

Comparison of Chapter 19 Concrete
James S. Lai, F.ACI, F.SEAOC

Section	Heading	2007 CBC	2010 CBC	Remarks
1901	General	1901	1901	No change
	Scope	1901.1	1901.1	do
	Plain and reinforced conc.	1901.2	1901.2	do
	Source and applicability	1901.3	1901.3	do
	Construction document	1901.4	1901.4	do
	Special inspection	1901.5	1901.5	do
1902	Definitions	1902	1902	No change
	General	1902.1	1902.1	Added: "as modified by 1908.1.1
1903	Specifications for test and materials	1903	1903	No change
	General	1903.1	1903.1	do
	Glass fiber reinforced conc.	1903.2	1903.2	No change
1904	Durability requirements			
	Water-cementitious ratio	1904.1	1904.1	No change
	Exposure category and classes	--	1904.2	Revised
	Freeze and thawing exposure	1904.2	1904.4	Revised
	Air entrainment	1904.2.1	1904.4.1	Editorial change
	Concrete properties	1904.2.2	1904.3	Exposure moved to 1904.2 (N)
	Deicing chemicals	1904.2.3	1904.4.2	Editorial change
	Min. specified comp. strength	T1904.2.2	T1904.3	No change
	Weathering probability map	F1904.2.2	F1904.3	No change
	Sulfate exposure	1904.3	--	Part of exposure category req't
	Corrosion protection of reinf.	1904.4	--	Part of exposure category req't
	Alternative cementitious material for sulfate exposure	--	1904.5	ACI 318 T4.3.1 may be used in lieu of ACI 318 sec. 4.5.1
1905	Concrete Quality, mixing and placing	1905	1905	No change
	General	1905.1	1905.1	do
	Strength	1905.1.1	1905.1.1	do
	Selection of conc. proportion	1905.2	1905.2	do
	Proportion based on field experience and/ or trial mix	1905.3	1905.3	do
	Proportion w/o field experience or trial mix	1905.4	1905.4	do
	Average strength reduction	1905.5	1905.5	do
	Evaluation and acceptance	1905.6	1905.6	do
	Qualified technician	1905.6.1	1905.6.1	do
	Frequency of testing	1905.6.2	1905.6.2	do
	Strength test specimens	1905.6.3	1905.6.3	do
	Field cured specimens	1905.6.4	1905.6.4	do
	Low strength test results	1905.6.5	1905.6.5	do
	Preparation of equipment and place deposit	1905.7	1905.7	do
	Mixing	1905.8	1905.8	do
	Conveying	1905.9	1905.9	do

	Depositing	1905.10	1905.10	do
	Curing	1905.11	1905.11	do
	Cold weather requirements	1905.12	1905.12	do
	Hot weather requirements	1905.13	1905.13	do
1906	Formwork, embedded pipes and construction joints	1906	1906	No change
	Formwork	1906.1	1906.1	do
	Removal of forms, shores and re-shores	1906.2	1906.2	do
	Conduits and pipe embedded in concrete	1906.3	1906.3	do
	Construction joints	1906.4	1906.4	do
1907	Details of reinforcement	1907	1907	
	Hooks	1907.1	1907.1	No change
	Minimum bend diameters	1907.2	1907.2	do
	Bending	1907.3	1907.3	do
	Surface conditions of reinf.	1907.4	1907.4	do
	Placing reinforcement	1907.5	1907.5	do
	Spacing limits for reinf.	1907.6	1907.6	No change
	Concrete protection of reinf.	1907.7	1907.7	ACI section numbering changed
	CIP concrete (nonprestressed)	1907.7.1	1907.7.1	“Minimum cover” change to “specified cover”
	CIP concrete (prestressed)	1907.7.2	1907.7.2	“Minimum cover” change to “specified cover”
	Precast concrete (plant control)	1907.7.3	1907.7.3	“Minimum cover” change to “specified cover”
	Bundled bars	1907.7.4	1907.7.4	No change
	Headed shear stud reinforcement		1907.7.5	New provision
	Corrosion environments	1907.7.5	1907.7.6	ACI section numbering changed
	Future extensions	1907.7.6	1907.7.7	Editorial
	Fire protection	1907.7.7	1907.7.8	Editorial
	Special reinf. details for column	1907.8	1907.8	No change
	Connections	1907.9	1907.9	do
	Lateral reinf. for comp. mem.	1907.10	1907.10	do
	Lateral reinf. for flexural mem.	1907.11	1907.11	do
	Shrinkage and temp. reinf.	1907.12	1907.12	do
	Req't for structural integrity	1907.13	1907.13	No change
1908	Modifications to ACI 318	1908	1908	
	General	1908.1	1908.1	Removed redundant clauses where ACI has incorporated IBC language
	Modify ACI 10.5	1908.1.1		Removed redundant clause
	Modify ACI 11.11	1908.1.2		Removed redundant clause
	Modify ACI 21.1	1908.1.3	1908.1.1	Definition in ACI 21.1 has been moved to ACI 2.2; added definition for “Special Structural Wall” which include both CIP and precast walls complying with

