

Chapter 8: Light Sources and Lamps 103

Light Sources	103
Lamp Shapes	115
Lamp Sizes	118
Lamp Bases	120
Beam Angle and Field Angle	122
Describing a Lamp	124
Selecting a Light Source	126
Lamp Information for Consumers	127
Digital Resources	128
References and Suggested Readings	128

Chapter 9: The Science of Color in Light 131

Why Understand the Science of Color?	131
The Special Nature of Vision	131
Colorimetry	132
Standard Observers	132
Chromaticity Diagrams	135
Colors of White Light	139
How Do We Define White Light?	144
Chromaticity Differences	146
Color Rendering	149
Light Source Color Characteristics	163
Other Issues in Color	164
Chromatic Light	169
Additive and Subtractive Color Mixing	171
Digital Resources	174
References and Suggested Readings	174

Chapter 10: Designing with Color in Light. 177

Selecting Color Temperature	177
Tunable Lighting	180
Using TM-30	188
Using Colored Light	193
Color and Meaning	196
Color and Environment	197
Sources of Colored Light	204

Chapter 4: What Is Light?	53
Light Is Illumination	53
Light Is Rays of Vision	54
Light Is a Material	54
Light Is Rays	55
Light Is Colored Rays	55
Light Is Waves	56
Light Is Particles	56
Light Is Waves, Again	57
Light Is Waves and Particles, aka Quanta	59
Light Is Art	60
Light Is a Tool	61
Digital Resources	62
References	62
 Chapter 5: How We See	 63
From Light Source to Vision	63
The Eye	64
How We See Color	68
Visual Performance	71
Digital Resources	74
References	74
 Chapter 6: Light and Perception	 77
Perception	77
Impressions	78
Lighting, Architecture, and Impressions	79
Light and Behavior	86
Digital Resources	86
References	87
 Chapter 7: Distribution of Light	 89
Interaction of Light and Materials	89
Types of Distribution	96
Other Distribution Issues	98
Digital Resources	101
References	102

Chapter 8: Light Sources and Lamps 103

Light Sources	103
Lamp Shapes	115
Lamp Sizes	118
Lamp Bases	120
Beam Angle and Field Angle	122
Describing a Lamp	124
Selecting a Light Source	126
Lamp Information for Consumers	127
Digital Resources	128
References and Suggested Readings	128

Chapter 9: The Science of Color in Light 131

Why Understand the Science of Color?	131
The Special Nature of Vision	131
Colorimetry	132
Standard Observers	132
Chromaticity Diagrams	135
Colors of White Light	139
How Do We Define White Light?	144
Chromaticity Differences	146
Color Rendering	149
Light Source Color Characteristics	163
Other Issues in Color	164
Chromatic Light	169
Additive and Subtractive Color Mixing	171
Digital Resources	174
References and Suggested Readings	174

Chapter 10: Designing with Color in Light. 177

Selecting Color Temperature	177
Tunable Lighting	180
Using TM-30	188
Using Colored Light	193
Color and Meaning	196
Color and Environment	197
Sources of Colored Light	204

Digital Resources207

References208

Chapter 11: Lighting Fixtures or Luminaires209

Luminaire Components210

Common Luminaire Types213

Mounting Conditions223

Outdoor Luminaires224

Luminaire Consideration Summary226

Reading Manufacturer’s Literature226

Modifying Luminaires230

Custom Luminaires230

Luminaire Sales and Information230

Digital Resources235

References236

Chapter 12: Lighting Techniques and Details237

Wall Washing237

Wall Grazing240

Accent Lighting241

Cove Lighting242

Scallops243

Luminous Ceilings245

Under-Shelf Lighting246

Digital Resources248

References249

Chapter 13: Daylighting251

The Benefits of Daylighting251

Planning for Daylighting252

Code Requirements253

Solar Angles253

Building Orientation254

Glazing255

Designing Daylighting256

Shading Strategies261

Digital Resources262

References263

Chapter 14: Lighting Controls	265
Electricity and Electrical Engineering	265
Why Do We Need Controls?	268
Basic Controls	269
Control Protocols	272
Other Control System Components	279
Control Systems	280
Commissioning Control Systems	285
Digital Resources	286
References	287
Chapter 15: Photometrics and Calculations	289
Terms Describing Brightness	289
Units for Measuring Light	290
How Much Light Is Required?	291
Illuminance Calculations	292
Glare Calculations	308
Flicker Calculations	309
Digital Resources	310
References and Suggested Readings	311
Chapter 16: Documenting the Design	313
Reflected Ceiling Plan or Lighting Plan	313
Luminaire Designations	320
Developing the RCP	320
Luminaire Cut Sheets	331
Luminaire or Fixture Schedule	333
Specifications	336
Documenting Controls	338
Load Calculations	341
Digital Resources	343
References	344
Chapter 17: Building and Energy Codes	345
Model Codes	346
Model Building Codes	347
Model Energy Codes	348
Verifying Energy Code Compliance	350

Digital Resources	351
References	352
Chapter 18: Sustainability	353
Voluntary Programs	354
Qualified Products Lists	357
What Else Can We Do?	358
Assessing Sustainability	361
Digital Resources	362
References and Suggested Readings	363
Chapter 19: Light and Health	365
Biological Rhythms	365
Measuring Circadian Entrainment Effectiveness	367
Other Health Uses for Light	368
Light Deficiency and Light Therapy	370
Full-Spectrum Lighting	371
Harmful Effects of Light	372
Light and the Aging Eye	372
WELL Building Standard	373
Digital Resources	374
References	374
Chapter 20: Lighting Economics	377
Initial Cost	377
Simple Payback	378
Life-Cycle Cost Analysis	379
Additional Value Considerations	381
Digital Resources	381
References	382
Appendix: Lighting Design–Related Professional Organizations	383
Glossary	385
Index	401