



Significant Changes to the Minimum Design Load Provisions of ASCE 7–16

Gary Chock
S. K. Ghosh
Michael O'Rourke
T. Eric Stafford

ASCE
PRESS



This is a preview. [Click here to purchase the full publication.](#)

Significant Changes to the Minimum Design Load Provisions of ASCE 7-16

Other Titles of Interest

ASCE 7 Hazard Tool. (ASCE, 2017). Delivers a quick, efficient way to look up key design parameters specified by Standard ASCE/SEI 7-10 and 7-16 through a web-based application that retrieves load data for each of seven hazards, visualizes them on a map, and generates a unified report of results. (<https://asce7hazardtool.online/>)

ASCE 7 Online. (ASCE, 2017). Provides digital access by subscription to both ASCE 7-10 and 7-16 versions of *Minimum Design Loads and Associated Criteria for Buildings and Other Structures*. Exclusive features include: side-by-side view of Provisions and Commentary; redlining; real-time updates; annotation and sharing tools; robust searching; and toggling between customary and metric units. (<http://asce7.online>)

Minimum Design Loads and Associated Criteria for Buildings and Other Structures, ASCE/SEI 7-16. (ASCE Standard, 2017). Provides requirements for general structural design and includes means for determining dead, live, soil, flood, wind, snow, rain, atmospheric ice, and earthquake loads and their combinations that are suitable for inclusion in building codes and other documents. A detailed commentary of explanatory and supplementary information is included. (ISBN 978-0-7844-1424-8)

Snow Loads: Guide to the Snow Load Provisions of ASCE 7-16, by Michael O'Rourke, Ph.D., P.E. (ASCE Press, 2017). Sets forth a detailed and authoritative interpretation of the snow load provisions of *Minimum Design Loads and Associated Criteria for Buildings and Other Structures*, Standard ASCE/SEI 7-16. (ISBN 978-0-7844-1456-9)

Visit <http://www.asce.org/asce-7/> for a complete list of products associated with the ASCE 7 Standard.

Significant Changes to the Seismic Load Provisions of ASCE 7-10: An Illustrated Guide, by S. K. Ghosh, Susan Dowty, and Prabuddha Dasgupta. (ASCE Press, 2011). Describes the revisions to the seismic requirements set forth in Standard ASCE/SEI 7-10. (ISBN 978-0-7844-1117-9)

Significant Changes to the Wind Load Provisions of ASCE 7-10: An Illustrated Guide, by T. Eric Stafford. (ASCE Press, 2010). Summarizes changes to the wind load requirements set forth in Standard ASCE/SEI 7-10. (ISBN 978-0-7844-1116-2)

Significant Changes to the Minimum Design Load Provisions of ASCE 7-16

Gary Y. K. Chock, P.E., D.CE

S. K. Ghosh, Ph.D.

Michael O'Rourke, Ph.D., P.E.

T. Eric Stafford, P.E.



Library of Congress Cataloging-in-Publication Data

Names: American Society of Civil Engineers, author. | Chock, Gary, author.
Title: Significant changes to the minimum design load provisions of ASCE 7-16
/ Gary Y.K. Chock, P.E., D.CE, S.K. Ghosh, Ph.D., Michael O'Rourke, Ph.D.,
P.E., T. Eric Stafford, P.E.
Description: Reston, Virginia : ASCE Press, [2018] | Includes bibliographical
references and index.
Identifiers: LCCN 2017047830 | ISBN 9780784414576 (soft cover : alk. paper) |
ISBN 9780784480229 (PDF)
Subjects: LCSH: Structural engineering--Standards--United States. |
Buildings--Standards--United States. | Strains and stresses. | Loads
(Mechanics)
Classification: LCC TH851 .A44 2018 | DDC 624.1/72021873--dc23
LC record available at <https://lcn.loc.gov/2017047830>

Published by American Society of Civil Engineers
1801 Alexander Bell Drive
Reston, Virginia 20191-4382
www.asce.org/bookstore | ascelibrary.org

