



Certificate # 3512.05

Construction Materials Testing Laboratory **FUGRO - SUHAIMI**
Jubail Branch

P.O. Box 2165 - Tel.: (013) 341 2700
Dammam 31451 - Fax.: (013) 341 2701
Saudi Arabia - E-mail.: fsljubail@fugro-suhaimi.com



SUMMARY OF TEST REPORT

Client	A.H. Al Marhoon & Bros. Co.	Job No.	SA08-3012
Project	Concrete Batch Plant, Rahima	Lab No.	12869
Material	3/4" (20 mm) Coarse Aggregate	Date Sampled	03 Feb 2016
Source	Al Osais, Abuhadriya (Sampled by FSL)	Date Reported	15 Feb 2016

Properties:

Properties Tested	Test Method	Results	S. Aramco Specification
Sieve analysis	ASTM C-136	See Attached	--
Material finer than No. 200 sieve %	ASTM C-117	0.7	5.0 max.
Clay lumps & friable particles %	ASTM C-142	0.5	5.0 Max.
Los Angeles Abrasion	ASTM C-131		
Loss at 100 revolutions %		8.5	--
Loss at 500 revolutions %		33.8	40 max.
Ratio 100/500 rev.		0.25	--
Magnesium sulfate soundness loss (5 cycles) %	ASTM C-88	9.5	25.0 max.
Specific gravity and absorption	ASTM C-127		
Apparent		2.628	--
SSD basis		2.582	--
Dry basis		2.554	--
Absorption		1.096	2.5 max
Acid soluble chloride, (Cl), %	ASTM C 114	0.020	0.03 max
Acid soluble sulphate (SO ₃), %	BS-812 Part 118	0.210	0.40 Max
Flakiness index	BS-812	6.9	--
Elongation index	BS-812	9.6	--
Coal & lignite	ASTM C-123	Nil	--

Remarks: All test results indicate compliance with the Saudi Aramco standard 09-SAMSS-088.

Tested By: CBB Reviewed By: Imran Ahmed
CTTA # : 0428 CTTA # : 0556



Sr. Laboratory Supervisor
Muhammad Nawaz CTTA # 0037

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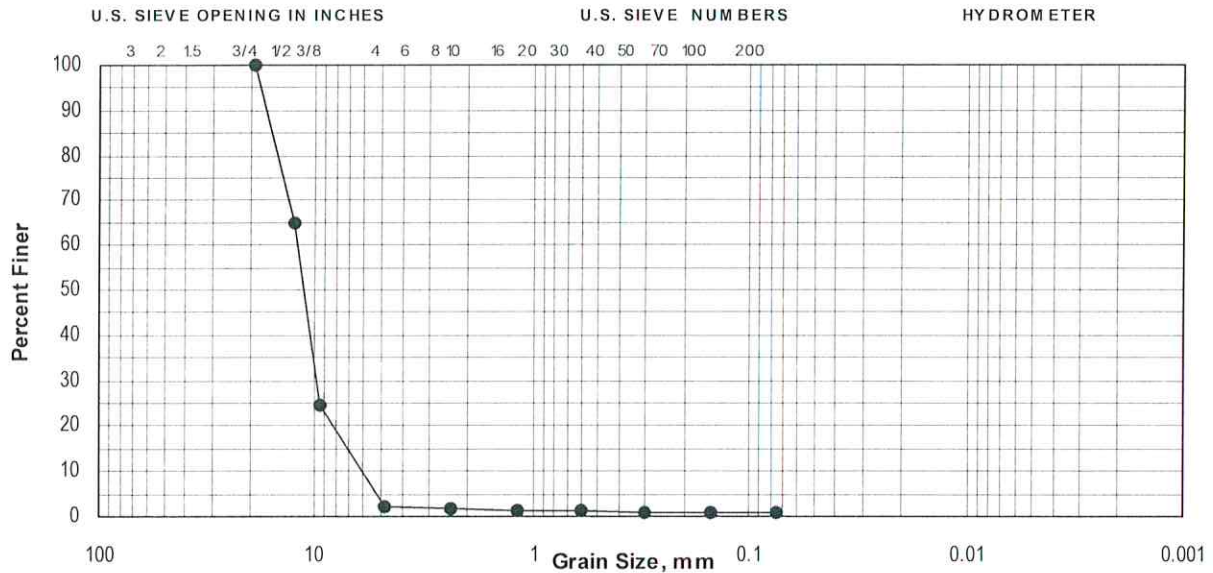
**Construction Materials Testing Laboratory
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PARTICLE SIZE ANALYSIS TEST REPORT

Client	A.H. Al Marhoon & Bros. Co.	Job No.	SA08-3012
Project	Concrete Batch Plant, Rahima	Lab No.	12869
Material	3/4" (20 mm) Coarse Aggregate	Date Sampled	03 Feb 2016
Source	Al Osais, Abuhadriya (Sampled by FSL)	Date Tested	04-06 Feb 2016
Method	ASTM C-136/117	Date Reported	15 Feb 2016



