

# TABLE OF CONTENTS

<b>About This Textbook</b> .....	x	<b>Part II. Not Over 1000V</b> .....	50
<b>Additional Products to Help You Learn</b> .....	xiii	110.26 Working Spaces About Electrical Equipment .....	50
<b>How to Use the <i>National Electrical Code</i></b> .....	1	110.27 Protection Against Physical Damage.....	60
<b>Article 90—Introduction to the <i>National Electrical Code</i></b> .....	7	110.28 NEMA Enclosure Types.....	60
90.1 Scope.....	7	110.29 In Sight From (Within Sight From, Within Sight) .....	61
90.2 Scope and Application of the <i>NEC</i> .....	7	<b>Chapter 1—Review Questions</b> .....	63
90.3 <i>Code</i> Arrangement.....	11	<b>CHAPTER 2—WIRING AND PROTECTION</b> .....	65
90.4 <i>NEC</i> Enforcement .....	11	<b>Article 200—Use and Identification of Grounded Conductors</b> .....	67
90.5 Mandatory and Permissive Rules, and Explanatory Material .....	13	200.1 Scope .....	68
90.7 Examination of Equipment for Safety .....	13	200.7 Identification of Grounded Conductors.....	68
<b>Article 90—Review Questions</b> .....	15	200.8 Use of White or Gray Color .....	70
<b>CHAPTER 1—GENERAL RULES</b> .....	17	<b>Article 210—Branch Circuits</b> .....	73
<b>Article 100—Definitions</b> .....	19	<b>Part I. General</b> .....	73
100 Scope .....	19	210.1 Scope .....	73
<b>Article 110—General Requirements for Electrical Installations</b> .....	37	210.5 Conductor Identification.....	73
<b>Part I. General Requirements</b> .....	37	210.8 GFCI Protection.....	75
110.1 Scope .....	37	210.12 Arc-Fault Circuit-Interrupter Protection .....	86
110.2 Approval of Conductors and Equipment.....	37	<b>Part II. Branch-Circuit Ratings</b> .....	90
110.3 Installation and Use of Equipment .....	38	210.21 Receptacle Rating.....	90
110.5 Conductor Material .....	39	<b>Part III. Required Outlets</b> .....	91
110.6 Conductor Sizes .....	39	210.52 Dwelling Unit Receptacle Outlet Requirements.....	91
110.8 Suitable Wiring Methods .....	40	210.70 Lighting Outlet Requirements.....	99
110.12 Mechanical Execution of Work .....	40	<b>Article 250—Grounding and Bonding</b> .....	103
110.13 Equipment Mounting and Cooling.....	42	<b>Part I. General</b> .....	103
110.14 Electrical Connections.....	42	250.1 Scope .....	103
110.22 Identification of Disconnecting Means .....	50	<b>Part III. Grounding Electrode System and Grounding Electrode Conductor</b> .....	104
110.25 Lockable Disconnecting Means .....	50	250.50 Grounding Electrode System .....	104
		250.52 Grounding Electrode Types .....	105
		250.53 Grounding Electrode Installation .....	109

