Stellenbosch UNIVERSITY IYUNIVESITHI UNIVERSITEIT

CONCRETE SOCIETY OF SOUTHERN AFRICA

SANS 51992-1-1 in Practice: Key Changes from SANS 10100

- Kim Timm

Overview

- A brief origin story of SANS 51992-1-1
- Code format and approach
- Sample of relevant issues & changes:
  - General
  - Materials
  - Additional Information
- Textbooks & Courses that can help

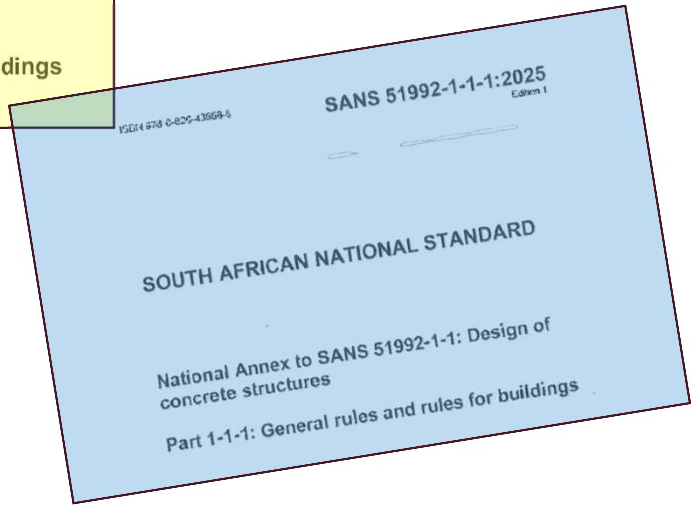

ISBN 978-0-626-43461-8

SANS 51992-1-1:2025
Edition 1
EN 1992-1-1:2004
Edition 2

SOUTH AFRICAN NATIONAL STANDARD

Eurocode 2: Design of concrete structures

Part 1-1: General rules and rules for buildings


SANS 51992-1-1-1:2025
Edition 1

SOUTH AFRICAN NATIONAL STANDARD

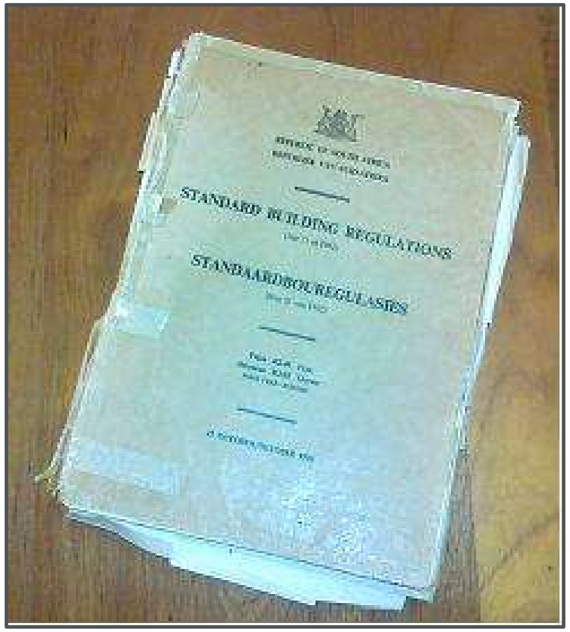
National Annex to SANS 51992-1-1: Design of concrete structures

Part 1-1-1: General rules and rules for buildings

SANS 51992-1-1 History

History

- 1985 : Standard Building regulations: One document : All materials + loading
- 1989 : Loading code SABS 0160
- SABS 0100:1992 – 1st limit states concrete standard for South Africa
  - Heavily based on BS 8110
  - Updated SABS 0100: 2000
- 2007: Process started for new revision
- Updating of Loading Code & Basis of Design

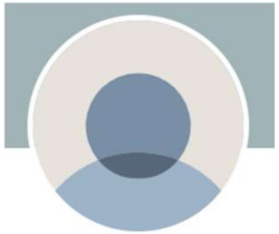


Why are revisions needed?

