

Contents

Acknowledgments xi
Credits xiii
Preface to the Second Edition xv
Introduction: How to Use This Book xvii

Chapter 1. General Information **1**

1.0 Introduction 1
1.1 Checklists 1
1.2 Electrical Symbols and Mounting Heights 19
1.3 NEMA Device Configurations 33
1.4 IEEE Standard Electrical Power System Device
Function Numbers and Contact Designations 35
1.5 NEMA Standard Enclosures 58
1.6 Formulas and Terms 61
1.7 Typical Equipment Sizes and Weights 62
1.8 Seismic Requirements 62

**Chapter 2. National Electrical Code (NEC) Articles,
Tables, and Data** **69**

2.0 Working Space About Electric Equipment 69
2.1 Over 600 Volts, Nominal 80
2.2 Overcurrent Protection Standard Ampere Ratings 82
2.3 NEC Article 240.21: Location in Circuit
(Feeder Tap Rules) 84
2.4 NEC Article 310: Conductors for General Wiring 92

viii Contents

- 2.5 NEC Chapter 9 Tables (Partial) 110
- 2.6 NEC Appendix C (Partial) 123

Chapter 3. Service and Distribution 159

- 3.0 Primary and Secondary Service and System Configurations 159
- 3.1 Preliminary Load Calculations 170
- 3.2 Secondary Voltage Selection 181
- 3.3 Short-Circuit Calculations 182
- 3.4 Selective Coordination of Overcurrent-Protective Devices 204
- 3.5 Component Short-Circuit Protection 217
- 3.6 Transformer Electrical Characteristics 238
- 3.7 Transformer Thermal and Sound Characteristics 254
- 3.8 Motor Feeders and Starters 256
- 3.9 Standard Voltages and Voltage Drop 265
- 3.10 Three-Phase Feeder Size Schedule 311

Chapter 4. Grounding and Ground Fault Protection 313

- 4.0 Grounding 313
- 4.1 Ground Fault Protection 325
- 4.2 Lightning Protection 331

Chapter 5. Emergency and Standby Power Systems 339

- 5.0 General Need for Emergency and Standby Power Systems 339
- 5.1 Emergency/Standby Power Source Options 349
- 5.2 Typical Emergency/Standby System Arrangements 363
- 5.3 Generator and Generator Set Sizing 373
- 5.4 Uninterruptible Power Supply (UPS) Systems 386

Chapter 6. Lighting 403

- 6.0 Measuring Light and Illumination Terms 403
- 6.1 How to Select the Recommended Illuminance Level 407

6.2	Zonal Cavity Method of Calculating Illumination	410
6.3	Lamp Characteristics and Selection Guide (Tables 6.14 through 6.19)	423
6.4	How Light Affects Color (Table 6.20)	423

Chapter 7. Special Systems **437**

7.0	Fire Alarm Systems	437
7.1	Telecommunications Structured Cabling Systems	450
7.2	Blown Optical Fiber Technology (BOFT)	488

Chapter 8. Miscellaneous Special Applications **495**

8.0	General	495
8.1	Mineral-Insulated Cable Applications	495
8.2	Fire Pump Applications	500
8.3	Wiring for Packaged Rooftop AHUs with Remote VFDs	503
8.4	Wye-Delta Motor Starter Wiring	503
8.5	Motor Control Diagrams	506
8.6	Elevator Recall Systems	550
8.7	Medium-Voltage Cable and Engineering Data	551
8.8	Harmonic Effects and Mitigation	564

Index 569