

Earthquake Protection of Building Equipment and Systems

BRIDGING THE IMPLEMENTATION GAP



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*With a foreword by
James R. Harris, Ph.D., P.E.*

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Earthquake Protection of Building Equipment and Systems

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*This book is dedicated to the many people
who have suffered hardship, affliction, or
bereavement caused by earthquake disasters.
May their losses not soon be forgotten.*

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Contents

Foreword by James R. Harris ix
Preface xi
Acknowledgments xvii

Part 1: Earthquake Demand

Chapter 1 Introduction to Demand Allocation 3

1.1 Nonstructural Building Systems 4

1.2 Systems Design Primer 11

1.3 Modern Nonstructural Design Philosophy 25

References 40

Chapter 2 Stakeholder Commentary 41

2.1 The Stakeholders 42

2.2 Code Regulation and Enforcement 43

2.3 Building Design and Construction 51

2.4 Product Design and Manufacture 63

References 69

Chapter 3 Geotechnical Primer 71

3.1 Plate Tectonics 72

3.2 Stress on Rocks 78

3.3 Damage Potential Based on Earthquake-Facility Variables 79

3.4 Faults 83

3.5 Seismic Waves 89

3.6 Lateral Loads versus Three-Axis Ground Motion 93

3.7 Seismic Early Warning Systems 93

3.8 Earthquake Scales 98

3.9 Foreshocks and Aftershocks 104

3.10 Deriving Seismic Hazard Maps from Seismology 106

References 114

Chapter 4 Building Code Seismic Requirements 117

4.1 Basic Elements of Model Building Codes 118

4.2 Elements of IBC and ASCE/SEI 7 Seismic Provisions 120

4.3 Seismic Requirements Summary 146

References 153

Part 2: Nonstructural Capacity

Chapter 5 Introduction to Seismic Qualification 157

5.1 Qualification Ownership 158

5.2 OEM Qualification Strategy 174

5.3 Nonstructural Compliance Metrics 181

5.4 Seismic Qualification Summary 196

 References 198

Chapter 6 Analytical Methods 201

6.1 Applied Seismic Analysis 202

6.2 Advanced Seismic Analysis 268

 References 279

Chapter 7 Dynamic Test Methods 281

7.1 Specification of the Test Environment 281

7.2 Seismic Test Machines and Technology 299

7.3 Test Preparation and Execution 307

7.4 Experimental Modal Analysis 312

 References 320

Chapter 8 Comparative Experience Methods 323

8.1 SQUG Qualification by Earthquake Experience 324

8.2 GERS Qualification by Testing Experience 331

8.3 Experienced-Based Methods Summary 332

 References 333

Chapter 9 Combined Methods 335

9.1 Options for Large-Class Qualification 337

9.2 Large-Class Qualification Summary 358

 References 359

Chapter 10 Trends in Earthquake Protection of Nonstructural Systems 361

10.1 Performance-Based Design 362

10.2 Nonstructural Research Needs 364

 References 374

Appendix. Test Facility Selection: Points to Consider 375

Glossary 379

Notation 389

Index 391

About the Authors 403

Foreword

Earthquake engineering for buildings has seen tremendous change over the past several decades. Earthquake after earthquake has demonstrated the insufficiency of our knowledge and ability to protect people in buildings, let alone our ability to provide buildings in which key systems are functional following the earthquake. As new lessons have been learned in the aftermath of damaging earthquakes and in the laboratory, substantial efforts have been made to improve our standards of practice and model building codes. The majority of people who work on these standards are structural engineers, although several seismologists and geotechnical engineers, plus a few architects and mechanical and electrical engineers, work with those structural engineers. Interdisciplinary communication is not easy, and the authors of this book are among those few who have attempted to bridge the gaps and improve the treatment of nonstructural portions of buildings. For that alone Gatscher, McGavin, and Caldwell deserve commendation. Their work in this book is yet another excellent contribution.

This book fills a serious void in the earthquake engineering literature: it illustrates the importance of a true systems analysis approach in providing equipment that will perform as desired in buildings, especially equipment in those systems expected to be in working condition immediately following the earthquake. The book goes far beyond traditional concerns with anchorage and bracing of switchgear, pumps, fans, conduits, pipes, ducts, and the like. It provides the guidance that has been so sorely missing for engineers involved in product design; in fact, it highlights the importance of including seismic resistance concepts in the initial planning and design of equipment before bringing it to market.

After defining the kinds of nonstructural components and systems included in buildings and describing common problems with performance in past earthquakes, the authors go back to the beginning with an admirable briefing on the mechanics of earthquakes. They offer a concise but well-detailed description of the seismic demands on nonstructural systems and components found in the most current building codes. In describing the building code provisions, the authors make serious attempts to explain the why behind the what. This content is especially valuable because the competent professional needs solid understanding of the intent in order to adapt terse code rules to real-life situations. The second half of the book offers excellent guidance for equipment designers, code