- Correction of errors and omissions
- Incorporation of latest research and developments
- Update on industry practices
- Harmonisation between:
  - Standards
  - Countries

Standard	Subject	Reference	Date
SANS 10160	Loading : Buildings	Local	2010/2011
SANS 10100	Concrete	BS 8110	2000
SANS 10162	Structural steel	CSA S16	2011
SANS 10163-1	Timber	Local	2003
SANS 10164-2	Masonry	Local	2008
TMH-7	Bridges	CEB-*fip* Model Code	1989

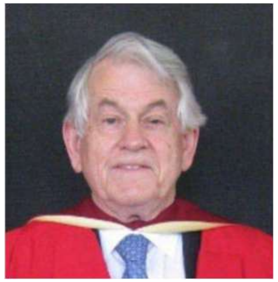
Working Committee



Graham Cross
Structural Specialist

Mitchell Gohnert
Professor at University of the Witwatersrand

Elsabe Kearsley
Professor at University of Pretoria



Johan Retief
Emeritus Professor at Stellenbosch University

John Robberts
Structural Specialist at Robberts & Marshall Structural Engineers

Chris Roth
Associate Professor at University of Pretoria

Gary Theodosiou
Specialist Structural Engineer

Gideon van Zijl
Distinguished Professor at Stellenbosch University

Jan Wium
Emeritus Professor at Stellenbosch University, Dean Faculty of Engineering, Northrise University

Revision options

- Options considered for the revision:

- *Update SANS 10100-1*
- *Re-write*

↔ Time/cost/expertise

- *Adapt a foreign code*
- *Adopt a foreign code - EN-1992-1-1*

↔ Expertise/updates/
vs
Local conditions/practice

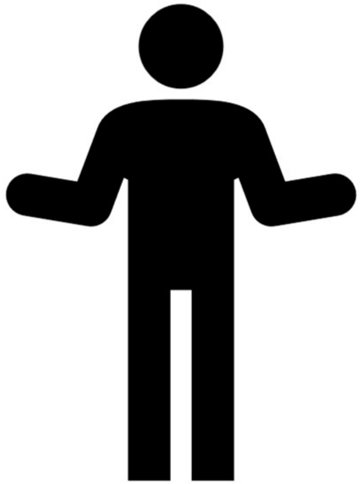
Adopting a foreign code

Advantages of adopting foreign code:

- Regular updates
- Supporting material (manuals, software, graphs)
- Time to implement

Disadvantages of adopting a foreign code:

- Materials
- Local practice and procedures
- Local standards
- Local environment



Decision

Decision in 2007 : *Adopt* EN 1992-1-1 with an own set of nationally determined parameters (vs. *adapting* EN 1992-1-1)

- Replaces BS 8110 as reference
- Compatible with SANS 10160
- Available material from UK

Process to *adopt* responsibly :

- ✓ comparative calculations
- ✓ review for local implications
- ✓ identifying and motivating the choice of nationally determined parameters.
- ✓ characterizing of South African material properties

SANS 51992-1-1 Format

Eurocode format

Standard main document : EN-1992-1-1 / SANS 51992-1-1

National Annex with nationally determined parameters: SANS 51992-1-1-1

ISBN 978-0-626-43461-8

SANS 51992-1-1:2025
Edition 1

EN 1992-1-1:2004
Edition 2

SOUTH AFRICAN NATIONAL STANDARD

Eurocode 2: Design of concrete structures

Part 1-1: General rules and rules for buildings

NATIONAL ANNEX

NA to BS EN 1992-1-1:2004

UK National Annex to Eurocode 2: Design of concrete structures —

Part 1-1: General rules and rules for buildings

ISBN 978-0-626-43568-5

SANS 51992-1-1-1:2025
Edition 1

SOUTH AFRICAN NATIONAL STANDARD

National Annex to SANS 51992-1-1: Design of concrete structures

Part 1-1-1: General rules and rules for buildings

Extract from SANS 51992-1-1

$$P_{max} = A_p \cdot \sigma_{p,max} \qquad (5.41)$$

where:

A_p is the cross-sectional area of the tendon

$\sigma_{p,max}$ is the maximum stress applied to the tendon
$= \min \{ k_1 \cdot f_{pk} \,;\, k_2 \cdot f_{p0,1k} \}$

Note: The values of k_1 and k_2 for use in a Country may be found in its National Annex. The recommended values are $k_1 = 0{,}8$ and $k_2 = 0{,}9$

Extract from SANS 51992-1-1-1

$k_1 = 0{,}8$ $k_2 = 0{,}9$	Use the recommended value

Table of Content: SANS 10100

1. Scope
2. Normative references
3. Limit states design
4. Reinforced concrete (design and detailing)
   - Analysis, Beams, Columns, Slabs etc.
5. Prestressed concrete (design and detailing)
   - Analysis, Beams, Columns, Slabs etc.
6. Precast, composite and plain concrete (design and detailing)
   - General, Construction, Connections etc
7. Fire resistance

Table of Content: SANS 51992-1-1

1. General
2. Basis of design
3. Materials
4. Durability & cover
5. Structural analysis
6. Ultimate limit states:
   - Bending, Shear, Torsion, Punching etc
7. Serviceability limit states:
   - Cracks, Deflections
8. Detailing of reinforcement
9. Detailing of members
10. Additional rules for precast
11. Lightweight aggregated concrete structures
12. Plain and lightly reinforced concrete structures

Relevant issues from adopting EN-1992-1-1

General e.g.:

- Shear resistance
- The use of L/d ratios for flat slabs with low percentage reinforcement
- Fire resistance for concrete structures

Materials e.g.:

- Concrete strength (cube vs cylinder)
- Steel Classes
- Durability
- High concrete strength classes

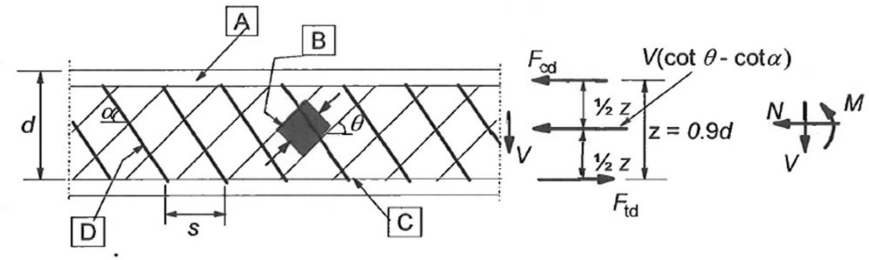
More information on:

- Light-weight concrete
- Prestressed & pre-cast concrete
- Creep and shrinkage
- Reinforcement

General Considerations

Shear

- $V_{Rd,c}$ is the design shear resistance of the member without shear reinforcement
- If the design shear load (V_{Ed}) is more than $V_{Rd,c}$, shear reinforcement is required for the full force.
- Required shear reinforcement is based on the Variable Strut Inclination (VSIM) analogy.
- The strut angle may be freely chosen between $1 \leq \cot\theta \leq 2.5$
- A smaller strut angle makes the stirrups more effective, but the concrete strut works harder. (i.e. the choice will depend on whether the designer prefers to optimise stirrup quantities or web thickness)
- Yielding of shear reinforcement is ensured by requiring that the concrete strut capacity $V_{Rd,max}$ be more than the stirrup capacity $V_{Rd,s}$
- Additional limitations are included in SANS51992-1-1 Section 6.3



A - compression chord, B - struts, C - tensile chord, D - shear reinforcement

Fire

EN 1992-1-2: Fire Resistance of Concrete Structures

- Not adopted in South Africa

SANS 51992-1-1-1 Section 6.7.2: Fire Resistance

- Tables for required cover for fire resistance depending on element type, material and exposure.
- For complex structures / issues / high fire ratings, the more rigorous calculations in EN 1992-1-2 can be referred to.