				requirements of 21.1.3, 21.1.7, 21.9 and 21.10.
	Modify ACI 21.2.1	1908.1.4	1908.1.2	Modified with re-organized section numbering
	Modify ACI 21.2.5	1908.1.5		Removed redundant clause
	Modify ACI 21.2	1908.1.6		Removed redundant clause
	Modify ACI 21.3	1908.1.7		Removed redundant clause
	Modify ACI 21.7	1908.1.8	1908.1.4	Re-organized section numbering
	Modify ACI 21.8	1908.1.9	1908.1.5	Re-organized section numbering
	Modify ACI 21.10.1.1	1908.1.10	1908.1.6	Re-organized section numbering
	Modify ACI 21.11	1908.1.11		Removed redundant clause
	Modify ACI 21.12.5	1908.1.12		Removed redundant clause
	Modify ACI 21.13	1908.1.13	1908.1.3	Re-organized section numbering
	Modify ACI 22.6	1908.1.14	1908.1.7	Re-organized section numbering
	Modify ACI 22.10	1908.1.15	1908.1.8	Re-organized section numbering
	Modify ACI D.3.3	1908.1.16	1908.1.9	Section modified to include requirements in ASCE 7-05
	Replace ACI D.4.2.2	--	1908.1.10	New provision for CBC
1909	Structural plain concrete	1909	1909	
	Scope	1909.1	1909.1	No change
	Special structures	1909.1.1	1909.1.1	do
	Limitations	1909.2	1909.2	do
	Joints	1909.3	1909.3	No change
	Design	1909.4	1909.4	Editorial
	Precast members	1909.5	1909.5	No change
	Walls	1909.6	1909.6	
	Basement walls	1909.6.1	1909.6.1	Editorial
	Other walls	1909.6.2	1909.6.2	No change
	Openings in walls	1909.6.3	1909.6.3	Change opening reinforcement from 2 #5 to 1 #5
1910	Minimum Slab provisions	1910	1910	No change
	General	1910.1	1910.1	do
1911	Anchorage to concrete - ASD	1911	1911	No change
	Scope	1911.1	1911.1	do
	Allowable service load	1911.2	1911.2	do
	Allowable service load on embedded bolts	T1911.2	T1911.2	do
	Req'd edge distance & spacing	1911.3	1911.3	do
	Increase in allowable load	1911.4	1911.4	do
	Increase for inspection	1911.5	1911.5	No change
1912	Anchorage to concrete strength design	1912	1912	
	Scope	1912.1	1912.1	Deleted Exception
1913	Shotcrete	1913	1913	No change
	General	1913.1	1913.1	do
	Proportions and materials	1913.2	1913.2	do
	Aggregate	1913.3	1913.3	do
	Reinforcement	1913.4	1913.4	do
	Size	1913.4.1	1913.4.1	do

