

# Table of Contents



## Chapter 1

### INTRODUCTION

|   |    |
|---|----|
| 1.0 The Purpose of the InstallationMasters® Program .....   | 13 |
| 2.0 Using This Manual.....                                  | 15 |
| 3.0 Skill and Knowledge Requirements of the Installer ..... | 16 |
| 4.0 Responsibility of the Various Trades.....               | 16 |

## Chapter 2

### PRODUCT TYPES, COMPONENTS AND MATERIALS

|  |    |
|--|----|
| 1.0 Window Types .....                                   | 17 |
| 1.1 Double Hung (Single/Triple Hung) Windows .....       | 17 |
| 1.2 Vertical Sliding Windows.....                        | 18 |
| 1.3 Horizontal Sliding Windows .....                     | 18 |
| 1.4 Projected Windows – Awning, Hopper and Casement..... | 19 |
| 1.5 Fixed Windows .....                                  | 19 |
| 1.6 Basement Windows.....                                | 20 |
| 1.7 Specialty Windows.....                               | 20 |
| 1.8 Bay and Bow Windows .....                            | 21 |
| 1.9 Garden Windows.....                                  | 21 |
| 1.10 Vertically and Horizontally Pivoted Windows.....    | 22 |
| 1.11 Side-Hinged (Inswinging) Windows .....              | 22 |
| 1.12 Top-Hinged (Inswinging) Windows.....                | 23 |
| 1.13 Dual Action Windows.....                            | 23 |
| 1.14 Hinged Egress (Rescue) Windows .....                | 23 |
| 1.15 Dual Windows .....                                  | 24 |
| 1.16 Jalousie Windows .....                              | 24 |
| 1.17 Tropical Awning Windows.....                        | 25 |
| 1.18 Jal-Awning Windows .....                            | 25 |
| 1.19 Secondary Storm Products (SSP's).....               | 25 |

- 2.0 Door Types ..... 26
  - 2.1 Side-Hinged Exterior Doors ..... 26
  - 2.2 Hinged Glass Doors ..... 26
  - 2.3 Sliding Glass Doors ..... 27
  - 2.4 Dual Action Hinged Glass Doors ..... 27
  - 2.5 Typical Understanding of Exterior Door Handling ..... 28
- 3.0 Components and Materials ..... 28
  - 3.1 Components ..... 28
  - 3.2 Materials ..... 30

**Chapter 3**

**PERFORMANCE CONSIDERATIONS, CODES AND STANDARDS**

- 1.0 Window and Door Performance Considerations ..... 31
  - 1.1 Structural Adequacy and Wind Loads ..... 31
  - 1.2 Windows and Energy ..... 31
  - 1.3 Condensation ..... 33
  - 1.4 Glazing and Framing Considerations ..... 33
  - 1.5 Sound Transmission ..... 35
- 2.0 The Role of Codes, Standards and Specifications ..... 36
  - 2.1 Energy Codes ..... 36
  - 2.2 Standards ..... 36
  - 2.3 Home Rule Doctrine ..... 37

**Chapter 4**

**PERFORMANCE CONSIDERATIONS**

- 1.0 Performance Considerations Related to Installation ..... 39
  - 1.1 Water Penetration Resistance ..... 39
  - 1.2 Air Infiltration Resistance ..... 41
  - 1.3 Occupant Safety and Accessibility ..... 42

**Chapter 5**

**WINDOW RATINGS AND LABELS**

- 1.0 Window Ratings ..... 49
  - 1.1 Performance Requirements and Ratings ..... 49
- 2.0 Labeling ..... 50
  - 2.1 Permanent Labels - Certification Labels, Etches or Markings ..... 50
  - 2.2 Permanent Labels - Child Safety Labels ..... 51
  - 2.3 Temporary Labels ..... 52

