Master-Lab
Integrated Consulting Eng. Laboratories
Consult. Eng. Dr. / Ahmed Fathy Abdel-Aziz

ماستر لاب
معامل إستشارات هندسية متكاملة
م. استشارى دكتور / أحمد فتحى عبد العزيز

Report on:

Pull-Off Strength Tests for Cement plastering over Concrete & AAC Masonry Block Wall.

Client	:	**Delta Block**
Project	:	**Blume Field**
Owner	:	تطوير مصر
Consultant	:	مركز التصميمات والاستشارات الهندسية الأستاذ الدكتور/ اشرف الزناتي
Contractor	:	شركة انشاء

Master-Lab

August 18, 2020.

اتحاد ماستر
للاستشارات الهندسية
د. بلام استشارات هندسية
رقم [illegible] أحمد فتحى عبد العزيز
رقم القابض [illegible]
نقابى ٦/٢٦١ استشارى ١/٢٢٦٠ سجل هندسى ٥١/٤٩٩

١٣٧ شارع عمر بن الخطاب - الماظة - أمام دار الإشارة - القاهرة ت (فاكس) ٢٤١٩٤٥٩٥ (٠٢)
137 Omar Ibn El-Khatab, Street, Almaza, Cairo Tel. (Fax) : (02) 24194595

Master-Lab
Integrated Consulting Eng. Laboratories
Consult. Eng. Dr. / Ahmed Fathy Abdel-Aziz

ماستر لاب
معامل إستشارات هندسية متكاملة
م. استشاري دكتور / أحمد فتحى عبد العزيز

REPORT ON
Pull-Off Strength Tests for
Cement plastering over Concrete & AAC Masonry Block Wall.

1 – Introduction:

Field Quality Control Testing for the evaluation of the adhesion of cement plastering applied on concrete substrate/AAC blocks masonry wall at Blume field project located at New Administration Capital respectively, was performed on site. These tests –pull-off strength- are considered as a part of quality control testing concerning the compliance with requirements of materials/application method as project inspects.

Test samples were selected at diverse locations of mockup masonry wall to be representative of both; masonry substrate, cement plastering, application procedure in accordance with the manufacture's specifications. Refer to appendix 2 –for the detailed description of AAC blocks type & sizes.

Master-Lab

2 – Applied Specifications:

Test methods used – within – include the application of these standards:

1) Pull-off Strength of Coatings Using Portable Adhesion Testers ASTM D 4541 -02.

2) Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method) ASTM C 1583-04.

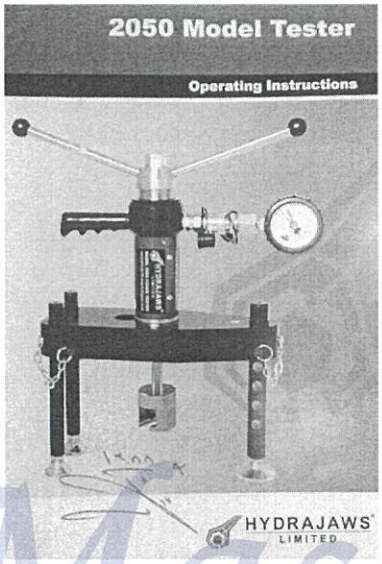
3 –Test Specimens

Test specimens were formed on pieces 5x5 cms cut from cement plastering adhered upon concrete or AAC blocks masonry. Then, a steel disk "5 cm diameter", is bonded to the top surface of test piece using a special epoxy glue adhesive. Samples were prepared by client, according to the designated data and on its sole responsibility. The following table is identifying the cases of the substrate base material for the testing area (Fig. 1).

اتحاد ماستر لاب
للاستشارات الهندسية
د . م احمد فتحى عبد العزيز
رقم : ١١٨-٩٢٩-٢٢٨ ملف : ٢٤-٠١-٧٢٠-١٦٢٨-٦-٦-٢٥٦
نقابى : ٦/٢٦١ استشارى : ٢٠٠ سجل هندسى : ٥١/٤٩٩

١٣٧ شارع عمر بن الخطاب - الماظة - أمام دار الإشارة - القاهرة ت (فاكس) ٢٤١٩٤٥٩٥ (٠٢)
137 Omar Ibn El-Khatab, Street, Almaza, Cairo Tel. (Fax) : (02) 24194595

Testing system consists of: Load spreading bridge with three telescopic legs resting upon steel bridge over the tested marble tile, Adjusting steel plates with different thicknesses, hollow rigid base plate, threaded stud adaptor M12 and detachable 50kN digital gauge. (Fig.-2).



