

RECTANGULAR INDUSTRIAL DUCT CONSTRUCTION STANDARDS

SI Version



**SHEET METAL AND AIR CONDITIONING CONTRACTORS'
NATIONAL ASSOCIATION, INC.
www.smacna.org**

This is a preview. [Click here to purchase the full publication.](#)

This is a preview. [Click here to purchase the full publication.](#)

RECTANGULAR INDUSTRIAL DUCT CONSTRUCTION STANDARDS

SI SECOND EDITION – AUGUST 2007



**SHEET METAL AND AIR CONDITIONING CONTRACTORS'
NATIONAL ASSOCIATION, INC.**

4201 Lafayette Center Drive
Chantilly, VA 20151-1209
www.smacna.org

This is a preview. [Click here to purchase the full publication.](#)

RECTANGULAR INDUSTRIAL DUCT CONSTRUCTION STANDARDS

COPYRIGHT © SMACNA 2005
All Rights Reserved
by

**SHEET METAL AND AIR CONDITIONING CONTRACTORS'
NATIONAL ASSOCIATION, INC.**

4201 Lafayette Center Drive
Chantilly, VA 20151-1209

Printed in the U.S.A.

FIRST EDITION – 1980
SI SECOND EDITION – AUGUST 2007

Except as allowed in the Notice to Users and in certain licensing contracts, no part of this book may be reproduced, stored in a retrievable system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the publisher.

[This is a preview. Click here to purchase the full publication.](#)

FOREWORD

These duct construction standards are intended for use by contractors, fabricators and designers of air pollution control, pneumatic conveyance and industrial ventilation systems.

The 1980 edition of these standards was the first publication dealing with the selection of duct thickness and reinforcement for rectangular industrial duct systems. While the first edition served industry very well for many years, technology has continued to evolve and in response to our membership's request, SMACNA's Rectangular Industrial Duct Construction Task Force led a comprehensive review and update of the first edition, resulting in this greatly expanded and more "user friendly" version of the original publication.

While the new text includes many of the same assumptions as the original work, a number of new features have been added:

- New SI version
- Six different types of carbon galvanized and aluminized steels
- Seven different types of stainless steel alloys
- Three different types of aluminum alloys
- Consideration of wind, snow, ice, and other loads
- Design check for localized and global modes of side panel buckling
- Design capability for high temperature systems up to 427°C, and higher with design review by a specialized professional.
- New Chapter of practical examples with step-by-step instructions
- New Duct Class 5 - for systems handling corrosives
- Expanded data for the selection of duct supports, fasteners, gaskets and joint sealants
- Accepted Industry Practice for Rectangular Industrial Ducts
- New Chapter on Welding
- New Guide Specification for the fabrication and installation of industrial duct systems

The Rectangular Industrial Duct Construction Task Force is deeply indebted to Doctor Michael C. Soteriades who did the original work for the first edition and contributed greatly to the improvements and expansion of the technical scope in the new edition. Likewise, the task force is deeply indebted to Joseph M Plecnik, PhD, P.E. of California State University at Long Beach, who is responsible for the physical testing, finite element analysis (FEA) studies, and design guidance related to the issue of Non-Linear Elastic Buckling of Duct Side Panels on Rectangular Industrial Duct.

SHEET METAL AND AIR CONDITIONING CONTRACTORS'
NATIONAL ASSOCIATION, INC.