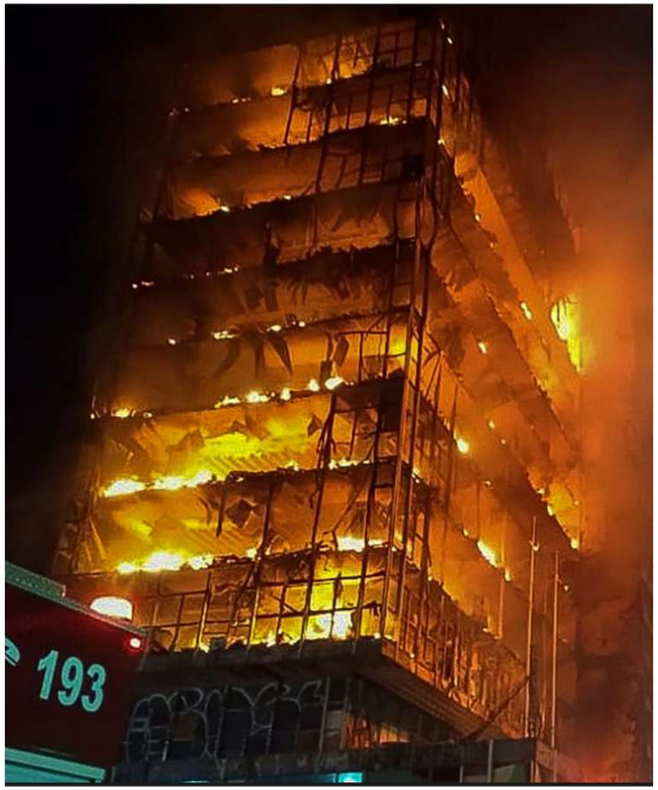


Photo Credit: Getty Images

Span/effective depth ratios

Extract from SANS 51992-1-1-1

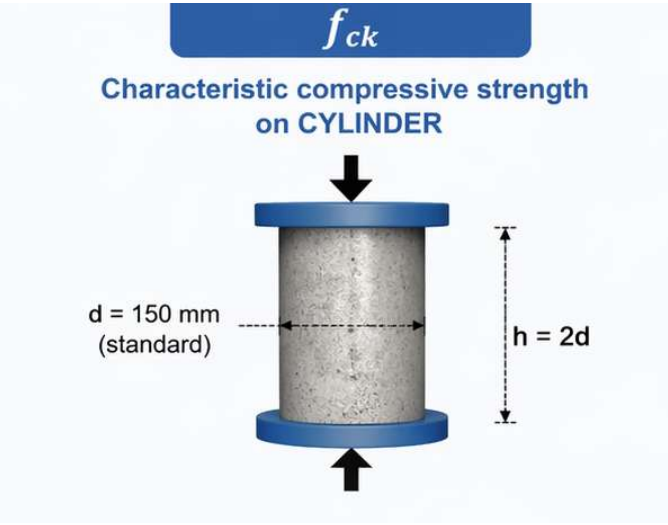
Section 6.4.2 Reinforcement ratios of less than 0.5%

Table 9 — Basic span/effective depth ratios for elements (concrete class C30/37; σ_s = 310 MPa)

