NEMA MW 820-2016

Conductor Softness Testing Methods

Published by:

National Electrical Manufacturers Association
1300 North 17th Street, Suite 900
Rosslyn, Virginia 22209

Approved: March 17, 2016

www.nema.org

© 2016 National Electrical Manufacturers Association. All rights, including translation into other languages, reserved under the Universal Copyright Convention, the Berne Convention for the Protection of Literary and Artistic Works, and the International and Pan American copyright conventions.

NOTICE AND DISCLAIMER

The information in this publication was considered technically sound by the consensus of persons engaged in the development and approval of the document at the time it was developed. Consensus does not necessarily mean that there is unanimous agreement among every person participating in the development of this document.

ANSI standards, of which the document contained herein is one, are developed through a voluntary consensus standards development process. This process brings together volunteers and/or seeks out the views of persons who have an interest in the topic covered by this publication. As Secretary of the ANSI Accredited Standards Committee, NEMA administers the process in accordance with the procedures of the American National Standards Institute to promote fairness in the development of consensus. As a publisher of this document, NEMA does not write the document and it does not independently test, evaluate or verify the accuracy or completeness of any information or the soundness of any judgments contained in its standards and guideline publications.

NEMA disclaims liability for any personal injury, property or other damages of any nature whatsoever, whether special, indirect, consequential or compensatory, directly or indirectly resulting from the publication, use of, application, or reliance on this document. NEMA disclaims and makes no guaranty or warranty, express or implied, as to the accuracy or completeness of any information published herein, and disclaims and makes no warranty that the information in this document will fulfill any of your particular purposes or needs. NEMA does not undertake to guarantee the performance of any individual manufacturer’s or seller’s products or services by virtue of this standard or guide.

In publishing and making this document available, NEMA is not undertaking to render professional or other services for or on behalf of any person or entity. Nor is NEMA undertaking to perform any duty owed by any person or entity to someone else. Anyone using this document should rely on his or her own independent judgment or, as appropriate, seek the advice of a competent professional in determining the exercise of reasonable care in any given circumstances. Information and other standards on the topic covered by this publication may be available from other sources, which the user may wish to consult for additional views or information not covered by this publication.

NEMA has no power, nor does it undertake to police or enforce compliance with the contents of this document. NEMA does not certify, test or inspect products, designs or installations for safety or health purposes. Any certification or other statement of compliance with any health- or safety-related information in this document shall not be attributable to NEMA and is solely the responsibility of the certifier or maker of the statement.

TABLE OF CONTENTS

© 2016 National Electrical Manufacturers Association

FOREWORD

This publication is periodically reviewed by the NEMA Magnet Wire Section for revisions considered to be necessary to keep it up to date with changes in technology and regulations.

Proposed or recommended revisions should be submitted to:

Senior Technical Director, Operations
National Electrical Manufacturers Association
1300 North 17th Street, Suite 900
Rosslyn, Virginia 22209

MW 820 was developed by the Magnet Wire Section of NEMA. At the time this edition was approved, the Magnet Wire Section had the following members:

Condumex Inc.	México, D.F., México
Elektrisola Inc.	Boscawen, NH
Essex Group Inc.	Fort Wayne, IN
Magnekón	San Nicolas, NL, México
MWS Wire Industries	Westlake Village, CA
Rea Magnet Wire Company Inc.	Fort Wayne, IN

© 2016 National Electrical Manufacturers Association

INTRODUCTION

The testing of conductor “softness” incorporates different metallurgical principles such as ductility, malleability, and surface hardness characteristics. The purpose of MW 820 is to present different wire testing methodologies used by magnet wire manufacturers and users to characterize the “softness of the conductor” in order to predict how well the magnet wire will wind and be formed into its final desired shape and position.

© 2016 National Electrical Manufacturers Association

SIGNIFICANCE AND USE

NEMA MW 1000 describes two different conductor softness test methods. Total percent elongation and springback test methods and specifications are described in NEMA MW 1000, part 3, section 3.4, Elongation, and section 3.7, Springback. The intent is not to duplicate these test methods, but it is important to recognize and reference them in this publication. Other test methods for conductor malleability and formability need to be described.

Maximum formability is desirable because it facilitates winding magnet wire more compactly, yields coils that will retain their shape best after removal from the winding forms, and permits the most rapid possible winding with minimum force, minimum wire breakage, and reduced abrasive effects. Each of these test methods provides a more significant measure of formability than do tests for hardness, tensile strength, or total percentage of elongation.

These test methods do not necessarily cover identical zones of the total stress-strain region. The springback method employs mild bending, hence a combination of elongation and compression. The low-stress elongation method employs very slight elongation, and the elastic ratio method employs the greatest elongation. Both the low-stress elongation and springback methods allow the deformed film-insulated magnet wire to return partially or entirely to the unstressed condition, while the elastic ratio method does not.

© 2016 National Electrical Manufacturers Association

Section 1
General

1.1 Scope

This publication describes ultimate tensile, yield strength, elastic ratio, low-stress elongation (LSE), and Rockwell hardness test methods and the equipment that may be used to determine these measurements.

© 2016 National Electrical Manufacturers Association