Code Excerpts, References and Definitions in Uniform ES ESR #0279

ESR 0279 Section 2.1, 4.2.1, 4.6.1

ACI 318 Section 7.12 Shrinkage and temperature reinforcement
7.12.2.1 — Area of shrinkage and temperature reinforcement shall provide at least the following ratios of reinforcement area to gross concrete area, but not less than 0.0014:
(a) Slabs where Grade 40 or 50 deformed bars are used 0.0020
(b) Slabs where Grade 60 deformed bars or welded wire reinforcement are used.....0.0018
(c) Slabs where reinforcement with yield stress exceeding 60,000 psi measured at a yield strain of 0.35 percent is used ..... (0.0018 x 60000) / fy

ACI 318 Chapter 22 Structural Plain Concrete
22.1 — Scope
22.1.1 — This chapter provides minimum requirements for design and construction of structural plain concrete members (cast-in-place or precast).
22.2 — Limitations
22.2.1 — Use of structural plain concrete shall be limited to (a), (b), or (c):
(a) Members that are continuously supported by soil or supported by other structural members capable of providing continuous vertical support;
(b) Members for which arch action provides compression under all conditions of loading;
(c) Walls and pedestals. See 22.6 and 22.8. The use of structural plain concrete columns shall not be permitted.
22.2.2 — This chapter shall not govern design and installation of cast-in-place concrete piles and piers embedded in ground.

IBC Section 1901
1901.1 Scope. The provisions of this chapter shall govern the materials, quality control, design and construction of concrete used in structures.
1901.2 Plain and reinforced concrete. Structural concrete shall be designed and constructed in accordance with the requirements of this chapter and ACI 318 as amended in Section 1905 of this code. Except for the provisions of Sections 1904 and 1907, the design and construction of slabs on grade shall not be governed by this chapter unless they transmit vertical loads or lateral forces from other parts of the structure to the soil.

IRC R401.1.2
R404.1.2 Concrete foundation walls. Concrete foundation walls that support light-frame walls shall be designed and constructed in accordance with the provisions of this section, ACI 318, ACI 332 or PCA 100. Concrete foundation walls that support above-grade concrete walls that are within the applicability limits of Section R611.2 shall be designed and constructed in accordance with the provisions of this section, ACI 318, ACI 332 or PCA 100. Concrete foundation walls that support above-grade concrete walls that are not within the applicability limits of Section R611.2 shall be designed and constructed in accordance with the provisions of ACI 318, ACI 332 or PCA 100. When ACI 318, ACI 332, PCA 100 or the provisions of this section are used to design concrete foundation walls, project drawings, typical details and specifications are not required to bear the seal of the architect or engineer responsible for design, unless otherwise required by the state law of the jurisdiction having authority.

IRC Section 611.1
R611.1 General. Exterior concrete walls shall be designed and constructed in accordance with the provisions of this section or in accordance with the provisions of PCA 100 or ACI 318. When PCA 100, ACI 318 or the provisions of this section are used to design concrete walls, project drawings, typical details and specifications are not required to bear the seal of the architect or engineer responsible for design, unless otherwise required by the state law of the jurisdiction having authority

ESR 0279 Section 2.2

IBC and IRC Section 104.11
104.11 Alternative materials, design and methods of construction and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction

not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design or method of construction shall be approved where the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code

ESR 0279 Section 2.3, 5.2

Classification is normally done by the Geotechnical Engineer in accordance with the following IBC Section and Cited Tables.

Seismic Design Category (Defined in IBC Section 1613.3.5 which references ASCE 7, Chapter 11.6 for Seismic Design Category).

