

JIS

JAPANESE INDUSTRIAL STANDARD

**Compression type tube fittings
for machine tools**

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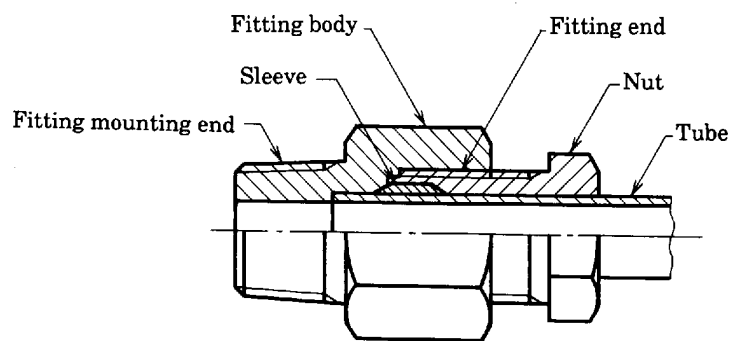
B 6164-1996

1. **Scope** This Japanese Industrial Standard specifies the compression type tube fittings ⁽¹⁾ (hereafter referred to as "fittings") to be used mainly for the metal tubes specified in the Annex, among the tube fittings to be used in the lubrication piping systems of rated pressure 2.5 MPa or under for machine tools.

Note ⁽¹⁾ The fittings of such type that the tube is connected to the fitting by compressing the sleeve to the tube, so that the pressurized fluid is hermetically sealed. Examples of the structure are given in Fig. 1.

Fig. 1

(A) Taper thread nipple



(B) Parallel thread elbow

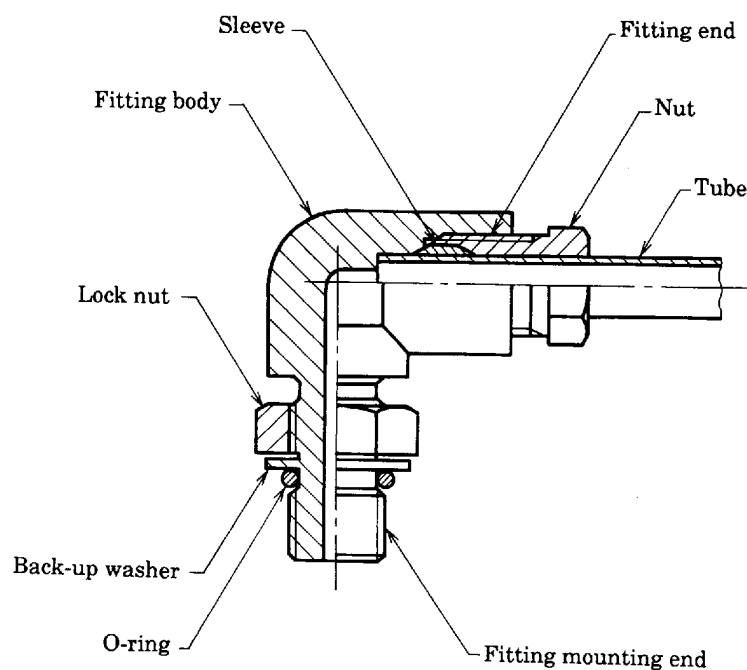
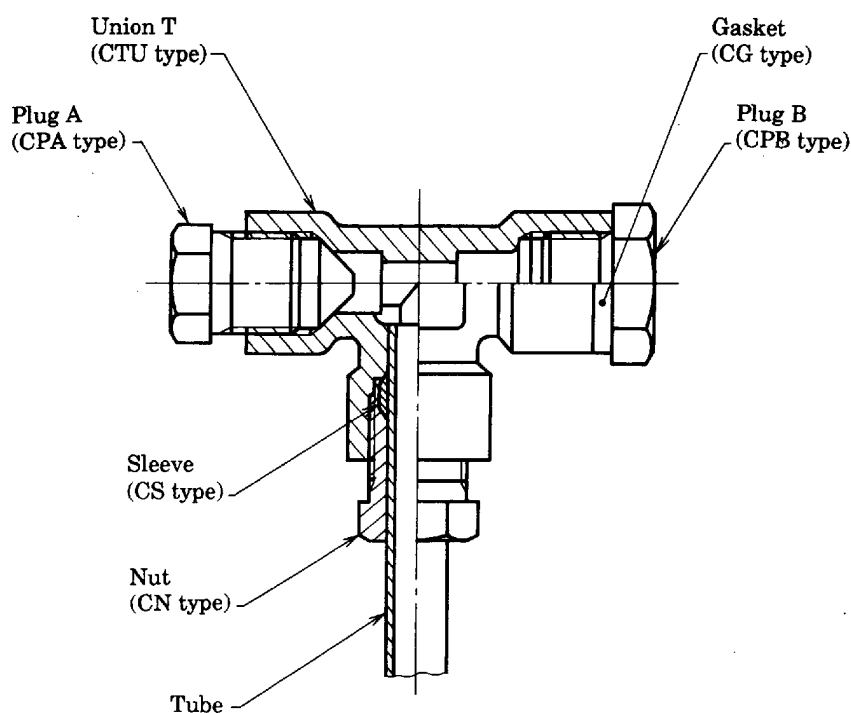