## Chapter 6

### INTEGRATION WITH THE BUILDING ENVELOPE

|  |    |
|--|----|
| 1.0 Wall Framing Around Windows and Doors .....  | 53 |
| 2.0 Water Resistive Barrier (WRB) Systems .....  | 54 |
| 2.1 Surface Barrier Systems.....   | 55 |
| 2.2 Membrane/Drainage Systems .....  | 56 |
| 2.3 Exterior Insulation and Finish System (EIFS) and Glass Fiber Reinforced Concrete (GFRC) Walls..... | 57 |

## Chapter 7

### FLASHING

|   |    |
|---|----|
| 1.0 Flashing Materials .....                                  | 59 |
| 1.1 Flexible Flashing .....                                   | 60 |
| 1.2 Rigid Flashing.....                                       | 63 |
| 1.3 Liquid Applied Flashing.....                              | 64 |
| 2.0 Rigid Head Flashing .....                                 | 65 |
| 3.0 Sill Pan Flashing .....                                   | 65 |
| 3.1 Types of Sill Pan Flashing Materials and Fabrication..... | 66 |

## Chapter 8

### TYPES OF WINDOWS AND DOORS AND RELATED COMPONENTS

|   |    |
|---|----|
| 1.0 Frame Style (Block, Mounting Flange, Flush Fin) ..... | 69 |
| 1.1 Block Frame Windows and Doors .....                   | 69 |
| 1.2 Mounting Flange Windows and Doors.....                | 70 |
| 1.3 Flush Fin Windows and Doors .....                     | 71 |
| 1.4 Variation in Door Types.....                          | 71 |
| 2.0 Window and Door Components for Installation .....     | 72 |
| 2.1 Subsills .....  | 72 |
| 2.2 Stool Trim and Sill Members .....                     | 73 |
| 2.3 Interior Trim/Casing.....                             | 73 |
| 2.4 Capping/Cladding .....                                | 74 |
| 2.5 Sill Angle or Sloped Sill Adaptor.....                | 74 |
| 2.6 Head Expander .....                                   | 75 |
| 2.7 Jamb Extensions .....                                 | 75 |
| 2.8 Mullion Clips.....                                    | 76 |
| 2.9 Exterior Casing/Brick Mould .....                     | 76 |
| 2.10 Mounting Clips or Brackets .....                     | 77 |
| 2.11 Sash Dividers / Grids / Muntins .....                | 77 |
| 2.12 Integral Ventilating Systems .....                   | 77 |

**Chapter 9**

**INSTALLATION MATERIALS AND SUPPLIES**

- 1.0 Shims ..... 79
  - 1.1 Types of Shims..... 79
  - 1.2 Shim Application ..... 80
- 2.0 Construction and Installation of a Wood Buck ..... 81
- 3.0 Fasteners ..... 82
  - 3.1 Fastener Materials ..... 83
  - 3.2 Separation from Incompatible Materials..... 83
- 4.0 Sealants ..... 84
  - 4.1 Choosing the Proper Sealant..... 85
  - 4.2 Joint Movement and Sealant Movement Capability..... 85
  - 4.3 Sealant Adhesion..... 86
  - 4.4 Sealant Compatibility ..... 86
  - 4.5 Joint and Sealant Dimensions ..... 89
  - 4.6 Surface Preparation ..... 89
  - 4.7 Use of Back-Up Materials..... 90
  - 4.8 Sealant Application and Tooling ..... 92
- 5.0 Cavity Insulation ..... 93
  - 5.1 Low Pressure Expanding Foam Products ..... 94

**Chapter 10**

**MANUFACTURER’S INSTALLATION INSTRUCTIONS**

- 1.0 Manufacturer’s Installation Instructions ..... 101
  - 1.1 When Conflicts Arise ..... 102
  - 1.2 Special Circumstances..... 102