ASCE 7 11.6 Seismic Design Category
Structures shall be assigned a Seismic Design Category in accordance with this section.
Risk Category I, II, or III structures located where the mapped spectral response acceleration parameter at 1-s period, **S**1 , is greater than or equal to 0.75 shall be assigned to Seismic Design Category E. Risk Category IV structures located where the mapped spectral response acceleration parameter at 1-s period, **S**1 , is greater than or equal to 0.75 shall be assigned to Seismic Design Category F. All other structures shall be assigned to a Seismic Design Category based on their Risk Category and the design spectral response acceleration parameters, **SDS** and **SD**1, determined in accordance with Section 11.4.4. Each building and structure shall be assigned to the more severe Seismic Design Category in accordance with Table 11.6-1 or 11.6-2, irrespective of the fundamental period of vibration of the structure, **T** . Where **S**1 is less than 0.75, the Seismic Design Category is permitted to be determined from Table 11.6-1 alone where all of the following apply:
1. In each of the two orthogonal directions, the approximate fundamental period of the structure, **Ta** , determined in accordance with Section 12.8.2.1 is less than 0.8**Ts** , where **Ts** is determined in accordance with Section 11.4.5.
2. In each of two orthogonal directions, the fundamental period of the structure used to calculate the story drift is less than **Ts.** 3. Eq. 12.8-2 is used to determine the seismic response coefficient **Cs** .

Table 11.6-1 Seismic Design Category Based on Short Period Response Acceleration Parameter

	Risk Category	
Value of S_{DS}	I or II or III	IV
$S_{DS} < 0.167$	A	A
$0.167 \le S_{DS} < 0.33$	B	C
$0.33 \le S_{DS} < 0.50$	C	D
$0.50 \le S_{DS}$	D	D

Table 11.6-2 Seismic Design Category Based on 1-S Period Response Acceleration Parameter

	Risk Category	
Value of S_{D1}	I or II or III	IV
$S_{D1} < 0.067$	A	A
$0.067 \le S_{D1} < 0.133$	B	C
$0.133 \le S_{D1} < 0.20$	C	D
$0.20 \le S_{D1}$	D	D

See USGS for maps/estimates Short Period and 1-S Reponses Values both in the US and Worldwide. See: http://earthquake.usgs.gov/hazards/designmaps/ww

Risk Categories Defined in ASCE-7 Table 1.5-1:

Table 1.5-1 Risk Category of Buildings and Other Structures for Flood, Wind, Snow, Earthquake, and Ice Loads

Use or Occupancy of Buildings and Structures	Risk Category
Buildings and other structures that represent a low risk to human life in the event of failure	I
All buildings and other structures except those listed in Risk Categories I, III, and IV	II
Buildings and other structures, the failure of which could pose a substantial risk to human life.	III
Buildings and other structures, not included in Risk Category IV, with potential to cause a substantial economic impact and/or mass disruption of day-to-day civilian life in the event of failure.	
Buildings and other structures not included in Risk Category IV (including, but not limited to, facilities that manufacture, process, handle, store, use, or dispose of such substances as hazardous fuels, hazardous chemicals, hazardous waste, or explosives) containing toxic or explosive substances where their quantity exceeds a threshold quantity established by the authority having jurisdiction and is sufficient to pose a threat to the public if released.	
Buildings and other structures designated as essential facilities.	IV
Buildings and other structures, the failure of which could pose a substantial hazard to the community.	
Buildings and other structures (including, but not limited to, facilities that manufacture, process, handle, store, use, or dispose of such substances as hazardous fuels, hazardous chemicals, or hazardous waste) containing sufficient quantities of highly toxic substances where the quantity exceeds a threshold quantity established by the authority having jurisdiction to be dangerous to the public if released and is sufficient to pose a threat to the public if released.[a]	
Buildings and other structures required to maintain the functionality of other Risk Category IV structures.	

[a]Buildings and other structures containing toxic, highly toxic, or explosive substances shall be eligible for classification to a lower Risk Category if it can be demonstrated to the satisfaction of the authority having jurisdiction by a hazard assessment as described in Section 1.5.2 that a release of the substances is commensurate with the risk associated with that Risk Category.

