



Building  
Maintenance  
Optimization  
Consultants

[buildingmoc.com](http://buildingmoc.com)

# PREVENTIVE MAINTENANCE PROCEDURES

## For the Facilities Portfolio

- Routine, Preventive, Predictive, and Compliance Procedures
- Optimized for Technical Accuracy and Scalability
- Ready for Deployment in CMMS

### INCLUDES:

- Wrench Time Planning Estimates
- Trade Recommendations
- Special Tools and Consumables Requirements
- Commentary on Strategic Asset Management Program and Deployment Strategy

SECOND EDITION

---

---

# PREVENTIVE MAINTENANCE PROCEDURES

---

---

FOR THE FACILITIES PORTFOLIO

*SECOND EDITION*

*BUILDING MAINTENANCE OPTIMIZATION CONSULTANTS<sup>®</sup>, INC.*

2020  
BROOKWOOD PRINTING  
ATLANTA, GEORGIA

# Preventive Maintenance Procedures for the Facilities Portfolio.

Copyright © 2020 by BMOC®, Inc.

Building Maintenance Optimization Consultants®, Inc.

4426 Hugh Howell Road

Suite B 138

Tucker GA, 30084

[www.buildingmoc.com](http://www.buildingmoc.com)

Order Information:

Phone: (877)-574-4313

Email: [support@buildingmoc.com](mailto:support@buildingmoc.com)

Cover Illustrator: *Albert Bloser*

Book Designer: *Raymond Carlson*

Technical Editor: *Raymond Carlson*

Senior Editor: *Jonathan C. Thomas, PE, CEM, CRL, President of BMOC®*

Production Manager: *Jonathan C. Thomas, PE, CEM, CRL, President of BMOC®*

All rights reserved. Reproduction or translation of any part of the work beyond that permitted by Section 107 or 108 of the 1976 United States Copyright Act without the permission of the copyright owner is unlawful. Requests for permission or further information should be addressed to BMOC®, Inc.

Building Maintenance Optimization Consultants®, BMOC®, FORS®, and the BMOC® logo are registered trademarks of BMOC®, Inc. Other product and company names mentioned herein may be the trademarks of their respective owners. Rather than use a trademark symbol with every occurrence of a trademarked name, we are using the names only in an editorial fashion and to the benefit of the trademark owner, with no intention of infringement of the trademark.

The information in this book is distributed on an "As Is" basis, without warranty. While every precaution has been taken in the preparation of this work, neither the author nor BMOC®, Inc. shall have any liability to any person or entity with respect to any loss or damage caused or alleged to be caused directly or indirectly by the information contained in it.

ISBN: 978-1-63625-832-4 (print)

ISBN: 978-1-63625-299-5 (digital)

Library of Congress Control Number: 2020915527

Composed in L<sup>A</sup>T<sub>E</sub>X using TeXworks Version 0.6.5 (MiK<sub>T</sub>E<sub>X</sub> 20.6.29)

Set with *PX font* 10 pt, a rendering of the Palatino typeface family

Second Edition  
First Printing

Brookwood Printing  
764 Miami Circle NE  
Number 220  
Atlanta GA, 30324

Printed in the United States of America

## Preface

Facilities management organizations typically understand the importance of preventive maintenance (PM); defined in this reference as scheduled proactive maintenance which incorporates routine, preventive, predictive, and compliance maintenance. They may be committed to it and actively engaging in it, in the process of developing a suitable program, operating in a reactive maintenance mode and can't spare the resources to get started on PM, and all points in between even by shop. In all cases, the definition of the procedures represents a significant investment of time and financial resources. At best it is a drag in progress and at worst, interminable.

The PM procedures in this reference have been developed to balance technical accuracy and scalability. They are designed to incorporate the latest best practices, support training, and encourage good workmanship. PM procedures available on the open market are either subjective and unscalable providing little value to technical staff or overly generic providing little value to work control staff beyond taking up space on a work order.

This reference has a return on investment for all facilities management organizations that is easily attainable. Just by using one percent of the procedure sets contained in this reference, organizations will have the cost of this reference returned to them in the form of reduced engineering research, compilation, deliberation, editing, and quality assurance time.

- For facilities management organizations with a thorough PM program in place, this reference will support continuous improvement efforts. It provides valuable perspective which can be used to make improvements, identify gaps, and fill gaps.
- Organizations with a PM program in development will save countless hours preparing for and engaging in committee meetings by using this reference as a starting point.
- For organizations operating in a reactive maintenance mode, this reference can be the catalyst needed to get on track. Take a small step by defining a high priority set of assets, assigning procedures from this reference, scheduling the work, and committing to gradually expanding the program.
- For organizations that outsource maintenance whether fully or partially, this reference can be used to validate existing service contracts. The procedures in this reference can be included as a part of the statement of work in more comprehensive applications. They can also be a part of the work order submitted to your contractors.

General benefits of PM programs include the reduction in maintenance costs, increased asset reliability and uptime, optimal energy consumption, the extension of asset useful life, efficient work management planning and scheduling, and satisfaction of regulatory requirements. These benefits ultimately result in a higher level of customer satisfaction. The PM procedures in this reference have been field-vetted and are actively deployed in institutional environments including central utility plants. They are applicable to any entity that owns and maintains facilities whether a single building or a multi-million gross square foot portfolio.

## Disclaimer

The information presented in this reference is intended to support efficient and effective work management processes. Some of the information may require adjustment or modification upon practical application for specific assets. The reader is encouraged to read the information presented in chapter 1 to be in the best position possible to use this information effectively. The author makes no warranty and assumes no liability for the accuracy or completeness of the information presented. This reference has not been submitted for recognition or approval by any authority having jurisdiction (AHJ) as an engineering standard. No AHJ has endorsed this edition of this reference.

## About BMOC®

Building Maintenance Optimization Consultants® (BMOC®) is a provider of comprehensive asset management services including inventorying of assets, data collection, data validation, maintenance programming, maintenance scheduling, staff estimating, computerized maintenance management (CMMS) software optimization, and facilities management organizational consulting services. These services are applicable to existing building portfolios, new

construction projects, and renovation projects. These services are provided by BMOC® in its Facilities Operations Readiness Support (FORS®) suite.

BMOC® strives to provide the highest quality of high value services and products possible. This reference will continuously be improved to better suit the market in the context of increased automation and emerging best practices. Please contact BMOC®, using the information listed in this section, if a change or improvement is recommended to the content in this reference. Your feedback will improve future editions of our products.

