

(ISO) (ASTM) (DIN) (AFNOR) (B.S.I.)
ACI

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2		
7 - 3		
30 - 8		
38 - 31		
47 - 39		
54 - 48		
64 - 55		
67 - 65		
70 - 68		
76 - 71		
85 - 77		
93 - 86		
96 - 94		
102 - 97		
138 - 103		
141 - 139		

الباب الأول

الأعمال الترابية

(7)

(3)

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20

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. (10)

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(30)

(60)

(uplift pressure). (1.5)



(a-b)

(2-1)

:-3-1

D-

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(ASTM) 2487

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a) Liquid limit = 40

b) Plasticity index = 10

B.S.I part/3 :

(a)

/1377/990

water-soluble

(SO4)

ACI 318-2002

(27)

.type v

(b)

25

%4 - %2+

% 90

(c)

" %95

(Dr)

(d)

:-

(3-1)

grade level

:- **4-1**

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(a)

. 25 / 6 (saturation extract electricity conductivity)

.8.5 6.5 (ph) (b)

% 10 4 (c)

(d)

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-2

الباب الثاني

الأعمال الخرسانية

(35)

(9)

1-2 :-

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(fc')

ACI 318-2002

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ACI 318-2002

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-1

1989/381 . .

131

383/

1989 - 382

1989

384

89

ASTMC150

-2

1/2

2/2

5

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1/2/2

2/2/2

3/2/2

2002/94

(1)

.BS 882 & BS 812

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5

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1/3/2

2/3/2

(2)
2002/94

(BS 882 & BS 812)

4/2

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(1)

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(3)

.BS 8 2

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(1)

								()
* 5	10	14	20	40	- 14 5	- 20 5	- 40 5	
-	-	-	-	100	-	-	100	50.0
-	-	-	100	100-85	-	100	100-90	37.5
-	-	100	100-85	25-0	100	100-90	70-35	20.0
-	100	100-85	70-0	-	100-90	80-40	55-25	14.0
100	100-85	50-0	25-0	5-0	85-50	60-30	40-10	10.0
100-45	25-0	10-0	5-0	-	10-0	10-0	5-0	5.0
30-0	5-0	-	-	-	-	-	-	2.36

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(2)

				()
-	-	-	100	10.0
-	-	-	100-89	5.0
100-80	100-65	100-60	100-60	2.36
100-70	100-45	90-30	100-30	1.18
100-55	80-25	54-15	100-15	600
70-5	48-5	40-5	70-5	300
-	-	-	*15-0	150

%20

(3)

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5	10	20	40	
-	-	-	100	() 50.0
-	-	100	100-95	37.5
-	-	100-95	80-45	20.0
-	100	-	-	14.0
100	100-95	-	-	10.0
100-70	65-30	55-35	50-25	5.00
100-25	50-20	-	-	2.36
45-15	40-15	-	-	1.18
25-5	30-10	35-10	30-8	600
20-3	15-5	-	-	300
15-0	* 8-0	* 8-0	* 8-0	150

%10

(4)

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3.0	3.0	
2.00	4.0	75
0.50	0.50	
50	-)
40	-	()

(5)

	%10	
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(%) (()	
25	150	
30	100	
45	50	

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1/3

1/1/3

(1)

2/1/3

(2)

3/1/3

(3)

4/1/3

.%3 (2002/1238 2002/1237)

2/3

(4)

1/2/3

%95

2/2/3

(6)

42 28 (7)

(6)

	0.01
	0.03

(7)

	0.08
	0.2
	1.33
	0.4

3/2/3

(TOTAL SO₃)

(4000) % 0.4

%5

4/2/3

volcanic

:

BRE 330

glass forms

Acid $\text{Na}_2\text{O}_{\text{eq}} = 0.76 \text{ Cl}^-$ Cl^-
 0.75 water soluble Soluble
 :

