

## DUBAI ACCREDITATION DEPARTMENT

### REPORT ON PTP 195 TH INTER-LABORATORY PROFICIENCY TESTING PROGRAM DETERMINATION OF CHLORIDE AND SULPHATE CONTENT IN CONCRETE BLOCK

Date: 15 August 2010

#### 1. INTRODUCTION

This document presents the results of the 195<sup>th</sup> inter-laboratory proficiency-testing program conducted during the month of July involving the determination of **Chloride and Sulphate content in concrete block** with twenty five laboratories participating.

This program is part of the Inter-laboratory Comparison Programs organized by Dubai Accreditation Department (DAC) of Dubai Municipality (DM) for monitoring the validity of test results of laboratories operating in Dubai as a requirement of the Local Order 52/1990 and ISO/IEC 17011: 2004.

#### 2. EXPERIMENTAL DESIGN

##### 2.1 Homogeneity:

DAC had ensured the homogeneity of the samples prior to their distribution to the participating laboratories by conducting homogeneity test on six samples (randomly selected). Based on the test results the homogeneity is statistically evaluated as per *ISO 13528:2005 as explained in DAC-G3-03*.

##### 2.2 Participants:

Twenty five laboratories were participated in this program; one is governmental laboratory and seventeen are private laboratories operating in the emirate of Dubai which are registered and/or accredited by DAC for construction materials testing, in addition, four participants from other emirates, two participants from Qatar; and one participant from Bahrain.

##### 2.3 Samples Tested:

Since the block factory commonly produces blocks with low Chloride and Sulphate content, the factory was requested to prepare a bundle of the same type of block with higher value of Chloride & Sulphate by adding certain weights of Sodium Chloride and white gypsum to the raw materials inside the batching bin before preparing the block, and adequate mixing was ensured before preparing the blocks.

One (1) sample of Masonry Hollow Block Grey in color 400\*200\*200 mm size consists of 1 specimen has been distributed to all participating laboratories. With each participant being given one sample with a unique identification number provided during the time of collection.

## DUBAI ACCREDITATION DEPARTMENT

### 3. CONFIDENTIALITY

Each laboratory is given a code number to maintain confidentiality of results and to protect their identities. Only the concerned laboratory knows its code number.

### 4. TEST METHOD

Instructions were given to the participants to test the samples for Determination of Chloride & Sulphate Content in Blocks as per (BS 1881, Part 124: 1988)

### 5. TEST RESULTS

The test results submitted by the participating laboratories are presented in Appendix A. In order to protect the identity of the participating laboratories, each one was assigned a code number. The numbers in the column headings, Lab #, of the tables represents the code numbers for the participating laboratories.

### 6. EVALUATION OF RESULTS

#### 6.1 Method of Analysis

The analysis of the participant's results is based on *ISO 13528:2005 (Statistical Methods for the Use in Proficiency Testing by Inter-laboratory Comparisons)*

#### 6.2 Calculations of Z- scores

Appendix B gives the details of the calculation of the laboratories results and their Z-Scores which are obtained from the raw data. Also Z- Score and participant's results are represented in a bar chart and X-Y scattered plots C. The Z-Score analysis is based on above mentioned international Standard (*ISO 13528:2005*).

#### 6.3 Outlier Results

Test	Labs outside the z-scores $\pm 3$
Acid Soluble Sulphate Content	Lab 68; Lab EX4; Lab EX16
Acid Soluble Chloride Content	Lab EX16

After evaluating the Z-Score, the test results provided by the abovementioned laboratories are outside the Z – score limits  $\pm 3$ , the abovementioned laboratories are requested to investigate the root cause of the outlier results, implement a appropriate corrective action and a report shall be available for checking by the assessment team during the nearest assessment visit.



## DUBAI ACCREDITATION DEPARTMENT

- 7. APPENDICES
- 7.1 Appendix A: Raw Data
- 7.2 Appendix B: Calculation of z-scores and other statistics
- 7.3 Appendix C: Charts

---- End of Report ---

رؤيتنا: بناء مدينة متميزة تتوفر فيها رفاهية العيش ومقومات النجاح.  
Our Vision : To create an excellent city that provides the essence of success and comfort of living.