Any statements expressed in these materials are those of the individual authors and do not necessarily represent the views of ASCE, which takes no responsibility for any statement made herein. No reference made in this publication to any specific method, product, process, or service constitutes or implies an endorsement, recommendation, or warranty thereof by ASCE. The materials are for general information only and do not represent a standard of ASCE, nor are they intended as a reference in purchase specifications, contracts, regulations, statutes, or any other legal document. ASCE makes no representation or warranty of any kind, whether express or implied, concerning the accuracy, completeness, suitability, or utility of any information, apparatus, product, or process discussed in this publication, and assumes no liability therefor. The information contained in these materials should not be used without first securing competent advice with respect to its suitability for any general or specific application. Anyone utilizing such information assumes all liability arising from such use, including but not limited to infringement of any patent or patents.

ASCE and American Society of Civil Engineers—Registered in U.S. Patent and Trademark Office.

Photocopies and permissions. Permission to photocopy or reproduce material from ASCE publications can be requested by sending an e-mail to permissions@asce.org or by locating a title in the ASCE Library (<http://ascelibrary.org>) and using the “Permissions” link.

Errata: Errata, if any, can be found at <https://doi.org/10.1061/9780784414576>.

Copyright © 2018 by the American Society of Civil Engineers.
All Rights Reserved.
ISBN 978-0-7844-1457-6 (print)
ISBN 978-0-7844- 8022-9 (PDF)
Manufactured in the United States of America.

24 23 22 21 20 19 18 17 1 2 3 4 5

TABLE OF CONTENTS

Part I - General Requirements and Load Combinations

Scope	
1.1, C1.1	2
Performance-Based Procedures	
1.2, 1.3.1.3	5
Fire Resistance	
1.3.7, Appendix E	8

Part II - Dead and Live Loads

Weight of Fixed Service Equipment	
3.1.1, 3.1.3	12
Vegetative and Landscaped Roofs	
3.1.4, Table 4-1	14
Solar Panels (DL and LL)	
3.1.5, 4.17	17
Definitions	
4.1	19
Minimum Uniformly Distributed Live Loads, L_o , and Minimum Concentrated Live Loads	
Table 4.3-1	20
Heavy Live Loads, Passenger Vehicle Garages	
4.7.3, 4.7.4	25

Part III - Snow, Rain and Ice Loads

Intersecting Drifts at Low Roofs	
7.1, 7.7.3	27
Ground Snow Loads for Decks, Balconies, and Other Near-Ground Level Surfaces or Roofs of Subterranean Spaces	
7.2	29

Ground Snow Loads	
Figure 7.2-1, Tables 7.2-2 through 7.2-8	30
Figure 7.6-1	
Figure 7.6-1	32
Canopy Drift	
Figure 7.6-1, 7.7.1	34
Snow Importance Factor for Drift Loading	
Figure 7.6-1, 7.7.1	36
Roof Projections and Parapets	
7.8	38
Roof Drainage	
8.2	40
Design Rain Loads	
8.3, C8.3	42
Ponding Instability and Ponding Load	
8.4	49
Controlled Drainage	
8.5	51
Ice Thickness Maps	
10.1.1, 10.4.2, 10.4.6, Figures 10.4-2 through 10.4-6	53

Part IV – Earthquake Loads

Quality Assurance Provisions	
Appendix 11A, 11.1.1, 11.1.5, C11.1.5	58
Definition of terms related to of Shear Walls and Diaphragms	
11.2	60
Steel Storage Racks	
11.2, 15.5.3.5, 15.5.3.8, C15.5.3, 23.1	62
Near Fault Sites	
11.4.1	64
Site Coefficients F_a and F_v	
11.4.3, 11.4.4	66
Site-Specific Ground Motion Procedures	
11.4.8	70