% 0.01 =
 % 0.013 = 0.01 =
 0.75

Volcanic Glass Forms -

- ASTM C 295

.³ / 3.5

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(ASTM C 227)

(2002 / 1246)

.(ASTM C 586)

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5/2/3

.(4)

() 6/2/3

.(4)

75 7/2/3

) %50

.(
() 4/3/3

.(8)
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(8) •

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10	12	
15	18	

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. 4 /3/3

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(75)

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% 10

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(soundness)

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NO	TEST NAME	Stander
1	PETROGRAPHIC EXAMINATION OF AGGREGATE	ASTM C295
2	PARTICLE SIZE DISTRIBUTION	BS 812S.103.1- K.SS1233/2002
3	SPECIFIC GRAVITY	ASTM C127
4	WATER ABSORPTION	ASTM C127
5	UNIT WEIGHT	ASTM C29 –K.SS1239/2002
6	PARTICLE DENSITY	B.S 812.P2-K.SS1239/2002
7	% VOIDS	ASTM C29 –K.SS1239/2002
8	CLAY LUMPS AND FRIABLE PARTICLES	ASTM. C142 -K.SS1241/2002
9	% PASSING NO. 200 SIEVE	B.S 812
10	SHELL CONTENT	BS 812P106-K.SS1240/2002
11	FLAKINESS INDEX	BS 812S.105.1-K.SS1235/2002
12	ELONGATION INDEX	BS 812S.105.2-K.SS1236/2002
13	CRUSHING VALUE	BS 812P110-K.SS1245/2002
14	10%FINES VALUE	BS 812P111-K.SS1244/2002
15	IMPACT VALUE	BS 812P112-K.SS1243/2002
16	RESISTANCE TO DEGRADATION (LOS ANGELES)	ASTM. C131 K.SS1242/2002
17	SOUNDNESS	ASTM .C88- K.SS1246/2002
*18	POTENTIAL. REACTIVTTY OF AGGREGATE (CHEMICAL, METHOD)	ASTM.C289- KSS1246/2002
*19	POTENTIAL ALKALI REACTIVTTY OFCEMENT AGGRGATES COMBINATIONS MORTAR BAR METHOD)	ASTM. C227 &K.SS1246/2002

*20	POTENTIAL ALKALI REACTIVITY OF CARBONATE ROCKS FOR CONCRETE AGGREGATES (ROCK CYLINDERS METHOD))	ASTM. C586
21	ACID SOLUBLE SULPHATE CONTENT (AS SO ₃ ,)	BS 812P118 –K.SS1247/2002
22	WATER SOLUBLE CHLORIDEION CONTENT	BS 812P117 –K.SS1247/2002
23	MOISTURE CONTENT OF AGGREGATE	
24	LIGHTWEIGHT PIECES IN AGGREGATE	ASTM. C123
25	CHEMICAL, ANALYSIS	_____
26	LONG-TERM PERFORMANCE OF CONCRETE USING AGGREGATE SOURCE	

(16) ()

B.S3148

B.S3148

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(ASTM-A-615)

(a

(b

(ASTM -A- 497)

(ASTM -A- 185)

(c

ASTM)

(...)

.()

(AWS D1.Y

(SMAW FILLET WELDS)

E.70)

ACI 318

:- : 3-2

(a)

(2-2)

(b)

(c)

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(d)

fc'r

(

(W/C)

fc

(e)

:

-1

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() ³ 115 .1.1

. ² 450 .1.2

-2

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150*150*150 6 -3

. 7 (2) 3.1

. 28 (2) 3.2

. (2) 3.3

28 -4

.