ESR 0279 Section 4.2.3

ACI 318 Section 22.3
22.3.1 — Contraction or isolation joints shall be provided to divide structural plain concrete members into flexurally discontinuous elements. The size of each element shall be chosen to limit stress caused by restraint to movements from creep, shrinkage, and temperature effects.
22.3.2 — In determining the number and location of contraction or isolation joints, consideration shall be given to: influence of climatic conditions; selection and proportioning of materials; mixing, placing, and curing of concrete; degree of restraint to movement; stresses due to loads to which an element is subject; and construction techniques.

ESR 0279 Section 4.3

ACI 318 Chapter 14 - Walls (Selected Excerpts-Commonly Used Sections)
14.1 — Scope
14.1.1 — Provisions of Chapter 14 shall apply for design of walls subjected to axial load, with or without flexure.
14.1 — General
14.2.7 — Quantity of reinforcement and limits of thickness required by 14.3 and 14.5 shall be permitted to be waived where structural analysis shows adequate strength and stability.
14.3 — Minimum reinforcement
14.3.1 — Minimum vertical and horizontal reinforcement shall be in accordance with 14.3.2 and 14.3.3 unless a greater amount is required for shear by 11.9.8 and 11.9.9.
14.3.2 — Minimum ratio of vertical reinforcement area to gross concrete area, ρl, shall be:
(a) 0.0012 for deformed bars not larger than No. 5 with fy not less than 60,000 psi; or
(b) 0.0015 for other deformed bars; or
(c) 0.0012 for welded wire reinforcement not larger than W31 or D31.
14.3.3 — Minimum ratio of horizontal reinforcement area to gross concrete area, ρt, shall be:
(a) 0.0020 for deformed bars not larger than No. 5 with fy not less than 60,000 psi; or
(b) 0.0025 for other deformed bars; or
(c) 0.0020 for welded wire reinforcement not larger than W31 or D31.
14.3.7 — In addition to the minimum reinforcement
required by 14.3.1, not less than two No. 5 bars in walls having two layers of reinforcement in both directions and one No. 5 bar in walls having a single layer of reinforcement in both directions shall be provided around window, door, and similar sized openings. Such bars shall be anchored to develop fy in tension at the corners of the openings.
14.6 — Nonbearing walls
14.6.1 — Thickness of nonbearing walls shall not be less than 4 in., nor less than 1/30 the least distance between members that provide lateral support.

ESR 0270 Section 4.5

ACI 360 Section 11.3.3
11.3.3 Thickness design methods—Five methods available for determining the thickness of steel FRC slabs-on-ground are described in this section:
1. The PCA, WRI, and COE thickness design methods;
2. Elastic method;
3. Yield line method;
4. Nonlinear finite modeling; and
5. Combined steel FRC and bar reinforcement.
These design methods depend on steel FRC attaining a minimum level of residual strength. In addition, Table 11.1 provides suggested performance levels for various floor loading conditions. These values represent a compilation of performance values obtained from trade literature.

ESR 0270 Section 4.6.5

ACI 318 Section 8.5 Modulus of elasticity
8.5.1 — Modulus of elasticity, Ec , for concrete shall bepermitted to be taken as wc^
1.5 x 33 sqrt (f'c) (in psi) for values
of wc between 90 and 160 lb/ft3. For normal weight concrete, Ec shall be permitted to be taken as 57,000 x sqrt (f'c).

ESR 0270 Section 4.7.3

ACI 318 Section 10.5 — Minimum reinforcement of flexural members
10.5.1 — At every section of a flexural member

where tensile reinforcement is required by analysis, except as provided in 10.5.2, 10.5.3, and 10.5.4, As provided shall not be less than that given by

$$A_{s,min} = \frac{3\sqrt{f'_c}}{f_y} b_w d \qquad (10\text{-}3)$$

and not less than 200bwd /fy.

10.5.2 — For statically determinate members with a flange in tension, As,min shall not be less than the value given by Eq. (10-3), except that bw is replaced by either 2bw or the width of the flange, whichever is smaller.
10.5.3 — The requirements of 10.5.1 and 10.5.2 need not be applied if, at every section, As provided is at least one-third greater than that required by analysis.
10.5.4 — For structural slabs and footings of uniform thickness, As,min in the direction of the span shall be the same as that required by 7.12.2.1. Maximum spacing of this reinforcement shall not exceed three times the thickness, nor 18 in.