ص.ب. 67 ، دبي، إ.ع.م ، Dubai, UAE هاتف : +9714 221 5555 ، فاكس : +9714 224 6666 ، تليكس: 45688 بلدية إم ، Telex: 45688 Baladya EM  
E-mail : info@dm.gov.ae / Website : www.dm.gov.ae

## Determination of Sulphate and Chloride Content in Concrete Block

### Appendix A: Raw Data

#### Acid Soluble Sulphate Content in Concrete Blocks

Lab #	Results
Lab G01	0.70
Lab 76	0.70
Lab 39	0.73
Lab 74	0.73
Lab 79	0.72
Lab 56	0.70
Lab 3	0.70
Lab 9	0.70
Lab 23	0.68
Lab 57	0.70
Lab EX6	0.71
Lab 64	0.70
Lab EX1	0.70
Lab 28	0.72
Lab 58	0.68
Lab EX14	0.69
Lab 21	0.69
Lab 7	0.71
Lab EX5	0.69
Lab 4	0.68
Lab EX4	0.80
Lab EX11	0.70
Lab 68	2.74
Lab 82	0.71
Lab EX16	0.31

#### Acid Soluble Chloride Content in Concrete Blocks

Lab #	Results
Lab G01	0.13
Lab 76	0.12
Lab 39	0.13
Lab 74	0.14
Lab 79	0.13
Lab 56	0.12
Lab 3	0.12
Lab 9	<b>0.13</b>
Lab 23	0.13
Lab 57	0.13
Lab EX6	0.13
Lab 64	0.13
Lab EX1	0.12
Lab 28	0.13
Lab 58	0.13
Lab EX14	0.12
Lab 21	0.13
Lab 7	0.13
Lab EX5	0.12
Lab 4	0.12
Lab EX4	0.14
Lab EX11	0.14
Lab 68	0.13
Lab 82	0.12
Lab EX16	0.23

## Determination of Chloride and Sulphate Content in Concrete Block

### Acid Soluble Sulphate Content in Concrete Blocks

Iteration	0		1		2		3		4		5		6		Z Score
$\delta = 1.5 s^*$	---	xi-x*	0.02	(xi-x*) <sup>2</sup>	0.02	(xi-x*) <sup>2</sup>	0.02	(xi-x*) <sup>2</sup>	0.02	(xi-x*) <sup>2</sup>	0.02	(xi-x*) <sup>2</sup>	0.02	(xi-x*) <sup>2</sup>	Z Score
$x^* - \delta$	---		0.68		0.68		0.68		0.68		0.68		0.68		
$x^* + \delta$	---		0.72		0.73		0.73		0.73		0.73		0.73		
Lab EX16	0.31	0.39	0.68	0.00	0.68	0.00	0.68	0.00	0.68	0.00	0.68	0.00	0.68	0.00	-24.14
Lab 23	0.68	0.02	0.68	0.00	0.68	0.00	0.68	0.00	0.68	0.00	0.68	0.00	0.68	0.00	-1.35
Lab 4	0.68	0.02	0.68	0.00	0.68	0.00	0.68	0.00	0.68	0.00	0.68	0.00	0.68	0.00	-1.35
Lab 58	0.68	0.02	0.68	0.00	0.68	0.00	0.68	0.00	0.68	0.00	0.68	0.00	0.68	0.00	-1.35
Lab 21	0.69	0.01	0.69	0.00	0.69	0.00	0.69	0.00	0.69	0.00	0.69	0.00	0.69	0.00	-0.73
Lab EX14	0.69	0.01	0.69	0.00	0.69	0.00	0.69	0.00	0.69	0.00	0.69	0.00	0.69	0.00	-0.73
Lab EX5	0.69	0.01	0.69	0.00	0.69	0.00	0.69	0.00	0.69	0.00	0.69	0.00	0.69	0.00	-0.73
Lab 3	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	-0.12
Lab 56	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	-0.12
Lab 57	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	-0.12
Lab 64	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	-0.12
Lab 76	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	-0.12
Lab 9	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	-0.12
Lab EX1	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	-0.12
Lab EX11	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	-0.12
Lab G01	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	-0.12
Lab 7	0.71	0.01	0.71	0.00	0.71	0.00	0.71	0.00	0.71	0.00	0.71	0.00	0.71	0.00	0.50
Lab 82	0.71	0.01	0.71	0.00	0.71	0.00	0.71	0.00	0.71	0.00	0.71	0.00	0.71	0.00	0.50
Lab EX6	0.71	0.01	0.71	0.00	0.71	0.00	0.71	0.00	0.71	0.00	0.71	0.00	0.71	0.00	0.50
Lab 28	0.72	0.02	0.72	0.00	0.72	0.00	0.72	0.00	0.72	0.00	0.72	0.00	0.72	0.00	1.12
Lab 79	0.72	0.02	0.72	0.00	0.72	0.00	0.72	0.00	0.72	0.00	0.72	0.00	0.72	0.00	1.12
Lab 39	0.73	0.03	0.72	0.00	0.72	0.00	0.72	0.00	0.72	0.00	0.72	0.00	0.72	0.00	1.73
Lab 74	0.73	0.03	0.72	0.00	0.72	0.00	0.72	0.00	0.72	0.00	0.72	0.00	0.72	0.00	1.73
Lab EX4	0.80	0.10	0.72	0.00	0.72	0.00	0.72	0.00	0.72	0.00	0.72	0.00	0.72	0.00	6.04
Lab 68	2.74	2.04	0.72	0.00	0.72	0.00	0.72	0.00	0.72	0.00	0.72	0.00	0.72	0.00	125.55
Average	0.77		0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00	
SD	0.42		0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	
New x*	0.70	0.01	0.70	0.01	0.70	0.01	0.70	0.01	0.70	0.01	0.70	0.01	0.70	0.01	
New s*	0.01		0.02		0.02		0.02		0.02		0.02		0.02		

