STANDARDIZATION OF THE DIMENSIONS OF BRUSHES

TECHNICAL NOTE ■ STA BE 16-36 GB

The I.E.C. (International Electrotechnical Commission) has published standards concerning brush dimensions and various fitting elements and the preferential values chosen are those which are mentioned in most National Standards.

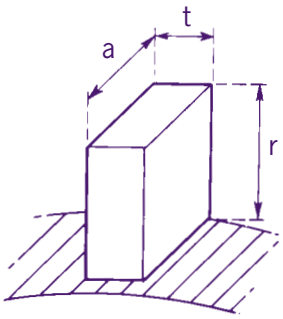
The CARBONE LORRAINE brushes have been developed in relation with the products of brush-holder main manufacturers and are generally in conformity with the I.E.C. standards.

Technical developments and costs of labour make the execution of "specials" more and more unusual at the present time and we strongly recommend to our Custumers to conform as far as possible with the following tables in which are indicated the CARBONE LORRAINE specifications for the principal standard dimensions and tolerances as applied to carbon brushes.

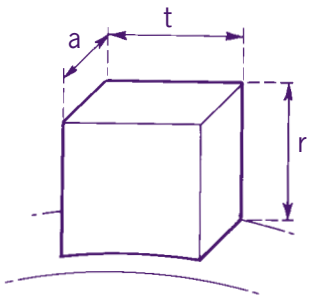
DIMENSIONS of CARBONE LORRAINE STANDARD BRUSHES

• 1 - Description and sequence of the principal dimensions of brushes

t X **a** X **r**
t: tangential dimension
a: axial dimension
r: radial dimension



commutator



slip ring

• 2 - Series of standard dimensions (in mm)

1.6 - 2 - 2.5 - 3.2 - 4 - 5 - 6.3 - 8 - 10 - 12.5 - 16 - 20 - 25 - 32 - 40 - 50 - 64 - 80

NOTE: The use of square cross section brushes (t = a) for several reasons and particularly for orientation uncertainly **is strongly deprecated.**

• 3 - Tolerances on t - a - r dimensions

Nominal dimensions (mm)	Tolerances on t or a		Tolerances on r
1.6 - 2 - 2.5 - 3.2	- 0.03 - 0.09	Brush-holder Tolerances E10	± 0.3
4 - 5 - 6.3 - 8 - 10	- 0.03 - 0.11		
12.5 - 16 - 20 - 25	- 0.04 - 0.13		± 0.5
32 -40 - 50 - 64 -80	- 0.05 - 0.15		± 0.8

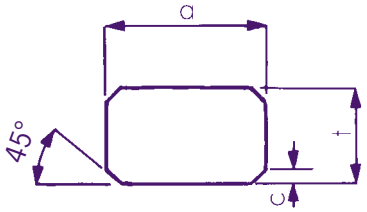
Note: These dimensions and tolerances conform to I.E.C. standards and allow the use of brush-holders made in accordance with the USE and DIN old standards; however in these cases it is to be noted that clearances are either larger of smaller than usually recommended (see STA Note N° 4).

• 4 - Some current combinations for the t x a x r dimensions of brushes (in mm)

Brushes for commutators								
t	a	r	t	a	r	t	a	r
5	12.5 16	25	8	20 25	32	16	32	40
	20	32		32	40		40	50
6.3	16	25	10	25 32	40	20	32	40
	20 25	32	12.5	32	40		40	50
	32	40		40	50	25	32	40
				50	64		40	50
						32	40	50

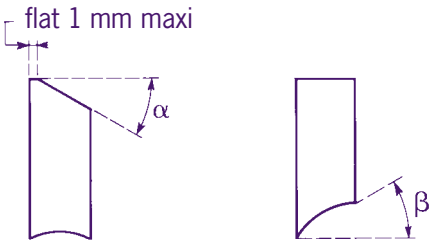
Brushes for rings		
t	a	r
16	8	25
20	8	25
	10	32
25	10 12.5	32
32	12.5 16 20	40
40	20 32	50

