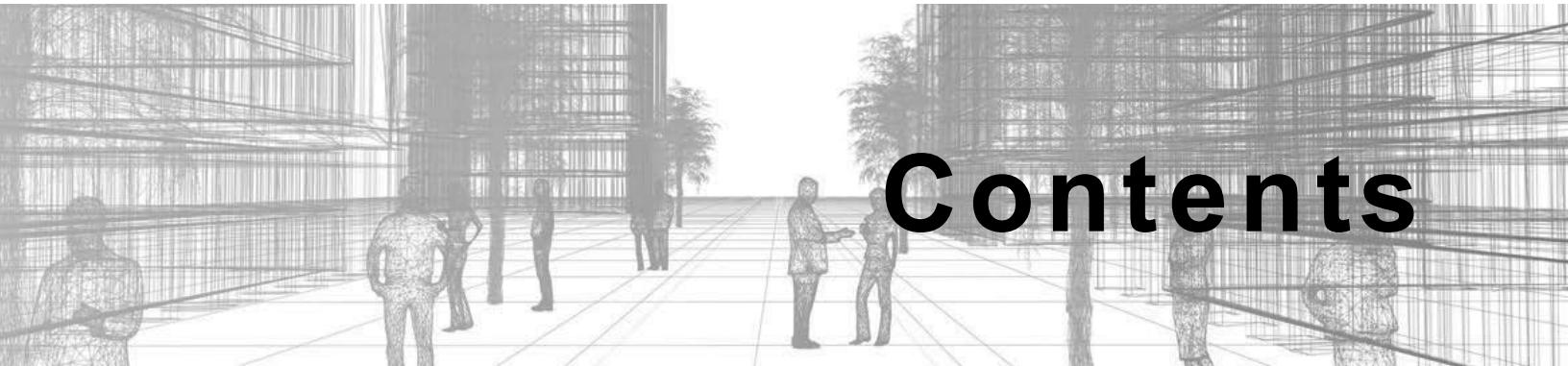


# Autodesk® Revit® 2016 MEP Fundamentals



Visit the following websites to learn more about this book:





# Contents

Preface .....	ix
In this Guide .....	xi
Practice Files .....	xv
Customizing the Interface .....	xvii
<b>Chapter 1: Introduction to BIM and Autodesk Revit .....</b>	<b>1-1</b>
<b>1.1 BIM and Autodesk Revit .....</b>	<b>1-2</b>
Workflow and BIM .....	1-3
Revit Terms .....	1-4
Revit and Construction Documents .....	1-5
<b>1.2 Overview of the Interface .....</b>	<b>1-6</b>
<b>1.3 Starting Projects .....</b>	<b>1-18</b>
Opening Projects .....	1-19
Starting New Projects .....	1-21
Saving Projects .....	1-22
<b>1.4 Viewing Commands .....</b>	<b>1-24</b>
Zooming and Panning .....	1-24
Viewing in 3D .....	1-26
Visual Styles .....	1-30
<b>Practice 1a Open and Review a Project .....</b>	<b>1-32</b>
<b>Chapter Review Questions .....</b>	<b>1-41</b>
<b>Command Summary .....</b>	<b>1-43</b>
<b>Chapter 2: Basic Drawing and Modify Tools .....</b>	<b>2-1</b>
<b>2.1 Using General Drawing Tools .....</b>	<b>2-2</b>
Drawing Aids .....	2-2
Reference Planes .....	2-6
<b>2.2 Inserting Components .....</b>	<b>2-8</b>
Loading Components .....	2-12

---

<b>Practice 2a Insert Components.....</b>	<b>2-13</b>
<b>2.3 Selecting and Editing Elements.....</b>	<b>2-19</b>
Selecting Multiple Elements .....	2-22
Filtering Selection Sets .....	2-24
<b>Practice 2b Select and Edit Elements .....</b>	<b>2-26</b>
<b>2.4 Working with Basic Modify Tools.....</b>	<b>2-31</b>
Moving and Copying Elements .....	2-31
Rotating Elements .....	2-33
Mirroring Elements .....	2-35
Creating Linear and Radial Arrays .....	2-36
<b>Practice 2c Work with Basic Modify Tools .....</b>	<b>2-40</b>
<b>Chapter Review Questions.....</b>	<b>2-47</b>
<b>Command Summary .....</b>	<b>2-50</b>
<b>Chapter 3: Basic Systems Tools .....</b>	<b>3-1</b>
<b>3.1 Connecting Components .....</b>	<b>3-2</b>
Testing Connections .....	3-7
<b>Practice 3a Connect Components .....</b>	<b>3-8</b>
<b>3.2 Working with Additional Modify Tools.....</b>	<b>3-15</b>
Aligning Elements .....	3-15
Splitting Linear Elements .....	3-17
Trimming and Extending .....	3-17
Offsetting Elements .....	3-19
<b>Practice 3b Work with Additional Modify Tools .....</b>	<b>3-21</b>
<b>3.3 Creating Systems - Overview.....</b>	<b>3-29</b>
Using the System Browser.....	3-33
<b>Practice 3c View and Create Systems.....</b>	<b>3-37</b>
<b>Chapter Review Questions.....</b>	<b>3-43</b>
<b>Command Summary .....</b>	<b>3-45</b>
<b>Chapter 4: Starting Systems Projects .....</b>	<b>4-1</b>
<b>4.1 Linking in Revit Models .....</b>	<b>4-2</b>
Managing Links .....	4-4
<b>Practice 4a Start a Systems Project .....</b>	<b>4-6</b>
<b>4.2 Setting Up Levels .....</b>	<b>4-9</b>
Creating Plan Views .....	4-11
<b>4.3 Copying and Monitoring Elements.....</b>	<b>4-13</b>
<b>Practice 4b Copy and Monitor Elements.....</b>	<b>4-15</b>

