

Clips for piping and wiring

1. Scope

This standard specifies the major dimensions, quality, shapes, materials, and testing methods of steel clips and resin clips used for positioning and fixing automobile piping and wiring.

Remarks :

The applicable standards of this standard are as follows.

JIS B 0408	Permissible deviations in dimensions without tolerance indication for working of sheet metal
JIS D 0201	General rules of electroplating for automobile part
JIS G 3141	Cold rolled carbon steel sheets and strip

JIS K 1321	Sulfuric acid
JIS K 2233	Non-petroleum base motor vehicle brake fluid
JIS K 2234	Engine antifreeze coolants
JIS K 6301	Physical testing methods for unvulcanized rubber
JASO M 312	Testing method of plastics parts for automobile

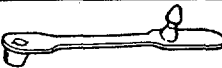
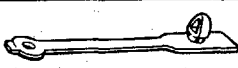
2. Type

Clips are divided into steel clips and resin clips by major materials, and clip types shall be classified as shown in **Tables 1** and **2** by shape.

Table 1 Type of steel clips

Type	Type code	Feature	Shape	Applicable attached table
A1 type	A1•1	Without coating		Attached table 1
	A1•2	With coating		
	A1•3	With flange		
A2 type	A2•1	Without coating		Attached table 2
	A2•2	With coating		
	A2•3	With flange		
B1 type	B1•1	Without coating		Attached table 3
	B1•2	With coating		
B2 type	B2•1	Without coating		Attached table 4
	B2•2	With coating		
C1 type	C1•2	With coating		Attached table 5
C2 type	C2•2	With coating		

Table 2 Type of resin clips

Type	Type code	Feature 1	Feature 2	Q' ty	Shape	Applicable attached table
PA type	PA1•1	Without mounting	Straight type	—		Attached table 6
	PA1•2		Bent type	—		
	PA2•1	With mounting	End anchored type	—		Attached table 7
	PA2•2		Middle anchored type	—		
	PA2•3		Plug type loop	—		Attached table 8
	PA2•4		Anchor type loop	—		
PB type	PB2•1	With mounting	Center anchored type	—		Attached table 9
	PB2•2		Off-set anchored type	—		
PC type	PC1•1•2	Without mounting	Lateral installation type, parallel layout	2 pieces		Attached table 10
	PC1•2•2		Bilateral installation type, parallel layout	2 pieces		
	PC1•3•2		Orthogonal installation type	2 pieces		
	PC2•1•1	With mounting	Vertical installation type, round cross-section	1 piece		Attached table 11
	PC2•1•2		Vertical installation type, round cross-section	2 pieces		
	PC2•2•1		Horizontal installation type, round cross-section	1 piece		
PD type	PD2•1	With mounting	Horizontal installation type, oval cross-section	—		Attached table 12
PE type	PE1•1	Without mounting	Twist lock type	—		Attached table 13
	PE1•2			—		
PF type	PF2•1	With mounting	Squeeze insert type	—		Attached table 14
PG type	PG2•1	With mounting	Lid covered lock type	—		Attached table 15

3. Performance

3.1 Steel clip

The coating performance of steel clips shall satisfy the requirements in **Table 3**, as a product.

Selection of class 1 or class 2 in the performance of heat resistance, low-temperature resistance, bending resistance, peeling resistance in the table shall follow mutual agreement between the parties concerned.

Table 3 Coating performance of steel clips

Item	Performance	
	Class1	Class 2
Heat resistance	Shall be free from harmful cracks, blister, peeling of the coating as the result of 120-hour heating at 120 °C .	Shall be free from harmful cracks, blister, peeling of the coating as the result of two cycles of 0.5-hour heating at 230°C and cooling to normal temperature.
Low-temperature resistance	Shall be free from harmful cracks, blister, peeling of the coating as the result of being set a side in an atmosphere of - 40°C .	Shall satisfy the performance of class 1 after the heat resistance test for class 2.
Bending resistance	Shall be free from harmful cracks, blister, peeling of the coating as the result of bending the coated portion 180 degrees at a curvature radius of 2.5 mm, at normal temperature.	
Peeling resistance	Shall not readily come out by pulling the coating by hand.	
Chemical resistance	Shall be free from harmful cracks, blister, peeling of the coating as the result of being immersed in the following chemicals at normal temperature for 5 hours. Brake fluid : JIS K 2233, Class 3 Gasoline for fuel : JIS K 6301, Fuel oil B Lubricating oil : JIS K 6301, Lubricating oil No. 3 Battery electrolyte : JIS K 1321, Refined dilute sulfuric acid Engine antifreeze coolant : JIS K 2234, Class 2	