ESR 0270 Section 4.8

ACI 360-10 Section 11.3.3.3. Yield Line Method

Case 1: *Central load on large slab*

$$P_o = 6\left[1 + \frac{2a}{L}\right]M_o$$

For this case, express the value of M_o as

$$M_o = M_n + M_p = \left[1 + \frac{R_{e,3}}{100}\right] \times \frac{f_r \times b \times h^2}{6}$$

Case 2: *Edge load*

$$P_o = 3.5\left[1 + \frac{3a}{L}\right]M_o$$

For this case, express the value of M_o as

$$M_o = M_n + M_p = \left[1 + \frac{R_{e,3}}{100}\right] \times \frac{f_r \times b \times h^2}{6}$$

Case 3: *Corner load*

$$P_o = 2\left[1 + \frac{4a}{L}\right]M_o$$

For this case, express the value of M_o as

$$M_o = M_n = \frac{f_r \times b \times h^2}{6}$$

In the previous formulas:

- a = radius of circle with area equal to that of the post base plate, in. (mm);
- b = unit width (1 in. [1 mm]);
- f_r = concrete modulus of rupture, psi (MPa);
- h = slab thickness, in. (mm);
- L = radius of relative stiffness, in. (mm); Section 7.2;
- M_n = negative moment strength of the slab, tension at top slab surface, in.-lb (N-mm);
- M_p = positive moment strength of the slab, tension at bottom slab surface, in.-lb (N-mm);
- P_o = ultimate load strength of the slab, lb (N); and
- $R_{e,3}$ = residual strength factor determined by JSCE SF4, %.

The term $f_r[1 + R_{e,3}/100]$ is an enhancement factor that accounts for the toughness of steel FRC slabs-on-ground.

L is the radius of relative stiffness [in. (m)], equal to

$$L = \sqrt[4]{\frac{Eh^3}{12(1-\nu^2)k}} \qquad (7\text{-}3)$$

where E is elastic modulus of concrete, psi (Pa); ν is Poisson's ratio for concrete—approximately 0.15; and k is modulus of subgrade reaction, lb/in.^{3} (N/m^3).

ESR Section 4.9.1

IBC Table 722.1.1. Fire Resistance

TABLE 722.2.1.1
MINIMUM EQUIVALENT THICKNESS OF CAST-IN-PLACE OR PRECAST CONCRETE WALLS, LOAD-BEARING OR NONLOAD-BEARING

CONCRETE TYPE	MINIMUM SLAB THICKNESS (inches) FOR FIRE-RESISTANCE RATING OF				
	1 hour	1½ hours	2 hours	3 hours	4 hours
Siliceous	3.5	4.3	5.0	6.2	7.0
Carbonate	3.2	4.0	4.6	5.7	6.6
Sand-lightweight	2.7	3.3	3.8	4.6	5.4
Lightweight	2.5	3.1	3.6	4.4	5.1

For SI: 1 inch = 25.4 mm.

ESR 0270 Section 5.10

ACI 318 10.3 — General principles and requirements (relevant section only)
10.3.2 — Balanced strain conditions exist at a cross section when tension reinforcement reaches the strain corresponding to **fy** just as concrete in compression reaches its assumed ultimate strain of 0.003.

10.3.4 — Sections are tension-controlled if the net tensile strain in the extreme tension steel, **εt**, is equal to or greater than 0.005 when the concrete in compression reaches its assumed strain limit of 0.003. Sections with **εt** between the compression controlled strain limit and 0.005 constitute a transition region between compression-controlled and tension-controlled sections.

