

# **THE RMA RUBBER HANDBOOK™**

## **FOR MOLDED, EXTRUDED, LATHE CUT AND CELLULAR PRODUCTS**

First Edition -- 1958  
Second Edition -- 1963  
Third Edition -- 1970  
Fourth Edition -- 1984  
Fifth Edition -- 1992  
Sixth Edition -- 2005

Published by  
The Rubber Manufacturers Association, Inc.  
1400 K Street, N.W.  
Washington, D.C. 20005  
[www.rma.org](http://www.rma.org)

All rights reserved. The contents of this publication may not be reprinted or otherwise reproduced in any form without the express written permission of RMA.

©The Rubber Manufacturers Association, Inc., 2005

## ACKNOWLEDGMENT

The Rubber Manufacturers Association gratefully acknowledges the efforts and approval of the following companies in the publication of this 6<sup>th</sup> Edition of The RMA Rubber Handbook™.

### Handbook Revision Task Force

Acadia Elastomers Corporation  
Ashtabula Rubber Company  
Chardon Rubber Company  
Custom Rubber Corporation  
Federal-Mogul Corporation  
South Bend Modern Molding  
T&M Rubber, Inc.  
Tenneco Automotive

---

Ammeraal Beltech, Inc.  
Associated Rubber Company  
Avon Automotive, N.A.  
Bando (U.S.A.), Inc.  
Blair Rubber Company  
BRC Rubber & Plastics, Inc.  
Bridgestone APM Company  
Busak & Shamban  
Carlisle Companies, Inc.  
Caterpillar Inc. -- Chemical Products  
Chicago-Allis Manufacturing Corporation  
Cooper-Standard Automotive  
Datwyler Rubber & Plastics, Inc.  
Dawson Manufacturing Company  
Eagle Elastomer Inc.  
Eaton Global Hose  
Echo Engineering & Production Supplies, Inc.  
Firestone Building Products  
Firestone Industrial Products Company  
Freudenberg-NOK, General Partnership  
Gates Corporation  
HBD Industries, Inc.  
Hutchinson FTS  
IMCO, Inc.  
Johnson Rubber Company

MBL (USA) Corporation  
Neff-Perkins Company  
North Shore Laboratories  
Ottawa Rubber Company  
Parker Hannifin Corp. - IHD  
Patch Rubber Company  
Paulstra CRC Corporation  
Pawling Corporation  
Polymer Sealing Solutions, Inc.  
Rema Tip Top North America, Inc.  
SAS Rubber Company  
Seals Eastern, Inc.  
SKF Sealing Solutions Americas  
Specification Rubber Products, Inc.  
TBMC, Inc.  
TECH International  
The Goodyear Tire & Rubber Company  
Titan Industries  
Trelleborg Automotive  
Trelleborg Wheel Systems Americas, Inc.  
Trostel, Ltd.  
VIP Rubber Company, Inc.  
Westland Technologies, Inc.

## FOREWORD

Rubber manufacturers and their customers have long recognized the need for a “universal language” by which design engineers can express their exact requirements and specifications for rubber parts.

In designing rubber parts, engineers have always had the problem of specifying requirements in terms sufficiently clear to enable the manufacturers to determine with a reasonable degree of accuracy what is actually described in terms of performance, tolerance and service characteristics.

A portion of this problem, namely a standard means for designing rubber materials, has in large part been solved. By using the charts, symbols and definitions developed jointly by ASTM International and the Society of Automotive Engineers (presently under the jurisdiction of SAE) and approved and published as ASTM D-2000 and as SAE J-200 (or ASTM D-1056 and SAE J-18 for sponge and expanded cellular products), design engineers are able to place on their drawings appropriate symbols and numbers to express precise material requirements. The rubber manufacturers, in turn, by referring to the same basic ASTM or SAE data, can interpret accurately what the engineers have specified. With the use of these charts approaching complete acceptance, error and misunderstanding of material requirements have been substantially reduced.

Thus, part of the “universal language” has been established and is in common usage. There remains, however, a large area to be covered. This area includes the means of specifying engineering and quality conformance requirements. This handbook is the effort of the molded, extruded, lathe-cut and cellular rubber industries to provide engineers with a uniform method of stating these requirements in a manner their suppliers can approach with the same certainty of understanding.

