

A Member of the International Code Family™



INTERNATIONAL MECHANICAL CODE®

2003

2003 International Mechanical Code®

First Printing: February 2003
Second Printing: May 2003
Third Printing: April 2004
Fourth Printing: January 2005
Fifth Printing: May 2005

ISBN # 1-892395-64-9 (soft-cover edition)

ISBN # 1-892395-63-0 (loose-leaf edition)

ISBN # 1-892395-83-5 (e-document)

COPYRIGHT© 2003

by

INTERNATIONAL CODE COUNCIL, INC.

ALL RIGHTS RESERVED. This 2003 International Mechanical Code® is a copyrighted work owned by the International Code Council, Inc. Without advance written permission from the copyright owner, no part of this book may be reproduced, distributed, or transmitted in any form or by any means, including, without limitation, electronic, optical or mechanical means (by way of example, and not limitation, photocopying, or recording by or in an information storage retrieval system). For information on permission to copy material exceeding fair use, please contact: Publications, 4051 West Flossmoor Road, Country Club Hills, IL 60478-5795 (Phone 888-422-7233).

Trademarks: “International Code Council,” the “International Code Council” logo and the “International Mechanical Code” are trademarks of the International Code Council, Inc.

PRINTED IN THE U.S.A.

PREFACE

Introduction

Internationally, code officials recognize the need for a modern, up-to-date mechanical code addressing the design and installation of mechanical systems emphasizing performance. The *International Mechanical Code*[®], in this 2003 edition, is designed to meet these needs through model code regulations that safeguard the public health and safety in all communities, large and small.

This comprehensive mechanical code establishes minimum regulations for mechanical systems using prescriptive and performance-related provisions. It is founded on broad-based principles that make possible the use of new materials and new mechanical system designs. This 2003 edition is fully compatible with all the *International Codes* (“I-Codes”) published by the International Code Council (ICC), including the *International Building Code*, *ICC Electrical Code*, *International Energy Conservation Code*, *International Existing Building Code*, *International Fire Code*, *International Fuel Gas Code*, *ICC Performance Code*, *International Plumbing Code*, *International Private Sewage Disposal Code*, *International Property Maintenance Code*, *International Residential Code*, *International Urban-Wildland Interface Code* and *International Zoning Code*.

The *International Mechanical Code* provisions provide many benefits, among which is the model code development process that offers an international forum for mechanical professionals to discuss performance and prescriptive code requirements. This forum provides an excellent arena to debate proposed revisions. This model code also encourages international consistency in the application of provisions.

Development

The first edition of the *International Mechanical Code* (1996) was the culmination of an effort initiated in 1995 by a development committee appointed by the International Code Council (ICC) and consisting of representatives of the three statutory members of the ICC: Building Officials and Code Administrators International, Inc. (BOCA), International Conference of Building Officials (ICBO) and Southern Building Code Congress International (SBCCI). The intent was to draft a comprehensive set of regulations for mechanical systems consistent with and inclusive of the scope of the existing model codes. Technical content of the latest model codes promulgated by BOCA, ICBO and SBCCI was utilized as the basis for the development. This 2003 edition presents the code as originally issued, with changes approved through the ICC Code Development Process through 2002. A new edition such as this is promulgated every three years.

With the development and publication of the family of *International Codes* in 2000, the continued development and maintenance of the model codes individually promulgated by BOCA (“BOCA National Codes”), ICBO (“Uniform Codes”) and SBCCI (“Standard Codes”) was discontinued. This 2003 *International Mechanical Code*, as well as its predecessor—the 2000 edition—is intended to be the successor mechanical code to those codes previously developed by BOCA, ICBO and SBCCI.

The development of a single set of comprehensive and coordinated *International Codes* was a significant milestone in the development of regulations for the built environment. The timing of this publication mirrors a milestone in the change in structure of the model codes, namely, the consolidation of BOCA, ICBO and SBCCI into the ICC. The activities and services previously provided by the individual model code organizations will be the responsibility of the consolidated ICC.

This code is founded on principles intended to establish provisions consistent with the scope of a mechanical code that adequately protects public health, safety and welfare; provisions that do not unnecessarily increase construction costs; provisions that do not restrict the use of new materials, products or methods of construction; and provisions that do not give preferential treatment to particular types or classes of materials, products or methods of construction.

