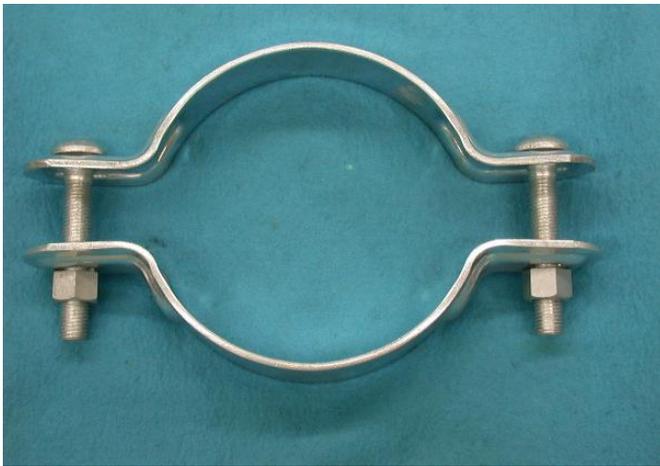


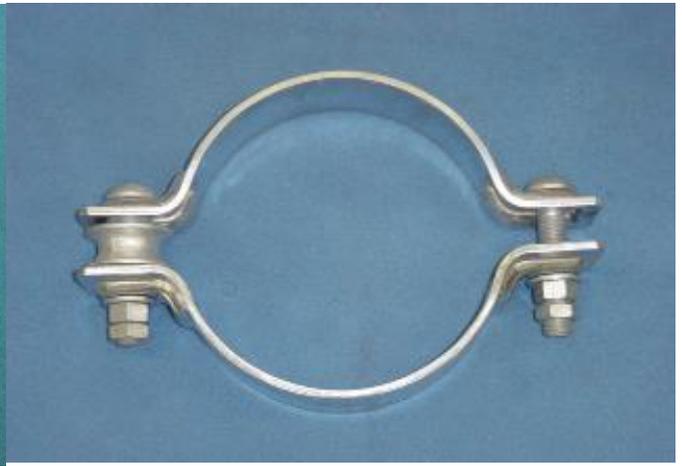
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## 6E-39: Strong Bands (Rank C)



Normal type (Type A)



High-tension-resistance type (Type A)

Established: October 1958

Revised (07): July 3, 2008

Enforced: August 4, 2008

Power Distribution Department  
TEPCO Power Grid, Incorporated

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## 1. Scope of Application

This specification applies to the bands used for attaching middle wiredrawing hooks; branch lines and subsidiary wires such as stranded galvanized copper wires; or supporting columns to reinforced concrete columns as defined in Specification 6D-8, steel-pipe columns used as compound pillars as defined in Specification 6D-21, or the like.

## 2. Related Standards

### 2.1. Japanese Industrial Standards (JIS)

- (1) JIS G 3101 (2004): Rolled steels for general structures
- (2) JIS G 3507-2 (2005): Carbon steels for cold heading - Part 2: Wires
- (3) JIS G 3134 (2006): Hot-rolled high strength steel plate, steel strip with improved formability for automobile structural uses
- (4) JIS H 0401 (2007): Test Methods for hot dip galvanized coatings
- (5) JIS H 8641 (2007): Hot dip galvanized coatings
- (6) JIS Z 2241 (1998): Method of tensile test for metallic materials
- (7) JIS Z 2248 (1996): Method of bend test for metallic materials

### 2.2. Standard Specifications of TEPCO

- (1) 6A-2: Stranded galvanized copper cables
- (2) 6D-8: Reinforced concrete columns
- (3) 6D-10: Thin reinforced concrete columns
- (4) 6D-21: Steel-pipe columns used as compound pillars
- (5) 6E-29: Middle wiredrawing hooks
- (6) 6E-31: Straps
- (7) 6E-69: Wrapping grips
- (8) 6E-78: Thimbles

## 3. Type

The product is available in total 14 different types, consisting of eight different normal types and six different high-tension-resistance types classified according to the strength and applicable diameter as shown in Table 1. They are classified as Type A or B according to the thickness of the metal material.