- Remarks**
1. Normal temperature referred to in this table shall conform to the requirements in JASO M 312, 4.1 (Standard conditions of testing room).
 2. In the chemical resistance test, the test pieces used for other chemicals shall not be used.

3.2 Resin clip

The performance of resin clips shall satisfy the requirements in **Table 4** when those are tested in accordance with **8.2** to **8.5**.

Selection of class 1 or class 2 in the performance of heat resistance shall follow mutual agreement between the parties concerned.

Table 4 Performance of resin clips

Item	Performance		Testing method
Insert force (anchor portion)	PA2•3 type: Max. 80N PA2 (excl. PA2•3), PB2, PC2, PD2, PF2, PG2 type: Max. 50N		8.2
Holding strength	Anchor portions of PA2, PB2, PC2, PD2, PF2, PG2 type: Min. 100N Band portion of PA type: Min. 100 N Holder portion of PC, PD, PE, PG type: Min. 30N The holding strength of the PF type is the same as that of the anchor portion.		8.3
Heat resistance	Class 1 90 °C	Shall have the above holding strength as the result of 48-hour heating and being set aside at normal temperature for 1 hour.	8.4
	Class 2 120 °C		
Low-temperature resistance	Shall have the above holding strength as the result of being cooled in an atmosphere — 40 °C for 48 hours and being set aside at normal temperature for 1 hour.		
Heat cycle resistance	Shall have the above holding strength as the result of 40 cycles of being heated at 80 °C for 4 hours, being set aside at normal temperature for 0.5 hour, being cooled at — 40 °C for 4 hours, and being set aside at normal temperature for 15.5 hours.		
Chemical resistance	Shall be free from harmful dissolution, expansion, and cracks and have the above holding strength as the result of being immersed in the following chemicals at normal temperature for 5 hours. Brake fluid : JIS K 2233, Class3 Gasoline for fuel : JIS K 6301, Fuel oil B Lubricating oil : JIS K 6301, Lubricating oil No.3 Engine antifreeze coolant : JIS K 2234, Class2		8.5

- Remarks**
1. Normal temperature referred to in this table shall conform to the requirements in **JASO M 312, 4.1** (Standard conditions of testing room).
 2. In the chemical resistance test, the test pieces used for other chemicals shall not be used.

4. Shape and dimensions

4.1 Steel clip

The shape and dimensions shall comply with **Attached Tables 1 to 5**.

4.2 Resin clip

The shape and major dimensions shall comply with **Attached Tables 6 to 15**.

The thickness t of applicable steel sheets may be determined by mutual agreement between the parties concerned, within the range indicated in the Attached Tables.

5. Appearance

5.1 Steel clip

The surface of the steel clip shall be free from harmful cracks, flaws, rust, burrs, and peeling.

5.2 Resin clip

The surface of the resin clip shall be free from harmful burrs, flaws, discoloration, weld marks, and entry of foreign bodies.

6. surface finishing

The surface finishing of the steel clips shall offer the performance of Ep-Fe/Zn8C (MFZn8) in **JIS D 0201**, or equivalent performance.

The surface finishing may be changed by mutual agreement between the parties concerned.

7. Material

7.1 Steel clip

The material of the steel clip shall have the performance of SPCC in **JIS G 3141**, and or equivalent performance. The material of the coating shall be soft synthetic resin.

7.2 Resin clip

The material of the resin clip shall be polyamide resin, polyacetal resin, or polypropylene resin, and its hue shall be natural color.