Adoption

The *International Mechanical Code* is available for adoption and use by jurisdictions internationally. Its use within a governmental jurisdiction is intended to be accomplished through adoption by reference in accordance with proceedings establishing the jurisdiction’s laws. At the time of adoption, jurisdictions should insert the appropriate information in provisions requiring specific local information, such as the name of the adopting jurisdiction. These locations are shown in bracketed words in small capital letters in the code and in the sample ordinance. The sample adoption ordinance on page v addresses several key elements of a code adoption ordinance, including the information required for insertion into the code text.

Maintenance

The *International Mechanical Code* is kept up to date through the review of proposed changes submitted by code enforcing officials, industry representatives, design professionals and other interested parties. Proposed changes are carefully considered through an open code development process in which all interested and affected parties may participate.

The contents of this work are subject to change both through the Code Development Cycles and the governmental body that enacts the code into law. For more information regarding the code development process, contact the Code and Standard Development Department of the International Code Council.

While the development procedure of the *International Mechanical Code* assures the highest degree of care, ICC and the founding members of ICC—BOCA, ICBO, SBCCI—their members and those participating in the development of this code do not accept any liability resulting from compliance or noncompliance with the provisions because ICC and its founding members do not have the power or authority to police or enforce compliance with the contents of this code. Only the governmental body that enacts the code into law has such authority.

Letter Designations in Front of Section Numbers

In each code development cycle, proposed changes to this code are considered at the Code Development Hearing by the International Mechanical Code Development Committee, whose action constitutes a recommendation to the voting membership for final action on the proposed change. Proposed changes to a code section whose number begins with a letter in brackets are considered by a different code development committee. For instance, proposed changes to code sections which have the letter [B] in front (for example, [B] 601.2), are considered by the International Building Code Development Committee at the Code Development Hearing. Where this designation is applicable to the entire content of a main section of the code, the designation appears at the main section number and title and is not repeated at every subsection in that section.

The content of sections in this code which begin with a letter designation are maintained by another code development committee in accordance with the following: [B] = International Building Code Development Committee; [E] = International Energy Conservation Code Development Committee; [EB] = International Existing Building Code Development Committee; and [F] = International Fire Code Development Committee.

Marginal Markings

Solid vertical lines in the margins within the body of the code indicate a technical change from the requirements of the 2000 edition. Deletion indicators (➡) are provided in the margin where a paragraph or item has been deleted.

ORDINANCE

The *International Codes* are designed and promulgated to be adopted by reference by ordinance. Jurisdictions wishing to adopt the 2003 *International Mechanical Code* as an enforceable regulation governing mechanical systems should ensure that certain factual information is included in the adopting ordinance at the time adoption is being considered by the appropriate governmental body. The following sample adoption ordinance addresses several key elements of a code adoption ordinance, including the information required for insertion into the code text.

SAMPLE ORDINANCE FOR ADOPTION OF THE *INTERNATIONAL MECHANICAL CODE* ORDINANCE NO. _____

An ordinance of the [JURISDICTION] adopting the 2003 edition of the *International Mechanical Code*, regulating and governing the design, construction, quality of materials, erection, installation, alteration, repair, location, relocation, replacement, addition to, use or maintenance of mechanical systems in the [JURISDICTION]; providing for the issuance of permits and collection of fees therefor; repealing Ordinance No. _____ of the [JURISDICTION] and all other ordinances and parts of the ordinances in conflict therewith.

The [GOVERNING BODY] of the [JURISDICTION] does ordain as follows:

Section 1. That a certain document, three (3) copies of which are on file in the office of the [TITLE OF JURISDICTION'S KEEPER OF RECORDS] of [NAME OF JURISDICTION], being marked and designated as the *International Mechanical Code*, 2003 edition, including Appendix Chapters [FILL IN THE APPENDIX CHAPTERS BEING ADOPTED] (see *International Mechanical Code* Section 101.2.1, 2003 edition), as published by the International Code Council, be and is hereby adopted as the Mechanical Code of the [JURISDICTION], in the State of [STATE NAME] regulating and governing the design, construction, quality of materials, erection, installation, alteration, repair, location, relocation, replacement, addition to, use or maintenance of mechanical systems as herein provided; providing for the issuance of permits and collection of fees therefor; and each and all of the regulations, provisions, penalties, conditions and terms of said Mechanical Code on file in the office of the [JURISDICTION] are hereby referred to, adopted, and made a part hereof, as if fully set out in this ordinance, with the additions, insertions, deletions and changes, if any, prescribed in Section 2 of this ordinance.