BMOC® can provide support as this PM program is integrated into the CMMS, or alternative work management system, and deployed for usage in your facilities portfolio. This support can include the services listed in this section of the book summarized as follows:

- Field asset inventory, label application, data collection, and data validation
- Training on asset inventory and data collection
- Remote data analysis and development
- Unique PM procedure development
- Local code-based PM procedure development
- PM procedure set selection and asset association
- CMMS data loading
- Deploying an asset management program without a formal CMMS
- Resource needs estimation (budget and staff)
- Strategic PM programming
- Staff and asset-optimized PM work order scheduling
- PM quality assurance programming
- Support for deployment in accredited environments such as hospitals

If BMOC® can support you in your facilities management optimization mission, then please contact us:

Building Maintenance Optimization Consultants®, Inc.  
4426 Hugh Howell Road  
Suite B 138  
Tucker, GA 30084  
[www.buildingmoc.com](http://www.buildingmoc.com)  
[support@buildingmoc.com](mailto:support@buildingmoc.com)  
(877)574-4313

# Contents

Preface . . . . .	iii
Disclaimer . . . . .	iii
About BMOC® . . . . .	iii
<b>1 Realizing the Value of this Reference</b>	<b>1</b>
1.1 Introduction . . . . .	2
1.2 Methodology . . . . .	2
1.3 Deployment . . . . .	3
1.4 PM Procedure Layout . . . . .	5
1.5 PM Work Order Development . . . . .	7
Table 1.1 - PM Procedure Nesting by Frequency . . . . .	8
Table 1.2 - Example Work Order Counts by Frequency . . . . .	8
1.6 Future Editions . . . . .	8
<b>2 Boilers and Steam Systems</b>	<b>11</b>
2.1 Boiler Feed Water System, Package . . . . .	12
2.1.1 Boiler Feed Water System, Package - Quarterly . . . . .	12
2.1.2 Boiler Feed Water System, Package - Annual . . . . .	13
2.2 Boiler, Hot Water, Rated≤160 PSI, Electric . . . . .	14
2.2.1 Boiler, Hot Water, Rated≤160 PSI, Electric - Quarterly . . . . .	14
2.2.2 Boiler, Hot Water, Rated≤160 PSI, Electric - Annual . . . . .	15
2.3 Boiler, Hot Water, Rated≤160 PSI, Oil/Gas-Fired . . . . .	16
2.3.1 Boiler, Hot Water, Rated≤160 PSI, Oil/Gas-Fired - Quarterly . . . . .	16
2.3.2 Boiler, Hot Water, Rated≤160 PSI, Oil/Gas-Fired - Semi-Annual . . . . .	17
2.4 Boiler, Hot Water, Rated>160 PSI, Water Tube, Oil/Gas-Fired . . . . .	18
2.4.1 Boiler, Hot Water, Rated>160 PSI, Water Tube, Oil/Gas-Fired - Daily . . . . .	18
2.4.2 Boiler, Hot Water, Rated>160 PSI, Water Tube, Oil/Gas-Fired - Monthly . . . . .	19
2.4.3 Boiler, Hot Water, Rated>160 PSI, Water Tube, Oil/Gas-Fired - Semi-Annual . . . . .	20
2.5 Boiler, Steam, Electric . . . . .	22
2.5.1 Boiler, Steam, Electric - Quarterly . . . . .	22
2.5.2 Boiler, Steam, Electric - Semi-Annual . . . . .	23
2.6 Boiler, Steam, Fire Tube, Oil/Gas-Fired . . . . .	24
2.6.1 Boiler, Steam, Fire Tube, Oil/Gas-Fired - Daily . . . . .	24
2.6.2 Boiler, Steam, Fire Tube, Oil/Gas-Fired - Monthly . . . . .	25
2.6.3 Boiler, Steam, Fire Tube, Oil/Gas-Fired - Semi-Annual . . . . .	26
2.6.4 Boiler, Steam, Fire Tube, Oil/Gas-Fired - 3-Year . . . . .	28
2.7 Boiler, Steam, Water Tube, Oil/Gas-Fired . . . . .	29
2.7.1 Boiler, Steam, Water Tube, Oil/Gas-Fired - Daily . . . . .	29
2.7.2 Boiler, Steam, Water Tube, Oil/Gas-Fired - Monthly . . . . .	30
2.7.3 Boiler, Steam, Water Tube, Oil/Gas-Fired - Semi-Annual . . . . .	31
2.8 Condensate Return Unit, Electric . . . . .	33
2.8.1 Condensate Return Unit, Electric - Quarterly . . . . .	33
2.8.2 Condensate Return Unit, Electric - Annual . . . . .	34
2.9 Degaerator . . . . .	35
2.9.1 Degaerator - Annual . . . . .	35

2.10 Heat Recovery System, Boiler Blowdown . . . . .	36
2.10.1 Heat Recovery System, Boiler Blowdown - Annual . . . . .	36
2.10.2 Heat Recovery System, Boiler Blowdown - 3-Year . . . . .	37
2.11 Manhole, Steam . . . . .	38
2.11.1 Manhole, Steam - Annual . . . . .	38
2.12 Steam Trap . . . . .	39
2.12.1 Steam Trap - Quarterly . . . . .	39
<b>3 Chillers and Cooling Towers</b>	<b>41</b>
3.1 Chiller, Dx, Centrifugal, Screw, Scroll . . . . .	42
3.1.1 Chiller, DX, Centrifugal, Screw, Scroll - Weekly . . . . .	42
3.1.2 Chiller, DX, Centrifugal, Screw, Scroll - Annual . . . . .	43
3.1.3 Chiller, DX, Centrifugal, Screw, Scroll - 3-Year . . . . .	44
3.2 Chiller, Package-Air Cooled . . . . .	45
3.2.1 Chiller, Package-Air Cooled - Weekly . . . . .	45
3.2.2 Chiller, Package-Air Cooled - Annual . . . . .	46
3.3 Chiller, Water-Cooled, Absorption . . . . .	47
3.3.1 Chiller, Water-Cooled, Absorption - Weekly . . . . .	47
3.3.2 Chiller, Water-Cooled, Absorption - Quarterly . . . . .	48
3.3.3 Chiller, Water-Cooled, Absorption - Semi-Annual . . . . .	49
3.3.4 Chiller, Water-Cooled, Absorption - Annual . . . . .	50
3.3.5 Chiller, Water-Cooled, Absorption - 3-Year . . . . .	51
3.3.6 Chiller, Water-Cooled, Absorption - 5-Year . . . . .	52
3.4 Chiller, Water-Cooled, Centrifugal, Screw, Scroll . . . . .	53
3.4.1 Chiller, Water-Cooled, Centrifugal, Screw, Scroll - Weekly . . . . .	53
3.4.2 Chiller, Water-Cooled, Centrifugal, Screw, Scroll - Quarterly . . . . .	54
3.4.3 Chiller, Water-Cooled, Centrifugal, Screw, Scroll - Annual . . . . .	55
3.4.4 Chiller, Water-Cooled, Centrifugal, Screw, Scroll - 3-Year . . . . .	57
3.4.5 Chiller, Water-Cooled, Centrifugal, Screw, Scroll - 5-Year . . . . .	58
3.5 Cooling Tower, Belt Drive . . . . .	59
3.5.1 Cooling Tower, Belt Drive - Monthly . . . . .	59
3.5.2 Cooling Tower, Belt Drive - Quarterly . . . . .	60
3.5.3 Cooling Tower, Belt Drive - Semi-Annual . . . . .	61
3.6 Cooling Tower, Gear-Drive . . . . .	62
3.6.1 Cooling Tower, Gear Drive - Monthly . . . . .	62
3.6.2 Cooling Tower, Gear Drive - Quarterly . . . . .	63
3.6.3 Cooling Tower, Gear Drive - Semi-Annual . . . . .	64
<b>4 Plumbing</b>	<b>65</b>
4.1 Acid Scrubber . . . . .	66
4.1.1 Acid Scrubber - Quarterly . . . . .	66
4.2 Acid Waste Neutralization Tank . . . . .	67
4.2.1 Acid Waste Neutralization Tank - Quarterly . . . . .	67
4.3 Backflow Preventer . . . . .	68
4.3.1 Backflow Preventer - Annual . . . . .	68
4.4 Backflow Preventer, Vacuum . . . . .	69
4.4.1 Backflow Preventer, Vacuum - Annual . . . . .	69
4.5 Backflow Preventer, Vacuum, Spill-Resistant . . . . .	70
4.5.1 Backflow Preventer, Vacuum, Spill-Resistant - Annual . . . . .	70
4.6 Chemical Feed Station . . . . .	71
4.6.1 Chemical Feed Station - Monthly . . . . .	71
4.6.2 Chemical Feed Station - Semi-Annual . . . . .	72
4.7 Clarifier, Grease . . . . .	73
4.7.1 Clarifier, Grease - Quarterly . . . . .	73
4.8 Double Check Valve . . . . .	74
4.8.1 Double Check Valve - Annual . . . . .	74