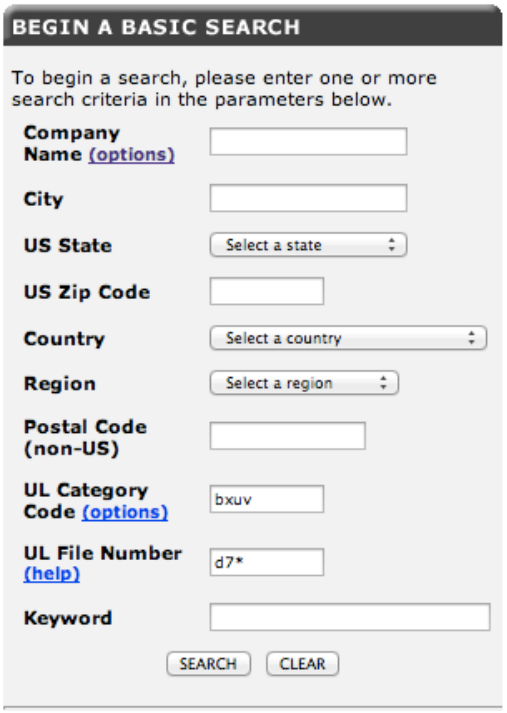
ESR Section 4.9.2

UL Assembly Nos G356, G514 and D700, D800 and D900 Series.

Details can be found on the UL.com under the Online Certifications Directory (as of 2014 the link on lower left of www.ul.com homepage, UL does move the link from time to time).

Instructions:
1. Enter UL Category Code "bxuv
2. Enter File Number:
-G365 enter UL File Number "G356"
-G514 enter UL File Number "G514"
-D700 Series G514 enter UL File Number "d7*"
-D800 Series G514 enter UL File Number "d8*"
-D800 Series G514 enter UL File Number "d9*"
3. Leave all other fields blank.
4. Click Search

Note the D700, D800 and D900 series include several assemblies each. Details for any of the assemblies may downloaded for free from the website.



Example UL Search Window

ESR Section 5.1

ASTM C1116 Section 4.1.1
4.1.1 Type I Steel Fiber-Reinforced Concrete—Contains stainless steel, alloy steel, or carbon steel fibers conforming to Specification A 820/A 820M.

ESR Section 5.3

IBC 1905.8 Mixing.
Mixing of concrete shall be performed in accordance with Sections
1905.8.1 through 1905.8.3.

1905.8.1 General.
Concrete shall be mixed until there is a uniform distribution of materials and shall be discharged completely before the mixer is recharged.

1905.8.2 Ready-mixed concrete.
Ready-mixed concrete shall be mixed and delivered in accordance with the requirements of ASTM C 94 or ASTM C 685.

1905.8.3 Job-mixed concrete.
Job-mixed concrete shall comply with ACI 318, Section 5.8.3.

ACI 318 Section 5.8.3

5.8.3 — Job-mixed concrete shall be mixed in accordance with (a) through (e):
(a) Mixing shall be done in a batch mixer of approved type; (b) Mixer shall be rotated at a speed recommended by the manufacturer;
(c) Mixing shall be continued for at least 1-1/2 minutes after all materials are in the drum, unless a shorter time is shown to be satisfactory by the mixing uniformity tests of ASTM C94; (d) Materials handling, batching, and mixing shall conform to applicable provisions of ASTM C94;
(e) A detailed record shall be kept to identify:
(1) number of batches produced;
(2) proportions of materials used;
(3) approximate location of final deposit in structure;
(4) time and date of mixing and placing.

