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Ministry of the Environment Decree

**concerning national choices with regard to the general rules for geotechnical design,
when applying standard SFS-EN 1997-1**

By decision of the Ministry of the Environment, the following is laid down under Section 117a of the Land Use and Building Act (132/1999), as it stands in Act 958/2012:

Section 1

Scope

This Decree, together with standard SFS-EN 1997-1:2004, shall apply to geotechnical design.

Section 2

Design requirements

The requirements and guidelines of geotechnical class 1 shall apply to the design of light and simple structures, clause 2.1(8)P of the standard.

Section 3

Design values

The design value of the action given in clause 2.4.6.1(4)P shall be defined by applying the partial safety factor in accordance with the Ministry of the Environment Decree concerning national choices for the basis of structural design, when applying standard SFS-EN 1990. In the uplift limit state under unfavourable load conditions, the partial safety factor for permanent actions is 1.1 KFI and for variable actions it is 1.5 KFI, where KFI is the load coefficient used for the reliability class. For the hydraulic heave limit state, the partial safety factor for permanent actions in favourable soil conditions is 1.35 KFI and in unfavourable soil conditions it is 1.8 KFI. The partial safety factor for variable actions in unfavourable load situations is 1.5 KFI.

The design values of geotechnical parameters are derived, in accordance with clause 2.4.6.2(2)P of the standard, by using the partial safety factor 1.5 for undrained shear strength and uniaxial compressive strength, and for the uplift limit state, the value of the partial safety factor is 1.5 for undrained shear strength, tensile pile resistance and anchorage resistance.

Section 4

Ultimate limit states

When selecting the values of partial safety factors in accidental situations and their effect on partial safety factors, clause 2.4.7.1(3) of the standard, the Ministry of the Environment Decree concerning national choices for the basis of structural design is applied, when applying standard SFS-EN 1990.

When selecting the values of partial safety factors in persistent and transient situations, in accordance with clause 2.4.7.2(2)P, Note 2 of the standard, the Ministry of the Environment Decree concerning national choices for the basis of structural design is applied, when assessing the limit state for static equilibrium or total structural or soil movement. The value of the partial safety factor for soil parameters for undrained shear strength and shaft compression resistance is 1.5.

When applying partial safety factors on actions or the effects of actions, in accordance with clause 2.4.7.3.2(3)P of the standard, the Ministry of the Environment Decree concerning national choices for the basis of structural design shall apply to the selection of the partial safety factors on actions. Set M2 shall be applied to partial safety factors for soil parameters so that the value of the partial safety factor for undrained shear strength and compression resistance for one axis is 1.5.

For footing and spread foundations, Set R2 of the partial factors on resistance shall be applied, in accordance with clause 2.4.7.3.3(2)P of the standard, so that the value for bearing resistance is 1.55 and for sliding it is 1.1.

Design Approach 2 (DA2) shall be applied to footing and spread foundations, pile foundations, anchorages and support structures, in accordance with clause 2.4.7.3.4.1(1)P, Note 1, of the standard. DA3 shall be applied to the design procedure for embankment stability, slope stability and overall stability.

The values given in Section 3(1) of this Decree, in accordance with clause 2.4.7.4(3)P of the standard, shall be applied to the partial safety factors for uplift design. The value of the partial safety factor for soil parameters for undrained shear strength and tensile piles is 1.5. For temporary anchorages, the partial resistance factor is 1.25 and for permanent anchorages it is 1.5.

When considering a limit state of failure by heave due to seepage of water in the ground, in accordance with clause 2.4.7.5(2)P of the standard, the partial safety factors set down in Section 3(1) of this Decree shall be applied to a limit state of failure by heave.

Section 5

Compressive ground resistance

When conducting geotechnical load tests of the compressive resistance of piles, in accordance with clause 7.6.2.2(8)P of the standard, the correlation factors ξ_1 and ξ_2 given in the standard shall be multiplied by the model factor 1.25. When testing the ultimate compressive resistance of driven piles, bored piles and Continuous Flight Auger (CFA) piles, in accordance with clause 7.6.2.2(14) P, clause 7.6.2.3(4)P and clause 7.6.2.4(4)P of the standard,, Set R2 for partial resistance factors shall be applied. For base, shaft and total/combined (compression) cases the partial safety factor is 1.2, and for tensile piles it is 1.35 in short-term loading and 1.5 in long-term loading.

When determining the correlation factor to derive characteristic values for base and shaft resistance from ground test results, in accordance with clause 7.6.2.3(5)P of the standard, the

values below shall be applied to correlation factors ξ_3 and ξ_4 . The number of test profiles is 'n'.

ξ , where n =	1	2	3	4	5	7	10
ξ_3	1.85	1.77	1.73	1.69	1.65	1.62	1.60
ξ_4	1.85	1.65	1.60	1.55	1.50	1.45	1.40

When assessing the compressive resistance of a pile foundation according to the alternate method given in clause 7.6.2.3(8) of the standard, the value of the model factor correcting the partial safety factors for friction piles is 1.60 or greater. For cohesion piles, the model factor is 1.95 or greater in long-term loading and 1.40 or greater in short-term loading.

Section 6

Resistance

When deriving the design value of pile resistance, in accordance with clause 7.6.3.2(2)P and clause 7.6.3.3(3)P of the standard, Set R2 for partial resistance factors for driven piles, bored piles and CFA piles shall be applied. For base, shaft and total/combined (compression) cases, the partial safety factor for tensile piles is 1.35 in short-term loading and 1.5 in long-term loading.

When determining the characteristic value of the pile resistance, in accordance with clause 7.6.3.2(5)P of the standard, the correlation factors ξ_1 and ξ_2 given in the standard shall be multiplied by the model factor 1.25.

When determining the characteristic value of the pile resistance, in accordance with clause 7.6.3.3(4)P of the standard, the values given in Section 5(3) shall be applied to the correlation factors. When determining the characteristic value of the pile resistance, in accordance with clause 7.6.3.3(6) of the standard, the value of the model factor correcting the partial safety factor shall be at least 1.5 for both short-term and long-term loading.

Section 7

Anchorage

When determining the pull-out resistance in the ultimate limit state, in accordance with clause 8.5.2(2)P of the standard, i, Set R2 shall be applied so that the partial factor for pull-out resistance is 1.25 for temporary anchorage and 1.5 for permanent anchorage.

Section 8

Stability analysis for slopes

The overall stability of slopes shall be verified, in accordance with clause 11.5.1(1)P of the standard, with design values of actions, resistances and strengths, which shall be determined in accordance with the Ministry of the Environment Decree concerning national choices for the basis of structural design, when applying standard SFS-EN 1990. Set M2 shall be applied to partial safety factors for soil parameters so that the value of the partial safety factor is 1.5 for undrained shear strength and compression resistance. Set R3 shall be applied to partial safety factors for soil resistance so that the value of the partial safety factor is 1.0 for slopes and overall stability.

Section 9

Annex H (informative): Limiting values of structural deformation and foundation movement

Annex H is not used.

This Decree enters into force on 1 January 2017.

This Decree shall apply to projects initiated after the Decree enters into force.

This Decree repeals the National Annex to standard SFS-EN 1997-1 concerning the application of Eurocodes in building construction, issued by the Ministry of the Environment on 15 October 2010.

In Helsinki on 7 November 2016

The Minister of Agriculture and the Environment Kimmo Tiilikainen

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