4.9	Emergency Eyewash / Shower Combination Station . . . . .	75
4.9.1	Emergency Eyewash / Shower Combination Station - Weekly . . . . .	75
4.9.2	Emergency Eyewash / Shower Combination Station - Semi-Annual . . . . .	76
4.10	Emergency Eyewash / Shower Combination Station With Mixing Valve . . . . .	77
4.10.1	Emergency Eyewash / Shower Combination Station with Mixing Valve - Weekly . . . . .	77
4.10.2	Emergency Eyewash / Shower Combination Station with Mixing Valve - Semi-Annual . . . . .	78
4.11	Emergency Eyewash Station . . . . .	79
4.11.1	Emergency Eyewash Station - Weekly . . . . .	79
4.11.2	Emergency Eyewash Station - Semi-Annual . . . . .	80
4.12	Emergency Eyewash Station With Mixing Valve . . . . .	81
4.12.1	Emergency Eyewash Station with Mixing Valve - Weekly . . . . .	81
4.12.2	Emergency Eyewash Station with Mixing Valve - Semi-Annual . . . . .	82
4.13	Emergency Shower . . . . .	83
4.13.1	Emergency Shower - Weekly . . . . .	83
4.13.2	Emergency Shower - Semi-Annual . . . . .	84
4.14	Emergency Shower With Mixing Valve . . . . .	85
4.14.1	Emergency Shower with Mixing Valve - Weekly . . . . .	85
4.14.2	Emergency Shower with Mixing Valve - Semi-Annual . . . . .	86
4.15	Filter, Ultraviolet . . . . .	87
4.15.1	Filter, Ultraviolet - Monthly . . . . .	87
4.15.2	Filter, Ultraviolet - Annual . . . . .	88
4.16	Filter, Water, Carbon . . . . .	89
4.16.1	Filter, Water, Carbon - Semi-Annual . . . . .	89
4.17	Filter, Water, Media Cartridge . . . . .	90
4.17.1	Filter, Water, Media Cartridge - Semi-Annual . . . . .	90
4.18	Filter, Water, Media Cartridge, Point Of Use . . . . .	91
4.18.1	Filter, Water, Media Cartridge, Point of Use - Semi-Annual . . . . .	91
4.18.2	Filter, Water, Media Cartridge, Point of Use - Annual . . . . .	92
4.19	Filter, Water, Sand . . . . .	93
4.19.1	Filter, Water, Sand - Quarterly . . . . .	93
4.19.2	Filter, Water, Sand - Annual . . . . .	94
4.20	Grease Trap . . . . .	95
4.20.1	Grease Trap - Monthly . . . . .	95
4.21	Heat Exchanger, Plate And Frame . . . . .	96
4.21.1	Heat Exchanger, Plate and Frame - Annual . . . . .	96
4.21.2	Heat Exchanger, Plate and Frame - 3-Year . . . . .	97
4.22	Heat Exchanger, Shell And Tube . . . . .	98
4.22.1	Heat Exchanger, Shell and Tube - 3-Year . . . . .	98
4.23	Monitor, pH . . . . .	99
4.23.1	Monitor, Ph - Annual . . . . .	99
4.24	Pump . . . . .	100
4.24.1	Pump - Monthly . . . . .	100
4.24.2	Pump, <2 HP - Quarterly . . . . .	101
4.24.3	Pump - Quarterly . . . . .	102
4.24.4	Pump - Semi-Annual . . . . .	103
4.24.5	Pump - Annual . . . . .	104
4.25	Pump, Sewage Ejector System . . . . .	105
4.25.1	Pump, Sewage Ejector System - Monthly . . . . .	105
4.25.2	Pump, Sewage Ejector System - Semi-Annual . . . . .	106
4.26	Pump, Sump, Non-Submersible Motor . . . . .	107
4.26.1	Pump, Sump, Non-Submersible Motor - Monthly . . . . .	107
4.26.2	Pump, Sump, Non-Submersible Motor - Semi-Annual . . . . .	108
4.27	Pump, Sump, Submersible Motor . . . . .	109
4.27.1	Pump, Sump, Submersible Motor - Monthly . . . . .	109
4.27.2	Pump, Sump, Submersible Motor - Semi-Annual . . . . .	110

4.28	Pump, Vertical Turbine . . . . .	111
4.28.1	Pump, Vertical Turbine - Monthly . . . . .	111
4.28.2	Pump, Vertical Turbine - Semi-Annual . . . . .	112
4.29	Reverse Osmosis System . . . . .	113
4.29.1	Reverse Osmosis System - Semi-Annual . . . . .	113
4.30	Separator, Air/Solid . . . . .	114
4.30.1	Separator, Air/Solid - Annual . . . . .	114
4.30.2	Separator, Air/Solid - 3-Year . . . . .	115
4.31	Separator, Solids, Centrifugal . . . . .	116
4.31.1	Separator, Solids, Centrifugal - Quarterly . . . . .	116
4.32	Tank, Expansion . . . . .	117
4.32.1	Tank, Expansion - Annual . . . . .	117
4.33	Valve, Mixing, Centralized, DDC . . . . .	118
4.33.1	Valve, Mixing, Centralized, DDC - Annual . . . . .	118
4.34	Valve, Thermostatic Mixing, Centralized . . . . .	119
4.34.1	Valve, Thermostatic Mixing, Centralized - Monthly . . . . .	119
4.34.2	Valve, Thermostatic Mixing, Centralized - Semi-Annual . . . . .	120
4.35	Water Fountain/Bottle Filler, Non-Refrigerated . . . . .	121
4.35.1	Water Fountain/Bottle Filler, Non-Refrigerated - Annual . . . . .	121
4.36	Water Fountain/Bottle Filler, Refrigerated . . . . .	122
4.36.1	Water Fountain/Bottle Filler, Refrigerated - Annual . . . . .	122
4.37	Water Heater, Electric, Tankless . . . . .	123
4.37.1	Water Heater, Electric, Tankless - Quarterly . . . . .	123
4.37.2	Water Heater, Electric, Tankless - Annual . . . . .	124
4.38	Water Heater, Electric, With Storage . . . . .	125
4.38.1	Water Heater, Electric, with Storage - Annual . . . . .	125
4.38.2	Water Heater, Electric, with Storage - 2-Year . . . . .	126
4.38.3	Water Heater, Electric, with Storage, 30 Gal - Annual . . . . .	127
4.39	Water Heater, Gas, Tankless . . . . .	128
4.39.1	Water Heater, Gas, Tankless - Annual . . . . .	128
4.40	Water Heater, Gas, With Storage . . . . .	129
4.40.1	Water Heater, Gas, with Storage - Annual . . . . .	129
4.40.2	Water Heater, Gas, with Storage, <65 Gal - Annual . . . . .	130
4.41	Water Heater, Steam, Tankless . . . . .	131
4.41.1	Water Heater, Steam, Tankless - Quarterly . . . . .	131
4.41.2	Water Heater, Steam, Tankless - Annual . . . . .	132
4.42	Water Heater, Steam, With Tank . . . . .	133
4.42.1	Water Heater, Steam, with Tank - Quarterly . . . . .	133
4.42.2	Water Heater, Steam, with Tank - Annual . . . . .	134
4.43	Water Softener . . . . .	135
4.43.1	Water Softener - Annual . . . . .	135
<b>5</b>	<b>Heating, Ventilation, and Air Conditioning</b>	<b>137</b>
5.1	Air Conditioner, Package Terminal . . . . .	138
5.1.1	Air Conditioner, Package Terminal - Quarterly . . . . .	138
5.1.2	Air Conditioner, Package Terminal - Semi-Annual . . . . .	139
5.2	Air Handling Unit, Belt-Drive . . . . .	141
5.2.1	Air Handling Unit, Belt Drive - Quarterly . . . . .	141
5.2.2	Air Handling Unit, Belt Drive - Semi-Annual . . . . .	142
5.3	Air Handling Unit, Direct-Drive . . . . .	144
5.3.1	Air Handling Unit, Direct Drive - Quarterly . . . . .	144
5.3.2	Air Handling Unit, Direct Drive - Semi-Annual . . . . .	145
5.4	Air Handling Unit, Dx Cooling, Belt Drive . . . . .	146
5.4.1	Air Handling Unit, DX Cooling, Belt Drive - Quarterly . . . . .	146
5.4.2	Air Handling Unit, DX Cooling, Belt Drive - Semi-Annual . . . . .	148
5.5	Air Handling Unit, Dx Cooling, Direct Drive . . . . .	150