Section 2. The following sections are hereby revised:

Section 101.1. Insert: [NAME OF JURISDICTION]

Section 106.5.2. Insert: [APPROPRIATE SCHEDULE]

Section 106.5.3. Insert: [PERCENTAGES IN TWO LOCATIONS]

Section 108.4. Insert: [OFFENSE, DOLLAR AMOUNT, NUMBER OF DAYS]

Section 108.5. Insert: [DOLLAR AMOUNT IN TWO LOCATIONS]

Section 3. That Ordinance No. _____ of [JURISDICTION] entitled [FILL IN HERE THE COMPLETE TITLE OF THE ORDINANCE OR ORDINANCES IN EFFECT AT THE PRESENT TIME SO THAT THEY WILL BE REPEALED BY DEFINITE MENTION] and all other ordinances or parts of ordinances in conflict herewith are hereby repealed.

Section 4. That if any section, subsection, sentence, clause or phrase of this ordinance is, for any reason, held to be unconstitutional, such decision shall not affect the validity of the remaining portions of this ordinance. The [GOVERNING BODY] hereby declares that it would have passed this ordinance, and each section, subsection, clause or phrase thereof, irrespective of the fact that any one or more sections, subsections, sentences, clauses and phrases be declared unconstitutional.

Section 5. That nothing in this ordinance or in the Mechanical Code hereby adopted shall be construed to affect any suit or proceeding impending in any court, or any rights acquired, or liability incurred, or any cause or causes of action acquired or existing, under any act or ordinance hereby repealed as cited in Section 2 of this ordinance; nor shall any just or legal right or remedy of any character be lost, impaired or affected by this ordinance.

Section 6. That the [JURISDICTION'S KEEPER OF RECORDS] is hereby ordered and directed to cause this ordinance to be published. (An additional provision may be required to direct the number of times the ordinance is to be published and to specify that it is to be in a newspaper in general circulation. Posting may also be required.)

Section 7. That this ordinance and the rules, regulations, provisions, requirements, orders and matters established and adopted hereby shall take effect and be in full force and effect [TIME PERIOD] from and after the date of its final passage and adoption.

TABLE OF CONTENTS

<p>CHAPTER 1 ADMINISTRATION 1</p> <p>Section</p> <p>101 General 1</p> <p>102 Applicability..... 1</p> <p>103 Department of Mechanical Inspection 2</p> <p>104 Duties and Powers of the Code Official 2</p> <p>105 Approval 2</p> <p>106 Permits 3</p> <p>107 Inspections and Testing 4</p> <p>108 Violations 5</p> <p>109 Means of Appeal 6</p> <p>CHAPTER 2 DEFINITIONS 9</p> <p>Section</p> <p>201 General 9</p> <p>202 General Definitions 9</p> <p>CHAPTER 3 GENERAL REGULATIONS 19</p> <p>Section</p> <p>301 General 19</p> <p>302 Protection of Structure..... 20</p> <p>303 Equipment and Appliance Location 20</p> <p>304 Installation 21</p> <p>305 Piping Support 22</p> <p>306 Access and Service Space 23</p> <p>307 Condensate Disposal 24</p> <p>308 Clearance Reduction 25</p> <p>309 Temperature Control 25</p> <p>310 Explosive Control 25</p> <p>311 Smoke and Heat Vents 25</p> <p>312 Heating and Cooling Load Calculations..... 25</p> <p>CHAPTER 4 VENTILATION 27</p> <p>Section</p> <p>401 General 27</p> <p>402 Natural Ventilation..... 27</p> <p>403 Mechanical Ventilation 28</p> <p>404 Enclosed Parking Garages..... 30</p> <p>405 Systems Control 30</p> <p>406 Ventilation of Uninhabited Spaces 30</p>	<p>CHAPTER 5 EXHAUST SYSTEMS..... 31</p> <p>Section</p> <p>501 General 31</p> <p>502 Required Systems..... 31</p> <p>503 Motors and Fans..... 37</p> <p>504 Clothes Dryer Exhaust..... 38</p> <p>505 Domestic Kitchen Exhaust Equipment..... 38</p> <p>506 Commercial Kitchen Hood Ventilation System Ducts And Exhaust Equipment 39</p> <p>507 Commercial Kitchen Hoods 41</p> <p>508 Commercial Kitchen Makeup Air..... 43</p> <p>509 Fire Suppression Systems 44</p> <p>510 Hazardous Exhaust Systems 44</p> <p>511 Dust, Stock and Refuse Conveying Systems 46</p> <p>512 Subslab Soil Exhaust Systems 47</p> <p>513 Smoke Control Systems..... 47</p> <p>514 Energy Recovery Ventilation Systems 52</p> <p>CHAPTER 6 DUCT SYSTEMS..... 53</p> <p>Section</p> <p>601 General 53</p> <p>602 Plenums 53</p> <p>603 Duct Construction and Installation..... 54</p> <p>604 Insulation 55</p> <p>605 Air Filters 56</p> <p>606 Smoke Detection Systems Control 56</p> <p>607 Ducts and Air Transfer Openings 57</p> <p>CHAPTER 7 COMBUSTION AIR 61</p> <p>Section</p> <p>701 General 61</p> <p>702 Inside Air 61</p> <p>703 Outdoor Air 61</p> <p>704 Combined Use of Inside and Outdoor Air (Condition 1)..... 62</p> <p>705 Combined Use of Inside and Outdoor Air (Condition 2)..... 62</p> <p>706 Forced Combustion Air Supply..... 62</p> <p>707 Direct Connection 62</p> <p>708 Combustion Air Ducts..... 63</p> <p>709 Opening Obstructions 63</p> <p>710 Opening Location and Protection 63</p>
--	--