Gravel		Sand			Silt or Clay
Coarse	fine	Coarse	medium	fine	

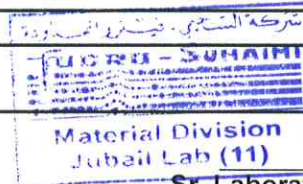
Description of Sand / Gravel Particles:

Shape	Hardness	Specific Gravity

Sieve Size Inch(mm)	Passing %	Specification	Properties Tested		
			Item	Description	Result
1 (25.0 mm)					
3/4 (19 mm)	100				
1/2 (12.5 mm)	64.8				
3/8 (9.5 mm)	24.5				
#4 (4.75 mm)	2.4				
#8 (2.36 mm)	1.6				
#16 (1.18 mm)	1.5				
#30 (0.600 mm)	1.1				
#50 (0.300 mm)	0.95				
#100 (0.150 mm)	0.82				
#200 (0.075 mm)	0.71				

Remarks	
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Tested By: CBB Reviewed By: Imran Ahmed
CTTA # : 0428 CTTA # : 0556



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Client	A.H. Al Marhoon & Bros. Co.	Job No.	SA08-3012
Project	Concrete Batch Plant, Rahima	Lab No.	12870
Material	3/8" (10- mm) Coarse Aggregate	Date Sampled	03 Feb 2016
Source	Al Osais, Abuhadriya (Sampled by FSL)	Date Reported	15 Feb 2016

Properties:

Properties Tested	Test Method	Results	S. Aramco Specification
Sieve analysis	ASTM C-136	See Attached	--
Material finer than No. 200 sieve %	ASTM C-117	0.94	5.0 max.
Clay lumps & friable particles %	ASTM C-142	0.7	5.0 max.
Los Angeles Abrasion	ASTM C-131		
Loss at 100 revolutions %		8.7	--
Loss at 500 revolutions %		34.8	40 max.
Ratio 100/500 rev.		0.25	--
Magnesium sulfate soundness loss (5 cycles) %	ASTM C-88	13.15	25.0 max.
Specific gravity and absorption	ASTM C-127		
Apparent		2.636	--
SSD basis		2.575	--
Dry basis		2.538	--
Absorption		1.5	2.5 max
Acid soluble chloride, (Cl), %	ASTM C 114		
(Cl), %		0.016	0.03 max
Acid soluble sulphate (SO ₃), %	BS-812 Part 118	0.332	0.40 Max
Flakiness index	BS-812	8.12	--
Elongation index	BS-812	10.11	--
Coal & lignite	ASTM C-123	Nil	--

Remarks: All test results indicate compliance with the Saudi Aramco standard 09-SAMSS-088.Tested By: CBB Reviewed By: Imran Ahmed
CTTA # : 0428 CTTA # : 0556Sr. Laboratory Supervisor
Muhammad Nawaz CTTA # 0037

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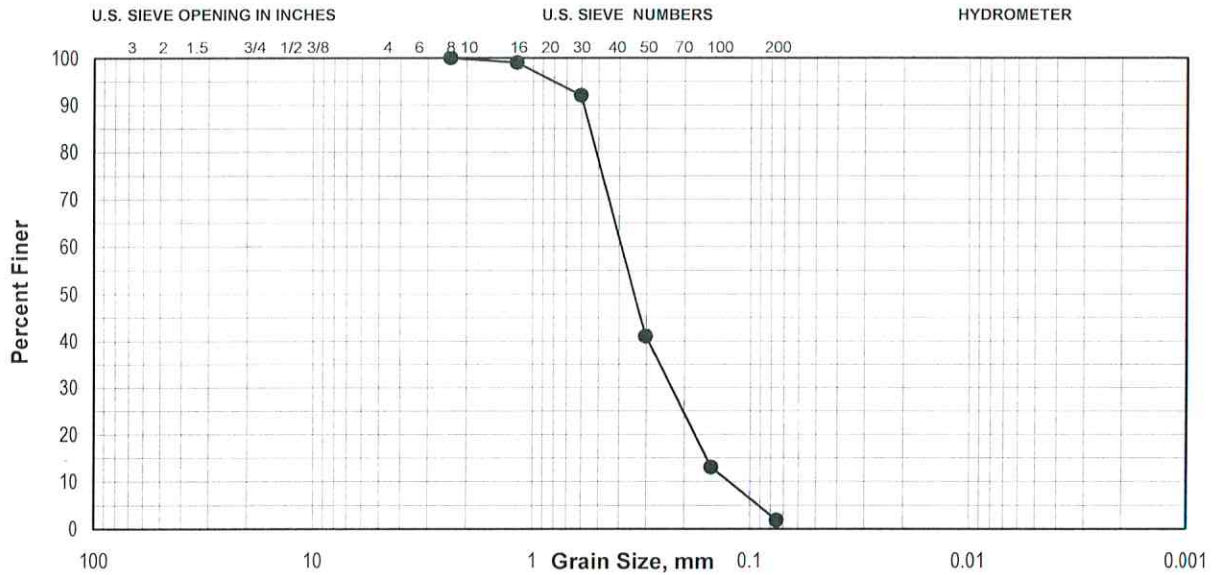
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PARTICLE SIZE ANALYSIS TEST REPORT

Client	A.H. Al Marhoon & Bros. Co.	Job No.	SA08-3012
Project	Concrete Batch Plant, Rahima	Lab No.	12871
Material	Sand	Date Sampled	03 Feb 2016
Source	Baladiyah, Jubail (Sampled by FSL)	Date Tested	04-06 Feb 2016
Method	ASTM C-117/136	Date Reported	15 Feb 2016



Gravel		Sand			Silt or Clay
Coarse	fine	Coarse	medium	fine	

Description of Sand / Gravel Particles:

Shape	Hardness	Specific Gravity

Sieve Size Inch(mm)	Passing %	Specification	Properties Tested		
			Item	Description	Result
#8 (2.36 mm)	100				
#16 (1.18 mm)	99				
#30 (0.600 mm)	92				
#50 (0.300 mm)	42				
#100 (0.15 mm)	13				
#200 (0.075 mm)	1.8				

Remarks	
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Tested By: CBB Reviewed By: Imran Ahmed
CTTA # : 0428 CTTA # : 0556

FUGRO - SUHAIMI
Material Division
Jubail Lab (11)
Sr. Laboratory Supervisor
Muhammad Nawaz CTTA # 0037



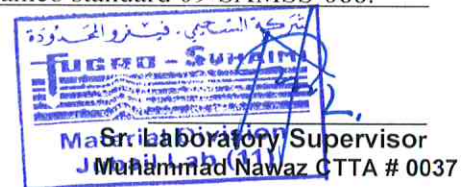
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Saudi Arabia – E-mail.: fsljubail@fugro-suhaimi.com**SUMMARY OF TEST REPORT**

Client	A.H. Al Marhoon & Bros. Co.	Job No.	SA08-3012
Project	Concrete Batch Plant, Rahima	Lab No.	12871
Material	Dune Sand	Date Sampled	03 Feb 2016
Source	Baladiyah, Jubail (Sampled by FSL)	Date Reported	15 Feb 2016

Properties:

Properties Tested	Test Method	Results	S. Aramco Specification
Sieve analysis	ASTM C-136	See Attached	--
Material finer than No. 200 sieve %	ASTM C-117	1.8	5.0 Max.
Clay lumps & friable particles %	ASTM C-142	N/A	3.0 Max.
Magnesium sulphate soundness loss (5 cycles) %	ASTM C-88	6.7	25.0 Max.
Specific gravity and absorption	ASTM C-127		
Apparent		2.643	--
SSD basis		2.605	--
Dry basis		2.582	--
Absorption		0.9	
Acid soluble chloride, (Cl), %	ASTM C 114	0.008	0.06 max
Acid soluble sulphate (SO ₃), %			0.40 Max
Organic impurities	ASTM C-40	Lighter then std	Light then std.

Remarks: All test results indicate compliance with the Saudi Aramco standard 09-SAMSS-088.Tested By: CBB Reviewed By: Imran Ahmed
CTTA # : 0428 CTTA # : 0556



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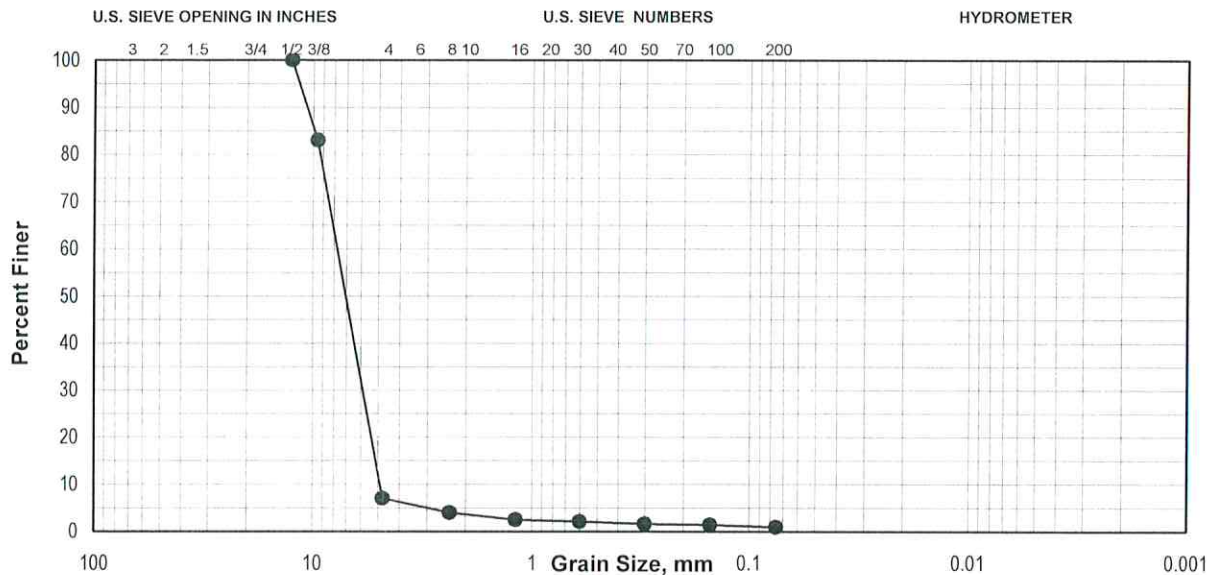
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PARTICLE SIZE ANALYSIS TEST REPORT