Table 1

Type	Designation	Ring gauge-diameter	Applicable thimble (6E-78)	Configuration
Normal type	14	14 cm	Small	Main unit (clamp ring, bolts, and nuts)
	17	17 cm		
	19	19 cm		
	21	21 cm		
	23	23 cm		
	25	25 cm		
	27	27 cm		
	29	29 cm		
High tension-resistance	19L	19 cm	Middle	Main unit (clamp ring,
	21L	21 cm		

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type	23L	23 cm		bolts, and nuts) + thimbles
	25L	25 cm		
	27L	27 cm		
	29L	29 cm		

## 4. Structure and Material

### 4.1. General

- (1) The structure and material must be free of flaws, cracks, rust, and other practically undesirable defects.
- (2) The product surface must be smooth with a galvanized coating smoothly and uniformly applied on it.

### 4.2. Requirements for the Main Structure

#### 4.2.1. Shape and Dimensions

The shape and dimensions of the product shall be as per Chart 1 for normal-type products (Type A), Chart 2 for high-tension-resistance-type products (Type A), Chart 3 for normal-type products (Type B), or Chart 4 for high-tension-resistance-type products (Type B). The tolerances not defined in the charts shall be within the practically permissible range.

#### 4.2.2. Structure

The product shall be able to be robustly and securely attached to reinforced concrete columns as defined in Specification 6D-8; to be equipped with wrapping grips as defined in Specification 6E-69 if the product is combined with a thimble as defined in Specification 6E-78; and to anchor stranded galvanized copper wires as defined in Specification 6A-2. In addition, the product shall be able to be easily clamped without allowing any bolt to rotate.

### 4.3. Material

#### 4.3.1. Clamp Ring

As the material, a steel material shall be used that is defined by the applicable JIS standards and satisfies the required product functional characteristics.

[Explanation]

Based on accumulated expertise, the steel materials that are defined by the applicable JIS standards and satisfy the required product functional characteristics include the SS400 steel defined by JIS G 3101 (Rolled steels for general structure) for Type A and the SPFH540 steel defined by JIS G 3134 (Hot-rolled high strength steel plate, steel strip with improved formability for automobile structural uses) for Type B.

#### 4.3.2. Bolts and Nuts

As the material, a steel material shall be used that is defined by the applicable JIS standards and satisfy the required material functional characteristics.

[Explanation]

Based on accumulated expertise, the steel materials that are defined by the applicable JIS standards and satisfy the required product functional characteristics include the SWCH10R steel as defined by JIS G 3507-2 (Carbon steels for cold heading - Part 2: Wires).

### 4.4. Surface Treatment

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The product shall have a hot-dip galvanized coating uniformly applied on the entire surface that is defined by JIS H 8641 (Hot dip galvanized coatings). This requirement shall not apply if a steel material is used that has the same or a higher level of corrosion resistance as a steel with a hot-dip galvanized coating.

## 5. Performance

The product shall undergo the tests defined in Section 7 to demonstrate that its performance satisfies the requirements defined in Table 2.