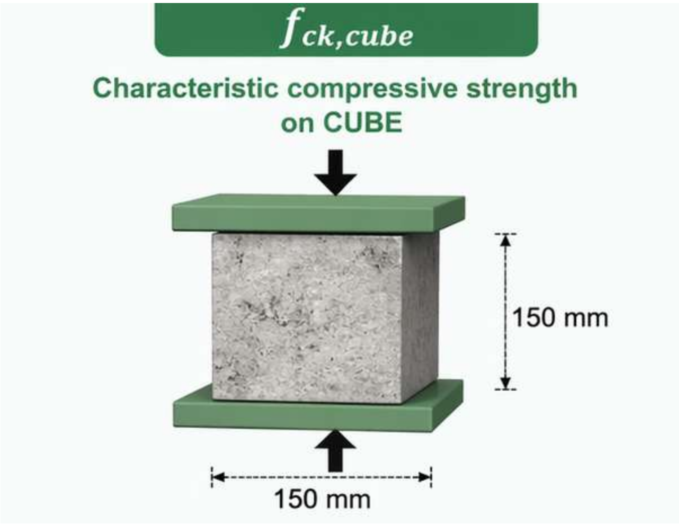
1	2	3	4	5
Structural system	K (Refer to table 7.4 of SANS 51992-1-1:2025)	Concrete highly stressed ρ = 1,5 % (see SANS 51992-1-1)	Concrete lightly stressed ρ = 0,5 % (see SANS-51992-1-1)	Concrete lightly stressed ρ = 0,25 % (see 6.4)
Simply supported beam, one- or two-way spanning simply supported slab	1,0	14	20	20
End span of continuous beam or one-way continuous slab or two-way spanning slab continuous over one long side	1,3	18	26	30
Interior span of beam or one-way or two-way spanning slab	1,5	20	30	35
Slab supported on columns without beams (flat slab) (based on longer span)	1,2	17	24	27
Cantilever	0,4	6	8	9

Material Considerations

Concrete Strength



C30/37



$f_{ck,cube} = f_{cu}$

$$f_{ck} \approx 0.8\, f_{ck,cube}$$

$(Where\ f_{ck,cube} < 80\ MPa)$

SANS 51992-1-1-1: Table 8 – Strength Classes for Concrete

1	2															3
	Strength classes for concrete															**Analytical relation/Explanation**
f_{ck} (MPa)	12	16	20	25	28	32	35	40	45	50	55	60	70	80	90	
$f_{ck,cube}$(MPa)	15	20	25	30	35	40	45	50	55	60	67	75	85	95	105	2.8
f_{cm} (MPa)	20	24	28	33	36	40	43	48	53	58	63	68	78	88	98	$f_{cm} = f_{ck} + 8$ (MPa)
f_{ctm} (MPa)	1,6	1,9	2,2	2,6	2,8	3,0	3,2	3,5	3,8	4,1	4,2	4,4	4,6	4,8	5,0	$f_{ctm} = 0,3 f_{ck}^{(2/3)}$: $f_{ck} \le C50/60$ $f_{ctm} = 2.12 \ln\left(1 + \left(f_{cm}/10\right)\right)$: $f_{ck} > C50/60$
$f_{ctk;0,05}$ (MPa)	1,1	1,3	1,5	1,8	1,9	2,1	2,2	2,5	2,7	2,9	3,0	3,1	3,2	3,4	3,5	$f_{ctk,0,05} = 0,7 f_{ctm}$ 5% fractile
$f_{ctk,0,95}$ (MPa)	2,0	2,5	2,9	3,3	3,6	3,9	4,2	4,6	4,9	5,3	5,5	5,7	6,0	6,3	6,6	$f_{ctk,0,95} = 1,3 f_{ctm}$ 95% fractile
E_{cm} (GPa)	27	29	30	31	32	33	34	35	36	37	38	39	41	42	44	$E_{cm} = 22[(f_{cm})/10]^{0,3}$, f_{cm} in MPa
ε_{c1} (‰)	1,8	1,9	2,0	2,1	2,11	2,2	2,25	2,3	2,4	2,45	2,5	2,6	2,7	2,8	2,8	See Figure 3.2 (SANS 51992-1-1): $\varepsilon_{c1}(^{o}/_{oo}) = 0,7 f_{cm}^{\;0,31} \le 2,8$
ε_{cu1} (‰)	3,5										3,2	3,0	2,8	2,8	2,8	See Figure 3.2 (SANS 51992-1-1): for $f_{ck} \ge 50$ MPa $\varepsilon_{cu1}(^{o}/_{oo}) = 2,8 + 27[(98 - f_{cm})/100]^{4}$
ε_{c2} (‰)	2,0										2,2	2,3	2,4	2,5	2,6	See Figure 3.3 (SANS 51992-1-1): for $f_{ck} \ge 50$ MPa $\varepsilon_{c2}(^{o}/_{oo}) = 2,0 + 0,085(f_{ck} - 50)^{0,53}$