---

<b>4.4 Batch Copying Fixtures .....</b>	<b>4-20</b>
Batch Copying Fixtures .....	4-22
<b>Practice 4c Batch Copy Fixtures .....</b>	<b>4-24</b>
<b>4.5 Coordinating Linked Models .....</b>	<b>4-27</b>
<b>Practice 4d Coordinate Linked Models .....</b>	<b>4-30</b>
<b>Chapter Review Questions .....</b>	<b>4-34</b>
<b>Command Summary .....</b>	<b>4-36</b>
 <b>Chapter 5: Working with Views .....</b>	<b>5-1</b>
<b>5.1 Setting the View Display .....</b>	<b>5-2</b>
Hiding and Overriding Graphics .....	5-3
System Filters .....	5-8
View Range .....	5-10
<b>5.2 Duplicating Views .....</b>	<b>5-14</b>
Duplication Types .....	5-14
<b>Practice 5a Duplicate Views and Set the View Display .....</b>	<b>5-16</b>
<b>5.3 Adding Callout Views .....</b>	<b>5-19</b>
Modifying Callouts .....	5-20
<b>Practice 5b Add Callout Views .....</b>	<b>5-22</b>
<b>5.4 Creating Elevations and Sections .....</b>	<b>5-25</b>
Elevations .....	5-26
Sections .....	5-27
Modifying Elevations and Sections .....	5-28
<b>Practice 5c Create Elevations and Sections .....</b>	<b>5-33</b>
<b>Chapter Review Questions .....</b>	<b>5-39</b>
<b>Command Summary .....</b>	<b>5-41</b>
 <b>Chapter 6: Spaces and Zones .....</b>	<b>6-1</b>
<b>6.1 Preparing a Model for Spaces .....</b>	<b>6-2</b>
<b>6.2 Adding Spaces .....</b>	<b>6-7</b>
Space Separation Boundaries .....	6-9
Space Properties .....	6-10
<b>Practice 6a Add Spaces .....</b>	<b>6-12</b>
<b>6.3 Working with Spaces .....</b>	<b>6-17</b>
Special Space Situations .....	6-18
<b>Practice 6b Work with Spaces .....</b>	<b>6-22</b>
<b>6.4 Creating Zones .....</b>	<b>6-32</b>
Using the System Browser with Zones .....	6-34

---

<b>6.5 Creating Color Schemes .....</b>	<b>6-36</b>
<b>Practice 6c Create Zones.....</b>	<b>6-41</b>
<b>Chapter Review Questions.....</b>	<b>6-48</b>
<b>Command Summary .....</b>	<b>6-51</b>
<b>Chapter 7: Energy Analysis .....</b>	<b>7-1</b>
<b>    7.1 Preparing a Project for Energy Analysis .....</b>	<b>7-2</b>
Preparing Energy Analysis.....	7-3
<b>    7.2 Analyzing the Heating and Cooling Loads .....</b>	<b>7-8</b>
<b>    7.3 Exporting for Secondary Analysis .....</b>	<b>7-12</b>
<b>Practice 7a Heating and Cooling Analysis.....</b>	<b>7-14</b>
<b>Chapter Review Questions.....</b>	<b>7-24</b>
<b>Command Summary .....</b>	<b>7-26</b>
<b>Chapter 8: HVAC Networks.....</b>	<b>8-1</b>
<b>    8.1 Adding Mechanical Equipment and Air Terminals .....</b>	<b>8-2</b>
Mechanical Equipment.....	8-2
Air Terminals .....	8-4
<b>Practice 8a Add Mechanical Equipment and Air Terminals .....</b>	<b>8-10</b>
<b>    8.2 Adding Ducts and Pipes .....</b>	<b>8-16</b>
Mechanical Settings .....	8-17
Adding Ducts and Pipes .....	8-17
Creating Parallel Pipes.....	8-21
<b>Practice 8b Add Ducts and Pipes .....</b>	<b>8-24</b>
<b>    8.3 Modifying Ducts and Pipes .....</b>	<b>8-30</b>
Adding Fittings & Accessories.....	8-31
Duct and Pipe Sizing .....	8-33
Converting Ducts and Pipes.....	8-34
Adding Insulation and Lining .....	8-36
Modifying the Justification .....	8-38
<b>Practice 8c Modify Ducts and Pipes .....</b>	<b>8-39</b>
<b>Chapter Review Questions.....</b>	<b>8-48</b>
<b>Command Summary .....</b>	<b>8-51</b>
<b>Chapter 9: Plumbing Networks .....</b>	<b>9-1</b>
<b>    9.1 Adding Plumbing Fixtures and Equipment .....</b>	<b>9-2</b>
Mechanical Equipment.....	9-2
Plumbing Fixtures .....	9-4
<b>Practice 9a Add Plumbing Fixtures and Equipment.....</b>	<b>9-7</b>