**Chapter 11**

**PREPARING FOR INSTALLATION**

- 1.0 General Installation Guidelines ..... 103
- 2.0 Measuring, Clearances and Tolerances ..... 103
  - 2.1 General Measuring Guidelines ..... 103
  - 2.2 Taking Measurements..... 104
  - 2.3 Measuring the Rough Opening – the First Step Toward Determining the Size .... 104

|   |     |
|---|-----|
| 2.4 Dimensions: Horizontal, Vertical and Diagonal ..... | 105 |
| 2.5 Beyond Measurements: Level, Plumb and True .....    | 108 |
| 2.6 Clearance Provisions.....                           | 109 |
| 2.7 Installation Tolerances .....                       | 110 |
| 3.0 Receiving Products on Site .....                    | 111 |
| 3.1 Verifying Proper Location.....                      | 111 |
| 3.2 Inspection of New Products.....                     | 111 |
| 3.3 Handling and Storage .....                          | 111 |

## Chapter 12

### JOB SITE INSPECTIONS

|   |     |
|---|-----|
| 1.0 Preliminary Site Inspection.....                    | 113 |
| 2.0 Health and Safety Inspection .....                  | 115 |
| 3.0 Pre-Installation Inspection .....                   | 115 |
| 3.1 Reporting Construction Deficiencies.....            | 116 |
| 3.2 Identifying and Removing Structural Components..... | 116 |
| 4.0 Quality Control Inspection.....                     | 117 |
| 4.1 Using Quality Control Checklists .....              | 117 |

## Chapter 13

### JOB SITE SAFETY

|                                     |     |
|-------------------------------------|-----|
| 1.0 Job Site Health Practices ..... | 121 |
| 1.1 Hazardous Materials .....       | 121 |
| 1.2 Chemical/Material Hazards ..... | 122 |
| 1.3 Respirators .....               | 122 |
| 2.0 Job Site Safety Practices.....  | 123 |
| 2.1 Equipment Safety .....          | 123 |
| 2.2 Electrical Safety.....          | 123 |
| 2.3 Tool Safety.....                | 124 |
| 2.4 Accessibility Safety .....      | 124 |
| 2.5 Scaffolding and Ladder Use..... | 124 |

**Chapter 14**

**INSTALLATION/APPLICATION OF FLASHING MATERIALS, RIGID HEAD FLASHING, SILL PAN FLASHING, FASTENERS AND SEALANTS**

- 1.0 Selecting, Cutting and Applying Flashing..... 129
- 2.0 Rigid Head Flashing ..... 131
- 3.0 Sill Pan Flashing ..... 131
  - 3.1 Types of Sill Pan Flashing Materials and Fabrication..... 132
  - 3.2 Leg Height of Rigid Sill Pan Flashing..... 135
- 4.0 Fastener Application..... 137
- 5.0 Sealant Application and Tooling..... 138

**Chapter 15**

**CHOOSING BETWEEN REPLACEMENT AND RETROFIT BEFORE STARTING THE JOB**

- 1.0 What is the Best Product for Each Job?..... 139
- 2.0 General Installation Guidelines..... 139

**Chapter 16**

**REMOVING THE EXISTING WINDOW – RETROFIT OR REPLACEMENT**

- 1.0 Removal of Sash or Panel Only (Retrofit) ..... 143
  - 1.1 Removal of Sash from Existing Windows (Inside-Out Method) ..... 144
  - 1.2 Removal of Sash from Existing Windows (Outside-In Method or Flush Fin Application) ..... 146
  - 1.3 Removal of Sliding Glass Door Operable Panel and Sill..... 147
- 2.0 Removal of Entire Frame (Replacement) ..... 148
  - 2.1 Metal Windows ..... 148
  - 2.2 Removal of Block Frame Windows ..... 150
  - 2.3 Removal of Mounting Flange Windows ..... 150
  - 2.4 Removal of an Entire Sliding Glass Door Frame..... 153
- 3.0 Restore WRB..... 154