Fig. 1. (continued)

(C) Union T and plug A • plug B



Remarks: The following standards are cited in this Standard:

- JIS B 0202 Parallel pipe threads
- JIS B 0203 Taper pipe threads
- JIS B 0207 Metric fine screw threads
- JIS B 0211 Limits of sizes and tolerances for metric fine screw threads
- JIS B 0252 Limit gauges for metric fine screw threads
- JIS B 0253 Gauges for taper pipe threads
- JIS B 0254 Screw thread limit gauges for parallel pipe threads
- JIS B 0405 General tolerances – part 1: Tolerances for linear and angular dimensions without individual tolerance indications
- JIS B 1002 Dimensions of widths across flats
- JIS B 2351 25 MPa (250 kgf/cm²) bite type tube fittings for hydraulic use
- JIS B 2401 O-rings
- JIS G 0568 Method for eddy current testing of steel products by encircling coil technique
- JIS H 0502 Method of eddy current testing for copper and copper alloy pipes and tubes

JIS H 3250	Copper and copper alloy rods and bars
JIS H 3300	Copper and copper alloy seamless pipes and tubes
JIS H 4080	Aluminium and aluminium alloy seamless pipes and tubes
JIS H 5301	Zinc alloy die castings
JIS K 2213	Turbine oils
JIS Z 2241	Method of tensile test for metallic materials
JIS Z 2244	Method of Vickers hardness test
JIS Z 2245	Method of Rockwell and Rockwell superficial hardness test

2. Classification The fittings shall be classified according to the shape, the shape of fitting mounting end and the size, they are classified into nine classes according to the shape and the shape of fitting mounting ends (hereafter referred to as "types") as given in Table 1, and further classified into three classes according to the size of applicable tube as given in Attached Tables 1 to 6.

Table 1

Type	Symbol	Remarks
Taper thread nipple	CNT	Attached Table 1
Taper thread elbow	CLT	Attached Table 1
Parallel thread nipple	CNS	Attached Table 2
Parallel thread elbow	CLS	Attached Table 2
Union	CU	Attached Table 3
Union T	CTU	Attached Table 3
Bulk head tightening union	CUP	Attached Table 4
Plug A	CPA	Attached Table 5
Plug B	CPB	Attached Table 6

The common components of the fittings are classified into three types as given in Table 2.

Table 2

Type	Symbol	Remarks
Nut	CN	Attached Table 7
Sleeve	CS	Attached Table 8
Gasket	CG	Attached Table 9

3. Performances

3.1 Compressibility The compressibility of the sleeve, when the test is carried out in accordance with the specifications of 7.2, shall be such that an annular indentation has been generated on the outer periphery of the tube. In this case, there shall be no excessive collapse ⁽²⁾ of the tube and swelling of the central part of the sleeve, or cracking on the surface of sleeve.

Note ⁽²⁾ The reduction of the inner diameter due to the annular indentation of the sleeve.

3.2 Repeated joining performance The fittings, when tested in accordance with the specifications of 7.3.2, shall be free from leakage.

3.3 Resistance to pressure The fittings, when tested in accordance with the specifications of 7.3.3, shall be free from leakage and breakage.

3.4 Resistance to impact pressure The fittings, when tested in accordance with the specifications of 7.3.4, shall be free from leakage and breakage.

3.5 Resistance to vibration The fittings, when subjected to the test of 7.3.5 (1) using the testing apparatus specified in 7.3.5 (2), shall be free from leakage and other abnormalities.

3.6 Hardness of sleeve The hardness of the sleeves of the fittings shall be HV170 or under.

4. Structure, shapes and dimensions The structure, shapes and dimensions of the fittings shall be as given in the following.

- (1) The structure, shapes and dimensions of the fittings shall comply with Attached Tables 1 to 6.
- (2) The shapes and dimensions of the nuts, sleeves and gaskets which are components of fittings shall comply with Attached Tables 7 to 9.
- (3) The shapes and dimensions of the thread parts of fittings shall comply with Attached Table 10.
- (4) The dimensions of the parallel thread portion of the fittings of parallel thread type and the shapes and dimensions of mating ports shall comply with Attached Table 11.
- (5) The O-rings to be used for the mounting end of the fittings of the parallel thread type shall be in accordance with JIS B 2401.
- (6) The screw threads of fitting end part (nut side) shall be in accordance with JIS B 0207, and their accuracy shall be 6g specified in JIS B 0211.