---

---

<b>9.2 Adding Plumbing Pipes .....</b>	<b>9-15</b>
Adding Pipes .....	9-17
Sloped Piping .....	9-20
Creating Parallel Pipes .....	9-21
<b>Practice 9b Add Plumbing Pipes .....</b>	<b>9-23</b>
<b>9.3 Modifying Plumbing Pipes .....</b>	<b>9-30</b>
Pipe Fittings & Accessories.....	9-30
Changing the Slope.....	9-33
Converting Pipes .....	9-33
Adding Insulation .....	9-34
Modifying the Justification .....	9-36
<b>Practice 9c Modify Plumbing Pipes.....</b>	<b>9-37</b>
<b>9.4 Adding Fire Protection Networks .....</b>	<b>9-46</b>
<b>Practice 9d Add Fire Protection Networks.....</b>	<b>9-47</b>
<b>Chapter Review Questions .....</b>	<b>9-52</b>
<b>Command Summary .....</b>	<b>9-54</b>
<b>Chapter 10: Advanced Systems for HVAC and Plumbing .....</b>	<b>10-1</b>
<b>10.1 Creating and Modifying Systems .....</b>	<b>10-2</b>
Modifying Systems .....	10-5
<b>Practice 10a Create and Modify HVAC Systems .....</b>	<b>10-7</b>
<b>Practice 10b Create and Modify Plumbing Systems.....</b>	<b>10-11</b>
<b>10.2 Creating Automatic Layouts .....</b>	<b>10-15</b>
<b>Practice 10c Create Automatic Duct Layouts.....</b>	<b>10-19</b>
<b>Practice 10d Create Automatic Plumbing Layouts .....</b>	<b>10-25</b>
<b>10.3 Testing Systems.....</b>	<b>10-30</b>
Showing Disconnects .....	10-31
System Inspector .....	10-34
Analyzing Systems with Schedules.....	10-36
<b>Practice 10e Test Systems .....</b>	<b>10-37</b>
<b>Chapter Review Questions .....</b>	<b>10-46</b>
<b>Command Summary .....</b>	<b>10-48</b>
<b>Chapter 11: Electrical Systems .....</b>	<b>11-1</b>
<b>11.1 About Electrical Systems .....</b>	<b>11-2</b>
Electrical Settings.....	11-3
<b>11.2 Placing Electrical Components .....</b>	<b>11-5</b>
Electrical Equipment .....	11-5
Electrical Devices .....	11-6
Lighting Fixtures .....	11-6