Table 2

Item				Requirement	Applicable test method			
Appearance				No practically undesirable defects are found.	7.1			
Structure/dimensions				The dimensional (tolerance) requirements shown in charts are satisfied.	7.2			
Material test	tensile test	Yield point	Normal type (Type A)	245 N/mm <sup>2</sup> or more	7.3			
			Normal type (Type B)	355 N/mm <sup>2</sup> or more				
			High-tension-resistance type (Type A)	245 N/mm <sup>2</sup> or more				
			High-tension-resistance type (Type B)	355 N/mm <sup>2</sup> or more				
		Tensile strength	Normal type (Type A)	400 N/mm <sup>2</sup> or more				
			Normal type (Type B)	540 N/mm <sup>2</sup> or more				
			High-tension-resistance type (Type A)	400 N/mm <sup>2</sup> or more				
			High-tension-resistance type (Type B)	540 N/mm <sup>2</sup> or more				
		Elongation	Normal type (Type A)	21% or more				
			Normal type (Type B)	23% or more				
			High tension-resistance type (Type A)	17% or more				
			High-tension-resistance type (Type B)	24% or more				
		Bending test				No defects such as cracks develop.		
		Bolt tensile strength	M16	62,800 N or more		7.4		
M20	98,000 N or more							
Strength performance	Test conducted with a branch line attached		No part breaks, cracks, or becomes significantly deformed when the product is subject to the following loads: 29,400 N for normal types 78,500 N for high-tension-resistance types	7.5				
	Test conducted with a middle wiredrawing hook attached (for normal types only)		When the product is subjected to a load of 9,800 N, no part breaks, cracks, or becomes significantly deformed.					

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Coating applied	350 g/m <sup>2</sup> or more (except for the bolt and nut threads)	7.6
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## 6. Marking

The product shall be clearly and permanently marked with the following information:

- (1) Designation (e.g., 21)
- (2) Manufacturer or its abbreviation

## 7. Test Methods

### 7.1. Appearance Inspection

The appearance shall be checked visually or by touch to determine if it satisfies the requirements defined in Section 4.

### 7.2. Structural/Dimensional Inspection

The structural/dimensional inspection shall be conducted to examine the structure visually or using a caliper to determine if the product satisfies the requirements defined in Section 4.

### 7.3. Material Tests

#### 7.3.1 Tensile Test

The tensile test shall be conducted according to JIS Z 2241 (Method of tensile test for metallic materials).

#### 7.3.2. Bending Test

The bending test shall be conducted according to JIS Z 2248 (Method of bend test for metallic materials).

### 7.4. Bolt Tensile Test

The bolt tensile test shall be conducted according to 8.2 "Method of tensile test for bolts, screws, and studs as installed in products" of JIS B 1051 (Mechanical properties of fasteners made of carbon steel and alloy steel – Part 1: Bolts, screws and studs). Nuts may be double nuts.

### 7.5. Strength Test

#### 7.5.1. Test Conducted with a Branch Line Attached

With a branch line attached (combined with a thimble defined in 6E-78 for normal types), the test load shown in Table 2 shall be applied in a 45° direction for 3 minutes to check the condition of each part of the clamp ring.

#### 7.5.2. Test Conducted with a Middle Wire Drawing Hook Attached

This test shall be conducted on normal-type products. With the product (normal type) attached as shown in Figure 1, the test load shall be applied for 3 minutes to check the condition of each part of the clamp ring. The column or jig used in the test may be a concrete pipe or steel pipe the diameter of which is close to the ring gauge diameter.

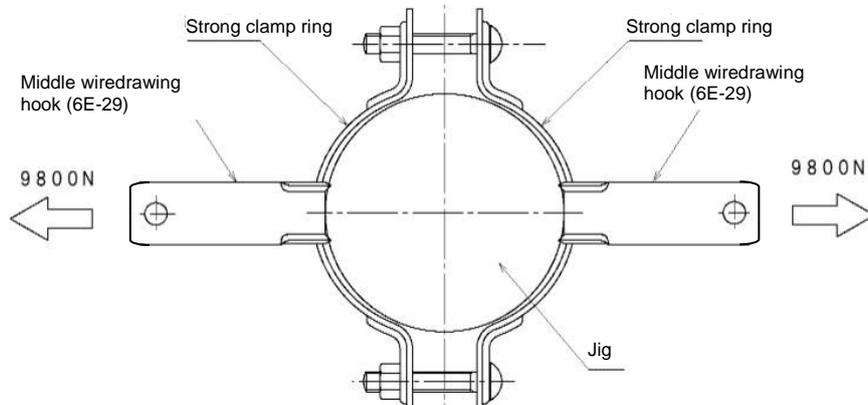


Figure 1: Test Conducted with a Middle Wiredrawing Hook Attached

## 7.6 Hot-dip Galvanizing Test

The applied coating shall be measured according to the method defined in Section 5.2 (Indirect method) or Section 5.3 (Magnetic method for testing thickness) of JIS H 0401 (Hot dip galvanized coatings). The test sample used in the applied coating test may be a preliminarily produced appropriate test piece with a galvanized coating applied in the method used in the same manufacturing process as for the product.