In addition, the screw threads of fitting mounting end shall be grade A or G threads specified in JIS B 0202 for those of parallel thread type, and be R threads specified in JIS B 0203 for those of taper thread type.

- (7) When the fluid passage has been worked from the both sides, the discrepancy at the meeting point shall not be excessively large.

- (8) Each part of the fitting shall be free from remarkable deviation on wall thickness.
- (9) The dimensional tolerances on the width across flats shall be in accordance with JIS B 1002.
- (10) In Attached Tables 1 to 11, the dimensional tolerances on the cutting worked parts of not particularly specified shall be m (middle grade) specified in JIS B 0405.
- (11) The back-up washers shall be those of which structure are to prevent the protrusion of O-rings to be used for the parallel thread elbows.

5. Appearance The appearance of the fittings shall be in accordance with the following:

- (1) The inner and outer faces of the fitting shall be free from the harmful defects in use such as cracks, burrs and rust.
- (2) The completely threaded part of the screw threads shall be free from the harmful defects such as leanness of thread and breakage of thread.

6. Materials The materials of the fittings shall be as follows:

- (1) The material of the fitting body shall be C 3602 BD specified in JIS H 3250 for the types of CNT, CNS, CU, CUP, CPA and CPB, ZDC 2 specified in JIS H 5301 for the types of CLT, CLS and CTU, or the material capable of exhibiting the equal performances when this material is used.
- (2) The material of the nuts and lock nuts shall be C 3602 BD specified in JIS H 3250, or the material capable of exhibiting the equal performances when this material is used.
- (3) The material of the sleeves shall be C 2600 BD-O specified in JIS H 3250, or the material capable of exhibiting the equal performances when this material is used.
- (4) The material of the gaskets shall be C 1100 BD specified in JIS H 3250, or the material capable of exhibiting the equal performances when this material is used.

7. Testing method

7.1 Assembling procedure for test fitting Before testing the test fitting, the sleeve shall be compressed against the tube by the following procedure.

The tube used for the test shall be STPS 1 or STPS 2 among the tubes specified in Annex (Tubes for compression type tube fittings for machine tools). The wall thickness of the tube to be used shall be 1 mm.

In this case, the straightness of the tube on the side to be inserted in the fitting shall be not larger than 0.2 mm per 35 mm.

- (1) The oil attached on the tube shall be wiped off.
- (2) An assembling jig or the fitting body shall be fixed on a vice. Where the fitting body of the product is used for the test, it shall not be used 5 or more times.

- (3) After mating the fitting and tube, the nut shall be tightened slowly until the tube rotates no more while rotating the tube by hand.
- (4) From the moment when the tube rotates no more, the nut shall be tightened according to the standard practice specified on agreement between the manufacturer and user.

7.2 Compressibility test The compressibility test shall be performed as follows: After assembling according to the assembling procedures of 7.1 (1) to (4) by using the tube specified in 7.1, the ring-like indentation on the tube outer periphery produced by the compression of the sleeve shall be exposed, and the degree of compression, the degree of sleeve expansion, and the occurrence of cracks on the sleeve surface shall be examined.

7.3 Pressure test

7.3.1 General requirements of pressure test The pressure test of the fitting shall be performed in such a way that the fitting is assembled with the tube as specified in 7.1, disassemble them and then reassembling them. The other requirements shall be as follows:

- (1) **Test fluid** The fluid used in the pressure test shall be Class 2-VG 32 specified in JIS K 2213 or an equivalent fluid, and the temperature of the fluid shall be $40 \pm 5^\circ\text{C}$.
- (2) **Tightness value** For fittings of all sizes, the tightness value in the reassembly shall be represented by the angle of rotation after passing the point at which the tightening torque of the nut increases rapidly, and the range of tightness values shall be as shown below:

Minimum tightness value: $\frac{1}{6}$ revolution
Maximum tightness value: $\frac{1}{3}$ revolution
- (3) **Method of connecting the fitting** All fittings to be subjected to the pressure test shall be assembled to the condition in which they are connected to the tube as specified in 7.1 (hereafter referred to as "fitting assembly"), and their mounting end shall be mounted firmly to the manifold of the test apparatus. The other free end of the tube shall be blocked by suitable means and shall not be fixed or restricted by any means except in the case of the vibration resistance test.

7.3.2 Repeated joining test The repeated joining test shall be performed on two sets of two kinds of assemblies assembled with the minimum tightness value and the maximum tightness value as specified in 7.3.1 (2). The test shall be performed on each sample fitting assembly by repeating assembly and disassembly 8 times in total, and on completion of the 3rd, 6th, and 8th assembly, two times the rated pressure shall be applied and maintained for 5 min and examination shall be made for the occurrence of leakage at the joints and other parts.

Disassembly shall be performed by detaching the tube from the fitting body at each time. However, at the last time, the fitting shall be left as it is assembled with the specified tightness value.