



المركز القومي لبحوث الإسكان والبناء
نائب رئيس مجلس الإدارة لشؤون البحوث والدراسات
معهد فيزيقا المنشآت

الموضوع : تقرير نتائج إختبارات

عدد المرفقات :

الجهة الطالبة / الوميتالو

المشروع /

تحية طيبة وبعد ،،،

إيماء الي خطاب سيادتكم بتاريخ 02/11/2025 بخصوص الموضوع عاليه نرفق تقريراً بالنتائج - هذا وقد
سددت للمركز الرسوم المقررة وقدرها 105,000.00 جنيهاً خصماً من القسيمة رقم 289862 بتاريخ
02/11/2025 - بخلاف الضرائب .

وتفضلوا بقبول وافر الإحترام ،،،

نائب رئيس مجلس الإدارة لشؤون البحوث والدراسات

أ.د. طارق محمد بهاء الدين
٢٠٢٥/١٢/٠٩



٤٧٨٧٢

مدير المعهد

أ.د. أحمد أحمد مدحت أحمد فهميم
٢٠٢٥/١٢/٠٩

تحريراً في: 08/12/2025



HBRC-BPI-ADL-2025-2753



Client Name: Alu-Metalo
Code: BPI/ADL/2025/2690
Customer Code: BPI/H/CO.469

Building name: Petrobel in Capital City

*Field diagnosis of water penetration of curtain
walls at Petrobel in Capital City, Egypt
In accordance with AAMA 501.2-15*

DECEMBER 2025

**Subject: “Evaluation of curtain wall systems against water penetration in
accordance with AAMA 501.2-15 standard”**

Ahmed Adel

Mahmoud Mohamed
8/12/2025





Client Name: Alu-Metalo
Code: BPI/ADL/2025/2690
Customer Code: BPI/H/CO.469

Building name: Petrobel in Capital City

Project details	
Customer (client) name	Alu-Metalo
Adress	الكيلو ٢٦ شارع عادل والي - طريق مصر اسكندريه الصحراوي - ٦ اكتوبر - الجيزه
Contact person	Sherif Zohny
Project Name and location	Project Name: Petrobel Location: Capital City
Owner	Petrobel
Consultant	Proger
Contractor	Sky
Subcontractor	Alu-metalo
Sample specifications	
Building names	A, B, and C
Sample type and name	Curtain Wall
Glass type and thickness	The glass consists of 8mm guardian, 22mm Spacer, and 6+6 lamination clear
Sample dimension	(1.20×2.60) m
Sample co-ordinate (axis, elevation, ..etc.) (for in site tested samples)	As shown in the shop drawing
Sample description (rain gutter, dust plug, brushes, ,,,,))	Curtain Wall is composed of aluminum framing and glazing.

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8/12/ 2025





Client Name: Alu-Metalo
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Customer Code: BPI/H/CO.469

Building name: Petrobel in Capital City

1- Scope and purpose:

- The main objective of this report is to carry out water penetration diagnosis for the curtain wall systems at **Petrobel in Capital City, Egypt** according to AAMA 501.2-15 standard titled "**Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Glazing Systems**".
- This field check procedure is intended to evaluate those joints, gaskets and sealant details in the glazing which are designed to remain permanently closed and watertight.

2- Façade description:

The façades of the buildings at petrobel are composed of Curtain Wall and cladding system; Curtain Wall composed of aluminum framing and glazing. The glazing consists of 8mm guardian, 22mm Spacer and 6+6 lamination clear. The selected fixed Curtain Wall sample and cladding as shown in annex 2

3 - Preparation of inspection area:

-The inspected area shall be a representative sample of typical construction and shall have no outstanding punch list items or other visible defects. This area should be selected to provide representative performance data, usually a minimum of 9.3 m² (100 ft²). The area to be inspected shall include perimeter caulking, typical splices, frame intersections, and, if applicable, at least 2 entire vision lites and 2 entire spandrel lites containing an intermediate vertical member and an intermediate horizontal member. All operable components within the inspection area shall be isolated and exempt from the inspection procedure.