## 8. Tests

### 8.1. General

The product shall undergo the “type test” defined in Section 8.2, “manufacturing process inspection” defined in Section 8.3, and “acceptance inspection” defined in Section 8.4 according to the test methods defined in Section 7 and shall satisfy all requirements defined in Sections 4 to 6.

### 8.2. Type Test

The type test shall be conducted on products or test pieces fabricated under the same conditions as for the product to conduct the following. The test shall be basically conducted on at least three pieces of the same type.

- (1) Appearance inspection
- (2) Structural/Dimensional Inspection
- (3) Material test
- (4) Bolt tensile test
- (5) Strength test
- (6) Galvanizing test

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### 8.3. Manufacturing Process Test

To check that a system is established that ensures that in volume production, products completely the same as the type product are produced, inspections shall be made to check the materials used, quality control items, quality control methods, etc.

### 8.4. Acceptance Inspection

The acceptance inspection shall be conducted in the presence of the customer according to the method defined in 8.2 "Type Test" if the customer has instructed to do so. The specific test items and sampling rate shall be determined in consultation with the customer. If the acceptance inspection is not conducted in the presence of the customer, the manufacturer shall conduct the internal test preliminarily defined in consultation with us and submit the test results as a test report to the customer.

## 9. Other

### 9.1. General

- (1) Any requirements that are not defined in this specification shall be defined in consultation with us if they are needed to satisfy the required product performance and functions.
- (2) If modifying part of this specification substantially benefit in terms of use or manufacturing, the appropriate part can be modified with approval from us.
- (3) An on-the-spot process inspection, material inspection, etc. may be conducted if we determine that they are necessary.

### 9.2. Preparation of Samples

The cost of the samples shall be borne by the seller.

### 9.3. Documents to Be Submitted

The type examination shall require the submission of the following documents.

#### 9.3.1. Fabrication Specification

The fabrication specification shall be filled out with specific information required for us to examine whether the product conforms to this specification and shall be submitted together with drawings that indicate detailed information such as dimensional tolerances and materials. As required, the fabrication specification shall also come with technical materials that complement the specification.

#### 9.3.2. Test Report

The test report shall be filled out with the results and conditions of the type test conducted according to 8.2 "Type Test."

#### 9.3.3. Quality Management Reports

A quality management flowchart, management report on subcontractors and suppliers, and other reports shall be used to indicate concrete information about the materials used, quality control points in each production process, quality control method for quality, actions taken against problems, quality management system, etc. If a main

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production processes are outsourced, a report on management of outsourced processes (a document to indicate how the processes are managed at the subcontractor(s), which must be filled out with information according to the format of the quality management flowchart) shall be submitted. The information that must be provided shall be defined in consultation with us.

#### 9.3.4. Technical Data

Type examination may require the submission of technical data so that we can sufficiently and appropriately assess the performance and quality of the product.