Steel Classes: Ductility

Table C.1: Properties of reinforcement

Product form	Bars and de-coiled rods			Wire Fabrics			Requirement or quantile value (%)
Class	A	B	C	A	B	C	-
Characteristic yield strength f_{yk} or $f_{0,2k}$ (MPa)	400 to 600						5,0
Minimum value of $k = (f_t/f_y)_k$	≥1,05	≥1,08	≥1,15 <1,35	≥1,05	≥1,08	≥1,15 <1,35	10,0
Characteristic strain at maximum force, ε_{uk} (%)	≥2,5	≥5,0	≥7,5	≥2,5	≥5,0	≥7,5	10,0
Bendability	Bend/Rebend test			-			
Shear strength	-			0,3 A f_{yk} (A is area of wire)			Minimum
Maximum deviation from nominal mass (individual bar or wire) (%) — Nominal bar size (mm): ≤ 8 > 8	± 6,0 ± 4,5						5,0

Durability

Traditional Approach

- Design structurally and then
- Determine how to make the structure durable

New Philosophy

- Determine environment and required longevity
- Determine required durability
- Choose an approach to achieve durability, and then
- Determine structural design

Concrete Cover

Concrete cover is the primary means of ensuring durability:

Nominal cover is defined as a minimum cover c_{min} plus an allowance in design for deviation Δc_{dev}

$c_{nom} = c_{min} + \Delta c_{dev}$

Minimum concrete cover c_{min} shall ensure:

- Adequate transmission of bond forces
- Protection of steel from corrosion
- Adequate fire resistance

$$c_{min} = \max\{c_{min,b}; c_{min,dur} + \Delta c_{dur,\gamma} - \Delta c_{dur,st} - \Delta c_{dur,add}; 10 \text{ mm}\}$$

Where:

$c_{min,b}$	minimum cover for bond requirements
$c_{min,dur}$	minimum cover for environmental requirements
$\Delta c_{dur,\gamma}$	additive safety element
$\Delta c_{dur,st}$	reduction of minimum cover for stainless steel
$\Delta c_{dur,add}$	reduction of minimum cover for additional protection

High Strength Concrete

Extract from SANS 51992-1-1: Table 3.1

Strength classes for concrete															Analytical relation / Explanation
f_{ck} (MPa)	12	16	20	25	30	35	40	45	50	55	60	70	80	90	
$f_{ck,cube}$ (MPa)	15	20	25	30	37	45	50	55	60	67	75	85	95	105	
f_{cm} (MPa)	20	24	28	33	38	43	48	53	58	63	68	78	88	98	$f_{cm} = f_{ck}+8$(MPa)
f_{ctm} (MPa)	1,6	1,9	2,2	2,6	2,9	3,2	3,5	3,8	4,1	4,2	4,4	4,6	4,8	5,0	$f_{ctm}=0,30\times f_{ck}^{(2/3)}$ ≤C50/60 $f_{ctm}=2,12\cdot\ln(1+(f_{cm}/10))$ > C50/60