• 5 - Chamfers for brushes



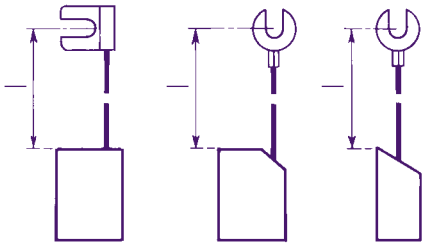
Dimension t or a whichever the smaller is (mm)	C (mm)
1.6 to 3.2	$0.2\,^{+0.1}_{0}$
4 to 8	$0.5\,^{+0.3}_{0}$
20 to 20	$1\,^{+0.5}_{0}$
≥ 25	$2\,^{+0.5}_{0}$

• 6 - Angles for contacts and top levels



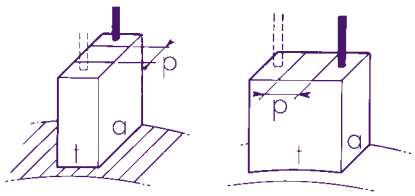
The following α and β (±1°) angles are recommanded	
α	0° - 7.5° - 15° - 22.5° - 30° - 37.5° - 45°
β	0° - 7.5° - 15° - 22.5° - 30° - 37.5°

• 7 - Length of flexibles (preferred lengths and tolerances)



l nominal (mm)	Tolerance (mm)	l nominal (mm)	Tolerance (mm)	l nominal (mm)	Tolerance (mm)
16		50		112	
20		56		125	
25	+3	63	+5	140	+8
32	0	71	0	160	0
40		80			
		90			
		100			

• 8 - Width available for application of pressure



In most cases the p width on the brush top showing the available area for the pressure device of the brush-holder is equal to half the t or a dimension.

However for brushes where the t dimension is only slightly different from the a dimension experience shows that flexible location often requires a larger area on the brush top. In these cases, the reserved area for the pressure device and p width are accordingly reduced, usually by about 20 %.

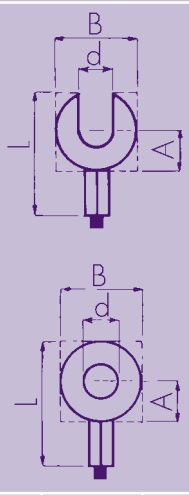
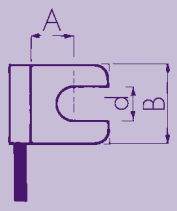
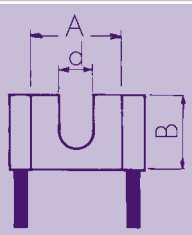
• 9 - Table of flexibles for industrial brushes

Nominal section (mm²)	Maximum diameter (mm)
0.25	0.8
0.35	1
0.50	1.2
0.75	1.4
1	1.6
1.25	1.8
1.50	2
2	2.2
2.50	2.5

Nominal section (mm²)	Maximum diameter (mm)
3.2	2.8
4	3.2
5	3.6
6	4
8	4.5
10	5
12.5	5.6
16	6.3

Note: Flexibles used on small brushes for domestic and aeronautic appliances as well as for automobile auxiliaries correspond to other standards.

• 10 - Table of terminals for industrial brushes

Screw diametre		Opening of terminal (hole diametre or slot width)	Spade terminal			Flag terminal		Double shoe terminal	
									
(mm)	(inches)	$d^{+0.3}_{0}$ (mm)	B*	A* mini	L*	B	A mini	B	A mini
4	5/32	4,3	10	6	18	10	6	12	12
5	3/16	5,2	12	7	20	12	7	14	14
6	1/4	6,5	14	8.5	25	14	8.5	16	17
8	5/16	8,5	18	10.5	32	18	10.5	18	21

* Dimensions in mm.

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