



FRP Composites Grating Manual

for Pultruded and
Molded Grating and
Stair Treads

SECOND EDITION



Published by American Composites Manufacturers Association



Notice and Disclaimer of Liability Concerning the Use of this Standard

This document “FRP Composites Grating Manual for Pultruded and Molded Grating and Stair Treads” was developed through a consensus standards development process approved by the American National Standards Institute, as described on the following page. This process brings together volunteers representing a variety of companies, issues and interests to achieve consensus.

Please note that nothing herein should be viewed as a recommendation by the American Composites Manufacturers Association (ACMA) that any application, technique or process is appropriate in any particular circumstances. Similarly, the fact that a particular application, technique or process is listed in this document should not be viewed as an endorsement by ACMA of such application, technique or process.

ACMA makes no claims concerning the accuracy or applicability of the information contained in the this standard and ACMA is not responsible for the results obtained from the use of such information. Determination of the suitability of the information included is the sole responsibility of the user.

This standard is sold without warranties, express or implied, including but not limited to any implied warranty of merchantability or fitness for a particular purpose. ACMA expressly disclaims all such warranties.

ACMA is not responsible for any damage or loss caused or alleged to be caused by the information contained herein. Accordingly, ACMA shall not be liable for any direct, indirect, incidental, special or consequential damages, resulting from the use of this standard. Additionally, ACMA has no power or ability to enforce, review or make any determination on the compliance with this standard.

Copyright © 2019 by American Composites Manufacturers Association (ACMA)
All rights reserved. No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without prior written permission of the publisher.

FRP Composites Grating Manual

for Pultruded and
Molded Grating and
Stair Treads

SECOND EDITION

Published by
American Composites Manufacturers Association

© 2019 American Composites Manufacturers Association
2000 N 15th Street, Suite 250
Arlington, VA 22201
Phone: 703-525-0511
Fax: 703-525-0743
www.acmanet.org

All rights reserved.

No part of this book may be reproduced or resold, in any form
or by any means, without permission from the publisher.

Printed in the United States

American National Standard

FRP Composites Grating Manual

for Pultruded and Molded Grating and Stair Treads

Larry B. Cox
Secretariat
American Composites Manufacturers Association

Approved: August 30, 2017

American National Standards Institute, Inc.

Approval of an American National Standard requires review by ANSI that the requirements for due process, consensus, and other criteria for approval have been met by the standards developer. Consensus is established when, in the judgment of the ANSI Board of Standards Review, substantial agreement has been reached by directly and materially affected interests. Substantial agreement means much more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that a concerted effort be made towards their resolution.

The use of American National Standards is completely voluntary; their existence does not in any respect preclude anyone, whether he has approved the standard or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standards.

The American National Standards Institute does not develop standards and will under no circumstances give an interpretation of any American National Standard. Moreover, no person shall have the right nor authority to issue an interpretation of an American National Standard in the name of the American National Standards Institute. Requests for interpretations should be addressed to the secretariat or sponsor whose name appears on the title page of this standard.

CAUTION NOTICE: This American National standard may be revised or withdrawn at any time. The procedures of the American National Standards Institute require that action be taken periodically to reaffirm, revise, or withdraw this standard. Purchasers of American National Standards may receive current information on all standards by calling or writing the American National Standards Institute.

American National Standards Institute, Inc., 25 West 43rd Street, New York, NY 10036

ACKNOWLEDGEMENTS

This manual was developed by representative member companies of the Fiberglass Grating Manufacturers Council (FGMC) of the American Composites Manufacturers Association (ACMA) to provide guidance on the design, selection and specification of fiberglass grating. The following are members of the FGMC:

Name	Company Affiliation
Bhyrav Mutnuri	Bedford Reinforced Plastics
Greg McCoy, P.E.	Creative Pultrusions, Inc.
Jason Huechtker	Delta Composites, LLC
Wendell Hollingsworth	Fibergrate Composites Structures, Inc.
Ethan Love, P.E.	Fibergrate Composites Structures, Inc.
Peter Surmak	Interplastic Corporation
Kevin Spoo	Owens Corning
Rick Pauer	Polynt-Reichhold
Wyatt Hardenberg, P.E.	Seasafe, Inc.
Greg Bond, P.E. (Chairman)	Strongwell Chatfield Division
James Sherwood	University of Massachusetts, Lowell
Antonio Nanni	University of Miami; Civil, Architectural & Environmental Engineering

The Fiberglass Grating Manufacturers Council (FGMC) of the American Composites Manufacturers Association (ACMA) also acknowledges and expresses gratitude to the non-member volunteer contributions made by material suppliers, fiberglass grating manufacturers, engineers and specifiers, and academia in developing this standard and the code of standard practice.

PREFACE

This preface is included as background information only. It is not part of the official *American National Standard FRP Composites Grating Manual for Pultruded and Molded Grating and Stair Treads*.

The Fiberglass Grating Manufacturers Council (FGMC) of the American Composites Manufacturers Association (ACMA) has supported the preparation and development of this Manual. Manufacturers of FRP composites grating represented on the Council manufacture fiberglass grating products conforming to the standards and specifications contained herein.

Fiberglass grating has been manufactured and used since the 1960s. It exhibits many features (as compared to metal gratings or wood decks) that are beneficial in a variety of applications. These features include corrosion and rot resistance, light weight, high strength-to-weight, electrical and thermal non-conductivity and molded-in colors. Due to the relatively low modulus of elasticity of glass fiber reinforced polymers, fiberglass grating is always controlled by the serviceability (deflection) limit state rather than strength limit states. This design methodology results in very high, real safety factors.

