

EG8 Harmonization

Andrew Bond (Convenor)

Tim Lansivaara (Secretary)

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1. Design Combinations
2. Reliability discrimination
3. Serviceability criteria and methods
4. Allowable bearing pressure
5. Guidance on amount of site investigation
6. Structural Design Report
7. Lexicon of terms

Membership of EG8 Harmonization

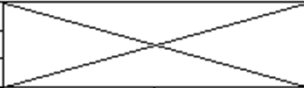
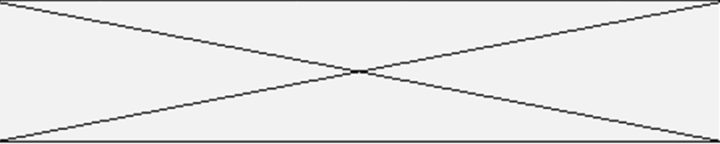
Andrew Bond (SC7) – convenor
Tim Lansivaara (Finland) – secretary
Sébastien Burlon (France)
Giuseppe Scarpelli (Italy)
Adriaan van Seters (Netherlands)
Brian Simpson (UK)

Carsten S. Sorensen (Denmark)
Martin Ziegler (Germany)
Fernando Pardo de Santayana (Spain)
Magnus Karlsson (Sweden)

Design combinations

Word document (v3.1)

Table 3a – Partial factors for persistent design situations

Limit State			GEO/STR											
Foundation type		Slopes		Retaining structures			Shallow foundations			Piles		Numerical methods		
Combination ⁰		1		2a	2b	3	4a	4b	5	6	7	8a	8b	9
Approach ¹		MFA		MFA	EFA	RFA ¹¹	MFA	EFA	RFA ¹¹	RFA ¹¹	RFA ¹¹	MFA	EFA	RFA
Partial factors on actions ⁹ (from EN 1990) including importance factor K_{FI}														
Unfavourable permanent ^{2,3}	γ_G	1.0 K_{FI}	Same as (1) ¹¹	1.0	1.35 K_{FI}	1.35 K_{FI}	1.0	Same as (4a) ¹¹	1.35 K_{FI}		1.0 K_{FI}	1.0	Same as (8a)	
Unfavourable variable ^{2,4}	γ_Q	1.3 $\psi_i K_{FI}$		1.1 ψ_i	1.5 $\psi_i K_{FI}$	1.5 $\psi_i K_{FI}$	1.1 ψ_i		1.5 $\psi_i K_{FI}$		1.3 $\psi_i K_{FI}$	1.1 ψ_i		
Favourable perm.	$\gamma_{G,fav}$	1.0	1.0			1.0			1.0		1.0			
Partial factors on ground parameters including importance factor K_{MI}														
Shearing resistance ²	γ_ϕ	1.25 K_{MI}	Same as (1)	1.0	1.0	Same as (1)	1.0	1.0	1.0		Same as (1)	1.0	1.0	
Effective cohesion ²	γ_c	1.25 K_{MI}												
Undrained strength ^{2,10}	γ_{cu}	1.4 K_{MI}												
Weight density	γ_γ	1.0	1.0			1.0			1.0					
Partial factors on ground resistance including importance factor K_{RI}														
Bearing resistance ²	γ_{Rk}	1.0 γ_{Rd}	1.0 γ_{Rd}	1.4 $\gamma_{Rd} K_{RI}$	1.0 γ_{Rd}	1.4 $\gamma_{Rd} K_{RI}$			1.0	1.0	?			
Sliding resistance ²	γ_{Rh}			1.1 $\gamma_{Rd} K_{RI}$		1.1 $\gamma_{Rd} K_{RI}$?			
Earth resistance ²	γ_{Re}			1.4 $\gamma_{Rd} K_{RI}$		1.4 $\gamma_{Rd} K_{RI}$?			
Pile shaft resistance ^{2,8}	γ_s								1.1 ($\xi_n \gamma_{Rd}$) K_{RI}	1.1 $\gamma_{Rd} K_{RI}$	1.0	1.0	?	
Pile shaft (tension) ^{2,8}	γ_{st}								1.15 ($\xi_n \gamma_{Rd}$) K_{RI}	1.15 $\gamma_{Rd} K_{RI}$?	
Pile base resistance ^{2,8}	γ_b								1.1 ($\xi_n \gamma_{Rd}$) K_{RI}	1.1 $\gamma_{Rd} K_{RI}$?	
Pile tot. resistance ^{2,5,8}	γ_t								1.1 ($\xi_n \gamma_{Rd}$) K_{RI}	1.1 $\gamma_{Rd} K_{RI}$?	
Anchor resistance ^{2,6,8}	γ_a								1.15 ($\xi_n \gamma_{Rd}$) K_{RI}	1.15 $\gamma_{Rd} K_{RI}$?	
Partial factors on effects of actions ⁷ including importance factor K_E														
Permanent ^{2,3}	γ_{EG}	1.0	1.0	1.35 K_E^{12}	1.0 ¹¹	1.0	1.35 K_E^{12}	1.0 ¹¹	1.0 ¹¹		1.0	1.35 K_E^{12}	1.35	
Variable ^{2,4}	γ_{EQ}												1.5	