-5

%15

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(f)

28

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-1

fc

fc-3.5) () -2

44.0 MPa fc cube (MPa

44.0MPa fc cube 0.1fc

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(g)

∴ : 4-2

(a)

(WORKABILITY)

. 10

fc' 150*300 cyl 28 days	Fc' 150*150*150 cube 28 days	fc'r 150*150*150 cube 28 days
20 MPA (2900 psi)	25 MPA	35 MPA
25 MPA (3625 psi)	30 MPA	40 MPA
4000 psi (27.6) MPA	343 kg/cm2	440 kg/cm2
4500 psi (31) MPA	394 kg/cm2	500 kg/cm2
5000 psi (34.5) MPA	44.2MPA (450 kg/cm2)	550 kg/cm2

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1MPA = 10.197 kg/cm² •

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fc'r **

(b)

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ACI 211-

ACI 318

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(c)

(d)

(ASTM C-94)

Design Of Formwork

- 1- Forms shall result in a final structure that conforms to shapes, lines, and dimensions of the members as required by the design drawings and specifications.
- 2- Forms shall be substantial and sufficiently light to prevent leakage of mortar.
- 3- Forms shall be properly braced or tied together to maintain position and shape
- 4- Forms and their supports shall be designed so as not to damage previously placed structure.
- 5- Design of formwork shall include consideration of the following factors:
 - 5-1 rate and method of placing concrete
 - 5-2 construction loads, including vertical, horizontal, and impact loads
 - 5-3 special form requirements for construction of shells, floded plates, domes, architectural concrete , or similar types of elements .
- 6- Forms for prestressed concrete members shall be designed and constructed to permit movement of the member without damage during

application of prestressing force

Construction joints

- 1- Surface of concret construction joints shall be cleaned and laitance removed.
- 2- Immediately before new concret is placed, all construction joints shall be wetted and standing water removed.
- 3- Construction joints shall be so made and located as not to impair the strength of the structure. provision shall be made for transfer of shear and other forces through construction joints .
- 4- Construction joints in floors shall be located within the middle third of spans of slabs, beams, and girders. Joints in girders shall be offset a minimum distance of two times the width of intersecting beams.
- 5- Beams, girders, or slabs supported by columns or walls shall not be cast or erected until concrete in the vertical support members is no longer plastic.
- 6- Beams, girders, haunches, drop panels, and capitals shall be placed monolithically as part of a slab system, unless otherwise shown in design drawings or specifications.

-(PLACING)_____: 5-2
(a)

(ACI 347 - ACI 318)
(b)

(c)

(d)

(e)

(f)

(0.25) (POLYTHENE)

(48)

(g)

(h)

(i)

(ACI224.3-2R)

-: : 6-2

(a)

.(ACI - 304 2R)

(b)

(c)

(d)

(e)

7-2

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(truck mixer)

(non-agitating equipment)

ACI 318

ACI

B.S1881

318

ACI 318

ASTM-C42

(ACI318)

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TABLE 4.2.2 REQUIREMENT FOR SPECIAL EXPOSURE CONDITIONS

EXPOSURE CONDITION	MAXIMUM WATER-CEMENTITIOUS MATERIALS RATIO * BY WEIGHT ,NORMALWEIGHT, AGGREGATE CONCRETE	MINIMUM FC' NORMAL WEIGHT CONCRETE FOR CYLINDER Kglcm2	MINIMUM FCU NORMAL WEIGHT CONCRETE FOR CUBE 15X15X15cm Kg/cm2
CONCRETE INTENDED TO HAVE LOW PERMEABILITY WHEN EXPOSED TO WATER	0.50	280	343

CONCRETE EXPOSED TO FREEZING AND THAWING IN A MOIST CONDITION OR TO DEICING CHEMICALS	0.45	316	394
FOR CORROSION PROTECTION OF REINFORCEMENT IN CONCRETE EXPOSED TO CHLORIDES FROM DEICING CHEMICALS , SALT, SALT WATER , BRACKISH WATER , SEAWATER, OR SPRAY FROM THESE SOURCES	0.40	350 (34.5 MPA)	450

* When both table 4.3.1 and table 4.2.2 are considered , the lowest applicable maximum w/cm and highest applicable minimum fc' shall be used .

