

# SANDWICH BRUSHES COMPOSITE BRUSHES

TECHNICAL NOTE ■ STA BE 16-19 GB

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.

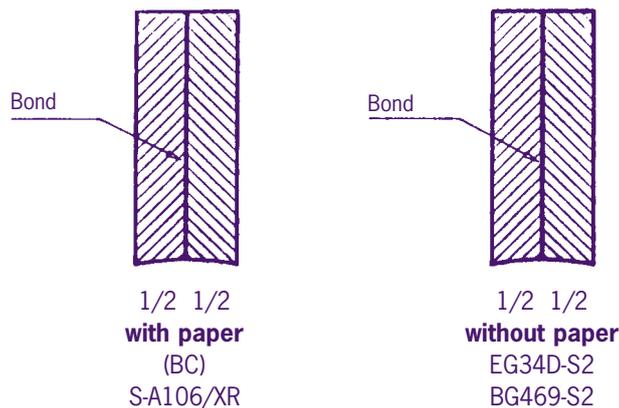
The difference between the two is that the layers in a sandwich brush are made of the same grade of material, while the composite brush is made of two different grades.

The two most commonly encountered models of sandwich brushes are pictured below, along with the three composite brushes that are most widely known.

It should be noted that sandwich brushes are symmetrical about their median plane and are hence suitable for reversing machines, while composite brushes are asymmetrical and are therefore preferred as a rule for unidirectional machines.

## SANDWICH BRUSHES

Two layers of the same grade of material



Examples of designation

– The simplest brush — and also the most widely used — is the sandwich brush with its two machined layers made of the same electrographitic (EG) grade of material.

This brush may be constructed in one of two ways, depending on how it is used: either (for consumer goods) with a sheet of insulation between the two layers, endowing it with uniformly high transverse resistance and good polishing power, or else (for equipment goods) without paper, in which case the transverse resistance is not as high.

This property is desirable whenever there is a risk of high voltage drops creating circulating currents between the collector bars under the brushes.

In fact, these two types of brush yield good results on AC and DC machines that exhibit difficult commutation and require good patina control.

In the case of S-A106/XR, the sandwich solution has enabled a longer life time on washing machine applications.

ISO 9001: 2000 | ISO 14001

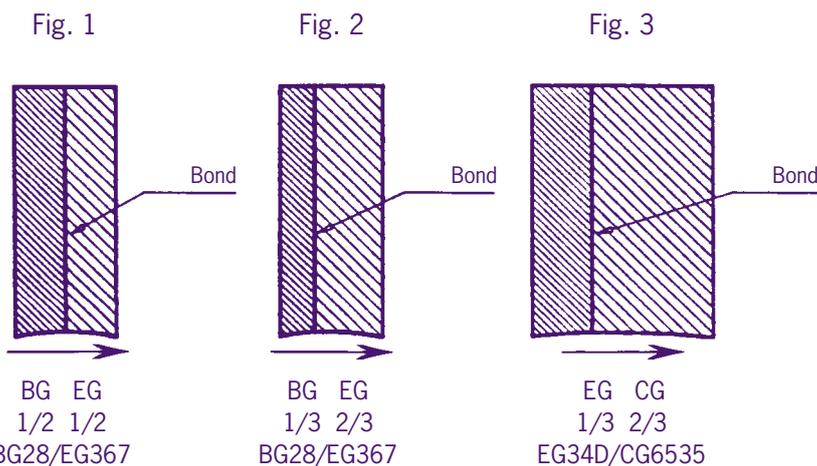
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## COMPOSITE BRUSHES

Two different grades of material



Examples of designation

Each brush element is engraved with the grade references.

- Brushes according fig. 1 and fig. 2 work on bar commutators.
- Brushes according fig. 3 are reserved for working on slip-rings.
- The composite brush (fig. 1) generally comprises an EG and a BG grade of material, both chosen from among the best commutating grades available.

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

The brush is preferably positioned so that the BG layer is in the upstream or leading-edge position, i.e. the commutator bars run under it first, and the EG layer is on the downstream side or 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 the sparks occur at the leading edge of the brushes.

The brush in figure 2 is an improvement over the one in figure 1. It is used only in the particular case where the effect of the EG layer needs to be reinforced with respect to the BG layer, e.g. for AC motors of the Schrage or Schorch type that are commonly overloaded.

The brush in figure 3 is a slip ring brush combining good current collection ability with high lubricating power. It is preferable to position the EG layer in the upstream position, i.e. as leading edge.

It should be noted that, for manufacturing reasons a sandwich or composite brush cannot be made less than 6 mm thick, with individual layers 2 mm thick at the minimum.



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