ACMA is the registered trademark of the American Composites Manufacturers Association.

This standard was developed under procedures accredited by the criteria for American National Standards. The list of canvasses that reviewed this standard was balanced to assure that individuals from competent and concerned interests had an opportunity to participate. The standard is available for public input. ACMA does not approve, rate or endorse any item or property device described in this standard. Participation by federal/state agency representatives or persons associated with industry is not to be interpreted as an endorsement of this standard.

TABLE OF CONTENTS

LIST OF TABLES	xiv
LIST OF FIGURES	xv
1.0 GENERAL SCOPE	1
2.0 GRATING MANUFACTURING PROCESSES	4
3.0 STANDARD NOMENCLATURE	6
4.0 STANDARD MOLDED GRATING DETAILS	8
5.0 STANDARD PULTRUDED GRATING DETAILS	9
6.0 TOLERANCES OF MANUFACTURED AND FABRICATED PANELS	10
7.0 LOAD TABLES	11
7.1 Inch-Pound (U.S. Customary) Units	12
Molded Grating – Uniform Load	12
Molded Grating – Concentrated Line Load	13
Pultruded Grating – Uniform Load	14
Pultruded Grating – Concentrated Line Load	16
7.2 SI Units	18
Molded Grating – Uniform Load	18
Molded Grating – Concentrated Line Load	19
Pultruded Grating – Uniform Load	20
Pultruded Grating – Concentrated Line Load	22
8.0 FASTENER DETAILS, BANDING AND KICK PLATES	24
8.1 Fastener Details	24
8.2 Banding and Kick Plates	25
8.3 Installed Grating Clearances and Guidelines	26
9.0 ORDERING INFORMATION	28
10.0 STANDARD SPECIFICATION – MOLDED AND PULTRUDED FRP GRATING	29
11.0 CODE OF STANDARD PRACTICE	35
12.0 GLOSSARY OF TERMS	39
APPENDIX A – PROCEDURE FOR TESTING GRATING PANELS	45

LIST OF TABLES

Table 3.1 – Standard Marking Systems for Molded and Pultruded Grating	7
Table 6.1 – General Tolerances of Grating Panels	10
Table 7.1 – Molded Grating – Uniform Load (Deflection in inches)	12
Table 7.2 – Molded Grating – Concentrated Line Load (Deflection in inches)	13
Table 7.3 – Pultruded Grating – Uniform Load (Deflection in inches)	14
Table 7.4 – Pultruded Grating – Concentrated Line Load (Deflection in inches)	16
Table 7.5 – Molded Grating – Uniform Load (Deflection in millimeters)	18
Table 7.6 – Molded Grating – Concentrated Line Load (Deflection in millimeters)	19
Table 7.7 – Pultruded Grating – Uniform Load (Deflection in millimeters)	20
Table 7.8 – Pultruded Grating – Concentrated Line Load (Deflection in millimeters)	22
Table A-1 – Number of Load Bars	45
Table A-2 – Required Test Spans & Sample Lengths – Pultruded Grating	45
Table A-3 – Required Test Spans & Sample Lengths – Molded Grating	46

LIST OF FIGURES

Figure 1.1 – Waterfront walkway	2
Figure 1.2 – Boardwalk near seashore	2
Figure 1.3 – Boardwalk near seashore	3
Figure 1.4 – Platform in copper mine	3
Figure 1.5 – Elevated walkway	3
Figure 1.6 – FRP Stairs in containment area	3
Figure 1.7 – Panel fabrication	3
Figure 2.1 – Molded grating with embedded grit	4
Figure 2.2 – Molded grating with meniscus surface	4
Figure 2.3 – Pultrusion process	5
Figure 2.4 – Assembled pultruded grating	5
Figure 3.1 – Pultruded grating spacing	6
Figure 4.1 – Standard molded grating details	8
Figure 5.1 – Standard pultruded grating details	9
Figure 7.1 – Molded grating – uniform load	12
Figure 7.2 – Molded grating – concentrated line load	13
Figure 7.3 – Pultruded grating – uniform load	14
Figure 7.4 – Pultruded grating – concentrated line load	16
Figure 7.5 – Molded grating – uniform load	18
Figure 7.6 – Molded grating – concentrated line load	19
Figure 7.7 – Pultruded grating – uniform load	20
Figure 7.8 – Pultruded grating – concentrated line load	22
Figure 8.1 – Fastener options for molded and pultruded grating	24
Figure 8.2 – FRP edge banding for molded grating	25
Figure 8.3 – FRP kick plates for molded grating	25
Figure 8.4 – FRP banding/kick plates for pultruded grating	26
Figure 8.5 – Grating clearances	27

Figure A-1 – Testing layout for pultruded grating – span 12 inches . . . . .	.47
Figure A-2 – Testing layout for pultruded grating – span 24 inches . . . . .	.47
Figure A-3 – Testing layout for pultruded grating – span 30 inches . . . . .	.47
Figure A-4 – Testing layout for pultruded grating – span 36 inches . . . . .	.48
Figure A-5 – Testing layout for pultruded grating – span 42 inches . . . . .	.48
Figure A-6 – Testing layout for pultruded grating – span 48 inches . . . . .	.49
Figure A-7 – Testing layout for pultruded grating – span 54 inches . . . . .	.49
Figure A-8 – Testing layout for pultruded grating – span 60 inches . . . . .	.50
Figure A-9 – Testing layout for pultruded grating – span 72 inches . . . . .	.50
Figure A-10 – Testing layout for molded grating . . . . .	.51
Figure A-11 – Testing layout for rectangular molded grating . . . . .	.52