TECHNICAL DATA SHEET

SANDWICH OR COMPOSITE BRUSHES

The terms "sandwich" and "composite" apply to brushes **made of two or three parallel radial layers** that are usually of equal thickness and are bonded to each other by an appropriate resin (figure 1).

The difference between the two is that **the layers in a sandwich brush are made of the same grade of material**, while **the composite brush is made of two different grades**. Each brush element is engraved with the grade references.

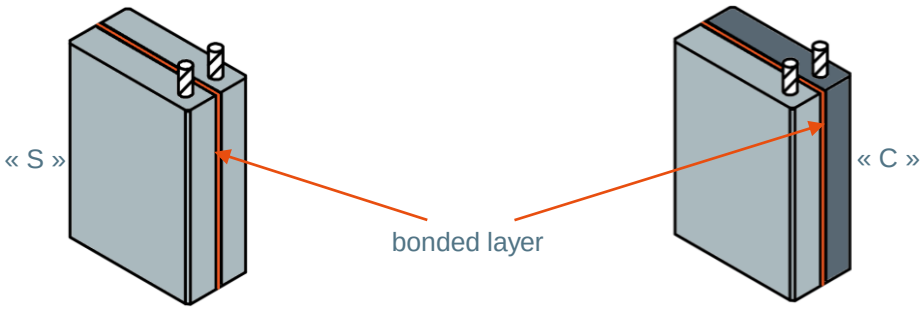

Figure 1 - Sandwich "S" and Composite "C" brushes

It should be noted that:

- Sandwich brushes are symmetrical about their median plane and are hence suitable for reversing machines
- Composite brushes are asymmetrical and are therefore preferred as a rule for unidirectional machines.

It is important to notice that, for manufacturing reasons, a sandwich or composite brush cannot be made less than 6 mm thick. Please consult us for conducting a feasibility study.

The most commonly encountered brush models are pictured below.

Notes: - The implantation of flexibles in figures is for illustration only.
- In figures below the arrow ⟶ corresponds to the rotating direction.

01 – SANDWICH BRUSHES

The simplest brush - and also the most widely used - is the sandwich brush of figure 2 with its two machined layers made of the same Electrographitic (EG) grade[1] (for example EG367).

The glue between the two layers of the brush provides a uniform high transverse resistance. This property is desirable whenever there is a risk of high voltage drops creating circulating currents under the brushes.

In fact, this type of brush yield good results on AC and DC machines that exhibit difficult commutation and require good film control.

In another version the sandwich solution with Carbographitic (A) or Resin-bonded (BG) grades[1] provides a longer life time on DC machines below 25kW which undergo commutation issues

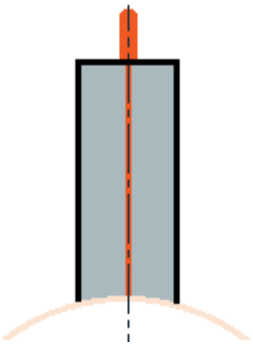

Figure 2 – Sandwich brush

[1] You can find information about the brush grade families in our « *How to maintain carbon brushes, brush-holders, commutators and slip rings*» technical guide.

02 – COMPOSITE BRUSHES

A composite brush is made of two different grades.

COMMUTATORS

Brushes per fig. 3 and fig. 4 are for commutators. They generally consist of an EG and a BG grade of material. Both are selected for their commutating ability.
(example: EG367/BG412)

The use of such a composite brush is a method to improve the performance of machines with difficult commutation.

Because of its exceptional properties, this brush is used mainly on AC motors with commutators, which often place the brushes under severe operating conditions (high inter-bar voltages, aggressive atmospheres).

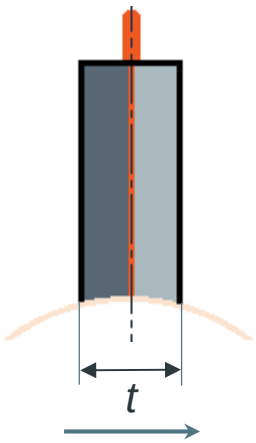

Figure 3
1/2 BG / 1/2 EG

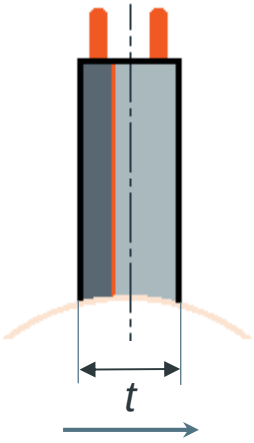

Figure 4
1/3 BG / 2/3 EG

The brush in figure 4 is an improvement over the one in figure 3. It is used only in the particular case where the effect of the EG layer needs to be more efficient with respect to the BG layer, e.g. for AC motors of the Schrage or Schorch type that are commonly overloaded.

The brush is preferably positioned so that the BG layer is in the upstream (leading-edge) position, i.e. the commutator bars run under it first, and the EG layer is on the downstream side (trailing edge). This is because the EG layer is not as vulnerable to the commutation sparks as is the BG layer.

This arrangement would not be correct, though, in the particular case of an over-commutating machine where sparks occur at the leading edge of the brushes.

Note: Other combinations of grades are possible, depending on the application. Please consult us.

SLIP RINGS

The brushes in figure 5 and 6 are examples of slip ring brushes combining good current collection ability with high lubricating power. Generally lubricating grades are chosen from the LFC and EG families, whereas current collecting grades are from CG or CA families.

It is preferable to position the LFC or EG layer in the upstream position, i.e. as leading edge. As for commutators the preferential rotating direction is generally engraved on the brush by an arrow (see picture).

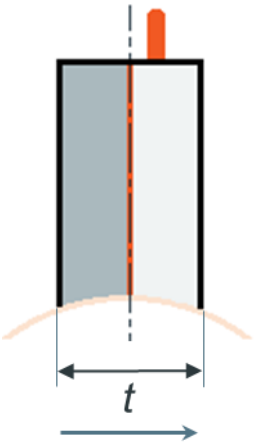

Figure 5
1/2 LFC / 1/2 CA

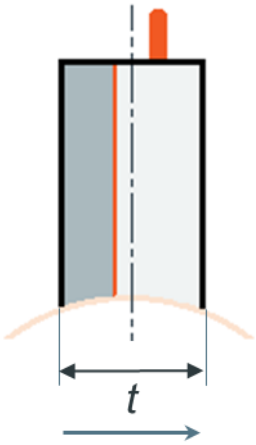

Figure 6
1/3 EG / 2/3 CG

Figure 7 - Composite brush LFC554/AG35 according to figure 5 for earthing in high peripheral speed generators

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