INTERNATIONAL STANDARD

ISO 4354

Second edition
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Wind actions on structures

Actions du vent sur les structures

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 4354 was prepared by Technical Committee ISO/TC 98, *Bases for design of structures*, Subcommittee SC 3, *Loads, forces and other actions*.

This second edition cancels and replaces the first edition (ISO 4354:1997), which been technically revised.

Introduction

This International Standard is intended for use by countries without an adequate wind loading standard and as a bridge between existing International Standards. The data in the annexes, with the exception of Annex A, whilst formally only informative, and limited to the most common usage, are intended for use within the definitions in this International Standard. Additional data will be provided from time to time in ISO Technical Reports for use on the same basis.

Wind actions on structures

1 Scope

This International Standard describes the actions of wind on structures and specifies methods of calculating characteristic values of wind loads for use in designing buildings, towers, chimneys, bridges and other structures, as well as their components and appendages. The loads are suitable for use in conjunction with ISO 2394 and other International Standards concerned with wind loads. In particular, this International Standard facilitates the conversion between peak and mean wind speed methodologies and covers the three main storm types, synoptic winds, thunderstorms and tropical cyclones (hurricanes and typhoons).

This International Standard provides the basic methods from which to determine wind loading analytically through the determination of design pressures or orthogonal along-wind and cross-wind forces and moments for structures of simple shape and wind directionality effects, and through wind tunnel or computational determinations of pressure, forces and moments for structures with complex shapes and wind directionality effects resulting in complex combinations of forces and moments.

Structures of unusual nature, size or complexity (e.g. tall buildings, long span bridges, large span roofs, guyed masts, offshore and moving structures) typically require a special engineering study; some guidance is given on the limitations of this International Standard in these cases.

Two methods of analytical determination of design wind loads are given in this International Standard, one based on a peak velocity and the other on a mean velocity. Both methods can be used when dynamic response effects are important, and where they are not important only the peak-velocity method is used in this International Standard by taking the peak dynamic response factor to be unity. To simplify presentation, the method based on the peak velocity is given in the main body of this International Standard and the method based on the mean velocity is given in a normative Annex A.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 2394, *General principles on reliability for structures*

3 Symbols

Symbol	Term	Unit
A	Tributary or local area (area of application of pressure coefficient C_p)	m^2
A_{ref}	Reference area for force on overall structure or part of structure	m^2
C_{dyn}	Peak dynamic response factor	1
$C_{dyn, m}$	Mean dynamic response factor	1
C_{exp}	Peak exposure factor	1
$C_{exp, m}$	Mean exposure factor	1
C_F	Force coefficient	1
C_{Fm}	Mean force coefficient	1
C_p	Pressure coefficient (time and spatially averaged)	1
$C_{\sigma F}$	Standard deviation force coefficient	1
F	Peak force	N
F_{loc}	Peak force on a tributary or local area	N
F_m	Mean force	N
g	Peak factor	1
g_v	Wind speed peak factor	1
h	Height	m
I_v	Wind speed turbulence intensity	1
p	Pressure	Nm^{-2}
$q_{ref, m}$	Regional reference mean dynamic pressure	Nm^{-2}
q_{site}	Site peak dynamic pressure	Nm^{-2}
$q_{site, m}$	Site mean dynamic pressure	Nm^{-2}
V	Peak wind speed	ms^{-1}
V_{hcr}	Critical wind speed at the top of the structure	ms^{-1}
V_m	Mean wind speed	ms^{-1}
V_{ref}	Regional peak reference wind speed (with return period)	ms^{-1}
$V_{ref, m}$	Regional mean reference wind speed	ms^{-1}
V_{site}	Site peak velocity	ms^{-1}
$V_{site, m}$	Site mean velocity	ms^{-1}
σ_F	Standard deviation of force	N

4 Wind actions

Wind actions that shall be considered in the design of the structure can produce the following:

a) excessive forces or instability in the structure or its structural members or elements;

b) excessive deflection or distortion of the structure or its elements;

c) repeated dynamic forces causing fatigue of structural elements;