## Chapter 17

### PREPARING THE OPENING

|  |     |
|--|-----|
| 1.0 Assessing the Opening.....                           | 155 |
| 1.1 Determining Squareness of the Opening .....          | 155 |
| 1.2 Make Modifications for Out-of-Square .....           | 155 |
| 1.3 Verify the Structural Integrity of the Opening ..... | 155 |
| 1.4 Check the Fit of the New Window or Door .....        | 156 |
| 1.5 Sill Support for Door Installation.....              | 156 |
| 2.0 Apply Accessories as Needed.....                     | 156 |
| 2.1 Capping the Sill .....                               | 156 |
| 2.2 Sloped Sill Adaptor.....                             | 157 |
| 2.3 Head Expander .....                                  | 158 |
| 2.4 Construction and Installation of a Wood Buck.....    | 158 |
| 2.5 Installation of Sill Pan Flashing.....               | 160 |
| 3.0 Protect Incompatible Materials.....                  | 163 |

## Chapter 18

### INSTALLING RETROFIT WINDOWS AND SLIDING GLASS DOORS

|   |     |
|---|-----|
| 1.0. Inside-Out Installation of Block Frame Windows.....          | 165 |
| 1.1 Begin Installation .....                                      | 165 |
| 1.2 Install Shims and Fasteners .....                             | 166 |
| 1.3 Final Adjustments and Securing .....                          | 166 |
| 1.4 Sealing and Finishing the Exterior .....                      | 167 |
| 1.5 Sealing and Finishing the Interior .....                      | 168 |
| 2.0 Outside-In Installation of Block Frame Windows .....          | 170 |
| 2.1 Begin Installation .....                                      | 170 |
| 2.2 Install Shims and Fasteners .....                             | 170 |
| 2.3 Final Adjustments and Securing .....                          | 170 |
| 2.4 Sealing and Finishing the Exterior .....                      | 170 |
| 2.5 Sealing and Finishing the Interior .....                      | 172 |
| 3.0 Flush Fin Window and Door Installation .....                  | 172 |
| 3.1 Prior to Installing Flush Fin Retrofit Windows or Doors ..... | 173 |
| 3.2 Install Flush Fin Window or Door and Seal the Exterior .....  | 173 |
| 3.3 Finishing and Sealing Flush Fin Windows and Doors .....       | 175 |

**Chapter 19**

**FULL FRAME REPLACEMENT OF WINDOWS WITHOUT REMOVAL OF BRICK VENEER – FMA/AAMA/WDMA 2710**

- 1.0. Special Considerations..... 177
  - 1.1 Rough Opening Preparation ..... 178
  - 1.2 Cavity Preparation ..... 178
  - 1.3 Flashing the Opening ..... 179
  - 1.4 Installation of Block Frame Windows Without Brick Mould ..... 182

**Chapter 20**

**INSTALLATION OF BLOCK FRAME WINDOWS AND DOORS**

- 1.0. Block Frame Windows and Doors in Surface Barrier Walls..... 185
  - 1.1 Block Frame Windows and Doors Without Brick Mould in Surface Barrier Walls.. 186
- 2.0. Block Frame Windows and Doors in Membrane/Drainage Walls ..... 189
  - 2.1 Application of Water Resistive Barrier ..... 190
  - 2.2 Installation of Flashing – Block Frame Windows and Doors with Integral Brick Mould in Membrane/Drainage Walls..... 191
  - 2.3 Installation of Flashing – Block Frame Windows and Doors with Non-Integral Brick Mould in Membrane/Drainage Walls..... 193
  - 2.4 Installation of Block Frame Windows in Membrane/Drainage Walls ..... 195
  - 2.5 Installation of Block Frame Doors in Membrane/Drainage Walls ..... 196
  - 2.6 Installation of Block Frame Doors..... 196
  - 2.7 Sealing and Finishing the Exterior – Block Frame Windows and Doors ..... 200
- 3.0. Finishing the Interior..... 203