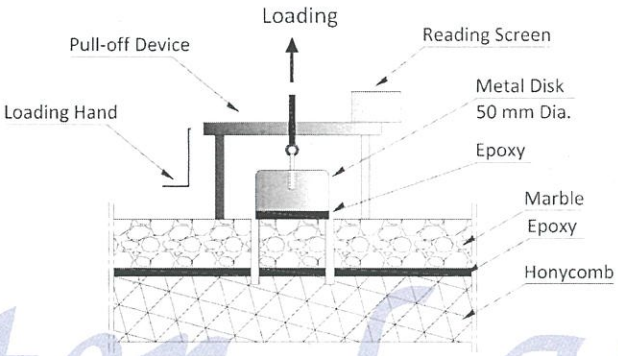


Figure 2- Pull-off tester, its detachable aluminum loading fixture& test setup.

Master-Lab

5 – ATTENDANCE:

Eng. Mohamed Abdelrahim	Represents Consultant
Eng. Ayman Kamel	Represents Q.C. Manager Misr Development
Fng Fsam Samy, Islam Mabrouk	Represents Delta Block
Eng. Ahmed Mostafa	Represents Testing Agent

اتحاد ماستر لاب
للاستشارات الهندسيه
د . م احمد فتحى عبد العزيز
رقم : ١١٨-٩٢٩-٢١٢ ملف : ٢٤-٠١-٧٢٠-١٦٣٨-٦-٦-٢٥٦
نقابى : ٦/٣٦١ استشارى : ١/٢٢٦٠ سجل هندسى : ٥١/٤٩٩٠

Table 1- Substrate layers and Material identification

Case	Code	Layer Description	Material
Test Sample	A	AAC blocks Masonry Wall Substrate/ or concrete	25 cms AAC blocks
	B	Cement Plaster	2.5 cm thick
	C	Adhesive Glue for steel plate	Epoxy resin
	D	Steel Disc	5 cms diameter

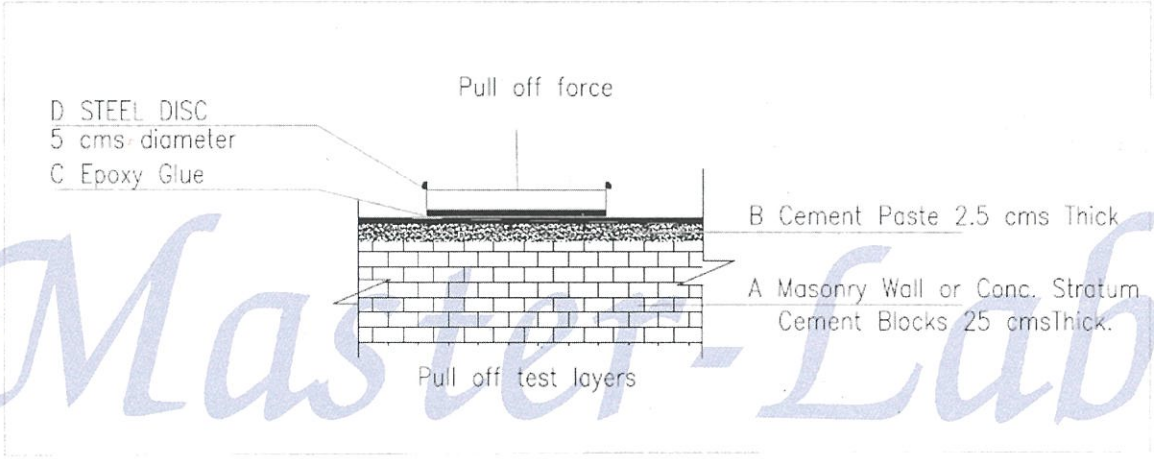


Fig. 1- Substrate layers & test setup

4 – TEST APPARATUS:

Pull-off tests were performed on 18/8/2020 at site for all tested samples, using the shown apparatus (Photo 1). Positioning, placement, centering and alignment of the loading device and support system was performed, in such a way that to meet the requirements of ASTM D 4541 -02. Special attachment (fixture) external to the surface of the base material was used to transmit loads to the tested sample, using Model 2050 tester with quick release hydraulic coupler of 0-50 kN pull-out load range of ± 0.5 % Accuracy (Photo-1). Samples were loaded gradually until failure. Then, both of the maximum load and failure pattern were registered.

اتحاد ماستر لاب
للاستشارات الهندسيه
د . م احمد فتحى عبد العزيز
رقم : ١١٨-٩٢٩-٧٢٨ ملف : ٢٤-٠١-٧٢٠-٧٢٨-٦-٦-٢٥٦
نقابى : ٦/٣٦١ استشارى : ١/٢٢٦٠ سجل هندسى : ٥١/٤٩٩

6 – TEST RESULTS:

The following table presents the obtained maximum tensile load, controlling failure mode and corresponding strength as calculated for all tested specimens.