RECTANGULAR INDUSTRIAL TASK FORCE

Steven P. Graves, P.E., *Chairman*
Du-Mont Company
Peoria, IL

Mitchell Hoppe
Melrose Metal Products, Inc.
Fremont, CA

Blake L. Anderson, P.E.
Climate Engineers, Inc.
Cedar Rapids, IA

Ernest R. Menold, P.E.
Ernest D. Menold, Inc.
Lester, PA

John Gundlach
McKinstry Company
Seattle, WA

G. A. Navas, *Staff Liaison*
SMACNA, Inc.
Chantilly, VA

CONSULTANTS

Douglas S. Barno
DSB Marketing Group, N.A.
Granville, OH

Simon J. Scott
Scott Consulting Services, Inc.
Westerville, OH

Joseph M. Plecnik, PhD, P.E.
Cal State University, L.B.
Long Beach, CA

Dr. Michael C. Soteriades
Catholic University
Washington, DC

FORMER COMMITTEE MEMBERS AND OTHER CONTRIBUTORS

Harry Basore
Kansas City, MO

Michael G. Poja
Milwaukee, WI

Wallace E. Fizer
Lexington, KY

Francis J. Walter
Evansville, IN

William Harbaugh
Houston, TX

Harold Weisgerber
Cincinnati, OH

Marvin Hicks
Idaho Falls, ID

Ing. Pedro Iturbide
Barcelona, Spain

Donald Partney
Granite City, IL

Dipl. Ing. Otto L. Arnold
Hannover, Germany



NOTICE TO USERS OF THIS PUBLICATION

1. DISCLAIMER OF WARRANTIES

- a) The Sheet Metal and Air Conditioning Contractors' National Association ("SMACNA") provides its product for informational purposes.
- b) The product contains "Data" which is believed by SMACNA to be accurate and correct but the data, including all information, ideas and expressions therein, is provided strictly "AS IS," with all faults. SMACNA makes no warranty either express or implied regarding the Data and SMACNA EXPRESSLY DISCLAIMS ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE.
- c) By using the data contained in the product user accepts the Data "AS IS" and assumes all risk of loss, harm or injury that may result from its use. User acknowledges that the Data is complex, subject to faults and requires verification by competent professionals, and that modification of parts of the Data by user may impact the results or other parts of the Data.
- d) IN NO EVENT SHALL SMACNA BE LIABLE TO USER, OR ANY OTHER PERSON, FOR ANY INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES ARISING, DIRECTLY OR INDIRECTLY, OUT OF OR RELATED TO USER'S USE OF SMACNA'S PRODUCT OR MODIFICATION OF DATA THEREIN. This limitation of liability applies even if SMACNA has been advised of the possibility of such damages. IN NO EVENT SHALL SMACNA'S LIABILITY EXCEED THE AMOUNT PAID BY USER FOR ACCESS TO SMACNA'S PRODUCT OR \$1,000.00, WHICHEVER IS GREATER, REGARDLESS OF LEGAL THEORY.
- e) User by its use of SMACNA's product acknowledges and accepts the foregoing limitation of liability and disclaimer of warranty and agrees to indemnify and hold harmless SMACNA from and against all injuries, claims, loss or damage arising, directly or indirectly, out of user's access to or use of SMACNA's product or the Data contained therein.

2. ACCEPTANCE

This document or publication is prepared for voluntary acceptance and use within the limitations of application defined herein, and otherwise as those adopting it or applying it deem appropriate. It is not a safety standard. Its application for a specific project is contingent on a designer or other authority defining a specific use. SMACNA has no power or authority to police or enforce compliance with the contents of this document or publication and it has no role in any representations by other parties that specific components are, in fact, in compliance with it.

3. AMENDMENTS

The Association may, from time to time, issue formal interpretations or interim amendments, which can be of significance between successive editions.

4. PROPRIETARY PRODUCTS

SMACNA encourages technological development in the interest of improving the industry for the public benefit. SMACNA does not, however, endorse individual manufacturers or products.

5. FORMAL INTERPRETATION

a) A formal interpretation of the literal text herein or the intent of the technical committee or task force associated with the document or publication is obtainable only on the basis of written petition, addressed to the Technical Resources Department and sent to the Association's national office in Chantilly, Virginia. In the event that the petitioner has a substantive disagreement with the interpretation, an appeal may be filed with the Technical Resources Committee, which has technical oversight responsibility. The request must pertain to a specifically identified portion of the document that does not involve published text which provides the requested information. In considering such requests, the Association will not review or judge products or components as being in compliance with the document or publication. Oral and written interpretations otherwise obtained from anyone affiliated with the Association are unofficial. This procedure does not prevent any committee or task force chairman, member of the committee or task force, or staff liaison from expressing an opinion on a provision within the document, provided that such person clearly states that the opinion is personal and does not represent an official act of the Association in any way, and it should not be relied on as such. The Board of Directors of SMACNA shall have final authority for interpretation of this standard with such rules or procedures as they may adopt for processing same.

b) SMACNA disclaims any liability for any personal injury, property damage, or other damage of any nature whatsoever, whether special, indirect, consequential or compensatory, direct or indirectly resulting from the publication, use of, or reliance upon this document. SMACNA makes no guaranty or warranty as to the accuracy or completeness of any information published herein.