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4 - Apparatus:

- The inspection shall be conducted using a Type B-25, 6.030 brass nozzle, the nozzle shall be connected to a hose [19 mm (3/4 in) diameter is suggested] and shall be provided with a control valve and a pressure gauge between the valve and the nozzle. The water pressure to the nozzle shall be adjusted to produce (30 to 35 psi) at the nozzle inlet. The schematic diagram of the inspecting apparatus is shown in Fig. 1

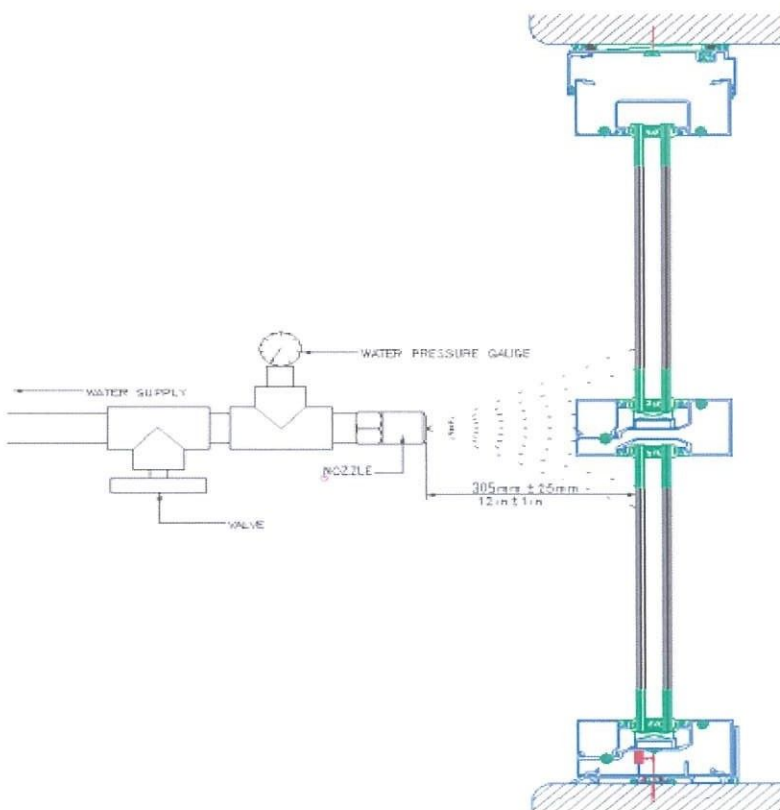


Fig. 1: Apparatus for water leakage field check

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5 - Summary of inspection method:

- The designated inspected area shall be divided into and evaluated in 1.5 m sections of the framing and joint. The nozzle shall be held at 305 mm from the location under inspection. Each 1.5 m section of the inspection area shall be evaluated for a period of 5 minutes by slowly moving the nozzle back and forth over the inspection section while maintaining the nozzle perpendicular to the plane of the wall.
- Working from the exterior, the wall inspection section shall be selectively wetted progressing from the lowest horizontal framing member, then the adjacent framing intersections, then the adjacent vertical framing members, etc.
- During the inspection, an observer on the indoor side of the wall, using a flashlight, if necessary, shall check for any water leakage and shall note where it occurs.
- If no water leakage occurs during the five-minute inspection, the next 1.5 m (5 ft) of framing shall be wetted for five minutes, and testing continued in this manner until the entire test area is tested.

- If water leakage occurs and the source of the leakage cannot be identified, the following sequence shall be followed:

1. After allowing the wall to dry completely and working downward from the top of the area to be checked, all joints, gaskets and framing within this area shall be completely and tightly covered, on the outdoor side, with waterproof adhesive masking tape. If necessary, use small amounts of sealant where the tape wraps around the framing corners and joints to ensure that the masking is complete and waterproof.
2. Starting at the bottom of the prepared area, the masking tape shall be removed from the lowest horizontal framing for not more than 1524 mm (5 ft) from one end of the frame, including the joint intersection or corner at the end. This exposed length shall be subjected to the nozzle spray as described before.
3. If no water leakage occurs during the five-minute test period, this length of framing shall be considered satisfactory and shall remain uncovered. If leakage has occurred at any point, the framing shall be re-taped at such points to prevent further leakage of these points during the subsequent checking of joints and framing adjacent to or above them.