5.5.1	Air Handling Unit, DX Cooling, Direct Drive - Quarterly . . . . .	150
5.5.2	Air Handling Unit, DX Cooling, Direct Drive - Semi-Annual . . . . .	151
5.6	Air Handling Unit, Separate Fans . . . . .	153
5.6.1	Air Handling Unit, Separate Fans - Quarterly . . . . .	153
5.6.2	Air Handling Unit, Separate Fans - Semi-Annual . . . . .	154
5.7	Computer Room Air Conditioning Unit, No Compressor . . . . .	155
5.7.1	Computer Room Air Conditioning Unit, No Compressor - Quarterly . . . . .	155
5.7.2	Computer Room Air Conditioning Unit, No Compressor - Semi-Annual . . . . .	156
5.8	Computer Room Air Conditioning Unit, With Compressor . . . . .	157
5.8.1	Computer Room Air Conditioning Unit, with Compressor - Quarterly . . . . .	157
5.8.2	Computer Room Air Conditioning Unit, with Compressor - Semi-Annual . . . . .	158
5.9	Condensing Unit, Heat Pump . . . . .	160
5.9.1	Condensing Unit, Heat Pump - Semi-Annual . . . . .	160
5.9.2	Condensing Unit, Heat Pump - Annual . . . . .	161
5.10	Damper, Fire, Fusible Link . . . . .	162
5.10.1	Damper, Fire, Fusible Link - 4-Year . . . . .	162
5.11	Damper, Smoke/Combined, Motorized . . . . .	163
5.11.1	Damper, Smoke/Combined, Motorized - 4-Year . . . . .	163
5.12	Dry Cooler . . . . .	164
5.12.1	Dry Cooler - Quarterly . . . . .	164
5.12.2	Dry Cooler - Semi-Annual . . . . .	165
5.13	Dust Collector, Cyclone, Belt Drive . . . . .	166
5.13.1	Dust Collector, Cyclone, Belt Drive - Daily . . . . .	166
5.13.2	Dust Collector, Cyclone, Belt Drive - Quarterly . . . . .	167
5.13.3	Dust Collector, Cyclone, Belt Drive - Semi-Annual . . . . .	168
5.14	Dust Collector, Cyclone, Direct Drive . . . . .	169
5.14.1	Dust Collector, Cyclone, Direct Drive - Daily . . . . .	169
5.14.2	Dust Collector, Cyclone, Direct Drive - Quarterly . . . . .	170
5.14.3	Dust Collector, Cyclone, Direct Drive - Semi-Annual . . . . .	171
5.15	Energy Recovery Unit, Package, Wheel, Belt-Drive . . . . .	172
5.15.1	Energy Recovery Unit, Package, Wheel, Belt Drive - Quarterly . . . . .	172
5.15.2	Energy Recovery Unit, Package, Wheel, Belt Drive - Semi-Annual . . . . .	174
5.16	Energy Recovery Unit, Package, Wheel, Direct-Drive . . . . .	175
5.16.1	Energy Recovery Unit, Package, Wheel, Direct Drive - Quarterly . . . . .	175
5.16.2	Energy Recovery Unit, Package, Wheel, Direct Drive - Semi-Annual . . . . .	176
5.17	Evaporative Cooler, Belt-Drive . . . . .	177
5.17.1	Evaporative Cooler, Belt Drive - Annual . . . . .	177
5.18	Evaporative Cooler, Direct-Drive . . . . .	178
5.18.1	Evaporative Cooler, Direct Drive - Annual . . . . .	178
5.19	Evaporator Unit, Ductless . . . . .	179
5.19.1	Evaporator Unit, Ductless - Quarterly . . . . .	179
5.19.2	Evaporator Unit, Ductless - Semi-Annual . . . . .	180
5.19.3	Evaporator Unit, Ductless - Annual . . . . .	181
5.19.4	Evaporator Unit, Ductless - 2-Year . . . . .	182
5.20	Evaporator, Gas Heat, Belt-Drive . . . . .	183
5.20.1	Evaporator, Gas Heat, Belt Drive - Quarterly . . . . .	183
5.20.2	Evaporator, Gas Heat, Belt Drive - Semi-Annual . . . . .	184
5.21	Evaporator, Gas Heat, Direct-Drive . . . . .	186
5.21.1	Evaporator, Gas Heat, Direct Drive - Quarterly . . . . .	186
5.21.2	Evaporator, Gas Heat, Direct Drive - Semi-Annual . . . . .	187
5.22	Evaporator, Heat Pump/Electric/No Heat, Belt-Drive . . . . .	188
5.22.1	Evaporator, Heat Pump/Electric/No Heat, Belt Drive - Quarterly . . . . .	188
5.22.2	Evaporator, Heat Pump/Electric/No Heat, Belt Drive - Semi-Annual . . . . .	189
5.23	Evaporator, Heat Pump/Electric/No Heat, Direct-Drive . . . . .	190
5.23.1	Evaporator, Heat Pump/Electric/No Heat, Direct Drive - Quarterly . . . . .	190