Reliability discrimination

Define material factors as product of three factors:

$$\gamma_F = \gamma_{F,basic} \times k_{FI} \times k_{DS}$$

$$\gamma_M = \gamma_{M,basic} \times k_{MI} \times k_{DS}$$

$$\gamma_R = \gamma_{R,basic} \times k_{RI} \times k_{DS}$$

$\gamma_{M,basic}$ = 'basic' material factor, defined for each geotechnical parameter

k_i = modifier based on Consequence Class

k_{DS} = modifier for design situation (persistent, transient, accidental)

Serviceability criteria

Building		$s_{m,lim}$ (mm)	Differential (‰)		
			Δ/L	α	β
Buildings and structures		120	3	6	–
Structures	statically determinate	100	–	5	–
	RC statically indeterminate	60	–	2	–
	steel statically indeterminate	80	–	3	–
Multi-storey frame	RC frames infilled by brick masonry	60	1.5	–	–
	Steel frames infilled by brick masonry	70	–	2.5	–
Multi-storey with bearing walls	Bricks and blocks with straining beam	80	1.5	–	–
	Large dimension panels made from monolithic concrete	60	–	1.5	–
RC structures	Stiff	200			3
	Chimneys up to 100 m	200			5
	Chimneys taller than 100 m	100			2
Crane tracks		50	–	1.5	–

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Allowable bearing pressure

Category/Types of rocks and soils		Value (kPa)	Remarks
Rocks	Strong igneous and gneissic rocks in sound condition	10 000	Values based on assumption that foundations are taken down to unweathered rock. For weak, weathered and broken rock, see BS 8004
	Strong limestones and strong sandstones	4 000	
	Schists and slates	3 000	
	Strong shales, strong mudstones and strong siltstones	2 000	
Non-cohesive soils	Dense gravel, or dense sand and gravel	> 600	Width of foundation ≥ 1 m. Groundwater level assumed to be not below foundation base. For effect of relative density and groundwater level, see BS 8004 (*Values depend on degree of looseness)
	Medium dense gravel, medium dense sand and gravel	< 200 to 600	
	Loose gravel, or loose sand and gravel	< 200	
	Compact sand	> 300	
	Medium dense sand	100–300	
	Loose sand	< 100*	
Cohesive soils	Very stiff boulder clays and hard clays	300 to 600	Group 3 is susceptible to long-term consolidation settlement (see BS 8004). For consistencies of clays, see BS 8004
	Stiff clays	150 to 300	
	Firm clays	75 to 150	
	Soft clays and silts	< 75	
	Very soft clays and silts	N/A	
Peat and organic soils		N/A	See BS 8004
Made ground or fill		N/A	See BS 8004