The coloration may be determined by mutual agreement between the parties concerned.

8. Testing method for resin clips

8.1 General test conditions

(1) Standard condition of testing room

The standard condition of the testing room shall conform to the requirements in **JASO M 312, 4.1** (Standard condition of testing room).

(2) Adjustment of test pieces

The adjustment of the test pieces shall follow the requirements in **JASO M 312, 4.3** (Adjustment of test pieces).

(3) Test steel sheet

The test steel sheet (hereinafter referred to as the steel sheet) shall be SPCC specified in **JIS G 3141**, and its shape and dimensions shall follow **Fig. 1** and **Table 5**. The hole shall be made by press working and be finished by painting. The thickness of the painting shall be 0.05 mm maximum.

Fig. 1 Shape of steel sheet

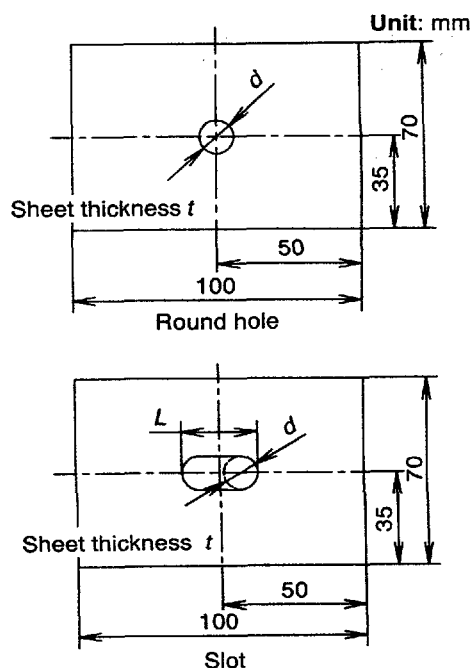


Table 5 Steel sheet for testing resin clips

Unit: mm		
Type code	t	d (or $d \times L$)
PA2 PB2 PC2 PD2 PF2 PG2	Maximum applicable sheet thickness	• Applicable hole diameter (or applicable slot diameter) • Tolerance $8^{+0.1}$

Remarks 1. The values of t and d (or $d \times L$) indicate dimensions before painting.
 2. The maximum applicable sheet thickness indicates the maximum applicable sheet thickness that is applicable to the clips.

(4) Resin clip inserting direction

The direction in which the clip is inserted into the steel sheet shall be the same as the punching direction of the hole.

8.2 Insert force test

This test is conducted to measure the force required when the resin clip is inserted into the specified hole in the steel sheet.

(1) Measuring instrument

Measuring instrument shall be capable of measuring compressive load and tensile load and have an accuracy of less than $\pm 1\%$ of the full scale.

(2) Operation

Fix the steel sheet, press the measuring instrument against the anchor portion of the resin clip to apply a load to the steel sheet vertically as shown in **Fig. 2**. At this time, measure the maximum load.

8.3 Holding strength test

This test is conducted to measure the load when the anchor portion of the resin clip is pulled out of the specified steel sheet, the unfastening load

of the band portion, the drawing load of the test jig (pipe), and the unfastening load of the knot.

(1) Measuring instrument

The measuring instrument shall match **8.2, (1)**.

(2) Operation

Fix the steel sheet on which the resin clip is installed, apply a load to the clip as shown in **Fig. 3**, and read the maximum load by the following procedures.

- (a)** For the anchor portion, read the maximum value needed for the clip to be broken or for the anchor portion to be drawn.
- (b)** For the band portion, read the maximum value needed for the clip to be broken or unfastened.
- (c)** For the holder portion, read the maximum value needed for the test jig to be drawn or for the knot of the clip to be unfastened.

For the clip having two holder portions, both portions shall be tested one by one.