Mixing and Placing Instructions

ACI 544.1R

(ACI 544.1R) Table 4.1 Range of mixture proportions for SFRC

Maximum aggregate size	3/8 in.* (9.5 mm)	3/4 in. (20 mm)	1-1/2 in. (38 mm)
Mixture parameters			
Cementitious material lb/yd3 (kg/m3)	600 to 1000 (356 to 593)	500 to 900 (297 to 534)	470 to 700 (279 to 415)
w/c	0.35 to 0.45	0.35 to 0.50	0.35 to 0.55
Percent of fine to coarse aggregate	45 to 60	45 to 55	40 to 55

ACI 544.1R Table 4.2 Recommended combined aggregate grading for SFRC

Maximum aggregate size	Percent Passing for maximum size of				
	3/8 in (10 mm)	1/2 in (13 mm)	3/4 in (19 mm)	1 in (25 mm)	1-1/2 in. (38 mm)
2 in. (51 mm)	100	100	100	100	100
1-1/2 in. (38 mm)	100	100	100	100	85 to 100
1 in. (25 mm)	100	100	100	94 to 100	65 to 85
3/4 in. (19 mm)	100	100	94 to 100	76 to 82	58 to 77
1/2 in. (13 mm)	100	93 to 100	70 to 88	65 to 76	50 to 68
3/8 in. (10 mm)	96 to 100	85 to 96	61 to 73	56 to 66	46 to 58
No. 4 (5 mm)	72 to 84	58 to 78	48 to 56	45 to 53	38 to 50
No. 8 (2.4 mm)	46 to 57	41 to 53	40 to 47	36 to 44	29 to 43
No. 16 (1.1 mm)	34 to 44	32 to 42	32 to 40	29 to 38	21 to 34
No. 30 (600 µm)	22 to 33	19 to 30	20 to 32	19 to 28	13 to 27
No. 50 (300 µm)	10 to 18	8 to 15	10 to 20	8 to 20	7 to 19
No. 100 (150 µm)	2 to 7	1 to 5	3 to 9	2 to 8	2 to 8
No. 200 (75 µm)	0 to 2	0 to 2	0 to 2	0 to 2	0 to 2

ASTM C33 (Excerpt) Grading Recommendations for Fine and Course Aggregate

6. Grading

6.1 *Sieve Analysis*—Fine aggregate, except as provided in 6.2, 6.3, and 6.4, shall be graded within the following limits:

Sieve (Specification E 11)	Percent Passing
9.5 mm (⅜-in.)	100
4.75-mm (No. 4)	95 to 100
2.36-mm (No. 8)	80 to 100
1.18-mm (No. 16)	50 to 85
600-µm (No. 30)	25 to 60
300-µ (No. 50)	10 to 30
150-µm (No. 100)	2 to 10

C 33

TABLE 2 Grading Requirements for Coarse Aggregates

Size Number	Nominal Size (Sieves with Square Openings)	Amounts Finer than Each Laboratory Sieve (Square-Openings), Mass Percent												
		100 mm (4 in.)	90 mm (3½ in.)	75 mm (3 in.)	63 mm (2½ in.)	50 mm (2 in.)	37.5 mm (1½ in.)	25.0 mm (1 in.)	19.0 mm (¾ in.)	12.5 mm (½ in.)	9.5 mm (⅜ in.)	4.75 mm (No. 4)	2.36 mm (No. 8)	1.18 mm (No. 16)
1	90 to 37.5 mm (3½ to 1½ in.)	100	90 to 100	...	25 to 60	...	0 to 15	...	0 to 5	...	...	...	...	...
2	63 to 37.5 mm (2½ to 1½ in.)	...	...	100	90 to 100	35 to 70	0 to 15	...	0 to 5	...	...	...	...	...
3	50 to 25.0 mm (2 to 1 in.)	...	...	...	100	90 to 100	35 to 70	0 to 15	...	0 to 5	...	...	...	...
357	50 to 4.75 mm (2 in. to No. 4)	...	...	...	100	95 to 100	...	35 to 70	...	10 to 30	...	0 to 5	...	...
4	37.5 to 19.0 mm (1½ to ¾ in.)	...	...	...	...	100	90 to 100	20 to 55	0 to 15	...	0 to 5	...	...	...
467	37.5 to 4.75 mm (1½ in. to No. 4)	...	...	...	...	100	95 to 100	...	35 to 70	...	10 to 30	0 to 5	...	...
5	25.0 to 12.5 mm (1 to ½ in.)	...	...	...	...	...	100	90 to 100	20 to 55	0 to 10	0 to 5	...	...	...
56	25.0 to 9.5 mm (1 to ⅜ in.)	...	...	...	...	...	100	90 to 100	40 to 85	10 to 40	0 to 15	0 to 5	...	...
57	25.0 to 4.75 mm (1 in. to No. 4)	...	...	...	...	...	100	95 to 100	...	25 to 60	...	0 to 10	0 to 5	...
6	19.0 to 9.5 mm (¾ to ⅜ in.)	...	...	...	...	...	...	100	90 to 100	20 to 55	0 to 15	0 to 5	...	...
67	19.0 to 4.75 mm (¾ in. to No. 4)	...	...	...	...	...	...	100	90 to 100	...	20 to 55	0 to 10	0 to 5	...
7	12.5 to 4.75 mm (½ in. to No. 4)	...	...	...	...	...	...	...	100	90 to 100	40 to 70	0 to 15	0 to 5	...
8	9.5 to 2.36 mm (⅜ in. to No. 8)	...	...	...	...	...	...	...	...	100	85 to 100	10 to 30	0 to 10	0 to 5

