Practical Guide to Seismic Restraint, Second Edition
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This book covers the topic of the design of seismic restraints for HVAC equipment in buildings, that is, the design of supports for HVAC and mechanical equipment so the equipment, after seismic event, remains in its place and is thus capable of functioning. It does not cover seismic qualification of the equipment itself nor the building.

It is written by two Mason Industries employees, Mason being a major vendor of vibration isolation mounts and seismic restraints. Both authors have a long history in the industry and experience with multiple standards organizations.

The book is written for the practitioner/designer of seismic restraints and requires the practitioner to have considerable prior experience in the area; it is not a textbook for the subject. For the practitioner, it is a comprehensive summary of code and design considerations as well as design practice. Sample calculations in each section, in English and Metric, make the book both very realistic and useful. The user will require having many of the codes, in full text, available so as to be able to access particularly the tables of factors that are used.

The user needs a background in vibration theory in single and multiple degree-of-freedom systems in order to understand the material. For example, early on, the text refers to "rigidly or hard-mounted equipment" and "flexibly or resiliently mounted" as well as the "fundamental period" without referring to vibration or single-degree-of-freedom systems. A chapter on equipment seismic certification refers to response spectrum but with only a simplistic definition in the glossary.

This book makes it very clear that design is required for every element of the equipment support system, from the support interface with the building to the interface with the equipment itself. It covers housekeeping pads and the attachment of the structure, all the different styles of anchors, bolts, screws, embedded plates etc. and the required characteristics of each of these elements. Attachment of the equipment to the structure, whether rigidly by direct connection or resiliently using vibration isolators, is covered in great detail. Sway bracing to limit the deflections of suspended piping and ductwork is covered extensively; the section details the design objectives and provides many examples clearly shown. With this section as a background, the practitioner would easily understand how to deal with a different geometry. Separate sections are provided for different kinds of equipment, floor-mounted, roof-top, cooling towers and condensers, roof-top fans, and more.

Multiple sample calculations are provided in every section with brief but clear explanations that make this book very practical. The language used in the examples is clear and formal, similar to the style of writing used in standards which makes comparison and coordination with the standards easier. Throughout the sample calculations, many comments and annotations clarify the design process. The user will need to have the standards available when doing calculations. Often the comments will identify a special case, e.g., that because of a certain "condition" a common "method" cannot be used but instead a different method. The user will need to rely on experience and reference to the standards/guidelines to understand the "condition" and the different "method."

From the text, one clearly understands that the subject is primarily code based, not an application of fundamental principles. Every calculation is based on a series of coefficients — safety factors — relating to the type of equipment and its importance, type of building etc. Most sections contain drawings, photographs, graphs, and tables which make the design intent and practical aspect of this design clear.

Particularly valuable are the initial four sections on fundamentals of earthquakes, building codes, specification guidelines, and equipment seismic certification, which describe the breadth and application of various codes and provide a very useful summary of the history of the development of these codes and practices.

Chapter 16 on bomb blast design provides an introduction to the subject of protective design (which this writer is not qualified to comment on) and understandably concludes that the "complexity" is such that "a dynamic analysis is still required." The final section on do's and don'ts provides over 60 photos of equipment which failed during seismic events, more of what failure looks like rather than a do or don't, but further emphasizing the importance of this design work.

Overall, the text provides an excellent history and practice of providing seismic restraints for HVAC equipment. It summarizes the very broad range of requirements, failure modes, application to HVAC equipment, and types of seismic restraint hardware, and particularly the engineering calculations required to meet these requirements.

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