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6 - Results and Observations:

Table 1: Inspected areas and their positions

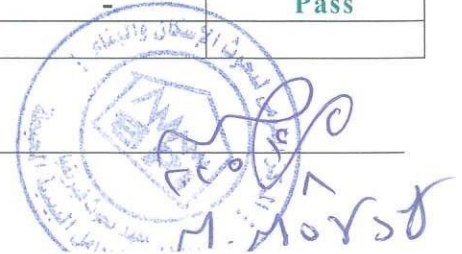
Building	Elevation/roof	Floor	Position (axis)	Room No.	Results
A	Straighten	4	E-D	426	Pass
			C-B	423	Pass
			D-C	inclined	Pass
	Front		7-8 (cladding)	419	Pass
			7-8 (cladding)		Pass
			7-8 (cladding)		Pass
			7-8 (cladding)		Pass
	Sky light	Perimeter	1 A	-	Pass
		Intersection	2 A	-	Pass
			3 A	-	Pass

Building	plan/roof	Position (axis)	Room NO	Results
B	2 nd floor	1B	208	Pass
		2B	-	Pass
	Sky light	3B	-	Pass

Building	Elevation/roof	Floor	Position (axis)	Room NO	Results
C	Front	4	27-28	455	Pass
			28-29	451	Pass
			29-30	445	Pass
			30-31	442	Pass
			31-32	441	Pass
	Side	4	A	440	Pass
			C-D	437	Pass
		2	C-D	227	Pass
	Sky light		1C	-	Pass
			2C	-	Pass
			3C	-	

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Building name: Petrobel in Capital City

7. Remarks:

- 1- All filed diagnosis has been conducted in the presence of consultant and main contractor representatives.
- 2- The inspection has been conducted in accordance with AAMA 501.2-15 requirements.
- 3- The inspected areas have been selected by a consultant without any interference on our part.
- 4- The abovementioned table shows the location and status of the inspected areas.
- 5- The Approved drawings are attached in Annex (1), while photos during inspection are attached in Annex (2).

Conclusion:

- The tested areas of the curtain wall demonstrated full watertight integrity and met the required performance criteria of AAMA 501.2-15 requirements
- The laboratory is not responsible for any future modifications such as maintenance work, cleaning, and deteriorations due to environmental effects, glass breaking or other installations that may adversely affect the performance of the curtain wall facades against water leakage.

Tested by

Ahmed Adel

A. Adel

Reported by

Assoc. prof. M. Morsy

Mahmoud Mohamed

Assoc. prof. M.M. Abd Elrazik

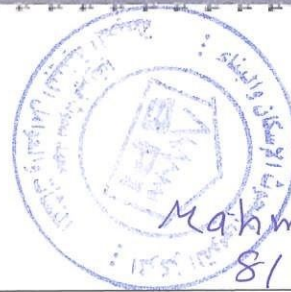
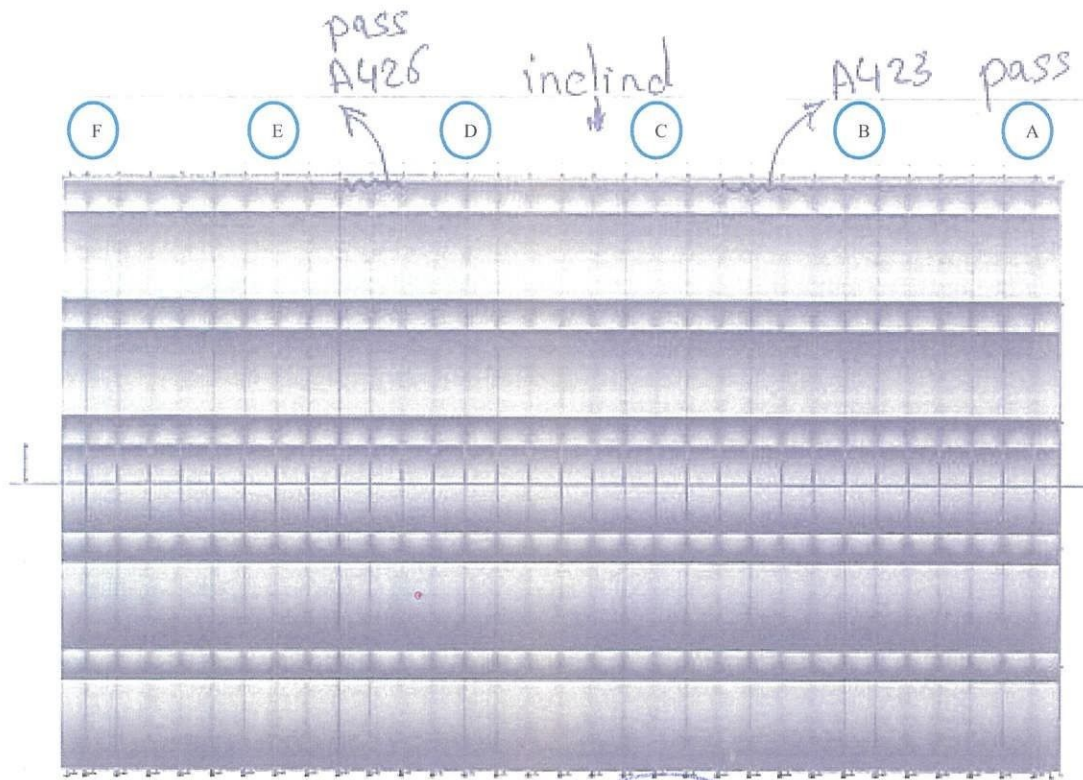
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Reviewed by