Rubber manufacturers seek in this handbook to establish a language which will enable engineers to express, on their drawings, requirements which will give them what they need, but not more than they need. To accomplish this, we set up the “language” on the following pages in the form of symbols, charts and definitions.

The manufacturing techniques, capabilities, limitations and problems are different for molded rubber parts than for extruded rubber parts or lathe-cut or cellular (expanded and sponge) rubber parts. Each is treated in a separate chapter with its own charts and definitions. Quality conformance is treated in a separate section.

The use of this handbook will lead to a better understanding between Design Engineers, Purchasing Departments and Inspection and Quality Control Departments of the users of these rubber products and the Technical, Production and Quality Control Departments of the rubber companies.

The expressions used throughout this handbook are the standard terminology used in the rubber manufacturing industry. It will be noted that the chapters on molded, extruded, lathe-cut and cellular (expanded and sponge) products are specifically pointed towards an exposition of the manufacturing techniques, capabilities and limitations of these areas. A method of prescribing the technical aspects of the quality desired is presented in these sections, (qualitative standards).

Concerning quality, this sixth edition provides recommendations for a total quality program to meet the demands for zero defects by the OEM. It is recognized that for certain products customers will agree to a less rigorous approach. In such cases, the producer may choose to use only those recommendations in this handbook that are necessary to achieve the agreed upon level of acceptance.

Recognizing the possible need for metric values we have printed all tables in both English and metric units. We have applied the rules for the use of the International System of units as outlined by the International Organization for Standardization (ISO).

As a supplement to the industry recommendations contained in this handbook, the RMA's General Products Group, and its members, have developed the **RMA Worker Training & Certification Program**. This comprehensive training software was developed by industry as a self-contained training curriculum for operators involved in injection molding, compression / transfer molding, extrusion, and material mixing. For additional information on this product please go to [www.rma.org](http://www.rma.org) or call the RMA's General Products Group at (202) 682-4800.

# TABLE OF CONTENTS

	Page
<b>MOLDED RUBBER PRODUCTS - Chapter 1</b>	<b>3</b>
Purpose and scope	3
Summary and examples of RMA drawing designations	3
Standards for tolerances	4
Standards for finish and appearance	10
Standards for flash	11
Standards for rubber-to-metal adhesion	13
Standards for static and dynamic load deflection characteristics	16
Standards for packaging	18
<b>EXTRUDED RUBBER PRODUCTS - Chapter 2</b>	<b>19</b>
Purpose and scope	19
Process illustrations	19
Summary of RMA drawing designations	21
Standards for cross sectional tolerances	22
Standards for extruded finish and appearance	24
Standards for formed tubing (for special shapes)	24
Standards for cut length tolerances for normal unspliced extrusions	26
Standards for angle cut tolerances for extrusions	27
Standards for spliced extrusions	28
Standards for outside dimensions of surface ground extrusions	30
Standards for internal dimensions of mandrel-supported extrusions	31
Standards for concentricity of mandrel cured and ground extruded tubing	32
Standards for optional method of tolerancing ground extruded tubing	33
Standards for packaging	34
<b>LATHE-CUT RUBBER PRODUCTS - Chapter 3</b>	<b>35</b>
Purpose and scope	35
How to specify	35
Standards for tolerances	36
Lathe-cut products used as seals	39
<b>CELLULAR RUBBER PRODUCTS - Chapter 4</b>	<b>41</b>
Purpose and scope	41
Summary of RMA drawing designations	42
Types of products	43
Sponge rubber (open cell)	43
Expanded rubber (closed cell)	43
Cellular silicone rubber	44
Standards for dimensional tolerances	46
Standards for finish and service condition	55
Standards for packaging	57
<b>QUALITY CONFORMANCE - Chapter 5</b>	<b>58</b>
Purpose and scope	58
Quality system control procedures	58
Supplier responsibilities	58
Manufacturing control	58
Service	60
People	60
<b>GLOSSARY OF TERMS</b>	<b>61</b>
<b>REFERENCES</b>	<b>64</b>