CHAPTER 8 CHIMNEYS AND VENTS 65

Section

801 General 65
802 Vents 66
803 Connectors 67
804 Direct-Vent, Integral Vent, Mechanical
Draft Systems Venting 68
805 Factory-Built Chimneys 69
806 Metal Chimneys 69

**CHAPTER 9 SPECIFIC APPLIANCES,
FIREPLACES AND SOLID FUEL
BURNING EQUIPMENT 71**

Section

901 General 71
902 Masonry Fireplaces 71
903 Factory-Built Fireplaces 71
904 Pellet Fuel-Burning Appliances 71
905 Fireplace Stoves and Room Heaters 71
906 Factory-Built Barbecue Appliances 71
907 Incinerators and Crematories 71
908 Cooling Towers, Evaporative
Condensers and Fluid Coolers 71
909 Vented Wall Furnaces 72
910 Floor Furnaces 72
911 Duct Furnaces 72
912 Infrared Radiant Heaters 72
913 Clothes Dryers 72
914 Sauna Heaters 73
915 Engine and Gas Turbine-Powered
Equipment and Appliances 73
916 Pool and Spa Heaters 73
917 Cooking Appliances 73
918 Forced-Air Warm-Air Furnaces 73
919 Conversion Burners 74
920 Unit Heaters 74
921 Vented Room Heaters 74
922 Kerosene and Oil-Fired Stoves 74
923 Small Ceramic Kilns 75
924 Stationary Fuel Cell Power Plants 75
925 Masonry Heaters 75

**CHAPTER 10 BOILERS, WATER HEATERS
AND PRESSURE VESSELS 77**

Section

1001 General 77

1002 Water Heaters 77
1003 Pressure Vessels 77
1004 Boilers 77
1005 Boiler Connections 78
1006 Safety and Pressure Relief Valves
And Controls 78
1007 Boiler Low-Water Cutoff 78
1008 Steam Blowoff Valve 79
1009 Hot Water Boiler Expansion Tank 79
1010 Gauges 79
1011 Tests 79

CHAPTER 11 REFRIGERATION 81

Section

1101 General 81
1102 System Requirements 81
1103 Refrigeration System Classification 82
1104 System Application Requirements 82
1105 Machinery Room, General Requirements 87
1106 Machinery Room, Special Requirements 88
1107 Refrigerant Piping 88
1108 Field Test 89
1109 Periodic Testing 90

CHAPTER 12 HYDRONIC PIPING 91

Section

1201 General 91
1202 Material 91
1203 Joints and Connections 92
1204 Pipe Insulation 93
1205 Valves 93
1206 Piping Installation 93
1207 Transfer Fluid 94
1208 Tests 94
1209 Embedded Piping 94

**CHAPTER 13 FUEL OIL PIPING
AND STORAGE 95**

Section

1301 General 95
1302 Material 95
1303 Joints and Connections 95
1304 Piping Support 96
1305 Fuel Oil System Installation 96
1306 Oil Gauging 96
1307 Fuel Oil Valves 97

1308	Testing.....	97
CHAPTER 14 SOLAR SYSTEMS 99		
Section		
1401	General	99
1402	Installation	99
1403	Heat Transfer Fluids	99
1404	Materials.....	100
CHAPTER 15 REFERENCED STANDARDS..... 101		
APPENDIX A COMBUSTION AIR OPENINGS AND CHIMNEY CONNECTOR PASS-THROUGHS 107		
APPENDIX B RECOMMENDED PERMIT FEE SCHEDULE..... 111		
INDEX 113		

CHAPTER 1

ADMINISTRATION

SECTION 101 GENERAL

101.1 Title. These regulations shall be known as the Mechanical Code of [NAME OF JURISDICTION], hereinafter referred to as “this code.”