Fig. 2 Clip inserting method

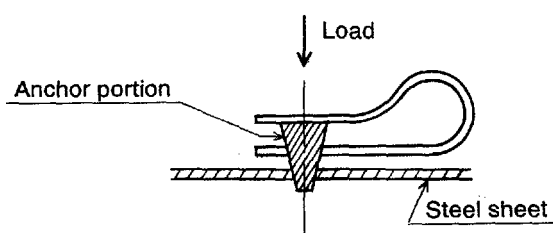
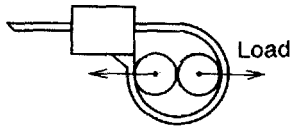


Fig. 3 Loading direction in holding strength test

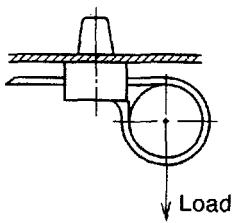
Band portion

PA1 type

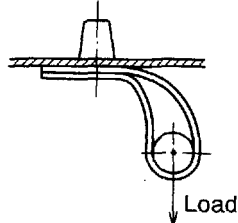


Anchor portion

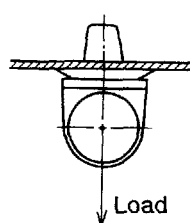
PA2•1, PA2•2 type



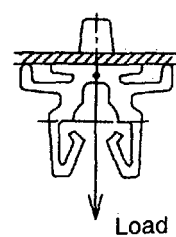
PA2•3, PA2•4 type



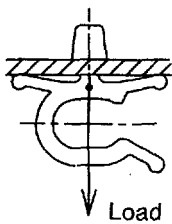
PB2 type



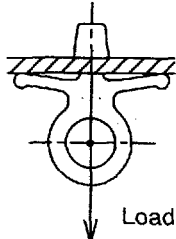
PC2 type



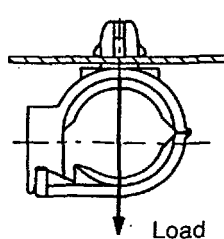
PD2 type



PF2 type

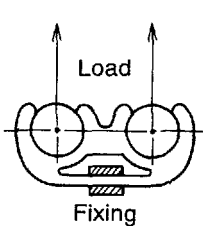


PG2 type

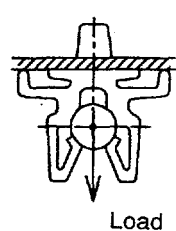


Holder portion

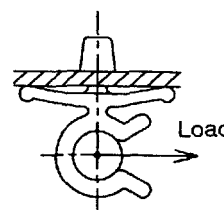
PC1 type



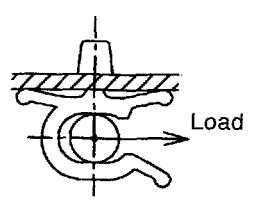
PC2•1 type



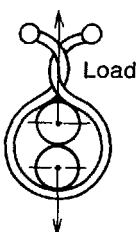
PC2•2 type



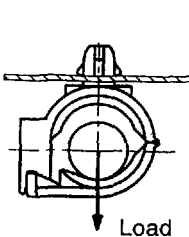
PD2 type



PE1 type



PG2 type



8.4 Heat resistance, low-temperature resistance, and heat cycle resistance test

These tests shall be performed under the condition that a load of 6 N is applied in the loading direction shown in **Fig. 3**, by applying the holding strength test in Item **8.3** after applying the temperature conditions in **Table 4**.

8.5 Chemical resistance test

This test shall be performed by applying the holding strength test in Item **8.3** after immersing the clip in the specified chemical for the period specified in **Table 4** and removing the stuck chemical completely.

9. Inspection

9.1 Steel clip

The inspection of the steel clip shall be performed in coating performance, shape and dimensions, appearance, and surface finishing, and the steel clip shall conform to the requirements **3.1**, **4.1**, **5.1**, and **6**.

9.2 Resin clip

The inspection of the resin clip shall be performed in performance, shape and dimensions, and appearance, and the resin clip shall conform to the requirements **3.2**, **4.2**, and **5.2**.

10. Designation

10.1 Steel clip

The designation of the steel clip shall use the standard number or standard name, type code, nominal, sheet width code, sheet thickness code, mounting hole dimension code, and designated items(').

Note (') The designated items, which include surface finishing or hue, and coating performance code, are indicated as occasion demands.

