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Brushes for Electrical Machines

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FOREWORD

NEMA CB 1-2000, *Brushes for Electrical Machines*, revises and supersedes the previous edition, CB 1-1995. It represents the general practice in the design and manufacture of brushes by the electrical manufacturing industry and is issued to provide practical information and to assist the user in the proper selection of such brushes.

The standards in this publication are the result of many years of research and investigation and have been developed through continual consultation among manufacturers, users, and national engineering societies. When utilized by the industry, they have resulted in improved quality of electrical products and economy in manufacture.

These standards are subject to periodic review. They have been revised from time to time to meet changing economic conditions and technical progress. In keeping with the policy of the U.S. National Committee of the International Electrotechnical Commission (IEC), an effort has been made to bring this publication into conformity with existing IEC publications to the extent practical. This revision incorporates provisions of the IEC publications where practical and where they can be achieved without hardship to the user and the industry. This standards publication is, therefore, not in complete conformity with IEC standards. With reference to dimensional data, it should be noted that the bracketed values represent conversion of SI units and are not necessarily IEC specified values. To avoid confusion to the user, brushes manufactured in conformity with IEC tolerances should be so identified.

In the preparation of this standards publication the input of users and other parties of interest has been solicited through American National Standards Committee C64. Inquiries, comments, and proposed or recommended revisions should be submitted to the concerned NEMA product subdivision by contacting the:

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The Carbon/Manufactured Graphite Section developed this standards publication. Section approval does not necessarily imply that all section members voted for its approval or participated in its development. At the time it was approved, the group/section was composed of the following members:

Carbone-Lorraine North America Corporation – Parsippany, NJ
Fulmer Company Incorporated – Westmoreland, PA
Graphite Metallizing Corporation – Yonkers, NY
Helwig Carbon Products, Incorporated – Milwaukee, WI
Hoffmann Carbon, Incorporated – Bradford, PA
Kirkwood Industries – Cleveland, OH
Morgan Advanced Materials & Technology Incorporated – St. Marys, PA
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Section 1
GENERAL

1.1 SCOPE

These standards record definitions, dimensions and tolerances, test procedures for physical properties, and test procedures for shunt connections for brushes used in the electrical manufacturing industry. Included are carbon, carbon-graphite, graphite, electrographite, metal-graphite, metal-impregnated, and resin-bonded brushes.

IEC definitions, terms, symbols, and SI units are given in square brackets ( ).

1.2 DEFINITION OF BRUSH

A brush, as used in the electrical manufacturing industry, is a conductor, usually composed in part of some form of the element carbon, serving to maintain an electrical connection between stationary and moving parts of a machine or apparatus.

1.3 CLASSIFICATIONS OF BRUSHES ACCORDING TO MATERIAL

Brushes are classified, according to the types of material used, as follows:

Type	Symbol
Carbon	(HC)
Carbon-graphite	(CG)
Electrographite	(EG)
Graphite	(NG)
Metal-graphite	(MG)
Metal-impregnated	(MI)
Resin-bonded	(BG)

1.3.1 Classes of Brush Materials

1.3.1.1 Carbon (HC) consists of various forms of amorphous carbon.

1.3.1.2 Carbon-graphite (CG) consists of a mixture of amorphous carbon and graphite.

1.3.1.3 Electrographite (EG) consists of various forms of amorphous carbon converted during manufacture to artificial graphite.

1.3.1.4 Graphite (NG) consists principally of graphite.

1.3.1.5 Metal-graphite (MG) consists of a mixture of metal(s) and graphite.

1.3.1.6 Metal-impregnated (MI) consists of carbon or graphite which has been impregnated with molten metal under pressure.

1.3.1.7 Resin-bonded (BG) consists of carbon or graphite bonded with synthetic resin.

1.4 CLASSIFICATION OF BRUSHES ACCORDING TO SIZE

Brushes are grouped into three classes, according to size, as follows: