

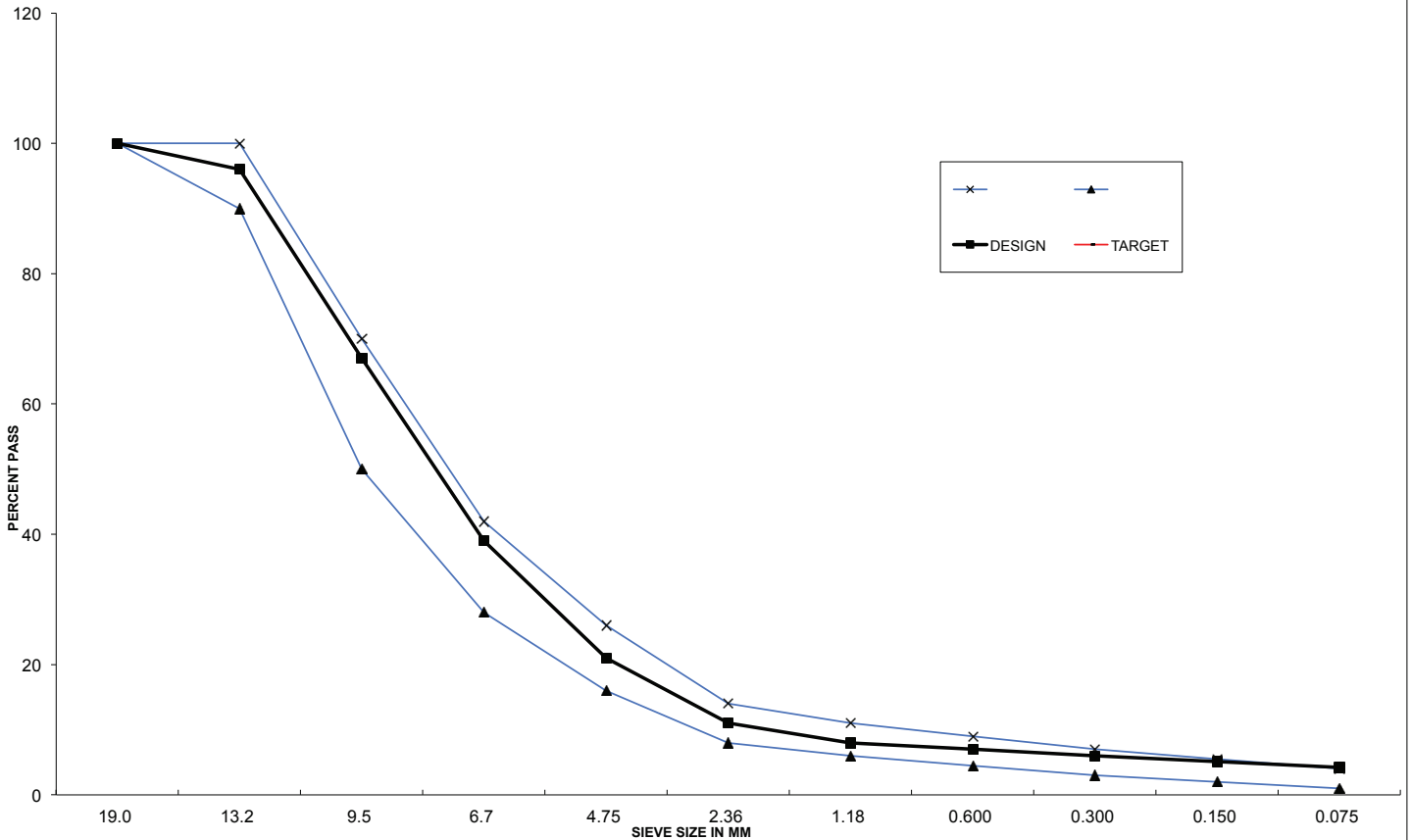
MIX TYPE OG14

Sieve mm	Design TARGET	Sunshine Coast Q (Moy Pocket)									Binder Type		Fibre	0.0%	
											All	Sasol	0.0%		
		DESIGN	20mm	14mm	10mm	5/7mm	C/Dust	Med. Sand	F/Sand	Baghouse	Lime Filler	Binder %	4.75	RTA Spec	Mix Design Nominate
		100.0	0.0	37.5	35.5	15.5	10.5	0.0	0.0	0.0	1.0				
37.5	100	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100	100		100.0
26.5	100	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100	100		100.0
19.0	100	95.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100	100		100.0
13.2	94	11.0	85.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	90	100		96.0
9.5	64	3.0	10.0	95.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	50	70		67.0
6.7	34	2.0	1.0	21.0	94.0	100.0	100.0	100.0	100.0	100.0	100.0	28	42		39.0
4.75	16	2.0	1.0	3.0	20.0	98.0	100.0	100.0	100.0	100.0	100.0	16	26		21.0
2.36	10	1.0	1.0	2.0	1.0	74.0	95.0	100.0	100.0	100.0	100.0	8.0	14		11.0
1.18	7.5	1.0	1.0	1.0	1.0	53.0	81.0	100.0	100.0	100.0	100.0	6.0	11		8.0
0.600	5.9	1.0	1.0	1.0	1.0	38.0	45.0	98.0	100.0	100.0	100.0	4.5	9.0		7.0
0.300	4.8	1.0	1.0	1.0	1.0	28.0	5.0	92.0	100.0	100.0	100.0	3.0	7.0		6.0
0.150	3.9	1.0	1.0	1.0	1.0	19.0	1.0	25.0	98.0	98.0	98.0	2.0	5.5		5.1
0.075	2.7	0.5	0.5	0.5	0.5	12.5	0.5	2.0	90.0	90.0	90.0	1.0	4.0		4.2

Mix Volume Ratio (<0.95)	N/A	Effect Binder Volume (Min 10.0)	8.3	Air Void (min 13%)	13.8	VMA (n/a)	22.1	Filler/Binder Ratio	0.9
Fixed Binder Fraction (n/a for OG)	0.45	Free Binder Volume (5.5-8.0)	4.5	BFT (min 15%)	12.7	VFB (n/a)	37.4		

	Particle Density (Coarse Agg)	2.624	Density of Binder	1.04
	Particle Density (Fine Agg)	2.591	Comp. Density	2.091
	Filler APD	2.502	Max Density	2.427
	VDCF	53	Unit Mass - Dry Agg	
Assumed Values	Combined Filler < 75um	4.2	Water Abs (Coarse)	1.09
Particle Density & Water Absorption Values from TMR testing			Water Abs (Fine)	1.38

MODEL



Mix Volume Ratio - Q318

Method
Q308A
Q308D

Sieve	% Passing
19	100
13.2	96
9.5	67
6.7	39
4.75	21
2.36	11
1.18	8.0
0.6	7.0
0.3	6.0
0.15	5.1
0.075	4.2
Binder %	4.75

**** Linked Cells****

	(Pc)	Proportion of Coarse Aggregate in the total Aggregate Retained >4.75mm	79
Q214	(p _D)	Particle Density of Dry Coarse Aggregate (Record to nearest 0.001t/m ³)	2.624
			Average Result
Q221B	(p _c)	Compacted Unit Mass of Combined Coarse Aggregate (Record to nearest 0.001t/m ³)	0.000
Q306C	(D _c)	Determine Compacted Density of mix (Record to nearest 0.001t/m ³)	2.091

Calculations

	(V _c)	Volume of Coarse Aggregate in mix	59.96	$V_c = \frac{P_c D_c (100 - B)}{100 p_D}$
	(V _v)	Void Volume in Compacted Coarse Aggregate	100.00	$V_v = 100 \left(1 - \frac{P_c}{p_D} \right)$
	MVR	Mix Volume Ratio for the Mix	0.40	$MVR = \frac{100 - V_c}{V_v}$

Free Binder Volume - Q321

Method Q308A Q308D		Sieve	% Passing
		19	100
		13.2	96
		9.5	67
		6.7	39
		4.75	21
		2.36	11
		1.18	8.0
		0.6	7.0
		0.3	6.0
		0.15	5.1
		0.075	4.2
	B	Binder %	4.75

** Linked Cells**

(*Values based on Production*)

(*Value based on Production*)

Q214B	(P_c)	Proportion of Coarse Aggregate (Report to nearest 0.1%)	79
--------------	------------------------	--	-----------

(*Calculated*)

Q214A	(P_f)	Proportion of Fine Aggregate (Report to nearest 0.1%)	16.8
--------------	------------------------	--	-------------

(*Calculated*)

Q211 Q316	b	Binder Absorption of aggregate (% by mass of the aggregate) (Report to the nearest 0.01%)	0.63
----------------------	----------	---	-------------

$$b = 0.55(P_c W_{Ac} + P_f W_{Af})$$

Proportion of Coarse and Fine Aggregate based on (Total-filler)

Q214B	(WA_c)	Water Absorption of Coarse Aggregate > 4.75 (Report to the nearest 0.01%)	1.09
--------------	-------------------------	--	-------------

(*Value obtained from Mix Design*)

Q214A	(WA_f)	Water Absorption of Fine Aggregate > 4.75 (Report to the nearest 0.01%)	1.38
--------------	-------------------------	--	-------------

(*Value obtained from Mix Design*)

Q331	(D_b)	Density of Binder (Report to the nearest 0.001t/m3)	1.04
-------------	------------------------	--	-------------

C170,C320, C600 and Multigrade binders may be determined as 1.03t/m3
Polymer Modified Binders may be determined as 1.02t/m3

Q306A Q306C	(D_c)	Determine Compacted Density of mix (Record to nearest 0.001t/m3)	2.091
------------------------	------------------------	---	--------------

(*Value obtained from Mix Design*)

	(F)	Determine proportion of Combined Filler (Record to nearest 0.1%)	4.2
--	------------	---	------------

(*Value to be based on nominated 75um % passing*)

	(P_{fill})	Apparent Particle Density of Combined Filler (Report to the nearest 0.001t/m3)	2.502
--	---------------------------	---	--------------

(*Value theoretically assumed from know APD values of Filler - Refer APD Spreadsh

AS1141.17	(V)	Voids in Dry Compacted Filler (Report to the nearest 1%)	53
------------------	------------	---	-----------

(*Value theoretically assumed from know APD values of Filler - Refer APD Spreadsh

Calculations

Q311	(V_b)	Effective Binder Volume (Unabsorbed)	8.3	$V_B = \frac{D_c}{D_B} (B - b)$
	(V_f)	Fixed Binder Volume	3.8	$V_F = \frac{F}{P_{fill}} \frac{V}{(100 - V)} \frac{D_c}{100} (100 - B)$
Q321	(V_{free})	Free Binder Volume	4.5	$V_{free} = V_B - V_F$
Q321	(FBF)	Fixed Binder Fraction	0.45	$FBF = V_B / V_F$

BINDER FILM THICKNESS

Measurement	Symbol	Result		
Particle Density of Coarse Aggregate on a dry basis (t/m ³)	pc	2.624		
Particle Density of Fine Aggregate on a dry basis (t/m ³)	pf	2.591		
Apparent Density of Filler (using flyash) (t/m ³)	pfill	2.50		
Proportion of coarse aggregate (%)	Pc	79.0	Total 100.00	
Proportion of fine aggregate (%)	Pf	16.8		
Proportion of filler (%)	Pfill	4.2		
Water Absorption Coarse Agg	WA _c	1.09		
Water Absorption Fine Agg	WA _f	1.38		
Total Binder Content	B	4.75	4.60	4.50
Binder Absorption	b	0.63		
Effective Binder Content	Be	4.12	3.97	3.87
Density of Binder	Db	1.03		
Calculation				
Pc / pc		30.107		
Pf / pf		6.484		
Pfill / pfill		1.679		
Particle den. of combined min. agg. (t/m ³)	pa	2.613		
Specific Surface Area				
Sieve Size	% Passing (P)	Factor (F)	P x F	
Maximum Size (19.0)	100.0	0.41	41.00	
4.75	21.0	0.41	8.61	
2.36	11.0	0.82	9.02	
1.18	8.0	1.64	13.12	
0.600	7.0	2.87	20.09	
0.300	6.0	6.14	36.84	
0.150	5.1	12.29	62.68	
0.075	4.2	32.17	135.11	
Sum			326.47	
SSA = (SUM x (2.65 / 100 pa))			3.31	

Binder Film Thickness

Tf

12.7

12.2

11.9

Theoretical Combined Filler Results

Typical Values		
Filler Type	APD	VDCF
Naturals	2.750	38
Flyash	2.150	51
Hydrated Lime	2.300	55
Bag House	2.750	38
Agg Lime	2.720	32

Typical Grading				
1.18	0.600	0.300	0.150	0.075
100.0	100.0	100.0	99.0	93.0
100.0	100.0	99.3	96.9	92.5
100.0	100.0	99.8	95.0	81.0
100.0	99.6	94.7	84.5	72.1

Mix Design	Total %	Enter % of each Filler in Mix Design				
	< 75um	Naturals	Flyash	Hydrated	Baghouse	Lime
OG14	4.0	3.0	0.0	0.0	0.0	1.0

Calculated Value	
APD	VDCF
2.743	36.5