**Chapter 21**

**INSTALLATION OF MOUNTING FLANGE WINDOWS AND DOORS - OVERVIEW**

- 1.0 Mounting Flange Windows and Doors..... 205
  - 1.1 Mounting Flange Window and Door Installation..... 205
  - 1.2 Sealing Non-Integral (Field Applied) Mounting Flanges and Mechanical Joints .205
  - 1.3 Methods of Installation ..... 206
- 2.0 Selecting, Cutting and Applying Flashing..... 207



## Chapter 22

### INSTALLATION OF REPLACEMENT MOUNTING FLANGE WINDOWS AND DOORS – ASTM E2112

|   |     |
|---|-----|
| 1.0 Mounting Flange Windows and Door Installation.....                          | 211 |
| 2.0 Sealing and Finishing the Exterior – Mounting Flange Windows and Doors..... | 214 |
| 3.0 Finishing the Interior.....   | 216 |

## Chapter 23

### INSTALLATION OF NEW CONSTRUCTION MOUNTING FLANGE WINDOWS AND DOORS – ASTM E2112

|   |     |
|---|-----|
| 1.0 Standard Practice for the Installation of Windows, Doors and Skylights –<br>ASTM E2112.....   | 217 |
| 1.1 Method A (Flashing Over the Face of the Mounting Flange at the Jamb; Water<br>Resistive Barrier Installed After Fenestration Product) .....     | 217 |
| 1.2 Method B (Flashing Behind the Face of the Mounting Flange at the Jamb; Water<br>Resistive Barrier Installed After Fenestration Product) .....   | 221 |
| 1.3 Method A1 (Flashing Over the Face of the Mounting Flange at the Jamb; Water<br>Resistive Barrier Installed Before Fenestration Product) .....   | 224 |
| 1.4 Method B1 (Flashing Behind the Face of the Mounting Flange at the Jamb; Water<br>Resistive Barrier Installed Before Fenestration Product) ..... | 230 |
| 2.0 Window Installation .....   | 236 |
| 3.0 Sealing and Finishing the Exterior – Mounting Flange Windows and Doors.....   | 237 |
| 4.0 Finishing the Interior .....  | 239 |

## Chapter 24

### INSTALLATION OF NEW CONSTRUCTION MOUNTING FLANGE WINDOWS AND DOORS – AAMA 2400

|  |     |
|--|-----|
| 1.0 Open Stud Frame Construction for Low Wind/Water Exposure Areas – AAMA 2400.... | 241 |
| 1.1 Method A (Flashing Over the Face of the Mounting Flange at the Jamb).....      | 242 |
| 1.2 Method B (Flashing Behind the Face of the Mounting Flange at the Jamb) .....   | 245 |
| 2.0 Window Installation .....  | 247 |
| 3.0 Sealing and Finishing the Exterior – Mounting Flange Windows and Doors.....    | 248 |
| 4.0 Finishing the Interior .....   | 249 |

**Chapter 25**

**INSTALLATION OF NEW CONSTRUCTION MOUNTING FLANGE WINDOWS AND DOORS – FMA/AAMA 100**

- 1.0 Mounting Flange Window or Door Installations with Sill Pan – FMA/AAMA 100 ..... 251
  - 1.1 Modify Water Resistive Barrier – Method “A1” Only ..... 251
  - 1.2 Applying a Sill Pan Flashing ..... 253
  - 1.3 Installation of Window into Rough Opening ..... 253
  - 1.4 Jamb and Head Flashing Installation Using Self-Adhering Flashing..... 255
  - 1.5 Jamb and Head Flashing Using Mechanically Attached Flashing ..... 256
- 2.0 Sealing and Finishing the Exterior – Mounting Flange Windows and Doors..... 258
- 3.0 Finishing the Interior ..... 260

