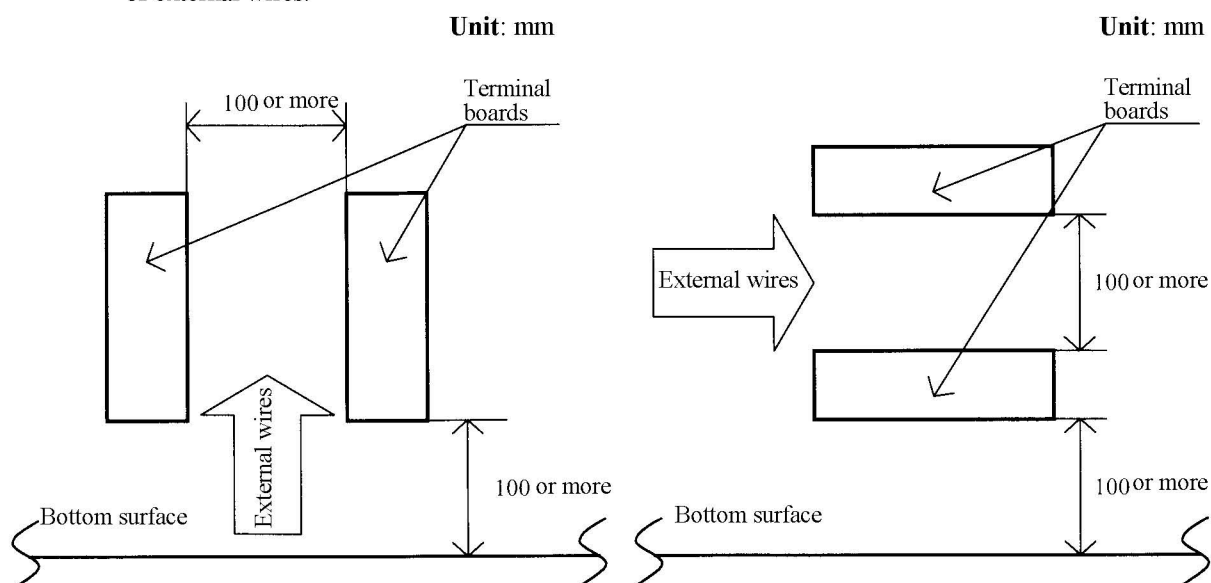


Fig. 1 Longitudinal arrangement

Fig. 2 Transverse arrangement

- A terminal board shall be marked with the same code as in the drawing and, if necessary, also with a circuit description or number.
- Terminals on a terminal board shall be suitably arranged for groups of external wires, preferably in specific application groups. In particular, terminals involving a circuit voltage of 440V or more shall be separated as a block and suitably marked for easy identification.

The terminals for an intrinsically safe apparatus contained in the control console shall be spaced 50 mm or more from other terminals or electrically isolated from them by means of a barrier having sufficient strength and insulating properties. Further, these terminals shall be marked to indicate that they are connection terminals for an intrinsically safe circuit.

- Terminal boards shall be completely isolated from piping joints of steam, water, oil, etc., by means of a partition or protective covering.
- It is preferable to limit the number of wires to be connected to one terminal on a terminal board to one for external terminal, and two for internal terminal.
- Terminals on a terminal board for a circuit that does not permit any kind of insulation resistance test or voltage withstand test shall be provided with a suitable warning means, such as by affixing a warning notice.

3.3 Connectors for wires A pair of separable wire connectors shall conform to the following requirements:

- A connector pair shall be provided with a means to prevent accidental disconnection due to vibration.
- A connector pair shall be guide-keyed to prevent the connection with incorrect polarity. When two or more connector pairs of the same type are used, the individual connectors of each pair shall be marked with a match mark or other suitable identifying symbol.