Client	A.H. Al Marhoon & Bros. Co.	Job No.	SA08-3012
Project	Concrete Batch Plant, Rahima	Lab No.	12870
Material	3/8" (10 mm) Coarse Aggregate	Date Sampled	03 Feb 2016
Source	Al Osais, Abuhadriya (Sampled by FSL)	Date Tested	04-06 Feb 2016
Method	ASTM C-117/136	Date Reported	15 Feb 2016



Gravel		Sand			Silt or Clay
Coarse	fine	Coarse	medium	fine	

Description of Sand / Gravel Particles:

Shape	Hardness	Specific Gravity

Sieve Size Inch(mm)	Passing %	Specification	Properties Tested		
			Item	Description	Result
3/4 (19.0 mm)					
1/2 (12.5 mm)	100				
3/8 (9.5 mm)	83				
#4 (4.75 mm)	7				
#8 (2.36 mm)	4				
#16 (1.18 mm)	2.5				
#30 (0.600 mm)	2.1				
#50 (0.300 mm)	1.6				
#100 (0.15 mm)	1.4				
#200 (75 mm)	0.94				

Remarks	
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Tested By: CBB
CTTA # : 0428

Reviewed By: Imran Ahmed
CTTA # : 0556



Sr. Laboratory Supervisor
Muhammad Nawaz CTTA # 0037



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Client	A.H. Al Marhoon & Bros. Co.	Report Date	15 Feb 2016
Project	Concrete Batch Plant, Rahima	Job No.	SA08-3012
Source	Sampled by FSL/ Al Kawther	Lab No.	12872/7631
		Sampled by	FSL

Fugro-Suhaimi Ltd. (FSL) has performed chemical analysis on a water sample based on client request. The testing was carried out in accordance with the relevant ASTM and APHA Methods. The results and pertinent information are as follows:

Test results

Serial No.	Determination	Test Results	S. Aramco Specification
2.	pH	7.35	6 - 8
3.	Chloride as Cl ⁻ , ppm	127.6	--
4.	Sulfate as SO ₃ , ppm	19.0	--
5.	Total Dissolved Solids- TDS, ppm	152.2	500 max

Remarks: All test results indicate compliance with the Saudi Aramco standard 09-SAMSS-088.

Tested By: CBB
CTTA # : 0428

Reviewed By: WN
CTTA # : -



SP. Laboratory Supervisor
Muhammad Nawaz CTTA # 0037



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**SUMMARY OF TEST REPORT
COMBINED AGGREGATE**

Client	A.H. Al Marhoon & Bros. Co.	Job No.	SA08-3012
Project	Concrete Batch Plant, Rahima	Lab No.	12869/12870
Material	3/4" - 3/8" Coarse Aggregate	Date Sampled	03 Feb 2016
Source	Al Osais, Abuhadriya (Sampled by FSL)	Date Reported	15 Feb 2016

Combined Grading

Sieve Size (mm)	Percent passing by weight			
	20-mm Size	10-mm size	55:45% 20:10-mm Blended	ASTM C 33 Size 67 limits
25	100	100	100	100
19	100	100	100	90 -100
12.5	64.8	100	80.6	--
9.5	24.5	82.6	50.6	20 – 55
4.75	2.4	7.4	4.7	0 – 10
2.36	1.6	2.8	2.1	0 – 5

Combined Soundness Loss By Magnesium Sulfate

Aggregate Size :	20 mm	10 mm
Individual Loss %	9.5	13.15
Combined loss @ 55: 45%		

Remarks: _____

Tested By: CBB
CTTA # : 0428

Reviewed By: Imran Ahmed
CTTA # : 0556

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