-: _____ -2

(TYPE V)

(ASTMC150)

1989 382

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TABLE 4.3.1

SULPHATE EXPOSURE	WATER SOLUBLE SULPHATE (SO4) SOIL	SULPHAT (S04) IN WATER PPM	CEMET TYPE	NORMAL WEIGHT AGGREGATE CONCRETE	Min F.C Kg/cm2 for CYLINDER	Min F.C Kg/cm2 for cube 15×15×15
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	PERCENT BY WEIGHT			MAXIMUM WATER CEMENT RATIO, BY MASS	-	-
NEGLIGIBLE	0.00 < SO4 < 0.10	0 < SO4 < 150	V.	-	-	-
MODERATE	0.10 < SO4 < 0.20	150 < SO4 < 1500	V.	0-50	281	343
SEVERE	0.20 < SO4 < 2.00	1500 < SO4 < 10.000	V.	0.45	316	394
VERY SEVERE	OVER 2.00	OVER 10.000	V.PLUS POZZOLAN	0.45	316	394

* When both table 4.3.1 and table 4.2.2 are considered , the lowest applicable maximum w/c and highest applicable minimum fc' shall be used .

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.(B.S 6949)

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%5

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%10

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.(70 C + 80% R.H)

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4

WATER)

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ACI 224.3 R-2

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water-soluble

(B.S 1377/1990; PART3)

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-(G.F.R.C) ()

(G.F.R.C)

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1- ACI 544.1 R-96 FIBER REINFORCED CONCRETE

2- GFRC.

RECOMMENDED PRACTICE FOR GLASS FIBER REINFORCED CONCRETE PANELS

PCI(PRECAST CONCRETE INSTITUTE)

3- CEM- FIL INTERNTIONAL LIMITED -ENGLAND

G.F.R.C.

(a

ASTM C 150

131 . . .

(%17)

(b

(SUPER PLASTICISER)

(c

-:

(d

METHOD OF MIXING	HAND SPRAY	PREMIX
LIMIT OF PROPORTIONALITY	MIN. 70 KG/CM ²	MIN. 50 KG/CM ²
MODULUS OF RUPTURE	MIN. 210 KG/CM ²	MIN. 100 KG/CM ²
COMPRESSIVE STRENGTH	MIN. 400 KG/CM ²	MIN. 400 KG/CM ²
DENSITY	1.9- 2.2 TON/M ³	NOT LESS THAN 1.8/M

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. 1991 PART5 1048DIN

. 6.5.7.5 24 1988 1045DIN

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. TABLE 4.2.2

B.S.5075

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General:

Movement joints (expansion and contraction) and construction joints shall be designed to prevent cracking , spalling and reinforcement corrosion . the number , spacings, and details of joints shall be designed taking full account of the physical properties and the ability of the filter , sealant , and waterstop materials to sustain cycles of deformations .

Refer to chapter 6 and ACI 504R ^{4.41} for the designed and details of movement and construction joints . bulb type waterstops are recommended for movement joints . the bulb size and construction of the waterstop influence the capability of the joint to sustain both out-of-plane and in-plane movements while maintaining liquid-tightness.

Waterstops:

Materials used for waterstops to stop the flow of liquids or gases shall be able to sustain movement deformations (elongation and contraction) without permanent deformation or failure and shall be resistant to freeze-thaw cycles , and temperature and chemical effects .

Sealants :

Joint sealants shall be provided along the exposed perimeter of the joints to exclude liquids or gases and to prevent solids from entering the joint that may impair the functioning of the joint. Sealants shall be designed to sustain the required pressures, temperatures , and movements and shall not debond or degrade under the expected chemical or gas attack and shall be resistant to the required pressures , temperatures and movements .

Movement joints:

The designed shall consider and provide for volume changes in a manner that will minimize damage to the structure .

: (POLYTHENE SHEET) : 10-2

(0.25) 1000

(OVERLAP)

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(1)