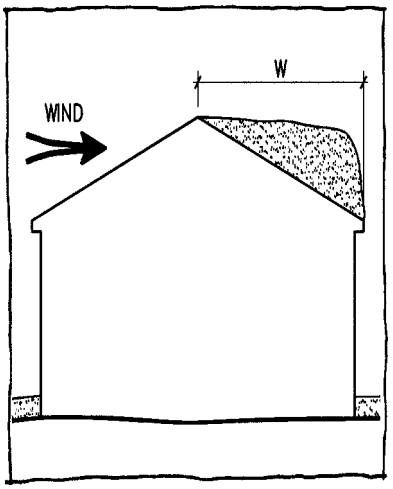
# Snow Loads

## Guide to the Snow Load Provisions of ASCE 7-10

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

ASCE PRESS

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## *Other Titles of Interest*

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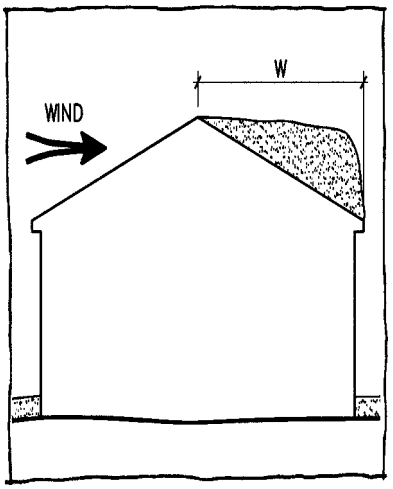


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# Contents

# Preface

This guide provides practicing structural engineers with a detailed description of the snow load provisions of ASCE/SEI Standard 7-10, *Minimum Design Loads for Buildings and Other Structures*, published by the American Society of Civil Engineers (ASCE). The intent of this guide is to present the research and philosophy that underpins the provisions and to illustrate the application of the provisions through numerous examples. Readers and users of this guide will know how to use the provisions and also know the reasoning behind the provisions. In this fashion, users may be able to address nonroutine snow loading issues that are not explicitly covered in ASCE 7-10. Every effort has been made to make the illustrative example problems in this guide correct and accurate. The author welcomes comments regarding inaccuracies, errors, or different interpretations. The views expressed and the interpretation of the snow load provisions made in this guide are those of the author and not of the ASCE 7 Standards Committee or the ASCE organization.

## Acknowledgments

The author would like to acknowledge the past and present members of the Snow and Rain Loads Committee of ASCE 7. Without their comments, questions, and discussions, the development of Section 7 in ASCE/SEI Standard 7-10, and subsequently this guide, would not have been possible.

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# Unit Conversions

| *Measurement* | *S.I. Units* | *Customary units* |
|---|---|---|
| Abbreviations | m = meter (S.I. base unit of length) | yd = yard |
| | cm = centimeter | in. = inch |
| | km = kilometer | mi = mile |
| | ha = hectare | acre |
| | L = liter (S.I. base unit of volume) | gal = gallon |
| | mL = milliliters | qt = quart |
| | kg = kilogram (S.I. base unit of mass) | lb = pound |
| | g = gram | oz = ounce |
| | N = Newton ($m \cdot kg \cdot s^2$) | lbf = pound-force |
| | Pa = Pascal ($N/m^2$) | psi = pounds per square inch |
| | kPa = kilopascals | atm = atmosphere |
| | J = Joule | ft·lbf = feet times pound-force |
| | W = watt | Btu = British thermal unit |
| | kW = kilowatt | hp = horsepower |
| | s = second (S.I. base unit of time) | s = second |
| | min = minute | min = minute |
| | h = hour | h = hour |
| | day | day |
| | °C = degrees Celsius | °F = degrees Fahrenheit |
| | ppm = parts per million | ppm = parts per million |
| Length | 1 m = 3.2808 ft = 1.0936 yd | 1 ft = 1/3 yd = 0.3048 m |
| | 1 cm = 0.3937 in. | 1 in. = 2.54 cm |
| | 1 km = 0.6214 mile | 1 mile = 0.869 nautical mile = 1.6093 km |
| Area | 1 $m^2$ = 10.7643 $ft^2$ | 1 $ft^2$ = 0.0929 $m^2$ |
| | 1 $km^2$ = 0.3861 $mi^2$ | 1 $mi^2$ = 2.59 $km^2$ |
| | 1 ha = 2.4710 acre | 1 acre = 43,560 $ft^2$ = 0.4047 ha |
| Volume | 1 L = 0.2642 gal | 1 gal = 4 qt = 3.7854 L |
| | 1 ml = 1 $cm^3$ | 1 $ft^3$ = 7.481 gal = 28.32 L |
| Mass | 1 g = 0.0353 oz | 1 oz = 28.3495 g |
| | 1 kg = 2.2046 lb | 1 lb = 0.4536 kg |
| Force | 1 N = 0.2248 lb/ft | 1 lbf = 4.4482 N |
| Density | 1 $kg/m^2$ = 0.2048 $lb/ft^2$ | 1 $lb/ft^2$ = 4.882 $kg/m^2$ |
| | 1 $kg/m^3$ = 6.2427 $lb/ft^3$ | 1 $lb/ft^3$ = 16.018 $kg/m^3$ |
| Pressure | 1 kPa = 0.145 psi | 1 psi = 6.8948 kPa |
| | | 1 atm = 14.7 psi = 101.35 kPa |
| Energy and Power | 1 J = 1.00 W·s = 0.7376 ft·lbf | 1 ft·lbf = 1.3558 J |
| | 1 kJ = 0.2778 W·h = 0.948 Btu | 1 Btu = 1.0551 kJ |
| | 1 W = 0.7376 ft·lbf/s = 3.4122 Btu/h | 1 ft·lbf/s = 1.3558 W |
| | 1 kW = 1.3410 hp | 1 hp = 550 ft·lb/s = 0.7457 kW |
| Flow | 1 L/s = 15.85 gal/min = 2.119 $ft^3$/min | 1 gal/min = 0.1337 $ft^3$/min = 0.0631 L/s |
| Concentration | mg/L = ppm (in dilute solutions) | |
| Temperature | °C = (°F – 32) × 5/9 | °F = (°C × 9/5) + 32 |
| Fundamental | Acceleration of gravity | 32.2 $ft/s^2$ = 9.81 $m/s^2$ |
| Constants and | Density of water (at 4 °C) = | 1,000 $kg/m^3$ = 1 $g/cm^3$ |
| Relationships | Specific weight of water (at 15 °C) = | 62.4 $lb/ft^3$ = 9,810 $N/m^3$ |
| | Weight of water | 1 gal = 8.345 lb =3.7854 kg |