

International Wind Engineering Seminar 5. Wind loading code developments

Thursday February 11th 2021, 12.00 UK time

Main Speaker

Svend Ole Hansen, Svend Ole Hansen ApS, Eurocode on Wind Actions

Short presentations

Francesco Ricciardelli, Professor of Structural Engineering, University of Campania “Luigi Vanvitelli”, Italy, Calibration of Code factors for Climatic Actions

Professor John Dora, infrastructure resilience, asset management and standards expert, Developments in addressing climate change in design codes

Donald Scott Latest updates to the ASCE 7 Wind Provisions and Development of Performance-Based Wind Design Prestandard.

Abstracts

Eurocode on Wind Actions. The second generation of Structural Eurocodes are currently being prepared, and this includes a revision of the Eurocode on wind actions EN 1991-1-4. The talk will focus on the expected content of the revised EN 1991-1-4. The scope of EN 1991-1-4 has been extended to structures with heights of up to 300 m, and a new wind model providing accurate mean wind velocities and turbulence intensities for heights of up to 300 m has been included. The revised EN 1991-1-4 extends the number of pressure and force coefficients considerably enabling a much larger variety of structures to be covered. The two procedures used to calculate along-wind dynamic response in the current EN 1991-1-4 have been harmonized into a single procedure, which also covers structures with simple mode shapes having changing signs. A single procedure for calculating vortex-induced vibrations has replaced the two procedures of the current Eurocode. The revised EN 1991-1-4 includes completely new Annexes on across-wind and torsional actions on susceptible buildings, guidance on derivation of design parameters from wind tunnel tests and numerical simulations, guidance on probabilistic models for wind actions, and response of steel lattice towers and guyed masts.

Calibration of Code factors for Climatic Actions. Calibration of Partial and Combination factors for climatic actions for Code implementation requires the probabilistic modelling of the action itself and of the structural behaviour, and the choice of a required reliability level. In the case of wind, probabilistic modelling of the action is based on the combined probabilistic modelling of reference mean wind velocity, of the characteristics of the Atmospheric Boundary Layer, of pressure or force coefficients and of the dynamic factor. Sources of uncertainty shall also be accounted for. For Combination factors, possible cross-correlation between two actions shall also be checked. The presentation is aimed at pointing out difficulties arising in the calibration process.

Developments in addressing climate change in design codes. Climate change has implications for any code that involves designing for weather effects; important design codes such as the Structural Eurocodes including EN 1991 Part 1-4 has guidelines based upon historic weather observations. This talk will outline how standards' developers are intending to address future climate patterns, with reference to developments in Europe through CEN/Cenelec, the European standards' organisation, and ISO, the international organisation for standardisation.

Latest updates to the ASCE 7 Wind Provisions and Development of Performance-Based Wind Design Prestandard. As an integral part of the building codes in the United States, the currently adopted ASCE/SEI 7-16: Minimum Design Loads and Associated Criteria for Buildings and Other Structures describes the means for determining natural hazard loading, including wind loads, on buildings and other structures. Current efforts are nearing completion of the first ever tornado loading for buildings for incorporation into the 2022 edition of the ASCE 7 standard, along with the use of Performance-Based Wind Design principals being added to the standard. This presentation will look at the current major provisions being incorporated into ASCE/SEI 7-22.

Speaker biographies

Dr. Svend Ole Hansen is director and founder of Svend Ole Hansen ApS and SOH Wind Engineering LLC, and he has been a lecturer in wind engineering at the Technical University of Denmark and Syddansk University. His text books on wind engineering are widely read and well regarded, and he has in more than 40 years authored a large number of papers on wind actions and wind-induced vibrations of structures. He was member of the Project Team preparing the current Eurocode on wind actions EN 1991-1-4, and he has been the Leader of the Project Team revising the current EN 1991-1-4.

Francesco Ricciardelli is Professor of Structural Engineering at the University of Campania "L. Vanvitelli", Editor-in-Chief of Wind and Structures, Vice-President of the Italian Association for Wind Engineering, Member of several Committees within CEN, among which TC250/SC1, TC250/SC1.WG1, TC250/SC1.T3, TC250/SC1.T6 (Team Leader), TC250/SC1.WG1/T2 (Convenor), and has served in Italian National standardization bodies (CNR, UNI). He is the author of about 170 papers most of which are in the areas of Wind Engineering and Structural Dynamics.

John Dora is a visiting professor at the University of Surrey, a visiting lecturer at the University of Birmingham and the international organisation for standardisation's global lead on adaptation to climate change. With nearly 40 years' experience in infrastructure resilience and asset management, he is adviser to CEN/ Cenelec, and works closely with BSI. He chaired the committee that drafted the first ISO on adaptation to climate change, ISO 14090, and is the chair of the UK's Infrastructure Operators' Adaptation Forum. He initiated and led the first adaptation studies for the entire GB rail network (2009-2016). Recent clients include: the UK rail regulator, the UK Met Office, UIC – the worldwide railway organisation and the UN Economic and Social Commission for Asia and the Pacific.

Donald R. Scott, S.E., is a Senior Principal with PCS Structural Solutions. Mr. Scott has over 38 years of experience in the design, evaluation, and rehabilitation of building structures. He was the principal investigator for the ASCE/SEI Prestandard for Performance-Based Wind Design. Mr. Scott is Chair of the SEI Codes and Standards Executive Committee, Chair of the ASCE 7 Wind Load Subcommittee, member of the ASCE 7 Main Committee and past Chair of the NCSEA

Wind Engineering Committee. Mr. Scott is a member of the SEI Board of Governors and a past President of the Board of Directors of the Applied Technology Council.