5.23.2	Evaporator, Heat Pump/Electric/No Heat, Direct Drive - Semi-Annual . . . . .	191
5.24	Fume Hood . . . . .	192
5.24.1	Fume Hood - Quarterly . . . . .	192
5.25	Fan Coil Unit . . . . .	193
5.25.1	Fan Coil Unit - Quarterly . . . . .	193
5.25.2	Fan Coil Unit - Semi-Annual . . . . .	194
5.26	Fan, Belt-Drive . . . . .	195
5.26.1	Fan, Belt Drive - Quarterly . . . . .	195
5.26.2	Fan, Belt Drive - Semi-Annual . . . . .	196
5.27	Fan, Direct-Drive . . . . .	197
5.27.1	Fan, Direct Drive - Semi-Annual . . . . .	197
5.28	Fan, Exhaust, Surface-Mount . . . . .	198
5.28.1	Fan, Exhaust, Surface-Mount - Annual . . . . .	198
5.29	Fan, High Plume, High Dilution, Belt-Drive . . . . .	199
5.29.1	Fan, High Plume, High Dilution, Belt Drive - Quarterly . . . . .	199
5.29.2	Fan, High Plume, High Dilution, Belt Drive - Semi-Annual . . . . .	200
5.30	Fan, High Plume, High Dilution, Direct-Drive . . . . .	201
5.30.1	Fan, High Plume, High Dilution, Direct Drive - Quarterly . . . . .	201
5.30.2	Fan, High Plume, High Dilution, Direct Drive - Semi-Annual . . . . .	202
5.31	Fan, High Volume Low Speed . . . . .	203
5.31.1	Fan, High Volume Low Speed - Annual . . . . .	203
5.32	Filter, Fan-Powered, Belt-Drive . . . . .	204
5.32.1	Filter, Fan-Powered, Belt Drive - Quarterly . . . . .	204
5.32.2	Filter, Fan-Powered, Belt Drive - Semi-Annual . . . . .	205
5.33	Filter, Fan-Powered, Direct-Drive . . . . .	206
5.33.1	Filter, Fan-Powered, Direct Drive - Semi-Annual . . . . .	206
5.34	Fume Extractor . . . . .	207
5.34.1	Fume Extractor - Annual . . . . .	207
5.35	Furnace, Gas-Fired, Package . . . . .	208
5.35.1	Furnace, Gas-Fired, Package - Quarterly . . . . .	208
5.35.2	Furnace, Gas-Fired, Package - Semi-Annual . . . . .	209
5.36	Grease Duct, High Volume . . . . .	210
5.36.1	Grease Duct, High Volume - Quarterly . . . . .	210
5.37	Grease Duct, Low Volume . . . . .	211
5.37.1	Grease Duct, Low Volume - Annual . . . . .	211
5.38	Grease Duct, Moderate Volume . . . . .	212
5.38.1	Grease Duct, Moderate Volume - Semi-Annual . . . . .	212
5.39	Grease Duct, Solid Fuel . . . . .	213
5.39.1	Grease Duct, Solid Fuel - Monthly . . . . .	213
5.40	Humidifier, Electric, RO/DI Water . . . . .	214
5.40.1	Humidifier, Electric, RO/DI Water - Annual . . . . .	214
5.41	Humidifier, Electric, Tap Or Soft Water . . . . .	215
5.41.1	Humidifier, Electric, Tap or Soft Water - Semi-Annual . . . . .	215
5.42	Humidifier, Evaporative, Wetted Media, Reverse Osmosis Water . . . . .	216
5.42.1	Humidifier, Evaporative, Wetted Media, Reverse Osmosis Water - Annual . . . . .	216
5.43	Humidifier, Evaporative, Wetted Media, Tap Or Soft Water . . . . .	217
5.43.1	Humidifier, Evaporative, Wetted Media, Tap or Soft Water - Semi-Annual . . . . .	217
5.43.2	Humidifier, Evaporative, Wetted Media, Tap or Soft Water - Annual . . . . .	218
5.44	Humidifier, Steam Injection . . . . .	219
5.44.1	Humidifier, Steam Injection - Annual . . . . .	219
5.45	Humidifier, Steam-Energized, RO/DI Water . . . . .	220
5.45.1	Humidifier, Steam-Energized, RO/DI Water - Annual . . . . .	220
5.46	Humidifier, Steam-Energized, Tap Or Soft Water . . . . .	221
5.46.1	Humidifier, Steam-Energized, Tap or Soft Water - Semi-Annual . . . . .	221
5.47	Humidifier, Ultrasonic . . . . .	222

5.47.1 Humidifier, Ultrasonic - Annual . . . . .	222
5.48 Ice Machine . . . . .	223
5.48.1 Ice Machine - Quarterly . . . . .	223
5.48.2 Ice Machine - Semi-Annual . . . . .	224
5.49 Kitchen Hood . . . . .	225
5.49.1 Kitchen Hood - Monthly . . . . .	225
5.49.2 Kitchen Hood - Annual . . . . .	226
5.50 Monitoring System, Refrigerant Leak . . . . .	227
5.50.1 Monitoring System, Refrigerant Leak - Semi-Annual . . . . .	227
5.50.2 Monitoring System, Refrigerant Leak - Annual . . . . .	228
5.51 Package Hvac Unit, Electric/Indirect/No Heat, Belt-Drive . . . . .	229
5.51.1 Package Hvac Unit, Electric/Indirect/No Heat, Belt Drive - Quarterly . . . . .	229
5.51.2 Package Hvac Unit, Electric/Indirect/No Heat, Belt Drive - Semi-Annual . . . . .	231
5.52 Package Hvac Unit, Electric/Indirect/No Heat, Direct-Drive . . . . .	233
5.52.1 Package Hvac Unit, Electric/Indirect/No Heat, Direct Drive - Quarterly . . . . .	233
5.52.2 Package Hvac Unit, Electric/Indirect/No Heat, Direct Drive - Semi-Annual . . . . .	234
5.53 Package Hvac Unit, Gas Heat, Belt-Drive . . . . .	236
5.53.1 Package Hvac Unit, Gas Heat, Belt Drive - Quarterly . . . . .	236
5.53.2 Package Hvac Unit, Gas Heat, Belt Drive - Semi-Annual . . . . .	238
5.54 Package Hvac Unit, Gas Heat, Direct-Drive . . . . .	240
5.54.1 Package Hvac Unit, Gas Heat, Direct Drive - Quarterly . . . . .	240
5.54.2 Package Hvac Unit, Gas Heat, Direct Drive - Semi-Annual . . . . .	241
5.55 Paint Booth, Belt-Drive . . . . .	243
5.55.1 Paint Booth, Belt Drive - Quarterly . . . . .	243
5.55.2 Paint Booth, Belt Drive - Annual . . . . .	244
5.56 Refrigerated Chamber, Walk-In . . . . .	245
5.56.1 Refrigerated Chamber, Walk-In - Monthly . . . . .	245
5.57 Refrigeration Unit, Air-Cooled . . . . .	246
5.57.1 Refrigeration Unit, Air-Cooled - Quarterly . . . . .	246
5.57.2 Refrigeration Unit, Air-Cooled - Semi-Annual . . . . .	247
5.58 Refrigeration Unit, Water-Cooled . . . . .	248
5.58.1 Refrigeration Unit, Water-Cooled - Quarterly . . . . .	248
5.58.2 Refrigeration Unit, Water-Cooled - Semi-Annual . . . . .	249
5.59 Tank, Ice, Thermal Energy Storage . . . . .	250
5.59.1 Tank, Ice, Thermal Energy Storage - Quarterly . . . . .	250
5.59.2 Tank, Ice, Thermal Energy Storage - Semi-Annual . . . . .	251
5.60 Unit Heater, Gas-Fired . . . . .	252
5.60.1 Unit Heater, Gas-Fired - Annual . . . . .	252
5.61 Air Curtain . . . . .	253
5.61.1 Air Curtain - Semi-Annual . . . . .	253
5.62 Vented Gas Container Cabinet . . . . .	254
5.62.1 Vented Gas Container Cabinet - Annual . . . . .	254
5.63 Water Source Heat Pump, Belt-Drive . . . . .	255
5.63.1 Water Source Heat Pump, Belt Drive - Quarterly . . . . .	255
5.63.2 Water Source Heat Pump, Belt Drive - Semi-Annual . . . . .	256
5.64 Water Source Heat Pump, Direct-Drive . . . . .	258
5.64.1 Water Source Heat Pump, Direct Drive - Quarterly . . . . .	258
5.64.2 Water Source Heat Pump, Direct Drive - Semi-Annual . . . . .	259
5.65 Wheel, Enthalpy . . . . .	261
5.65.1 Wheel, Enthalpy - Semi-Annual . . . . .	261
5.65.2 Wheel, Enthalpy - Annual . . . . .	262
5.66 Wheel, Total Energy . . . . .	263
5.66.1 Wheel, Total Energy - Annual . . . . .	263
<b>6 Air Compressors and Vacuum Pumps</b> . . . . .	<b>265</b>
6.1 Air Compressor, Oiled . . . . .	266