	Clearance	1913.4.2	1913.4.2	do
	Splices	1913.4.3	1913.4.3	do
	Spirally tied columns	1913.4.4	1913.4.4	do
	Preconstruction tests	1913.5	1913.5	do
	Rebound	1913.6	1913.6	do
	Joints	1913.7	1913.7	do
	Damage	1913.8	1913.8	do
	Curing	1913.9	1913.9	do
	Initial curing	1913.9.1	1913.9.1	do
	Final curing	1913.9.2	1913.9.2	do
	Natural curing	1913.9.3	1913.9.3	do
	Strength tests	1913.10	1913.10	do
	Sampling	1913.10.1	1913.10.1	do
	Panel criteria	1913.10.2	1913.10.2	do
	Acceptance criteria	1913.10.3	1913.10.3	do
1914	Reinforced gypsum concrete	1914	1914	No change
	General	1914.1	1914.1	do
	Minimum thickness	1914.2	1914.2	do
1915	Concrete filled pipe column	1915	1915	
	General	1915.1	1915.1	No change
	Design	1915.2	1915.2	do
	Connection	1915.3	1915.3	do
	Reinforcement	1915.4	1915.4	No change
	Fire rating protection	1915.5	1915.5	Editorial
	Approvals	1915.6	1915.6	No change

TMS 402 -05 to TMS 402-08

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General

- Update from TMS 402 to TMS 402-08
- Majority of provisions in chapter 21 were transcribed from the MSJC document
- Delete redundant language from IBC in compliance with reference to national standards; avoid split differences, avoid conflicts between IBC transcription and published MSJC standards in future years
- Fire resistance requirements updated to ACI 216/ TMS 216-07
- Sound transmission STC – 1207.1 reference to TMS 0302
- 1614 – structural integrity requirements for high rise (as defined under IBC 403) building categories III and IV
- IBC 403.2.3 , exit enclosure and elevator hoistway – use of masonry wall deem to comply with structural integrity requirements
- Seismic reinforcement and anchorage for fireplaces and chimneys extended from SDC D to also apply to SDC C
- Chapter 17 inspection requirements closely match those in MSJC. Note inspection requirement for reinforcement may be too lenient in IBC than requirement in MSJC
- Testing requirements for masonry – formerly specified in seismic resistance clauses- were moved to T1704.5.1 and T1704.5.3) now applies to all SDC
 - Certificate of compliance confirmation
 - Specified strength of masonry verification (unit strength method or prisms
 - Slump flow and visual stability index (VSI) verification for self-consolidation grout

Major changes of TMS 402-08:

- Addition of requirements for Self-Consolidating Grout (SCG)
- Complete rewrite and revision of the Seismic Design and Detailing Requirements, with the addition of some former IBC requirements for masonry
- Revision and harmonization of anchor bolt provisions
- Options to use less onerous reinforcement requirements for lightly loaded columns.
- Removal of pseudo-strength design provisions for allowable- stress design
- Addition of maximum reinforcement limits from the IBC for special reinforced masonry shear walls designed by allowable-stress design procedures
- Refinement in the Unit Strength Method for determining compliance with $f'm$ for clay and concrete masonry.
- Addition of minimum frequencies (periodic or continuous) for various inspection tasks.
- Slight relaxation of the prescriptive requirements for Special Masonry Shear Walls when the masonry can carry the entire shear.

- Supplemental reinforcement to improve deformation capacity for breakout mode; may use higher ϕ -factor
- Anchor reinforcement designed to transfer full design load into structural member is precluded from consideration of breakout mode.
- Modification factor for concrete breakout failure mode introduced to correct conservative provisions for anchorages loaded in shear and located in thin concrete members
- Seismic design provisions for anchors modified to clarify the ductility requirements for anchors and to provide a design option when anchors are controlled by concrete failure modes

- 11.5.6.1 significant change when $V_u > 0.5\phi V_c$
- Reduction V_c for deeper member (size effect)
- Hollow core units – requirement for shear reinf. Could be waived
- Exemption for shear reinforcement using FRC
- 11.7.5 Shear friction V_u increases when concrete placed against intentionally roughen surface

Chapter 12 – Development and Splices of Reinforcement

- 12.6 development of headed deformed bars and mechanical anchorage of reinf in tension
- 12.1.3 reference 7.13 for structural integrity requirement
- 12.15.3 added to defined splice length for splices of different sized bars
- 12.2.4(b) Coating factor for galvanized reinforcement