Table 2 Pull-off test results

Test No.	Substrate material	Spec. Area dimension	Load	Max. Strength	Failure Mode
		cms	kN (kg)	N/mm^2	
1	Concrete	5x5	1.8 (180)	0.72	Separation at concrete surface A& B Layer
2		5x5	1.1 (110)	0.44	
3	AAC Blocks	5x5	0.8 (80)	0.32	Separation at AAC blocks A layers
4		5x5	0.9 (90)	0.36	
5		5x5	0.8 (80)	0.32	
6		5x5	1.1 (110)	0.44	

Master-Lab

Tested by
Ahmed Hassan.

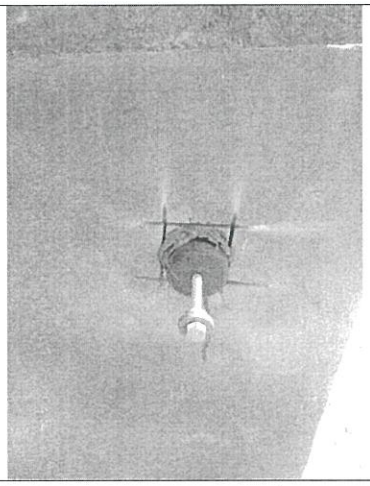
Revised by
Eng. Khaled Ahmed

Authorized By:
DR./ AHMED FATHY ABDEL-AZIZ

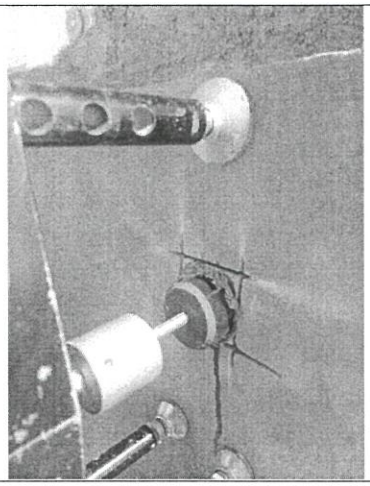
Faculty of Engineering
Ain Shams University.
Structural Department

اتحاد ماستر لاب
للاستشارات الهندسيه
د . م احمد فتحى عبد العزيز
رقم : ١١٨-٩٣٩-٢٢٨ ملف : ٢٤٤-٠١-٧٢٠-١٦٢٨-٦-٦-٢٥٦
نقابى : ٢٦١ / ٦ استشارى : ٢٢٦ / سجل هندسى : ٤٩٩ / ٥١

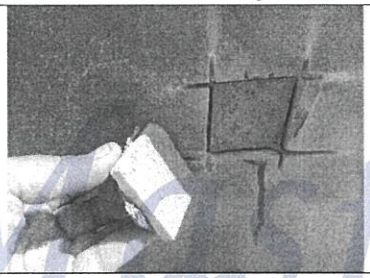
Test Photos

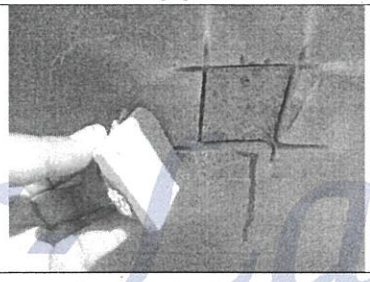


Pole fixation over plastering

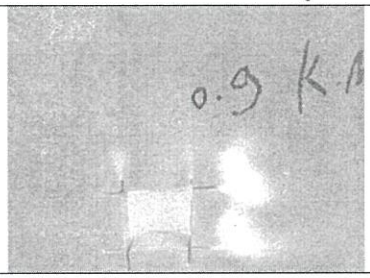


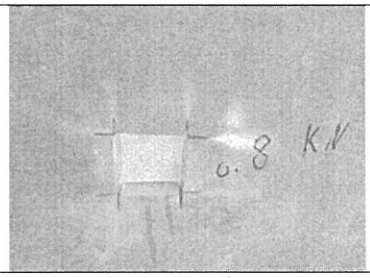
Load application





Separation from concrete





Separation from AAC Blocks

Master-Lab

اتحاد ماستر لاب
للاستشارات الهندسيه
د . م احمد فتحى عبد العزيز
رقم : ١١٨-٩٢٩-٢٢٨ ملف ٢٤ - ٠١ - ٧٢٠ - ١٦٢٨ - ٦ - ٦ - ٥٦
نقابى : ٦/٢٦١ استشارى ٦٣٦٠ سجل هندسي : ٥١/٢٠٠٩