6. APPLICATION

a) Any standards contained in this publication were developed using reliable engineering principles and research plus consultation with, and information obtained from, manufacturers, users, testing laboratories, and others having specialized experience. They are



subject to revision as further experience and investigation may show is necessary or desirable. Construction and products which comply with these Standards will not necessarily be acceptable if, when examined and tested, they are found to have other features which impair the result contemplated by these requirements. The Sheet Metal and Air Conditioning Contractors' National Association and other contributors assume no responsibility and accept no liability for the application of the principles or techniques contained in this publication. Authorities considering adoption of any standards contained herein should review all federal, state, local, and contract regulations applicable to specific installations.

b) In issuing and making this document available, SMACNA is not undertaking to render professional or other services for or on behalf of any person or entity. SMACNA is not undertaking to perform any duty owed to any person or entity to someone else. Any person or organization using this document should rely on his, her or its own judgement or, as appropriate, seek the advice of a competent professional in determining the exercise of reasonable care in any given circumstance.

7. REPRINT PERMISSION

Non-exclusive, royalty-free permission is granted to government and private sector specifying authorities to reproduce *only* any construction details found herein in their specifications and contract drawings prepared for receipt of bids on new construction and renovation work within the United States and its territories, provided that the material copied is unaltered in substance and that the reproducer assumes all liability for the specific application, including errors in reproduction.

8. THE SMACNA LOGO

The SMACNA logo is registered as a membership identification mark. The Association prescribes acceptable use of the logo and expressly forbids the use of it to represent anything other than possession of membership. Possession of membership and use of the logo in no way constitutes or reflects SMACNA approval of any product, method, or component. Furthermore, compliance of any such item with standards published or recognized by SMACNA is not indicated by presence of the logo.



TABLE OF CONTENTS

This is a preview. [Click here to purchase the full publication.](#)

TABLE OF CONTENTS

FOREWORD	iii
RECTANGULAR INDUSTRIAL TASK FORCE	iv
FORMER COMMITTEE MEMBERS AND OTHER CONTRIBUTORS	iv
NOTICE TO USERS OF THIS PUBLICATION	v
TABLE OF CONTENTS	vii
CHAPTER 1 INTRODUCTION	Page
1.1 SCOPE	1.1
1.2 PURPOSE	1.1
1.3 DEVELOPMENT OF THE SECOND EDITION	1.1
1.4 INDUSTRIAL DUCT DESIGN	1.1
1.5 HOW TO USE THIS MANUAL	1.2
1.6 MANUAL CONTENTS	1.2
CHAPTER 2 INDUSTRIAL DUCT APPLICATIONS	
2.1 INTRODUCTION	2.1
2.2 DEFINITION OF INDUSTRIAL DUCT	2.1
2.3 DUCT SYSTEM CLASSIFICATION	2.1
2.4 MATERIAL (PARTICULATE) CHARACTERISTICS AND CLASSES	2.2
CHAPTER 3 DUCT MATERIALS	
3.1 INTRODUCTION	3.1
3.2 MATERIAL TYPES	3.1
3.3 CARBON AND COATED STEEL DATA	3.4
3.4 STAINLESS STEEL DATA	3.8
3.5 ALUMINUM DATA	3.12
3.6 MATERIAL PROPERTIES SUMMARY	3.14
3.7 CORROSION	3.15
CHAPTER 4 DESIGN CRITERIA	
4.1 INTRODUCTION	4.1
4.2 GENERAL PROVISIONS	4.1
4.3 NOMENCLATURE	4.1
4.4 LOADS	4.3
4.5 LIMITS AND TOLERANCES	4.7
4.6 SERVICEABILITY AND DURABILITY	4.7
4.7 DESIGN OF DUCT THICKNESS	4.7
4.8 DESIGN OF STIFFENER SIZE	4.11
4.9 DESIGN OF SUPPORT SPACING	4.12
4.10 BOLTING OF CONNECTIONS	4.13
4.11 CHECKING SHEAR CAPACITY OF DUCT SIDE WALLS	4.16
4.12 CRITERIA FOR THE DESIGN OF SYSTEMS WITH INTERNAL SUPPORTS	4.21
4.13 HANGERS AND SUPPORTS	4.24
4.14 THERMAL EXPANSION	4.26