Measuring Contact Resistance of Electrodes to Earth ..... 109

**Part VI. Equipment Grounding Conductors** ..... 113

250.119 Identification of Wire-Type Equipment Grounding  
     Conductors ..... 113

250.120 Equipment Grounding Conductor Installation ..... 114

250.146 Receptacle Grounding Terminal Bonding ..... 114

250.148 Continuity and Connections of Equipment Grounding  
     Conductors in Boxes ..... 115

**Chapter 2—Review Questions** ..... 119

**CHAPTER 3—WIRING METHODS AND MATERIALS** ..... 123

**Article 300—General Requirements for Wiring Methods and Materials** ..... 125

**Part I. General Requirements** ..... 125

300.1 Scope ..... 125

300.4 Fire and Water Damage ..... 126

300.5 Conductors ..... 126

300.6 Protection Against Physical Damage ..... 129

300.7 Underground Installations ..... 133

300.9 Raceways Exposed to Different Temperatures ..... 135

300.12 Electrical Continuity ..... 136

300.13 Securing and Supporting ..... 137

300.14 Mechanical Continuity ..... 140

300.15 Mechanical and Electrical Continuity of Conductors ..... 140

300.16 Conductor Length at Boxes ..... 141

300.17 Boxes or Fittings, Splices and Terminations ..... 141

**Article 310—Conductors for General Wiring** ..... 145

**Part I. General** ..... 145

310.1 Scope ..... 145

310.5 Conductors, Minimum Size and Material ..... 145

310.6 Conductor Identification ..... 146

**Part III. Installation** ..... 147

310.10 Uses Permitted ..... 147

**Article 312—Cabinets and Meter Socket Enclosures** ..... 151

**Part I. General** ..... 151

312.1 Scope ..... 151

312.4 Damp or Wet Locations ..... 151

312.5 Position in Walls ..... 152

312.7 Repairing Gaps in Noncombustible Surfaces ..... 152

312.8 Cable Termination to Enclosures ..... 152

**Article 314—Boxes, Conduit Bodies, and Handhole Enclosures** ..... 155

**Part I. General** ..... 155

314.1 Scope ..... 155

**Part II. Installation** ..... 155

314.15 Wet Locations ..... 155

314.16 Outlet Box Sizing ..... 155

314.17 Cables That Enter Boxes ..... 162

314.20 Flush-Mounted Boxes ..... 163

314.21 Repairing Noncombustible Surfaces ..... 163

314.23 Supporting Enclosures ..... 164

314.25 Box Covers ..... 167

314.29 Wiring to be Accessible ..... 167

314.30 Handhole Enclosures ..... 168

**Article 320—Armored Cable (AC Cable)** ..... 171

**Part I. General** ..... 171

320.1 Scope ..... 171

**Part II. Installation** ..... 172

320.10 Uses Permitted ..... 172

320.12 Uses Not Permitted ..... 172

320.15 Exposed Work ..... 172

320.30 Securing and Supporting ..... 172

320.40 Boxes and Fittings ..... 173

**Article 330—Metal-Clad Cable (MC Cable)** ..... 175

**Part I. General** ..... 175

330.1 Scope ..... 175

**Part II. Installation** ..... 176

330.10 Uses Permitted ..... 176

330.12 Uses Not Permitted ..... 176

330.30 Securing and Supporting ..... 176

**Article 334—Nonmetallic-Sheathed Cable (NM Cable)** ..... 179

**Part I. General** ..... 179

334.1 Scope ..... 179

**Part II. Installation** ..... 180

334.10 Uses Permitted ..... 180

334.12 Uses Not Permitted ..... 181

334.30 Securing and Supporting ..... 182

334.40 Boxes and Fittings ..... 183

**Article 336—Power and Control Tray Cable (TC Cable)** ..... 185

**Part I. General** ..... 185

336.1 Scope ..... 185

**Part II. Installation** ..... 185

336.10 Uses Permitted ..... 185

336.12 Uses Not Permitted ..... 186

336.30 Securing and Supporting ..... 186

**Article 338—Service-Entrance Cable (SE and USE Cable)** ..... 187

**Part I. General** ..... 187

338.1 Scope ..... 187

**Part II. Installation** ..... 188

338.10 Uses Permitted ..... 188

338.12 Uses Not Permitted ..... 188

**Article 340—Underground Feeder and Branch-Circuit Cable (UF Cable)** ..... 189

**Part I. General** ..... 189

340.1 Scope ..... 189

**Part II. Installation** ..... 189

340.10 Uses Permitted ..... 189

340.12 Uses Not Permitted ..... 190

**Article 342—Intermediate Metal Conduit (IMC)** ..... 191

**Part I. General** ..... 191

342.1 Scope ..... 191

**Part II. Installation** ..... 192

342.10 Uses Permitted ..... 192

342.24 Bends ..... 192

342.28 Reaming ..... 192

342.29 Paired Locknuts ..... 193

342.30 Securing and Supporting ..... 193

342.42 Couplings and Connectors ..... 194

342.46 Bushings ..... 195

**Article 344—Rigid Metal Conduit (RMC)** ..... 197

**Part I. General** ..... 197

344.1 Scope ..... 197

**Part II. Installation** ..... 198

344.10 Uses Permitted ..... 198

344.24 Bends ..... 198

344.28 Reaming ..... 198

344.29 Paired Locknuts ..... 199

344.30 Securing and Supporting ..... 199

344.42 Couplings and Connectors ..... 200

344.46 Bushings ..... 201

**Article 348—Flexible Metal Conduit (FMC)** ..... 203

**Part I. General** ..... 203

348.1 Scope ..... 203