N 25

Target value	0.70
Low Acceptable	0.65
High Acceptable	0.75
Acceptable Range	0.65 - 0.75

## Determination of Chloride and Sulphate Content in Concrete Block

### Acid Soluble Chloride Content in Concrete Blocks

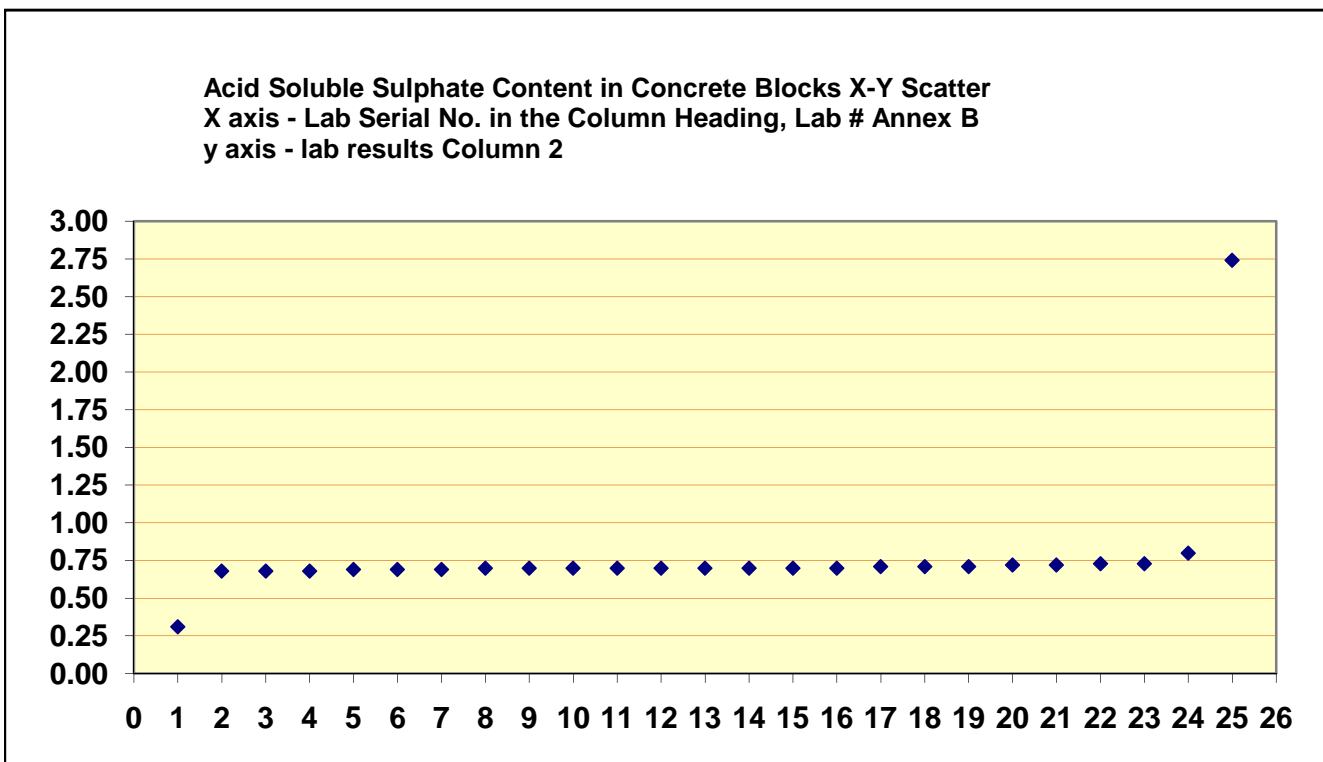
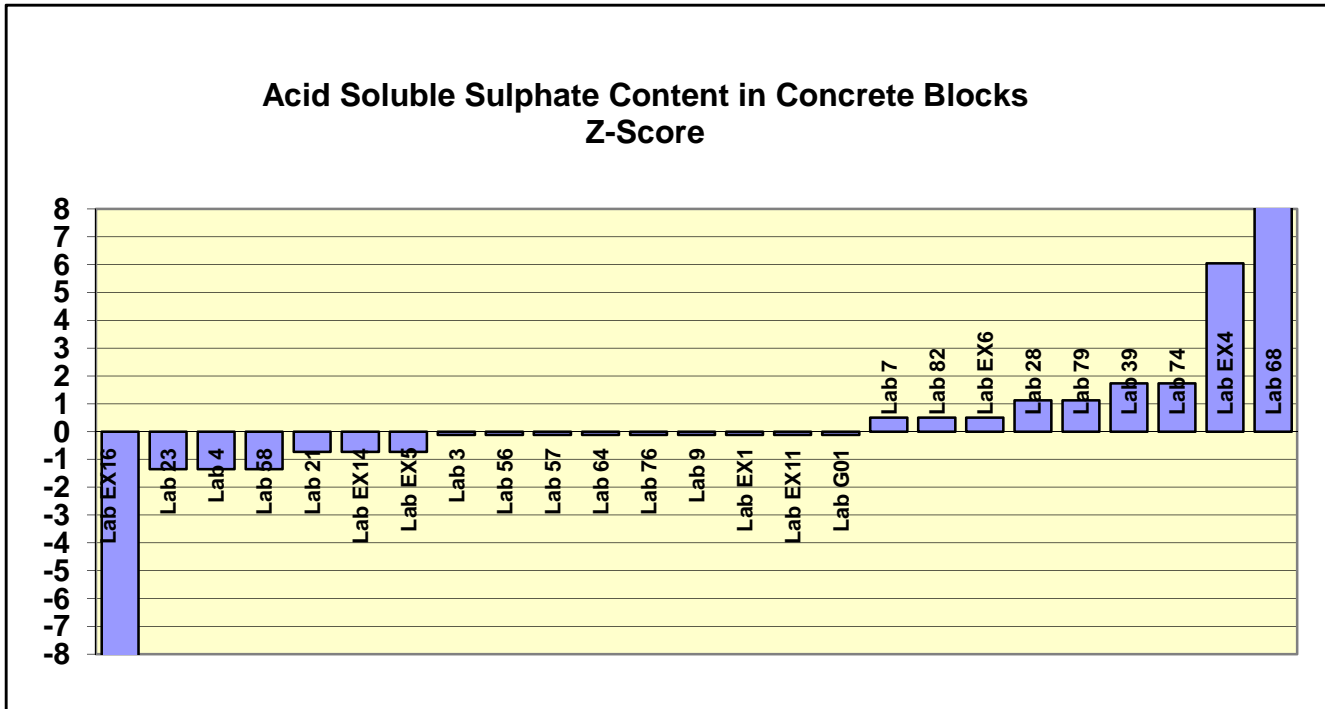
Iteration	0	xi-x*	1	(xi-x*) <sup>2</sup>	2	(xi-x*) <sup>2</sup>	3	(xi-x*) <sup>2</sup>	4	(xi-x*) <sup>2</sup>	5	(xi-x*) <sup>2</sup>	6	(xi-x*) <sup>2</sup>	Z Score
$\delta = 1.5 s^*$	---		0.03		0.02		0.01		0.01		0.01		0.01		
$x^* - \delta$	---		0.10		0.11		0.12		0.12		0.12		0.12		
$x^* + \delta$	---		0.16		0.14		0.14		0.14		0.14		0.14		
Lab 3	0.12	0.01	0.12	0.00	0.12	0.00	0.12	0.00	0.12	0.00	0.12	0.00	0.12	0.00	-1.08
Lab 4	0.12	0.01	0.12	0.00	0.12	0.00	0.12	0.00	0.12	0.00	0.12	0.00	0.12	0.00	-1.08
Lab 56	0.12	0.01	0.12	0.00	0.12	0.00	0.12	0.00	0.12	0.00	0.12	0.00	0.12	0.00	-1.08
Lab 76	0.12	0.01	0.12	0.00	0.12	0.00	0.12	0.00	0.12	0.00	0.12	0.00	0.12	0.00	-1.08