Extract from SANS 51992-1-1-1

6.1.2 The use of high strength concrete classes

SANS 51992-1-1:2025 allows the use of concrete characteristic strength of up to 105 MPa cube strength (see item 3.1.2 (2)P). Although concrete with high resistances is being produced in South Africa, this is found to a very limited extent. In addition, there is insufficient information available on local material characteristics such as creep, shrinkage and durability to justify the general use of concrete classes higher than C50/60 MPa. If concrete classes higher than C50/60 are specified, then designers shall be able to demonstrate that specific quality control procedures will be applied during construction, and that relevant material characteristics such as creep, shrinkage and modulus of elasticity values have been considered for the specified concrete class.

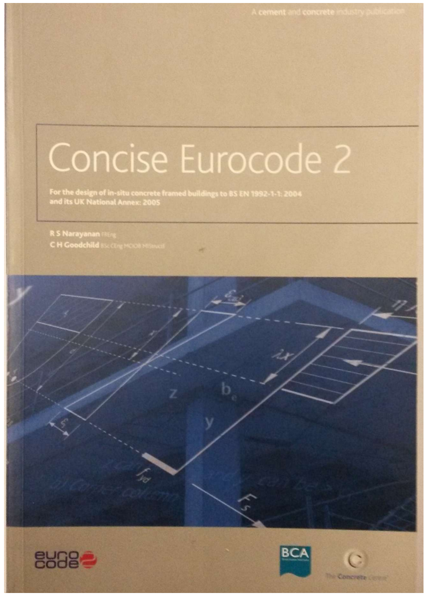
Other Considerations

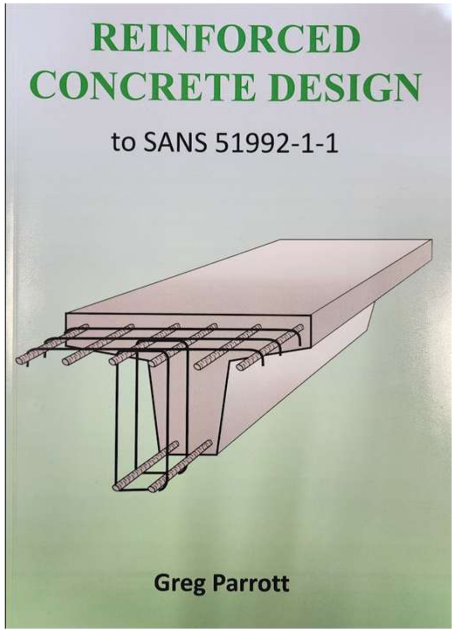
Other Considerations

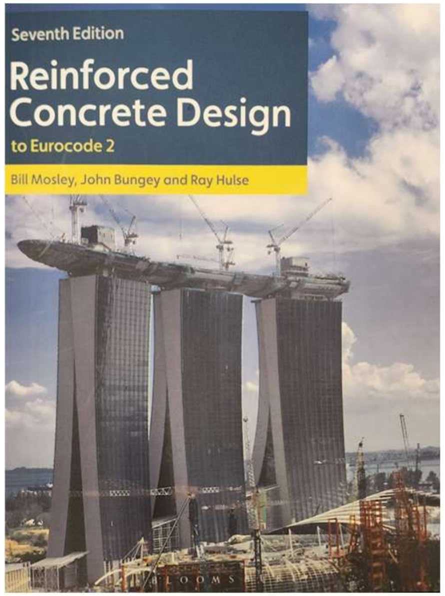
- Light-weight concrete
- Prestressed & pre-cast concrete
- Creep and shrinkage
- Reinforcement
- Non-linear analysis

& more

…But use with care and due diligence!