**Part II. Installation** ..... 203

348.10 Uses Permitted ..... 203

348.12 Uses Not Permitted ..... 203

348.24 Bends ..... 204

348.28 Trimming ..... 204

348.30 Securing and Supporting ..... 204

348.42 Connectors ..... 205

**Article 350—Liquidtight Flexible Metal Conduit (LFMC)** ..... 207

**Part I. General** ..... 207

350.1 Scope ..... 207

**Part II. Installation** ..... 208

350.10 Uses Permitted ..... 208

350.12 Uses Not Permitted ..... 208

350.24 Bends ..... 208

350.28 Trimming ..... 208

350.30 Securing and Supporting ..... 208

350.42 Connectors ..... 209

**Article 352—Rigid Polyvinyl Chloride Conduit (PVC)** ..... 211

**Part I. General** ..... 211

352.1 Scope ..... 211

**Part II. Installation** ..... 212

352.10 Uses Permitted ..... 212

352.12 Uses Not Permitted ..... 212

352.24 Bends ..... 213

352.28 Trimming ..... 213

352.30 Securing and Supporting ..... 213

352.44 Expansion Fittings ..... 214

352.46 Bushing or Adapter ..... 215

<b>Article 356—Liquidtight Flexible Nonmetallic Conduit (LFNC)</b> .....	217	<b>Article 380—Multioutlet Assemblies</b> .....	235
<b>Part I. General</b> .....	217	<b>Part I. General</b> .....	235
356.1 Scope.....	217	380.1 Scope.....	235
<b>Part II. Installation</b> .....	218	<b>Part II. Installation</b> .....	235
356.10 Uses Permitted.....	218	380.10 Uses Permitted.....	235
356.12 Uses Not Permitted.....	218	380.12 Uses Not Permitted.....	236
356.24 Bends.....	218	<b>Article 386—Surface Metal Raceways</b> .....	237
356.30 Securing and Supporting.....	218	<b>Part I. General</b> .....	237
356.42 Fittings.....	219	386.1 Scope.....	237
<b>Article 358—Electrical Metallic Tubing (EMT)</b> .....	221	<b>Part II. Installation</b> .....	237
<b>Part I. General</b> .....	221	386.10 Uses Permitted.....	237
358.1 Scope.....	221	386.12 Uses Not Permitted.....	238
<b>Part II. Installation</b> .....	221	386.30 Supporting.....	238
358.10 Uses Permitted.....	221	<b>Article 392—Cable Trays</b> .....	239
358.12 Uses Not Permitted.....	222	<b>Part I. General</b> .....	239
358.24 Bends.....	222	392.1 Scope.....	239
358.28 Reaming.....	223	<b>Part II. Installation</b> .....	239
358.30 Securing and Supporting.....	223	392.10 Uses Permitted.....	239
358.42 Couplings and Connectors.....	224	392.12 Uses Not Permitted.....	241
<b>Article 362—Electrical Nonmetallic Tubing (ENT)</b> .....	227	392.18 Cable Tray Installations.....	241
<b>Part I. General</b> .....	227	392.30 Securing and Supporting.....	242
362.1 Scope.....	227	<b>Chapter 3—Review Questions</b> .....	243
<b>Part II. Installation</b> .....	228	<b>CHAPTER 4—EQUIPMENT FOR GENERAL USE</b> .....	255
362.10 Uses Permitted.....	228	<b>Article 404—Switches</b> .....	257
362.12 Uses Not Permitted.....	229	<b>Part I. Installation</b> .....	257
362.24 Bends.....	229	404.1 Scope.....	257
362.28 Trimming.....	230	404.5 Switch and Circuit Breaker Enclosures.....	257
362.30 Securing and Supporting.....	230	404.6 Damp or Wet Locations.....	258
362.46 Bushings.....	230	404.9 Indicating.....	259
362.48 Joints.....	230	404.10 Accessibility and Grouping.....	259
<b>Article 376—Metal Wireways</b> .....	231	<b>Article 406—Wiring Devices</b> .....	261
<b>Part I. General</b> .....	231	<b>Part I. General</b> .....	261
376.1 Scope.....	231	406.1 Scope.....	261
<b>Part II. Installation</b> .....	231	406.2 Listing Requirements.....	261
376.10 Uses Permitted.....	231	406.9 Wiring Devices in Damp or Wet Locations.....	261
376.12 Uses Not Permitted.....	232	<b>Part II. Receptacles, Cord Connectors, and Attachment Plugs (Caps)</b> .....	264
376.30 Supports.....	232	406.14 Receptacle Mounting.....	264
376.56 Splices, Taps, and Power Distribution Blocks.....	232	406.16 Receptacle Faceplates or Cover Plates.....	265

**Part III. General-Use Snap Switches, Dimmers, and Electronic Control Switches**.....266

406.42 Snap Switches, Dimmers, and Control Switches  
Mounting.....266

**Article 408—Switchboards and Panelboards**.....267

**Part I. General**.....267

408.1 Scope.....267

408.4 Circuit Directory and Description.....267

408.7 Unused Openings.....269

**Article 410—Luminaires**.....271

**Part I. General**.....271

410.1 Scope.....271

410.2 Listing Requirements.....271

**Part II. Luminaire Locations**.....272

410.10 Luminaires in Specific Locations.....272

**Part V. Grounding (Bonding)**.....272

410.44 Connection to the Equipment Grounding Conductor.....272

**Article 422—Appliances**.....275

**Part I. General**.....275

422.1 Scope.....275

**Part II. Branch-Circuit Requirements**.....275

422.16 Flexible Cords.....275

**Chapter 4—Review Questions**.....279

**FINAL EXAM A—STRAIGHT ORDER**.....283

**FINAL EXAM B—RANDOM ORDER**.....289

**ABOUT THE AUTHOR**.....299

**ABOUT THE MIKE HOLT TEAM**.....301