Lab 82	0.12	0.01	0.12	0.00	0.12	0.00	0.12	0.00	0.12	0.00	0.12	0.00	0.12	0.00	-1.08
Lab EX1	0.12	0.01	0.12	0.00	0.12	0.00	0.12	0.00	0.12	0.00	0.12	0.00	0.12	0.00	-1.08
Lab EX14	0.12	0.01	0.12	0.00	0.12	0.00	0.12	0.00	0.12	0.00	0.12	0.00	0.12	0.00	-1.08
Lab EX5	0.12	0.01	0.12	0.00	0.12	0.00	0.12	0.00	0.12	0.00	0.12	0.00	0.12	0.00	-1.08
Lab 21	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.20
Lab 23	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.20
Lab 28	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.20
Lab 39	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.20
Lab 57	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.20
Lab 58	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.20
Lab 64	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.20
Lab 68	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.20
Lab 7	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.20
Lab 79	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.20
Lab 9	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.20
Lab EX6	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.20
Lab G01	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.20
Lab 74	0.14	0.01	0.14	0.00	0.14	0.00	0.14	0.00	0.14	0.00	0.14	0.00	0.14	0.00	1.48
Lab EX11	0.14	0.01	0.14	0.00	0.14	0.00	0.14	0.00	0.14	0.00	0.14	0.00	0.14	0.00	1.48
Lab EX4	0.14	0.01	0.14	0.00	0.14	0.00	0.14	0.00	0.14	0.00	0.14	0.00	0.14	0.00	1.48
Lab EX16	0.23	0.10	0.16	0.00	0.14	0.00	0.14	0.00	0.14	0.00	0.14	0.00	0.14	0.00	13.01
Average	0.13		0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	0.13	0.00	
SD	0.02		0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	
New x*	0.13	0.00	0.13	0.01	0.13	0.01	0.13	0.01	0.13	0.01	0.13	0.01	0.13	0.01	
New s*	0.02		0.01		0.01		0.01		0.01		0.01		0.01		

N 25

Target value	0.13
Low Acceptable	0.10
High Acceptable	0.15
Acceptable Range	0.10 - 0.15

# Determination of Chloride and Sulphate Content in Concrete Block

## Appendix C:Charts



# Determination of Chloride and Sulphate Content in Concrete Block

## Appendix C:Charts

