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Greenhouses - Design and construction - Part 1: Commercial production greenhouses

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 05/20

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EUROPEAN STANDARD

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English Version

Greenhouses - Design and construction - Part 1: Commercial production greenhouses

Serres - Calcul et construction - Partie 1 : Serres de production

Gewächshäuser - Bemessung und Konstruktion - Teil 1: Produktionsgewächshäuser

This European Standard was approved by CEN on 19 May 2019.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (EN 13031-1:2019) has been prepared by Technical Committee CEN/TC 284 "Greenhouses", the secretariat of which is held by NEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2020, and conflicting national standards shall be withdrawn at the latest by June 2020.

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

This document will supersede EN 13031-1:2001.

National document: National choices are allowed in EN 13031-1 through:

- 5.2.3 for Design working life of the structure;
- 5.3.1 for Classification of Consequence Classes CC;
- 5.3.2 for Differentiation of Partial Factors;
- 5.3.3 and 10.3 for Combinations of actions and related ψ-coefficients;
- 5.3.4 for Reference Periods for related Probabilities of Exceedance;
- 10.2.2 and 10.2.3 for Adjustment Factors for Reference Periods according to 5.3.4;
- 10.2.2.6 for Temperature ranges for gutters and other structural components;
- 10.3 Combination of actions;
- Annex A for Glass design calculation;
- Annex B for Wind: Size Factors, Correlation Coefficients, Aerodynamic Coefficients;
- Annex C for Snow: Surface Material Coefficients, Thermal Coefficients, Shape Coefficients;
- Annex E for Earthquake: Classification of Importance Categories IC, Importance Factors γ_I, Return Periods, probabilities of Exceedance and Adjustment Factors;
- Annex F for Owner's manual and identification plate.

As a guidance, the recommended values in tables are shown in grey fields.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

Part 1 of this document relates specifically to commercial production greenhouses used for the professional production of plants (crops) where human occupancy is restricted to authorized personnel, concerning low levels in number and duration. Other parts of this European standard are to be prepared that relate to greenhouses where general access by the public is permitted (such as those in garden centres or expositions).

This document gives specific rules and information, such as load distributions, deformation criteria and limitations to tolerances, for structural design and construction of greenhouses to enable adequate structural safety.

The structural design is based on EN 1990 and the relevant parts of EN 1991 to EN 1999 (Eurocodes 1 to 9) regarding the general principles and basic requirements for actions, mechanical resistance and stability, serviceability and durability. National Application Documents (NAD) are considered.

Recommended values for structural design in this document are given in accordance with the classification of greenhouses in EN 1990. This takes into account, that for commercial production greenhouses the consequences and nature of failure and the importance for public safety are lower than for normal buildings. The design working life is small. The potential economic loss is limited to the owner and the impact on the environment is low.

Non-contradictory, complementary information is provided to account for the particular requirements, functions and forms of commercial production greenhouses that distinguish them from ordinary buildings. A distinguishing functional requirement is the optimization of solar radiation transmission to create and maintain an optimal environment for the growth of plants (crops). This has implications on the form and structural design of commercial greenhouses.

As rules and requirements of this standard may become adopted by other European standards, for example the Structural Eurocodes or codes for Glass in Building – Design of glass panes, these will be replaced by a reference to this document.

1 Scope

This document specifies principles and requirements for the mechanical resistance and stability, serviceability and durability for design and construction of commercial production greenhouse structures, including their foundations, irrespective of the material used, for the professional production of plants (crops).

Fire resistance-related aspects are not covered in this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

EN 572-1, *Glass in building — Basic soda lime silicate glass products — Part 1: Definitions and general physical and mechanical properties*

EN 572-6, *Glass in building — Basic soda lime silicate glass products — Part 6: Wired patterned glass*

EN 673, *Glass in building — Determination of thermal transmittance (U value) — Calculation method*

EN 1090-1, *Execution of steel structures and aluminium structures — Part 1: Requirements for conformity assessment of structural components*

EN 1096-1, *Glass in building — Coated glass — Part 1: Definitions and classification*

EN 1279-1, *Glass in Building — Insulating glass units — Part 1: Generalities, system description, rules for substitution, tolerances and visual quality*

EN 1990, *Eurocode — Basis of structural design*

EN 1991-1-1, *Eurocode 1: Actions on structures — Part 1-1: General actions — Densities, self-weight, imposed loads for buildings*

EN 1991-1-3, *Eurocode 1 – Actions on structures — Part 1-3: General actions — Snow loads*

EN 1991-1-4, *Eurocode 1: Actions on structures — Part 1-4: General actions — Wind actions*

EN 1993-1-1, *Eurocode 3: Design of steel structures — Part 1-1: General rules and rules for buildings*

EN 1998-1, *Eurocode 8: Design of structures for earthquake resistance — Part 1: General rules, seismic actions and rules for buildings*

EN 12150-1, *Glass in building — Thermally toughened soda lime silicate safety glass — Part 1: Definition and description*

prEN 16612:2017, *Glass in building — Determination of the lateral load resistance of glass panes by calculation*

ISO 4355, *Bases for design of structures — Determination of snow loads on roofs*

EN ISO 6946, *Building components and building elements — Thermal resistance and thermal transmittance — Calculation methods (ISO 6946)*

EN ISO 10077-1, *Thermal performance of windows, doors and shutters — Calculation of thermal transmittance – Part 1: General (ISO 10077-1)*

EN ISO 10077-2, *Thermal performance of windows, doors and shutters — Calculation of thermal transmittance — Part 2: Numerical method for frames (ISO 10077-2)*

EN ISO 12543-5, *Glass in building — Laminated glass and laminated safety glass — Part 5: Dimensions and edge finishing (ISO 12543-5)*