Seismic Design Category	
11.6	73
Geotechnical Investigation Report Requirements for SDC D through F	
11.8.3	75
Vertical Ground Motion Spectrum for Seismic Design	
11.9	77
Load Combinations with Seismic Load Effects	
2.3.1, 2.3.6, 2.4.1, 2.4.5, 12.4.2.3, 12.4.3.2, 12.4.3.3, 12.14.3.1.3, 12.14.3.2.3	80
Foundation Design	
12.1.5, 12.13.5, 12.13.6	84
Alternative Structural Systems	
12.2.1, 12.2.1.1	88
Elements of Seismic Force-Resisting Systems	
12.2.1.2	90
Flexible Diaphragm Condition	
12.3.1.3, 11.3	92
Redundancy Factor	
12.3.4.1	94
Vertical Seismic Load Effect, E_v	
12.4.2.2	95
Capacity-Limited Horizontal Seismic Load Effect	
12.4.3.1, 12.4.3.2, 12.14.3.2.1, 12.14.3.2.2, 11.3	97
Structures with Nonparallel System Irregularities in Seismic Design Category C	
12.5.3, 12.5.3.1	100
Linear Dynamic Analysis	
Table 12.6-1, 12.9, 12.9.1, 12.9.2, 12.13.3, 15.1.3	102
Structural Modeling	
12.7.3	106
Maximum S_{DS} Value in Determination of C_s and E_v	
12.8.1.3	108
Accidental Torsion in Equivalent Lateral Force Procedure	
12.8.4.2	110
Number of Modes for Modal Response Spectrum Analysis	
12.9.1.1	112

Structural Modeling for Modal Response Spectrum Analysis	
12.9.1.8	114
Scaling for Modal Response Spectrum Analysis	
12.9.1.4, 12.9.1.4.1, 12.9.1.4.2	115
Alternative Design Provisions for Diaphragms Including Chords and Collectors	
12.10, 12.10.3, 11.2, 11.3	117
Diaphragm Design Forces with Transfer Forces	
12.10.1.1, 11.2	121
Collector Elements	
12.10.2.1	123
Structural Wall Out-of-Place Forces and Anchorage Forces	
12.11.1, 12.11.2, 12.11.2.1	124
Transfer of Anchorage Forces into Diaphragm	
12.11.2.2.1	126
Anchorage of Wood Diaphragms to Concrete or Masonry Structural Walls	
12.11.2.2.3, 12.14.7.5.2	128
Foundations on Liquefiable Soils	
12.13.2, 12.13.9	130
Pile Anchorage Requirements	
12.13.8.5	131
Simplified Design Procedure Limitations	
12.14.1.1	133
Mechanical and Electrical Components	
13.6	137
Exemptions from Chapter 13 Requirements	
13.1.4, Table 13.2-1	140
Pre-Manufactured Modular Mechanical and Electrical Systems	
13.1.5	143
Seismic Design Force on Nonstructural Components	
13.3.1	144
Dynamic Analysis	
13.3.1.4	147
Anchors in Masonry	
13.4.2.2	151
Seismic Coefficients for Nonstructural Components	
Table 13.5-1, Table 13.6-1	153

Exterior Nonstructural Wall Elements and Connections	
13.5.3.1 – 13.5.3.5	155
Exterior Nonstructural Connections	
13.5.3.4, Table 13.5-1	158
Glass in Glazed Curtain Walls and Storefronts	
13.5.4	160
Acoustical Tile and Lay-in Panel Ceilings in Seismic Design Categories D through F	
13.5.6.2.2	162
Egress Stairs and Ramps	
13.5.10, Table 13.5-1	164
Seismic Coefficients for Mechanical and Electrical Components	
Table 13.6-1	166
HVACR Equipment	
13.6.2.1	168
Distribution Systems	
13.6.5, 13.6.6, 13.6.7, 13.6.8, 11.2	170
Rooftop Solar Photovoltaic Arrays	
13.6.13, 13.4	177
Linear Dynamic Analysis	
15.1.3	180
Nonbuilding Structures and Vertical Ground Motions	
15.1.4, 15.7.2, 15.7.7.3	182
Structural Design Requirements	
15.4.1	186
Drift Requirements	
15.4.5, 15.4.7	188
ASTM F1554 Anchors	
15.4.9.4	190
Nonbuilding Structure on Liquefiable Sites	
15.4.10	192
Storage Racks	
15.5.3, Table 15.4-1, 11.2	193
Structural Towers for Tanks and Vessels	
15.5.5.1, 15.7.3, 15.7.10.1	197