Guidance on amount of site investigation

Type of construction			Favourable ground (T1)				Intermediate ground (T2)			
No of storeys*		Plan (m ²)	d _{max} (m)	P (m)	BHs†	PTs††	d _{max} (m)	P (m)	BHs†	PTs††
C-0	< 4	< 300	35	6	-	-	30	18	1	66%
C-1		≥ 300			1	70%			2	50%
C-2	4-10		30	12	2	70%	25	25	3	50%
C-3	11-20		25	14	3	50%	20	30	3	40%
C-4	> 20**		20	16	3	40%	17	35	3	30%
Large area		> 10k	Nº of points may be reduced to 50% for the area in excess of 10k							

*including basements; **or monumental buildings

d_{max} = maximum distance between investigation points (minimum nº = 3)

P = guiding depth below final excavation level, together with: net stress increment ≤ 10% initial effective vertical stress; 5D below end-bearing pile toe

†BHs = minimum nº of mechanical boreholes required

††PTs = boreholes that may be replaced by continuous penetration tests (DPs or CPTs)

ISSMGE's lexicon in 8 languages

“Dear Andrew,

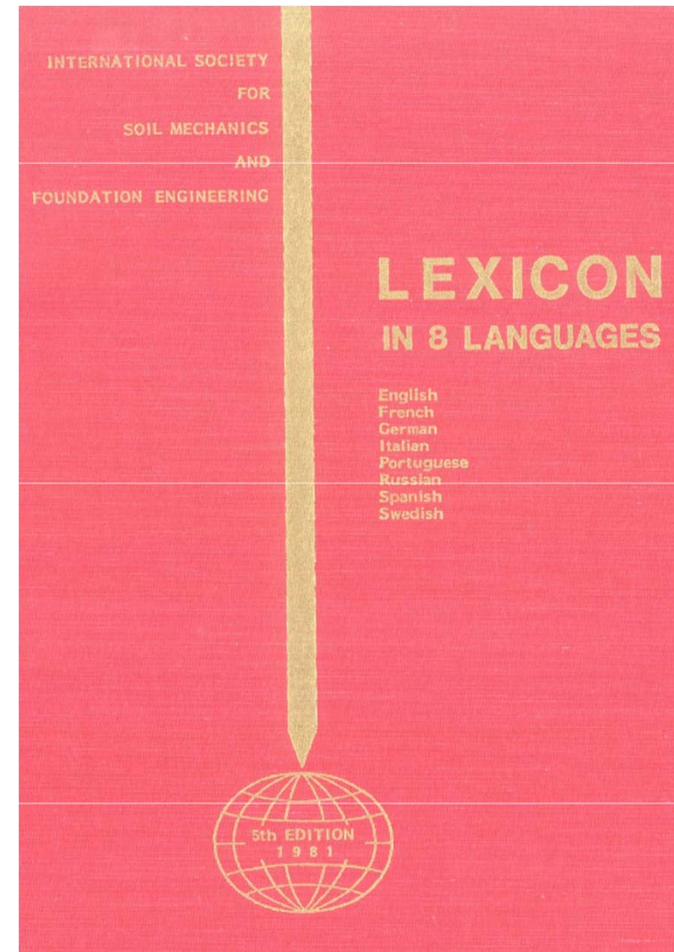
“Yes, indeed, there is a list of
‘Symbols and Definitions’
and we did our best to
follow it during the drafting
of EN 1997 (both in English
and in French)!”

Roger Frank

ISSMGE Lexicon 5th edition
was published in 1981

Download here:

www.issmge.org/images/Attachments/Lexicon300.pdf



1st CEN/TC 250/SC 7 Experts Meeting Eurocode 7 committee

Andrew Bond
Chairman TC250/SC7