101.2 Scope. This code shall regulate the design, installation, maintenance, alteration and inspection of mechanical systems that are permanently installed and utilized to provide control of environmental conditions and related processes within buildings. This code shall also regulate those mechanical systems, system components, equipment and appliances specifically addressed herein. The installation of fuel gas distribution piping and equipment, fuel gas-fired appliances and fuel gas-fired appliance venting systems shall be regulated by the *International Fuel Gas Code*.

Exceptions:

1. Detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories high with separate means of egress and their accessory structures shall comply with the *International Residential Code*.
2. Mechanical systems in existing buildings undergoing repair, alterations, or additions, and change of occupancy shall be permitted to comply with the *International Existing Building Code*.

101.2.1 Appendices. Provisions in the appendices shall not apply unless specifically adopted.

101.3 Intent. The purpose of this code is to provide minimum standards to safeguard life or limb, health, property and public welfare by regulating and controlling the design, construction, installation, quality of materials, location, operation and maintenance or use of mechanical systems.

101.4 Severability. If a section, subsection, sentence, clause or phrase of this code is, for any reason, held to be unconstitutional, such decision shall not affect the validity of the remaining portions of this code.

SECTION 102 APPLICABILITY

102.1 General. The provisions of this code shall apply to all matters affecting or relating to structures and premises, as set forth in Section 101. Where, in a specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive shall govern.

102.2 Existing installations. Except as otherwise provided for in this chapter, a provision in this code shall not require the removal, alteration or abandonment of, nor prevent the continued utilization and maintenance of, a mechanical system lawfully in existence at the time of the adoption of this code.

102.3 Maintenance. Mechanical systems, both existing and new, and parts thereof shall be maintained in proper operating condition in accordance with the original design and in a safe and sanitary condition. Devices or safeguards which are required by this code shall be maintained in compliance with the code edition under which they were installed. The owner or the owner’s designated agent shall be responsible for maintenance of mechanical systems. To determine compliance with this provision, the code official shall have the authority to require a mechanical system to be reinspected.

[EB] 102.4 Additions, alterations or repairs. Additions, alterations, renovations or repairs to a mechanical system shall conform to that required for a new mechanical system without requiring the existing mechanical system to comply with all of the requirements of this code. Additions, alterations or repairs shall not cause an existing mechanical system to become unsafe, hazardous or overloaded.

Minor additions, alterations, renovations and repairs to existing mechanical systems shall meet the provisions for new construction, unless such work is done in the same manner and arrangement as was in the existing system, is not hazardous and is approved.

[EB] 102.5 Change in occupancy. It shall be unlawful to make a change in the occupancy of any structure which will subject the structure to any special provision of this code applicable to the new occupancy without approval. The code official shall certify that such structure meets the intent of the provisions of law governing building construction for the proposed new occupancy and that such change of occupancy does not result in any hazard to the public health, safety or welfare.

[EB] 102.6 Historic buildings. The provisions of this code relating to the construction, alteration, repair, enlargement, restoration, relocation or moving of buildings or structures shall not be mandatory for existing buildings or structures identified and classified by the state or local jurisdiction as historic buildings when such buildings or structures are judged by the code official to be safe and in the public interest of health, safety and welfare regarding any proposed construction, alteration, repair, enlargement, restoration, relocation or moving of buildings.

102.7 Moved buildings. Except as determined by Section 102.2, mechanical systems that are a part of buildings or structures moved into or within the jurisdiction shall comply with the provisions of this code for new installations.

102.8 Referenced codes and standards. The codes and standards referenced herein shall be those that are listed in Chapter 15 and such codes and standards shall be considered as part of the requirements of this code to the prescribed extent of each such reference. Where differences occur between provisions of this code and the referenced standards, the provisions of this code shall apply.

102.9 Requirements not covered by this code. Requirements necessary for the strength, stability or proper operation of an