Prof. M. A. Hassan

Annex 1: Shop drawing of the tested areas.

Building A (Straighten side)



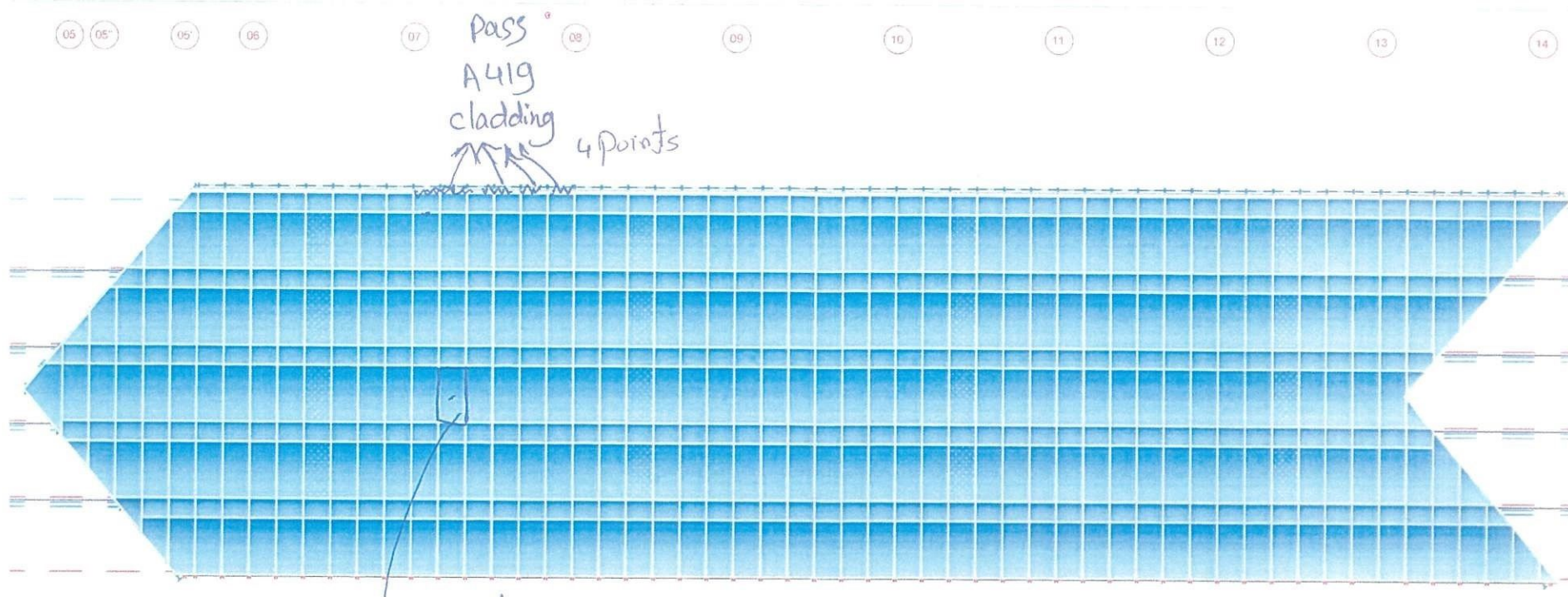
(STRAIGHTEN VIEW)