Concise Eurocode 2

The Concrete Centre

R.S Narayanan, C.H. Goodchild

www.concretecentre.com

ISBN 1-904818-35-8

Reinforced Concrete Design

to SANS 51992-1-1

Greg Parrott

kznit@axxess.co.za

ISBN 978-1-0370-9675-4

Reinforced Concrete Design

to Eurocode 2 (7th Edition)

Mosley, Bungey and Hulse

ISBN 978-0-2303-0285-3

ROADSHOW SEMINAR

THE NEW CONCRETE CODE: SANS 51992-1-1 *- unpacked*

SAVE THE DATES

CAPE TOWN
Tuesday, 09 June 2026

DURBAN
Thursday, 11 June 2026

JOHANNESBURG
Tuesday, 23 June 2026

The Code Has Changed — Have You?

The new SANS 51992-1-1 is not just an update — it is a game-changing shift in how concrete structures will be designed, specified, and assessed in South Africa.

This is your opportunity to get ahead of the curve and gain clear, practical insight into what the code really means for your day-to-day work. From critical changes and hidden pitfalls to compliance risks and design implications, this seminar aims to develop an understanding of the key changes and the conceptual approaches underpinning the new code. If you are serious about staying relevant, protecting your professional liability, and delivering work that meets the latest standards, this is one event you simply cannot afford to miss.

Seats are limited and demand is expected to be high. Secure your place now to ensure you are fully up to speed with the new code and earn valuable CPD points while doing so. Don't wait until these changes catch you off guard —

be informed, be prepared, and be ahead.

ECSA CPD points will be applied for

CONCRETE SOCIETY OF SOUTHERN AFRICA

AfriSam · chryso · KNIKGROUP — DIAMOND MEMBERS

CHARGE PER DELEGATE

Non-member	R2,400.00 excl. VAT
Diamond Member	25% discount
Ruby Member	20% discount
Emerald Member	15% discount
Tanzanite Member	10% discount
Emerging Enterprise Member	5% discount
Individual Member	5% discount

Sponsorship opportunities available

Please contact Natasja for more information on this ***not to be missed and informative seminar roadshow.***

Email natasja.pols@concretesocietysa.org.za Cell 082 514 2560

Adopting SANS 51992-1-1: Designing to the new concrete code

DEPARTMENT OF CIVIL ENGINEERING • 28 - 29 May 2026

COURSE PRESENTER
Dr Kim Timm

FEES
2 - day course
28 - 29 May 2026
R 6 200.00

ECSA CPD POINTS
2 points for 2-day course

PLEASE NOTE: Only DIGITAL certificates will be issued.

LANGUAGE: English

TIMETABLE : Page 2

CONTACT
Janine: 021 808 2080
civilcourses@sun.ac.za

Please read the T's & C's when registering

DR KIM TIMM

Kim is a professional engineer and has built up a wealth of experience over more than 20 years as a practicing structural engineer. She was appointed as Technical Director and Practice Area Lead at AECOM SA, serving as Lead Structural Engineer on, amongst others, Medupi and Kusile Boiler Island Civil Works, and the Growthpoint-Exxaro ConneXXion Building, a technically challenging and award-winning project.

Graduating with her PhD in 2025, Kim is currently working as a Senior Lecturer at Stellenbosch University.

OBJECTIVES

To ensure that practising structural engineers can adapt to the new concrete code SANS 51992-1-1 with local annex SANS 51992-1-1-1.

OUTCOMES

An understanding of how the new code works, how to navigate and use it and what the fundamental changes from SANS 10100 are.

COURSE ARRANGEMENTS
This course will be presented in hybrid mode: in-person on Stellenbosch Campus and online via MS Teams. Details will be forwarded to registered delegates once payment has been received.

CLICK HERE TO REGISTER

REGISTRATIONS
Registrations close:
18 May 2026
All payments are due by:
22 May 2026
Payment confirms registration.



Scan me!

CONCRETE SOCIETY OF SOUTHERN AFRICA

SANS 51992-1-1 in Practice

Stellenbosch UNIVERSITY IYUNIVESITHI UNIVERSITEIT

Thank you
Enkosi
Dankie