---

---

<b>Practice 11a Place Electrical Components .....</b>	<b>11-12</b>
<b>11.3 Creating Electrical Circuits .....</b>	<b>11-16</b>
Adding Wires.....	11-18
<b>Practice 11b Create Electrical Circuits.....</b>	<b>11-20</b>
<b>11.4 Setting up Panel Schedules .....</b>	<b>11-27</b>
Creating Panel Schedules.....	11-28
Modifying Panel Schedules.....	11-28
<b>Practice 11c Set Up Panel Schedules .....</b>	<b>11-30</b>
<b>11.5 Adding Cable Trays and Conduit .....</b>	<b>11-33</b>
Creating Parallel Conduit Runs.....	11-37
Modifying Cable Tray and Conduit.....	11-38
Adding Fittings .....	11-41
<b>11.6 Testing Electrical Layouts.....</b>	<b>11-42</b>
<b>Practice 11d Add Conduit and Panel Schedules.....</b>	<b>11-45</b>
<b>Chapter Review Questions .....</b>	<b>11-49</b>
<b>Command Summary .....</b>	<b>11-51</b>
<b>Chapter 12: Creating Construction Documents .....</b>	<b>12-1</b>
<b>12.1 Setting Up Sheets .....</b>	<b>12-2</b>
Sheet (Title Block) Properties .....	12-4
<b>12.2 Placing and Modifying Views on Sheets.....</b>	<b>12-5</b>
<b>Practice 12a Create Construction Documents .....</b>	<b>12-11</b>
<b>12.3 Printing Sheets.....</b>	<b>12-16</b>
Printing Options.....	12-16
<b>Chapter Review Questions .....</b>	<b>12-20</b>
<b>Command Summary .....</b>	<b>12-22</b>
<b>Chapter 13: Annotating Construction Documents .....</b>	<b>13-1</b>
<b>13.1 Adding Dimensions .....</b>	<b>13-2</b>
Modifying Dimensions .....	13-5
<b>Practice 13a Add Dimensions .....</b>	<b>13-10</b>
<b>13.2 Working With Text.....</b>	<b>13-13</b>
Spell Checking .....	13-16
Creating Text Types .....	13-17
<b>13.3 Drawing Detail Lines and Symbols .....</b>	<b>13-19</b>
Using Symbols .....	13-21
<b>Practice 13b Annotate Construction Documents.....</b>	<b>13-23</b>

---

<b>13.4 Creating Legends .....</b>	<b>13-26</b>
<b>Practice 13c Create Legends .....</b>	<b>13-28</b>
<b>Chapter Review Questions.....</b>	<b>13-30</b>
<b>Command Summary .....</b>	<b>13-32</b>
 <b>Chapter 14: Adding Tags and Schedules.....</b>	<b>14-1</b>
<b>    14.1 Adding Tags .....</b>	<b>14-2</b>
Tagging in 3D Views .....	14-7
<b>    Practice 14a Add Tags .....</b>	<b>14-9</b>
<b>    14.2 Working with Schedules.....</b>	<b>14-15</b>
Modifying Schedules .....	14-16
Modifying a Schedule on a Sheet .....	14-17
<b>    Practice 14b Work with Schedules.....</b>	<b>14-19</b>
<b>    Chapter Review Questions.....</b>	<b>14-24</b>
<b>    Command Summary .....</b>	<b>14-25</b>
 <b>Chapter 15: Creating Details.....</b>	<b>15-1</b>
<b>    15.1 Setting Up Detail Views .....</b>	<b>15-2</b>
Referencing a Drafting View .....	15-4
Saving Drafting Views .....	15-5
<b>    15.2 Adding Detail Components .....</b>	<b>15-8</b>
Detail Components.....	15-8
Repeating Details .....	15-10
<b>    15.3 Annotating Details .....</b>	<b>15-12</b>
Adding Detail Tags .....	15-12
Creating Filled Regions .....	15-14
<b>    Practice 15a Create a Fire Damper Detail .....</b>	<b>15-16</b>
<b>    Practice 15b Create a Floor Drain Detail.....</b>	<b>15-23</b>
<b>    Chapter Review Questions.....</b>	<b>15-24</b>
<b>    Command Summary .....</b>	<b>15-26</b>
 <b>Appendix A: Introduction to Worksets .....</b>	<b>A-1</b>
<b>    A.1 Introduction to Worksets.....</b>	<b>A-2</b>
Saving Workset- Related Files .....	A-4
<b>    Command Summary .....</b>	<b>A-6</b>
 <b>Appendix B: Additional Tools .....</b>	<b>B-1</b>
<b>    B.1 Importing CAD Files.....</b>	<b>B-2</b>

<b>B.2 Loading from Autodesk Seek .....</b>	<b>B-6</b>
<b>B.3 Custom Piping .....</b>	<b>B-8</b>
<b>B.4 Work with System Graphics.....</b>	<b>B-10</b>
Duct and Piping System Graphic Overrides.....	B-10
Using Graphic Override Filters.....	B-12
<b>B.5 Pressure Loss Reports.....</b>	<b>B-15</b>
<b>B.6 Working with Guide Grids on Sheets.....</b>	<b>B-18</b>
<b>B.7 Revision Tracking .....</b>	<b>B-20</b>
Issuing Revisions .....	B-24
<b>B.8 Annotating Dependent Views .....</b>	<b>B-25</b>
Annotating Views .....	B-25
<b>B.9 Importing and Exporting Schedules .....</b>	<b>B-28</b>
<b>B.10 Creating Building Component Schedules .....</b>	<b>B-30</b>
Schedule Properties.....	B-36
<b>Appendix C: Autodesk Revit MEP Certification Exam Objectives .....</b>	<b>C-1</b>
<b>Index .....</b>	<b>Index-1</b>