6.1.1	Air Compressor, Oiled - Monthly . . . . .	266
6.1.2	Air Compressor, Oiled - Quarterly . . . . .	267
6.2	Air Compressor, Oil-Free . . . . .	268
6.2.1	Air Compressor, Oil-Free - Monthly . . . . .	268
6.2.2	Air Compressor, Oil-Free - Quarterly . . . . .	269
6.3	Air Dryer, Desiccant . . . . .	270
6.3.1	Air Dryer, Desiccant - Semi-Annual . . . . .	270
6.4	Air Dryer, Refrigerated . . . . .	271
6.4.1	Air Dryer, Refrigerated - Quarterly . . . . .	271
6.4.2	Air Dryer, Refrigerated - Semi-Annual . . . . .	272
6.5	Vacuum Pump, Liquid-Sealed, Direct-Drive . . . . .	273
6.5.1	Vacuum Pump, Liquid-Sealed, Direct Drive - Quarterly . . . . .	273
6.5.2	Vacuum Pump, Liquid-Sealed, Direct Drive - Semi-Annual . . . . .	274
6.6	Vacuum Pump, Oiled, Belt-Drive . . . . .	275
6.6.1	Vacuum Pump, Oiled, Belt Drive - Quarterly . . . . .	275
6.6.2	Vacuum Pump, Oiled, Belt Drive - Semi-Annual . . . . .	276
6.7	Vacuum Pump, Oiled, Direct-Drive . . . . .	277
6.7.1	Vacuum Pump, Oiled, Direct Drive - Quarterly . . . . .	277
6.7.2	Vacuum Pump, Oiled, Direct Drive - Semi-Annual . . . . .	278
6.8	Vacuum Pump, Oil-Free, Belt-Drive . . . . .	279
6.8.1	Vacuum Pump, Oil-Free, Belt Drive - Quarterly . . . . .	279
6.8.2	Vacuum Pump, Oil-Free, Belt Drive - Semi-Annual . . . . .	280
6.9	Vacuum Pump, Oil-Free, Belt-Drive, Vane . . . . .	281
6.9.1	Vacuum Pump, Oil-Free, Belt Drive, Vane - Quarterly . . . . .	281
6.9.2	Vacuum Pump, Oil-Free, Belt Drive, Vane - Semi-Annual . . . . .	282
6.9.3	Vacuum Pump, Oil-Free, Belt Drive, Vane - Annual . . . . .	283
6.10	Vacuum Pump, Oil-Free, Direct-Drive . . . . .	284
6.10.1	Vacuum Pump, Oil-Free, Direct Drive - Quarterly . . . . .	284
6.10.2	Vacuum Pump, Oil-Free, Direct Drive - Semi-Annual . . . . .	285
6.11	Vacuum Pump, Oil-Free, Direct-Drive, Vane . . . . .	286
6.11.1	Vacuum Pump, Oil-Free, Direct Drive, Vane - Quarterly . . . . .	286
6.11.2	Vacuum Pump, Oil-Free, Direct Drive, Vane - Semi-Annual . . . . .	287
6.11.3	Vacuum Pump, Oil-Free, Direct Drive, Vane - Annual . . . . .	288
<b>7</b>	<b>Electrical</b> . . . . .	<b>289</b>
7.1	Battery Back-Up System, Remote . . . . .	290
7.1.1	Battery Back-Up System, Remote - Quarterly . . . . .	290
7.1.2	Battery Back-Up System, Remote - Semi-Annual . . . . .	291
7.1.3	Battery Back-Up System, Remote - Annual . . . . .	292
7.1.4	Battery Back-Up System, Remote - 2-Year . . . . .	293
7.2	Breaker, High Voltage, Gas-Filled, SF6 . . . . .	294
7.2.1	Breaker, High Voltage, Gas-Filled, SF6 - Semi-Annual . . . . .	294
7.2.2	Breaker, High Voltage, Gas-Filled, SF6 - 3-Year . . . . .	295
7.3	Breaker, High Voltage, Vacuum . . . . .	297
7.3.1	Breaker, High Voltage, Vacuum - Semi-Annual . . . . .	297
7.3.2	Breaker, High Voltage, Vacuum - 3-Year . . . . .	298
7.4	Bus Duct, Exterior . . . . .	300
7.4.1	Bus Duct, Exterior - Semi-Annual . . . . .	300
7.4.2	Bus Duct, Exterior - 3-Year . . . . .	301
7.5	Dimmer Panel . . . . .	302
7.5.1	Dimmer Panel - Annual . . . . .	302
7.6	Handhole, Electrical . . . . .	303
7.6.1	Handhole, Electrical - Semi-Annual . . . . .	303
7.6.2	Handhole, Electrical - Annual . . . . .	304
7.7	Lighting, Exterior, LED . . . . .	305
7.7.1	Lighting, Exterior, LED - 3-Year . . . . .	305

7.8	Lighting, Exterior, Non-LED . . . . .	306
7.8.1	Lighting, Exterior, Non-LED - Annual . . . . .	306
7.9	Load Bank, Resistive/Reactive . . . . .	307
7.9.1	Load Bank, Resistive/Reactive - Semi-Annual . . . . .	307
7.10	Manhole, Electrical . . . . .	308
7.10.1	Manhole, Electrical - Semi-Annual . . . . .	308
7.10.2	Manhole, Electrical - Annual . . . . .	309
7.11	Motor Control Center . . . . .	310
7.11.1	Motor Control Center - Semi-Annual . . . . .	310
7.11.2	Motor Control Center - 3-Year . . . . .	311
7.12	pHotovoltaic Power Panel . . . . .	312
7.12.1	Photovoltaic Power Panel - Quarterly . . . . .	312
7.13	Power Inverter, Alternative Energy . . . . .	313
7.13.1	Power Inverter, Alternative Energy - Annual . . . . .	313
7.14	Switch, High Voltage, Load-Interrupter . . . . .	314
7.14.1	Switch, High Voltage, Load-Interrupter - Semi-Annual . . . . .	314
7.14.2	Switch, High Voltage, Load-Interrupter - 3-Year . . . . .	315
7.15	Switch, High Voltage, Oil . . . . .	316
7.15.1	Switch, High Voltage, Oil - Semi-Annual . . . . .	316
7.15.2	Switch, High Voltage, Oil - 3-Year . . . . .	317
7.16	Switchboard . . . . .	318
7.16.1	Switchboard - Annual . . . . .	318
7.16.2	Switchboard - 3-Year . . . . .	319
7.17	Switchgear And Distribution Assembly . . . . .	320
7.17.1	Switchgear and Distribution Assembly - Semi-Annual . . . . .	320
7.17.2	Switchgear and Distribution Assembly - 3-Year . . . . .	321
7.18	Switchgear, Paralleling . . . . .	323
7.18.1	Switchgear, Paralleling - Semi-Annual . . . . .	323
7.18.2	Switchgear, Paralleling - Annual . . . . .	324
7.19	Transfer Switch, Automatic . . . . .	326
7.19.1	Transfer Switch, Automatic - Semi-Annual . . . . .	326
7.19.2	Transfer Switch, Automatic - Annual . . . . .	327
7.20	Transformer, Dry . . . . .	329
7.20.1	Transformer, Dry - Semi-Annual . . . . .	329
7.20.2	Transformer, Dry - 3-Year . . . . .	330
7.21	Transformer, Oil-Filled . . . . .	331
7.21.1	Transformer, Oil-Filled - Semi-Annual . . . . .	331
7.21.2	Transformer, Oil-Filled - 3-Year . . . . .	332
7.22	Uninterruptible Power Supply . . . . .	333
7.22.1	Uninterruptible Power Supply - Quarterly . . . . .	333
7.22.2	Uninterruptible Power Supply - Semi-Annual . . . . .	334
7.22.3	Uninterruptible Power Supply - 2-Year . . . . .	335
7.23	Variable Frequency Drive . . . . .	336
7.23.1	Variable Frequency Drive - Quarterly . . . . .	336
7.23.2	Variable Frequency Drive - Annual . . . . .	337
<b>8</b>	<b>Generators</b>	<b>339</b>
8.1	Cogeneration Unit, Natural Gas . . . . .	340
8.1.1	Cogeneration Unit, Natural Gas - Monthly . . . . .	340
8.1.2	Cogeneration Unit, Natural Gas - Quarterly . . . . .	341
8.1.3	Cogeneration Unit, Natural Gas - Semi-Annual . . . . .	342
8.2	Connection Board, Portable Generator . . . . .	344
8.2.1	Connection Board, Portable Generator - Annual . . . . .	344
8.3	Emergency Generator, Diesel . . . . .	345
8.3.1	Emergency Generator, Diesel - Weekly . . . . .	345
8.3.2	Emergency Generator, Diesel - Biweekly . . . . .	346

