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JIS

JAPANESE INDUSTRIAL STANDARD

Commutator bars

JIS C 2801—1995

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Commutator bars

C 2801-1995

1. Scope This Japanese Industrial Standard specifies commutator bars used for commutators of electrical devices.

Remarks 1. The following standards are cited in this Standard:

JIS H 0321 General rules for inspection of non-ferrous metal materials

JIS H 1201 Methods for chemical analysis of copper products

JIS H 2121 Electrolytic cathode copper

JIS Z 2243 Method of Brinell hardness test

JIS Z 2244 Method of Vickers hardness test

JIS Z 2246 Method of Shore hardness test

JIS Z 8601 Preferred numbers

2. The International standard corresponding to this Standard is given below.

IEC 356 (1971) Dimensions for commutators and slip-rings

2. Classification, symbols and materials The classification, symbols and materials of commutator bars shall be as given in Table 1.

Table 1. Classification, symbols and materials

Class	Symbol	Material
Class 1	CMB 1	Copper (JIS H 2121)
Class 2	CMB 2	Silver-bearing copper (Copper of JIS H2121 and pure silver)
Class 3	CMB 3	
Class 4	CMB 4	

3. Quality

3.1 Appearance Commutator bars shall be well finished, uniform in quality, and free from defects, detrimental to service.

3.2 Chemical composition The chemical composition shall be as given in Table 2.

Table 2. Chemical composition

Class	Chemical composition %		
	Cu	Cu + Ag	Ag
Class 1	99.9 min.	–	–
Class 2	–	99.9 min.	0.15 to 0.25
Class 3	–	99.9 min.	0.08 to 0.12
Class 4	–	99.9 min.	0.06 to 0.10

3.3 Hardness The hardness shall be as given in Table 3. If not so, it shall be as specified in Annex.

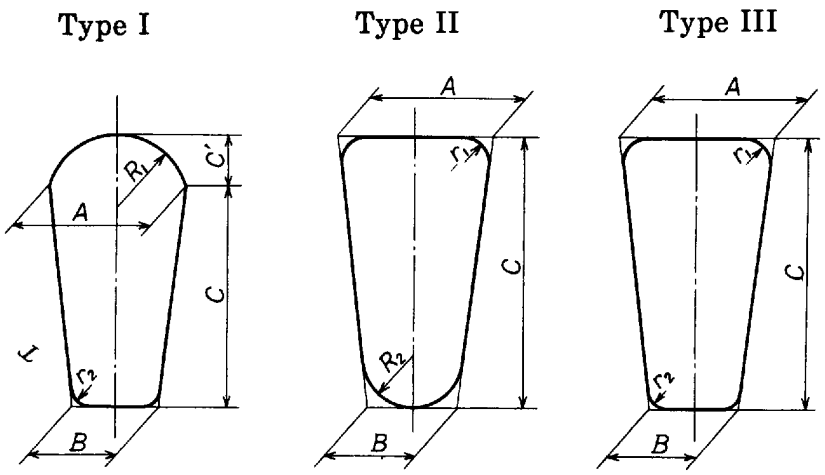
Table 3. Hardness

Dimension		Hardness				Hardness after heating for one hour at 300°C			
A mm	C mm	Vickers hardness HV20		Shore hardness HS		Vickers hardness HV20		Shore hardness HS	
		Class 1	Classes 2, 3 and 4	Class 1	Classes 2, 3 and 4	Class 2	Class 3	Class 2	Class 3
$A < 5$	$C \leqq 60$	108 min.	110 min.	20 min.	21 min.	108 min.	103 min.	20 min.	18 min.
	$60 < C$	105 min.	108 min.	19 min.	20 min.	105 min.	103 min.	19 min.	18 min.
$5 \leqq A < 10$	$C \leqq 60$	105 min.	108 min.	19 min.	20 min.	105 min.	103 min.	19 min.	18 min.
	$60 < C$	103 min.	105 min.	18 min.	19 min.	103 min.	100 min.	18 min.	17 min.
$10 \leqq A < 15$	$C \leqq 60$	103 min.	105 min.	18 min.	19 min.	103 min.	100 min.	18 min.	17 min.
	$60 < C$	100 min.	103 min.	17 min.	18 min.	100 min.	98 min.	17 min.	16 min.
$15 \leqq A$	$C \leqq 60$	100 min.	103 min.	17 min.	18 min.	100 min.	98 min.	17 min.	16 min.
	$60 < C$	98 min.	100 min.	16 min.	17 min.	98 min.	98 min.	16 min.	16 min.

4. Shape, dimensions and tolerance The shape, dimensions and tolerance shall be as follows. If not so, it shall be as specified in Annex.

(1) Shape The shape of the cross section vertical to the longitudinal direction of commutator bars shall be the three types given in Fig. 1, and both side faces in wedge form shall be flat. Both ends shall be cut off exactly at right angles to the longitudinal direction.

Fig. 1. Shapes of commutator bars



(2) Dimensions The standard dimensional range of commutator bars shall be as follows:

A = 1.2 mm to 25 mm B = 0.5 mm to 20 mm C = 5 mm to 125 mm

C' = 1 mm to 1.5 mm $R_1 = {}^1/_2 A$ or more R_2 = Approx. ${}^1/_2 B$

r_1 = approx. 0.4 mm

r_2 = { approx. ${}^1/_2 B$ when B is less than 5 mm
approx. 2.5 mm when B is 5 mm or more

The length shall be specified by means of single length, multiple length, or fixed length(1) method.

Note (1) Single length method means the specifying method when the commutator bar is used as a segment, as it is without cutting.

Multiple length method means the specifying method in which the purchaser designates the unit length, number of pieces, and cutting allowance of the segments to be cut from the commutator bar.

Fixed length method means the method when the purchaser designates the total length.

(3) Dimensional tolerance

(a) Dimensional tolerances on A, B and C The dimensional tolerances on A, B and C shall be as given in Table 4.

Table 4. Dimensional tolerances

Unit: mm

A	$\frac{A-B}{C}$ (γ)	Tolerance		
		A	B	C(2)
$10 \leqq A$	$0.02 \leqq \gamma$	±0.05	±0.05	+0.40 0
$A < 10$		±0.04	±0.04	
–	$\gamma < 0.02$	±0.035	±0.035	+0.40 0
Remarks		Measured by the limit line of the gauge		Measured directly

Note(2) For Type I: $C + C'$

(b) Section gauge When a commutator bar is inserted into the section gauge of Attached Fig. 1, the clearance on either side face shall be as specified in Table 5, and both the upper and lower ends of dimension C shall fall within the upper and lower limit lines of the section gauge.

The purchaser shall send a set of male and female section gauges to the manufacturer when placing an order. The reference line and the upper and lower limit lines of the section gauge (see Attached Fig. 1) shall be determined according to Table 4.

Table 5. Clearance

Unit: mm

C	Clearance
$C < 50$	0.03 max.
$50 \leqq C$	0.04 max.

(c) Tolerance on length The tolerance on length shall be as given in Table 6.

Table 6. Tolerance on length

Unit: mm

Length	Tolerance
Single length	+2 0
Multiple length	+3 0
Fixed length	+3 0