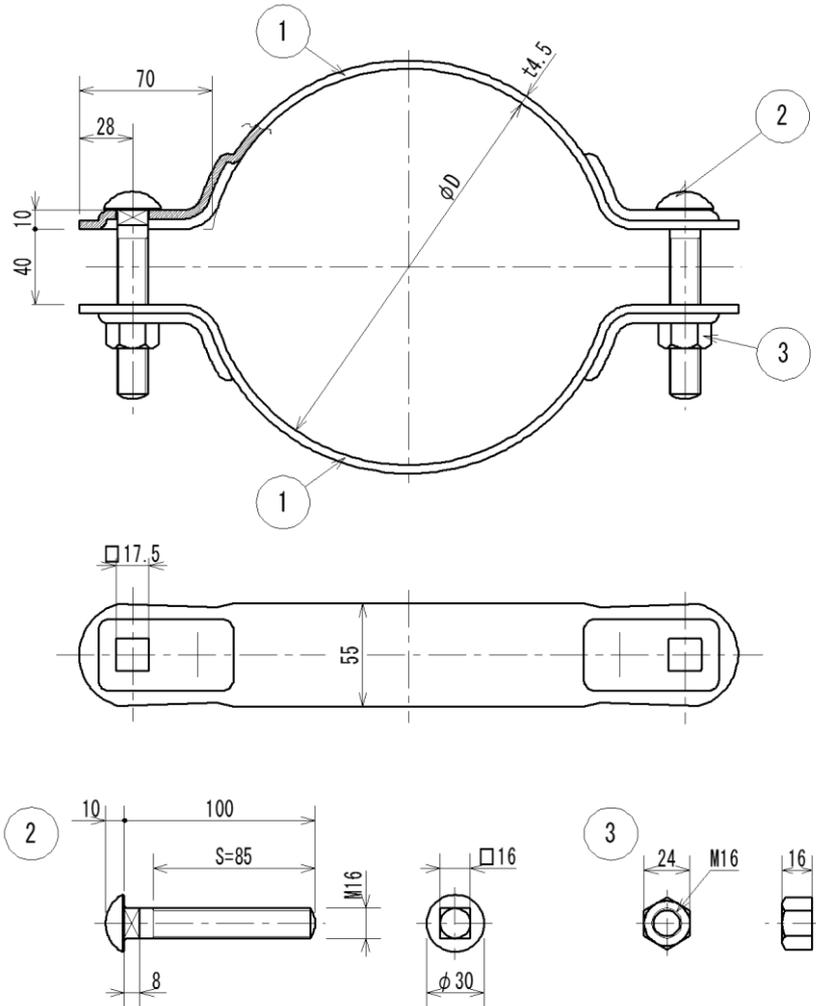
#### 9.4. Pacing Method

The products shall be individually packed so that each piece will be stacked on another in the same orientation. Normal-type products shall be combined with bolts and nuts and high-tension-resistance-type products with thimbles, bolts, and nuts metal washer.

The products shall be packed in a manner that provides suitable transportability and portability without allowing packages to break easily. The packages shall be marked with the following information. The specific packing method shall be defined in consultation with us and clearly indicated in the packing specification.

- (1) Article name
- (2) Quantity
- (3) Month and year of manufacture
- (4) Manufacturer or its abbreviation

(Figures in mm)