8.3.3	Emergency Generator, Diesel - Semi-Annual . . . . .	348
8.3.4	Emergency Generator, Diesel - Annual . . . . .	350
8.4	Emergency Generator, Gasoline . . . . .	352
8.4.1	Emergency Generator, Gasoline - Weekly . . . . .	352
8.4.2	Emergency Generator, Gasoline - Biweekly . . . . .	353
8.4.3	Emergency Generator, Gasoline - Semi-Annual . . . . .	354
8.4.4	Emergency Generator, Gasoline - Annual . . . . .	356
8.5	Emergency Generator, Natural Gas . . . . .	358
8.5.1	Emergency Generator, Natural Gas - Weekly . . . . .	358
8.5.2	Emergency Generator, Natural Gas - Biweekly . . . . .	359
8.5.3	Emergency Generator, Natural Gas - Semi-Annual . . . . .	361
8.5.4	Emergency Generator, Natural Gas - Annual . . . . .	363
8.6	Generator, Diesel, Portable . . . . .	365
8.6.1	Generator, Diesel, Portable - Monthly . . . . .	365
8.6.2	Generator, Diesel, Portable - Semi-Annual . . . . .	366
8.6.3	Generator, Diesel, Portable - Annual . . . . .	368
8.7	Pump, Fuel Oil, Emergency Generator . . . . .	370
8.7.1	Pump, Fuel Oil, Emergency Generator - Semi-Annual . . . . .	370
8.8	Tank, Fuel Oil, External, Above Ground . . . . .	371
8.8.1	Tank, Fuel Oil, External, Above Ground - Annual . . . . .	371
8.8.2	Tank, Fuel Oil, External, Above Ground - 4-Year . . . . .	372
<b>9</b>	<b>Fire Suppression</b> . . . . .	<b>373</b>
9.1	Fire Department Connection . . . . .	374
9.1.1	Fire Department Connection - Quarterly . . . . .	374
9.2	Fire Extinguisher . . . . .	375
9.2.1	Fire Extinguisher - Monthly . . . . .	375
9.2.2	Fire Extinguisher - Annual . . . . .	376
9.3	Fire Hose . . . . .	377
9.3.1	Fire Hose - Quarterly . . . . .	377
9.3.2	Fire Hose - Annual . . . . .	378
9.4	Fire Hydrant, Wet Or Dry Barrel, Or Wall . . . . .	380
9.4.1	Fire Hydrant, Wet or Dry Barrel, or Wall - Annual . . . . .	380
9.5	Fire Hydrant, Dry . . . . .	381
9.5.1	Fire Hydrant, Dry - Quarterly . . . . .	381
9.5.2	Fire Hydrant, Dry - Annual . . . . .	382
9.6	Fire Suppression, Kitchen Hood . . . . .	383
9.6.1	Fire Suppression, Kitchen Hood - Monthly . . . . .	383
9.6.2	Fire Suppression, Kitchen Hood - Semi-Annual . . . . .	384
9.7	Fire Suppression System, Clean Agent . . . . .	385
9.7.1	Fire Suppression System, Clean Agent - Monthly . . . . .	385
9.7.2	Fire Suppression System, Clean Agent - Semi-Annual . . . . .	386
9.7.3	Fire Suppression System, Clean Agent - Annual . . . . .	387
9.7.4	Fire Suppression System, Clean Agent - 5-Year . . . . .	388
9.8	Fire Suppression System, Dry Pipe . . . . .	389
9.8.1	Fire Suppression System, Dry Pipe - Weekly . . . . .	389
9.8.2	Fire Suppression System, Dry Pipe - Monthly . . . . .	390
9.8.3	Fire Suppression System, Dry Pipe - Quarterly . . . . .	391
9.8.4	Fire Suppression System, Dry Pipe - Annual . . . . .	393
9.8.5	Fire Suppression System, Dry Pipe - 3-Year . . . . .	397
9.8.6	Fire Suppression System, Dry Pipe - 5-Year . . . . .	398
9.9	Fire Suppression System, Foam-Water . . . . .	399
9.9.1	Fire Suppression System, Foam-Water - Monthly . . . . .	399
9.9.2	Fire Suppression System, Foam-Water - Quarterly . . . . .	401
9.9.3	Fire Suppression System, Foam-Water - Annual . . . . .	403
9.9.4	Fire Suppression System, Foam-Water - 5-Year . . . . .	406