ASTM C150 Table 2, Low Alkali Cement

C 150 – 07

TABLE 2 Optional Composition Requirements[A]

Cement Type	Applicable Test Method	I and IA	II and IIA	III and IIIA	IV	V	Remarks
Tricalcium aluminate (C_3A)[B], max, %	See Annex A1	...	...	8	...	...	for moderate sulfate resistance
Tricalcium aluminate (C_3A)[B], max, %	See Annex A1	...	...	5	...	...	for high sulfate resistance
Equivalent alkalies ($Na_2O + 0.658K_2O$), max, %	C 114	0.60[C]	0.60[C]	0.60[C]	0.60[C]	0.60[C]	low-alkali cement

[A] These optional requirements apply only when specifically requested. Verify availability before ordering. See Note 2.
[B] See Annex A1 for calculation.
[C] Specify this limit when the cement is to be used in concrete with aggregates that are potentially reactive and no other provisions have been made to protect the concrete from deleteriously reactive aggregates. Refer to Specification C 33 for information on potential reactivity of aggregates.

References:

American Concrete Institute
38800 Country Club Dr.
Farmington Hills, MI 48331-3439 USA

- ACI 318-11 Building Code Requirements for

Structural Concrete and Commentary
- ACI 318-08 Building Code Requirements for Structural Concrete and Commentary
- ACI 360-10 Reported by ACI Committee 360 Guide to Design of Slabs-on-Ground

Available for Purchase from ACI http://www.concrete.org/Store.aspx

International Code Counsel
500 New Jersey Avenue, NW 6th Floor, Washington, DC 20001
- 2012 International Residential Code (IRC)
- 2009 International Residential Code (IRC)
  Available for viewing free at:
  http://publicecodes.cyberregs.com/icod/irc/index.htm
- 2012 International Building Code (IBC)
- 2009 International Building Code (IBC)
  Available for viewing free at:
  http://publicecodes.cyberregs.com/icod/ibc/2012/index.htm
  IRC and IBC are available for purchase at http://shop.iccsafe.org/

American Society of Civil Engineers
1801 Alexander Bell Drive
Reston, VA 2019
- ASCE 7 Minimum Design Loads for Buildings and Other Structures
  Available at http://www.asce.org/sei

American Society for Testing and Materials (ASTM)
100 Barr Harbor Drive, West Conshohocken, Pennsylvania, USA

- ASTM C1116 Standard Specification for Fiber-Reinforced Concrete
  http://www.astm.org/Standards/C1116.htm
- *ASTM C685: Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing*
  http://www.astm.org/Standards/C685.htm
- *ASTM C94: Standard Specification for Ready-Mixed Concrete*
  http://www.astm.org/Standards/C94.htm

Underwriters Laboratory
333 Pfingsten Road
Northbrook, IL 60062-2096
U.S.A.

See Fire Resistant Assembly Information at UL.com (free)