Type classification

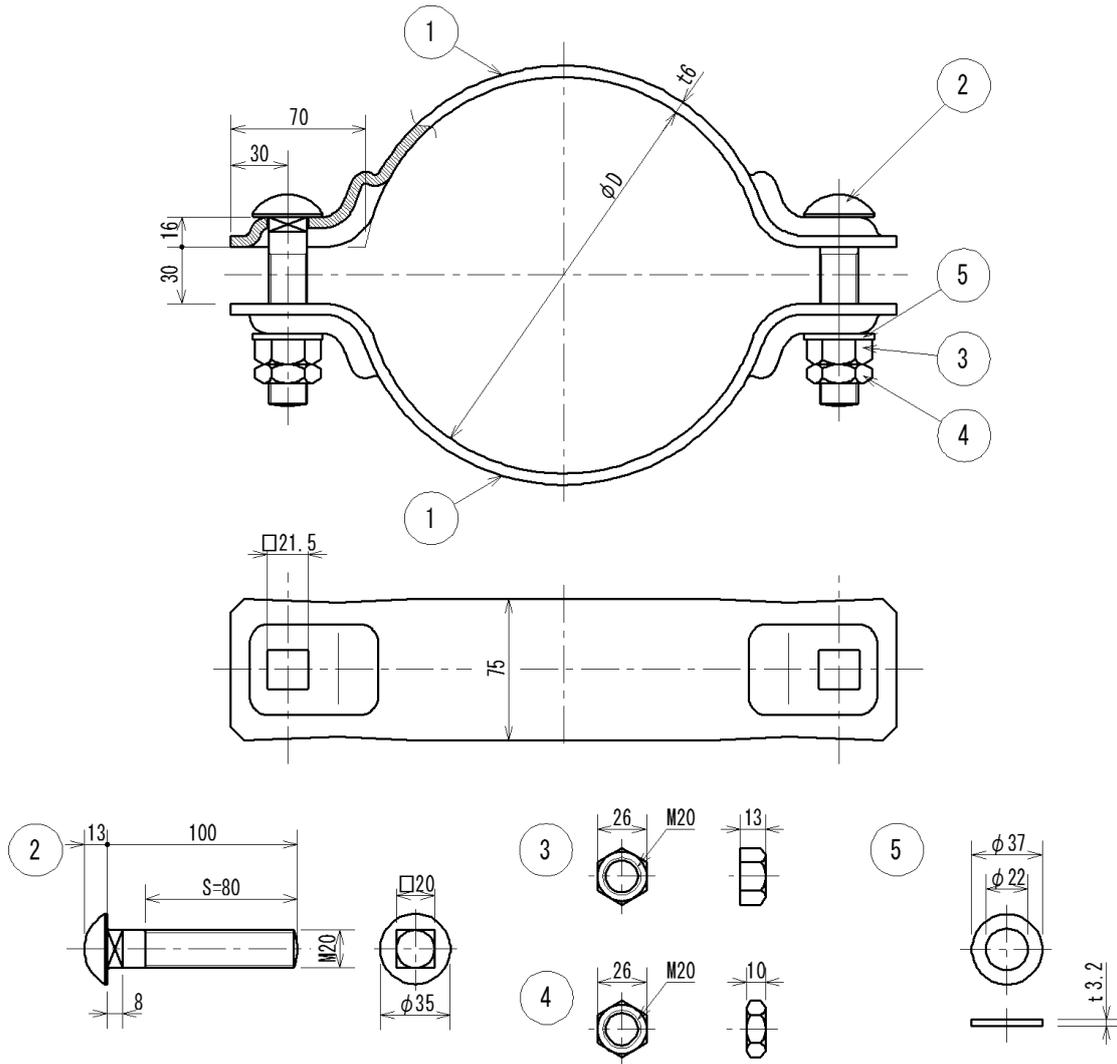
Designation	Ring gauge-diameter	Applicable diameter in mm (reference)
14	14 cm	130 to 153
17	17 cm	152 to 183
19	19 cm	181 to 205
21	21 cm	194 to 224
23	23 cm	222 to 244
25	25 cm	233 to 257
27	27 cm	263 to 283
29	29 cm	275 to 302

(1)	Clamp ring
(2)	Cup square neck bolt
(3)	Hexagon nut

Chart 1: Normal Types (Type A)

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(Figures in mm)