**Chapter 26**

**INSTALLATION OF NEW CONSTRUCTION MOUNTING FLANGE WINDOWS AND DOORS – FMA/AAMA/WDMA 500**

- 1.0 Walls Utilizing Foam Plastic Insulating Sheathing (FPIS) with a Separate WRB ..... 261
  - 1.1 Methods of Installation ..... 262
  - 1.2 General Considerations ..... 263
  - 1.3 Window Installation Procedures ..... 263
  - 1.4 Method A..... 264
  - 1.5 Preparation for WRB (for all Installation Methods) ..... 265
  - 1.6 Method B..... 269
  - 1.7 Method C..... 271
  - 1.8 Application of Interior Air and Water Seal..... 274
- 2.0 Finishing the Interior ..... 275

**Chapter 27**

**INSTALLING SPECIAL WINDOWS**

- 1.0 Basement Window Installation..... 277
  - 1.1 Prepare and Check the Opening..... 277
  - 1.2 Installation Options ..... 277
- 2.0 Bay, Bow and Garden Window Installation ..... 278
  - 2.1 Measuring Bay Windows..... 278
  - 2.2 Measuring Bow Windows..... 280
  - 2.3 Measuring Garden Windows ..... 280

|   |     |
|---|-----|
| 2.4 Installation of Bay, Bow and Garden Windows.....          | 280 |
| 2.5 Selection and Use of Fasteners for Attachment .....       | 282 |
| 2.6 Verify Level, Square and Plumb.....                       | 282 |
| 2.7 Adding Structural Support.....                            | 282 |
| 2.8 Adding a Roof Structure.....                              | 284 |
| 2.9 Finishing the Exterior – Bay and Bow Windows.....         | 287 |
| 2.10 Finishing the Interior – Bay and Bow Windows.....        | 287 |
| 3.0 Combination Window Installation.....                      | 288 |
| 3.1 Assembly of Combination Windows.....                      | 288 |
| 3.2 Limitations and Precautions for Combination Windows ..... | 289 |
| 4.0 Specially Shaped Window Installation.....                 | 290 |
| 4.1 Specially Shaped Window Construction .....                | 291 |
| 4.2 Modifications to Standard Installation Instructions.....  | 291 |
| 4.3 Adding Support and Bracing.....                           | 292 |
| 4.4 Proper Flashing Techniques .....                          | 293 |
| 4.5 Proper Shimming and Fastening Techniques .....            | 295 |
| 5.0 Finishing the Interior.....                               | 295 |

## Chapter 28

### FINISHING THE JOB

|   |     |
|---|-----|
| 1.0 Occupant Safety.....                                | 297 |
| 2.0 Operational Checks and Adjustments.....             | 297 |
| 2.1 Hung Windows.....                                   | 297 |
| 2.2 Awning, Hopper and Casement Windows .....           | 298 |
| 2.3 Sliding Windows .....                               | 298 |
| 2.4 Sliding Doors .....                                 | 300 |
| 2.5 Hinged Doors.....                                   | 300 |
| 3.0 Final Cleaning of Installed Windows and Doors ..... | 300 |
| 3.1 Use of Protective Coverings.....                    | 301 |
| 3.2 Manufacturer’s Instructions .....                   | 301 |
| 3.3 General Cleaning of Light Surface Soil .....        | 302 |
| 3.4 Some Important Cautions Regarding Any Finish.....   | 303 |
| 3.5 Washing Glass Surfaces.....                         | 303 |
| 4.0 Installation of Screens .....                       | 304 |
| 4.1 Types of Screens.....                               | 305 |
| 4.2 Locating the Screen .....                           | 305 |
| 4.3 Screen Installation .....                           | 306 |

5.0 Final Site Clean-Up .....308  
    5.1 Removal of Construction Debris.....308  
    5.2 Proper Disposal of Debris.....308

**Appendix 1**

Glossary .....311

**Appendix 2**

Acronyms .....325