9.9.5	Fire Suppression System, Foam-Water - 10-Year . . . . .	407
9.10	Fire Suppression System, Preaction . . . . .	408
9.10.1	Fire Suppression System, Preaction - Weekly . . . . .	408
9.10.2	Fire Suppression System, Preaction - Monthly . . . . .	409
9.10.3	Fire Suppression System, Preaction - Quarterly . . . . .	410
9.10.4	Fire Suppression System, Preaction - Annual . . . . .	412
9.10.5	Fire Suppression System, Preaction - 3-Year . . . . .	416
9.10.6	Fire Suppression System, Preaction - 5-Year . . . . .	417
9.11	Fire Suppression System, Wet-Pipe . . . . .	418
9.11.1	Fire Suppression System, Wet-Pipe - Monthly . . . . .	418
9.11.2	Fire Suppression System, Wet-Pipe - Quarterly . . . . .	419
9.11.3	Fire Suppression System, Wet-Pipe - Annual . . . . .	420
9.11.4	Fire Suppression System, Wet-Pipe - 5-Year . . . . .	422
9.12	Post Indicator Valve . . . . .	423
9.12.1	Post Indicator Valve - Monthly . . . . .	423
9.12.2	Post Indicator Valve - Annual . . . . .	424
9.13	Pump, Fire, Diesel . . . . .	425
9.13.1	Pump, Fire, Diesel - Weekly . . . . .	425
9.13.2	Pump, Fire, Diesel - Biweekly . . . . .	426
9.13.3	Pump, Fire, Diesel - Semi-Annual . . . . .	428
9.13.4	Pump, Fire, Diesel - Annual . . . . .	430
9.14	Pump, Fire, Electric . . . . .	432
9.14.1	Pump, Fire, Electric - Weekly . . . . .	432
9.14.2	Pump, Fire, Electric - Monthly . . . . .	433
9.14.3	Pump, Fire, Electric - Semi-Annual . . . . .	434
9.14.4	Pump, Fire, Electric - Annual . . . . .	436
9.15	Standpipe CLASS I, III . . . . .	437
9.15.1	Standpipe Class I, III - Monthly . . . . .	437
9.15.2	Standpipe Class I, III - Quarterly . . . . .	438
9.15.3	Standpipe Class I, III - Annual . . . . .	439
9.15.4	Standpipe Class I, III - 5-Year . . . . .	441
9.16	Water Tank, Fire Suppression, Wood, Coated Metal, Fiberglass, Remotely Monitored . . . . .	442
9.16.1	Water Tank, Fire Suppression, Wood, Coated Metal, Fiberglass, Remotely Monitored - Monthly . . . . .	442
9.16.2	Water Tank, Fire Suppression, Wood, Coated Metal, Fiberglass, Remotely Monitored - Quarterly . . . . .	443
9.16.3	Water Tank, Fire Suppression, Wood, Coated Metal, Fiberglass, Remotely Monitored - Annual . . . . .	445
9.16.4	Water Tank, Fire Suppression, Wood, Coated Metal, Fiberglass, Remotely Monitored - 5-Year . . . . .	447
<b>10</b>	<b>Fire Alarm and Security Systems</b>	<b>449</b>
10.1	Emergency Light And Exit Sign System, Generator Backup, Non-Automated Testing . . . . .	450
10.1.1	Emergency Light and Exit Sign System, Generator Backup, Non-Automated Testing - Monthly . . . . .	450
10.2	Emergency Light And Exit Sign System, Unitary Battery Backup, Non-Automated Testing . . . . .	451
10.2.1	Emergency Light and Exit Sign System, Unitary Battery Backup, Non-Automated Testing - Monthly . . . . .	451
10.2.2	Emergency Light and Exit Sign System, Unitary Battery Backup, Non-Automated Testing - Annual . . . . .	452
10.3	Fire Detection And Notification System, Point-Addressable . . . . .	453
10.3.1	Fire Detection and Notification System, Point-Addressable - Monthly . . . . .	453
10.3.2	Fire Detection and Notification System, Point-Addressable - Quarterly . . . . .	454
10.3.3	Fire Detection and Notification System, Point-Addressable - Semi-Annual . . . . .	455
10.3.4	Fire Detection and Notification System, Point-Addressable - Annual . . . . .	457
10.3.5	Fire Detection and Notification System, Point-Addressable - 2-Year . . . . .	463
10.3.6	Fire Detection and Notification System, Point-Addressable - 3-Year . . . . .	464
10.4	Blue Light Station . . . . .	465
10.4.1	Blue Light Station - Quarterly . . . . .	465
<b>11</b>	<b>Vertical Transportation</b>	<b>467</b>

11.1	Dock Leveler . . . . .	468
11.1.1	Dock Leveler - Quarterly . . . . .	468
11.2	Dumbwaiter . . . . .	469
11.2.1	Dumbwaiter - Monthly . . . . .	469
11.3	Elevator, Hydraulic . . . . .	470
11.3.1	Elevator, Hydraulic - Monthly . . . . .	470
11.4	Elevator, Traction . . . . .	471
11.4.1	Elevator, Traction - Monthly . . . . .	471
11.5	Elevator, Traction Machine Room-Less . . . . .	472
11.5.1	Elevator, Traction Machine Room-Less - Monthly . . . . .	472
11.6	Lift, Scissor . . . . .	473
11.6.1	Lift, Scissor - Weekly . . . . .	473
11.6.2	Lift, Scissor - Monthly . . . . .	474
11.7	Lift, Wheelchair . . . . .	475
11.7.1	Lift, Wheelchair - Weekly . . . . .	475
11.8	Lift, Pool/Spa . . . . .	476
11.8.1	Lift, Pool/Spa - Daily . . . . .	476
<b>12</b>	<b>Doors</b>	<b>477</b>
12.1	Access Control System, Central . . . . .	478
12.1.1	Access Control System, Central - Annual . . . . .	478
12.2	Door, Exterior, Vertical Folding, Hydraulic . . . . .	479
12.2.1	Door, Exterior, Vertical Folding, Hydraulic - Weekly . . . . .	479
12.2.2	Door, Exterior, Vertical Folding, Hydraulic - Monthly . . . . .	480
12.3	Door, Hangar, Sliding, Electric . . . . .	481
12.3.1	Door, Hangar, Sliding, Electric - Quarterly . . . . .	481
12.3.2	Door, Hangar, Sliding, Electric - Annual . . . . .	482
12.4	Door, Non-Rated, Sliding, Electric . . . . .	483
12.4.1	Door, Non-Rated, Sliding, Electric - Annual . . . . .	483
12.5	Door, Non-Rated, Swinging, Manual . . . . .	484
12.5.1	Door, Non-Rated, Swinging, Manual - Annual . . . . .	484
12.6	Door, Overhead, Fire-Rated . . . . .	485
12.6.1	Door, Overhead, Fire-Rated - Annual . . . . .	485
12.7	Door, Sliding, Fire-Rated . . . . .	486
12.7.1	Door, Sliding, Fire-Rated - Annual . . . . .	486
12.8	Door, Swinging, Fire-Rated . . . . .	487
12.8.1	Door, Swinging, Fire-Rated - Annual . . . . .	487
12.9	Power Door Operator, Overhead, Electric . . . . .	488
12.9.1	Power Door Operator, Overhead, Electric - Annual . . . . .	488
12.10	Power Door Operator, Swinging, Electric . . . . .	489
12.10.1	Power Door Operator, Swinging, Electric - Annual . . . . .	489
12.11	Power Door Operator, Swinging, Pneumatic . . . . .	490
12.11.1	Power Door Operator, Swinging, Pneumatic - Monthly . . . . .	490
12.11.2	Power Door Operator, Swinging, Pneumatic - Semi-Annual . . . . .	491
<b>13</b>	<b>Exterior and Structural</b>	<b>493</b>
13.1	Clock, Exterior Lighting, Manual . . . . .	494
13.1.1	Clock, Exterior Lighting, Manual - Semi-Annual . . . . .	494
13.2	Gate, Parking Arm . . . . .	495
13.2.1	Gate, Parking Arm - Annual . . . . .	495
13.3	Gate, Vehicular, Sliding, Electric . . . . .	496
13.3.1	Gate, Vehicular, Sliding, Electric - Annual . . . . .	496
13.4	Roof, Flat, Membrane Or Modified / Bituminous . . . . .	497
13.4.1	Roof, Flat, Membrane or Modified / Bituminous - Semi-Annual . . . . .	497
13.4.2	Roof, Flat, Membrane or Modified / Bituminous - Annual . . . . .	498
13.5	Roof, Flat, Split Slab Concrete . . . . .	499

13.5.1	Roof, Flat, Split Slab Concrete - Semi-Annual . . . . .	499
13.6	Roof, Flat, Vegetative . . . . .	500
13.6.1	Roof, Flat, Vegetative - Semi-Annual . . . . .	500
13.7	Roof, Pitched, Metal, Standing Seam . . . . .	501
13.7.1	Roof, Pitched, Metal, Standing Seam - Semi-Annual . . . . .	501
13.8	Roof, Pitched, Shingle . . . . .	502
13.8.1	Roof, Pitched, Shingle - Semi-Annual . . . . .	502
<b>References</b>		<b>503</b>
<b>Index</b>		<b>504</b>