Type classification

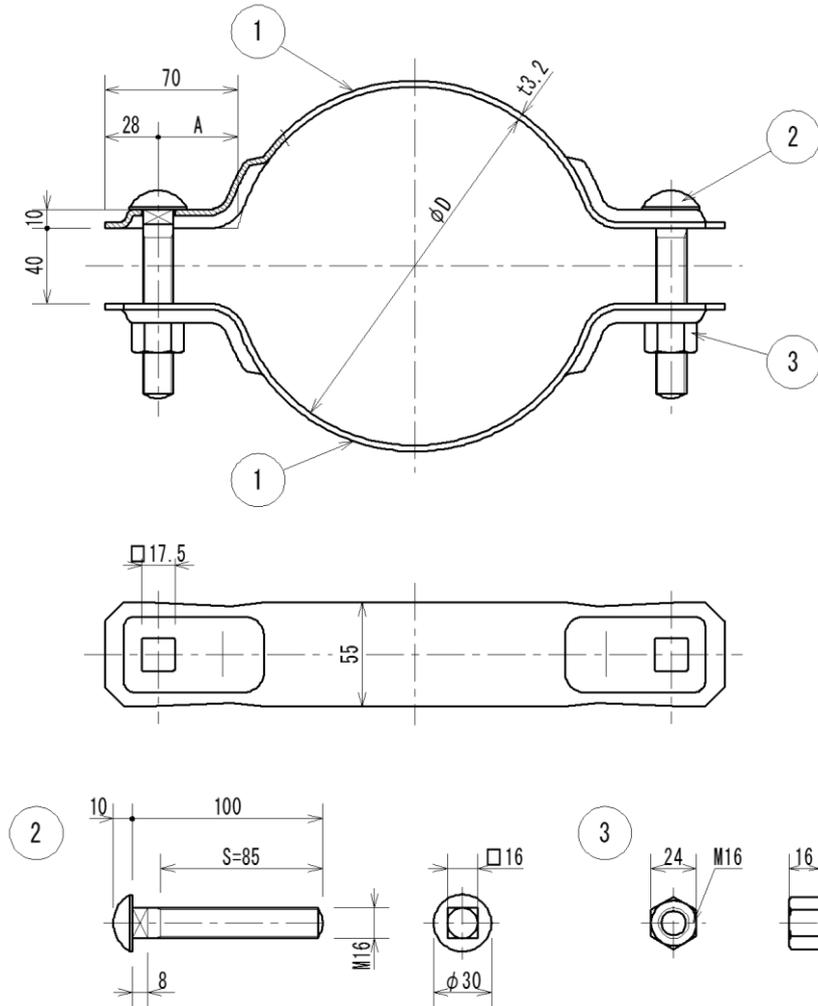
Designation	D	Applicable diameter in mm (reference)
19L	19 cm	173 to 189
21L	21 cm	203 to 216
23L	23 cm	222 to 235
25L	25 cm	244 to 257
27L	27 cm	264 to 277
29L	29 cm	281 to 292

(1)	Clamp ring
(2)	Cup square neck bolt
(3)	Hexagon nut
(4)	Hexagon nut
(5)	Plain washer

Chart 2: High-tension-resistance Types (Type A)

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(Figures in mm)



Type classification

Designation	Ring gauge-diameter	Applicable diameter in mm (reference)
14	14 cm	130 to 153
17	17 cm	152 to 183
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27	27 cm	263 to 283
29	29 cm	275 to 302