Chapter 13 – Two Way Slab Systems

- New definition for shear cap in chapter 2 – distinguish shear head from shear cap and drop panel
- 13.2.6 dimension limits for shear caps
- 13.3.6 Alternate corner reinforcement supported by edge beams or walls

Chapter 14 – Walls

- Out-of-plane deflection equation modified to conformed to 1997 UBC

Chapter 18

- 18.4.1 permits increase in allowable concrete compression stress immediately after prestress transfer at ends of P/T simple span members
- 18.12 requirement for structural integrity steel of two way unbonded P/T slab system

Chapter 20

- 20.2.3 equivalent f'_c from core test data (ACI 214.4R-03) not less than largest of three load combinations

Chapter 21

- Reorganized with provisions for lower SDC first and followed by high SDC
- New requirements for OMF for structures assigned to SDC B; revisions for shear and moment transfer
- Detailing of coupling beams – option for confinement of entire beam in place of confinement of individual diagonal bar groups
- Conventional coupling beams – clarify when requirement applies
- Column in SMF – rewritten in more logical sequence
- Confinement reinforcement – modified for ease of implementation
- Confinement reinforcement strength – raised to 100 ksi to help reduced congestions
- Structural walls and diaphragms – requirements for special boundary element confinement relaxed
- BM longitudinal spacing of transverse reinforcement changed from $\frac{1}{4}$ section width to $\frac{1}{3}$ section width
- Structural diaphragm – clarifications of load paths, shear strength of topping slabs and use of tendons to resist flexure

Chapter 22 – Structural Plain Concrete

- 22.1.2 Clarified scope and applicability of this chapter
- R1.1.4 Refer to “ACI 332-04” for residential construction

Appendix D – Anchoring to Concrete

- Defines two types of reinforcement for use across potential breakout cone

ACI 318-05 to ACI 318-08

James S. Lai, F. ACI, F.SEAOC

Chapter 1 – General Requirements

- 1.1.8 T 1.1.8.1 - ACI 318 change compatible with ASCE/ SEI 7 nomenclature
- Correlate SDC classification w/ former terminology of low, medium and high seismic risk

Chapter 3, 4 and 5 – Materials

- New requirements for headed shear stud reinforcement, headed deformed bars and stainless reinforcement reference to ASTM standards

Chapter 4 – Durability Requirements

- Reorganized exposure categories and classes
- Durability more parallel with international codes

Chapter 5 - Concrete quality, Mixing and Placing

- Adopt use of three 4 x 8 cylinder equivalent to two 6x12 cylinders
- Mixture proportion - Historical data limited to 12 months
- Performance criteria for flexural test (ASTM C1609) for FRC

Chapter 7 – Details of Reinforcement

- “specified cover” replaces “minimum cover”
- Structural integrity – changes to anchorage and splice, continuous top and bottom reinf., transverse reinforcement in perimeter beams

Chapter 8 – Analysis and Design – General considerations

- 8.4 permit moments redistribution away from +M as well as –M
- 8.7 Modeling procedure for evaluating lateral deflections of R/C system

Chapter 9 – Strength and Serviceability Requirements

- Spirally R/C Columns ϕ increases from 0.70 to 0.75
- Plain concrete, ϕ increases from 0.55 to 0.60

Chapter 10 – Flexure and Axial Loads

- 10.10 Slenderness effects (since 1971) updates to reflect evolution current practice of incorporating second order effects in computer analysis technique
- Moment magnifier method is retained as an alternate procedure

- Subcommittee on Design Issues (R.W. Furlong)

Nadim said that sub-committee 318-D agreed with the committee 441 request to make a change in Sec. 10.10.7.3 of ACI 318-08. The following change will be proposed for incorporation in the next ACI 318 code:

“If δ_s calculated by Eq. (10-20) exceeds 1.5, moments M_1 and M_2 at the ends of an individual compression member shall be calculated using second-order elastic analysis or δ_s shall be calculated using 10.10.7.4.”

Chapter 11 – Shear and Torsion

- Modified shear equations to better incorporate use of light weight concrete
- Headed studs requirements added to code, with better strength for V_c and V_n assigned using shear stud