(1)	Clamp ring
(2)	Cup square neck bolt
(3)	Hexagon nut

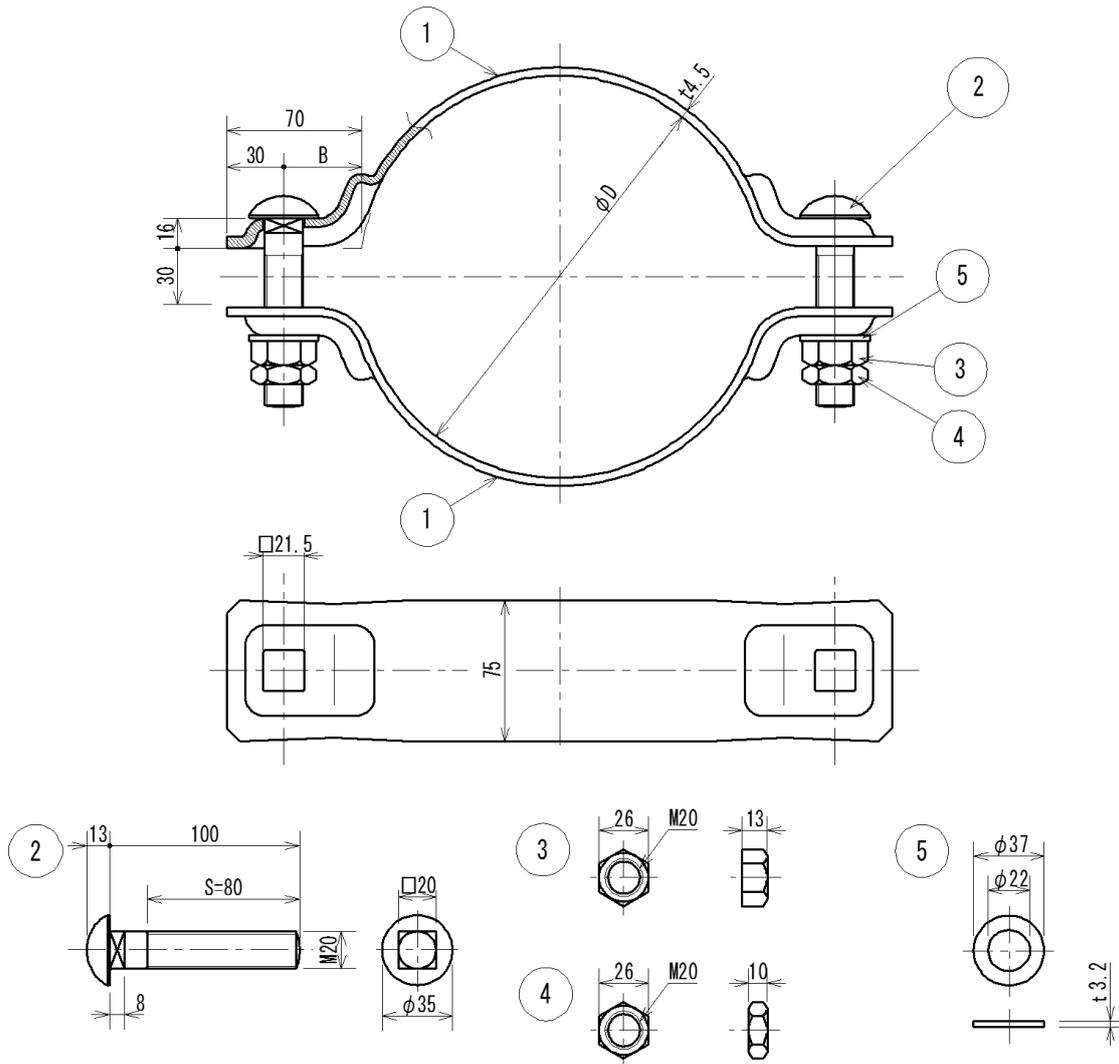
Dimensional tolerances

Dimension	Tolerance
Clamp ring width	+1, -1 mm
Clamp ring square hole	+1, -0.4 mm
Bolt length	+5, -1.0 mm
Bolt cup square	+1, -0 mm
Nut width	+0, -0.8 mm
A	+1.5 mm, -1.5 mm

Chart 3: Normal Types (Type B)

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(Figures in mm)



Type classification

Designation	D	Applicable diameter in mm (reference)
19L	19 cm	173 to 189
21L	21 cm	203 to 216
23L	23 cm	222 to 235
25L	25 cm	244 to 257
27L	27 cm	264 to 277
29L	29 cm	281 to 292

(1)	Clamp ring
(2)	Cup square neck bolt
(3)	Hexagon nut
(4)	Hexagon nut
(5)	Plain washer

Dimensional tolerances

Dimension	Tolerance
Clamp ring width	+1, -1 mm
Clamp ring square hole	+1, -0.4 mm
Bolt length	+5, -1.0 mm
Bolt cup square	+1, -0 mm
Nut width	+0, -0.8 mm
B	+1.5 mm, -1.5 mm

Chart 4: High-tension-resistance Types (Type B)

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