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Building A (Front view)



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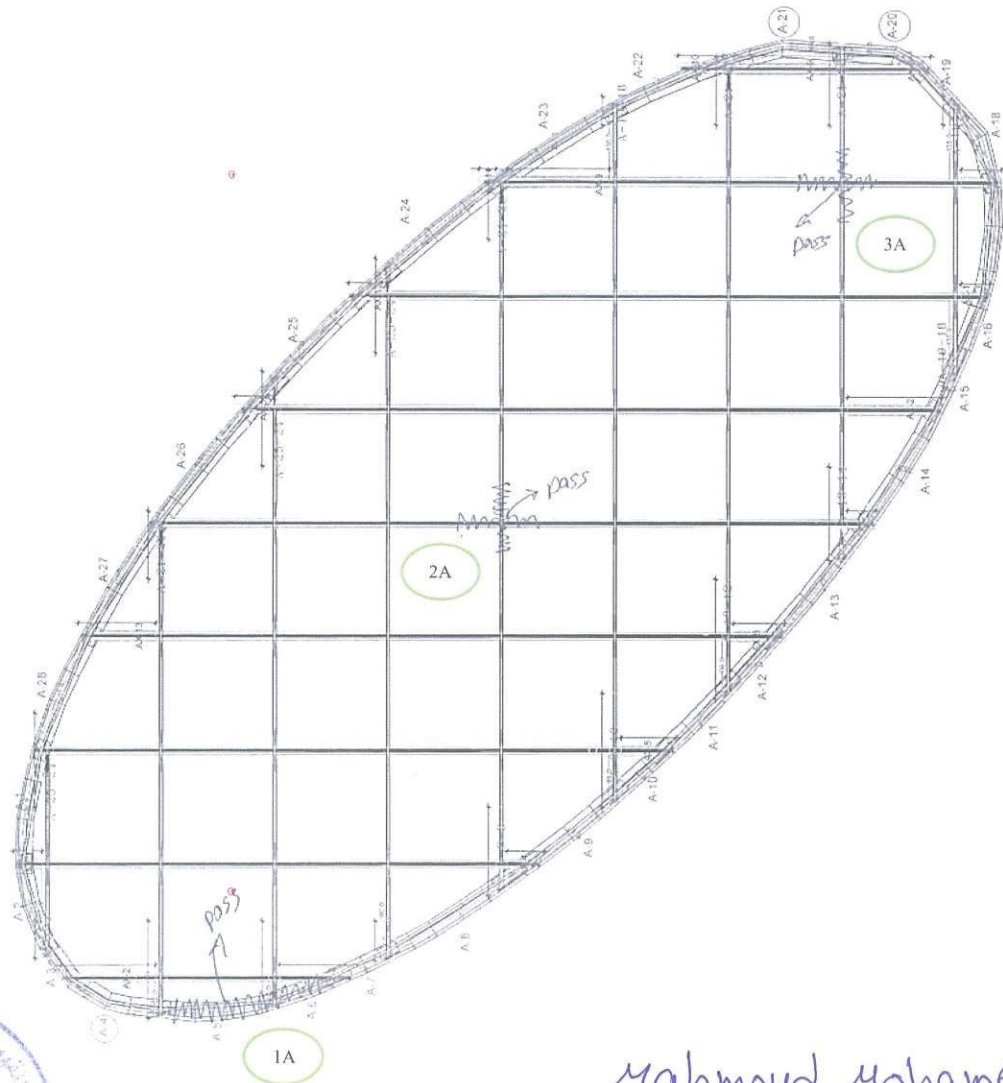


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Building A (Skylight view)



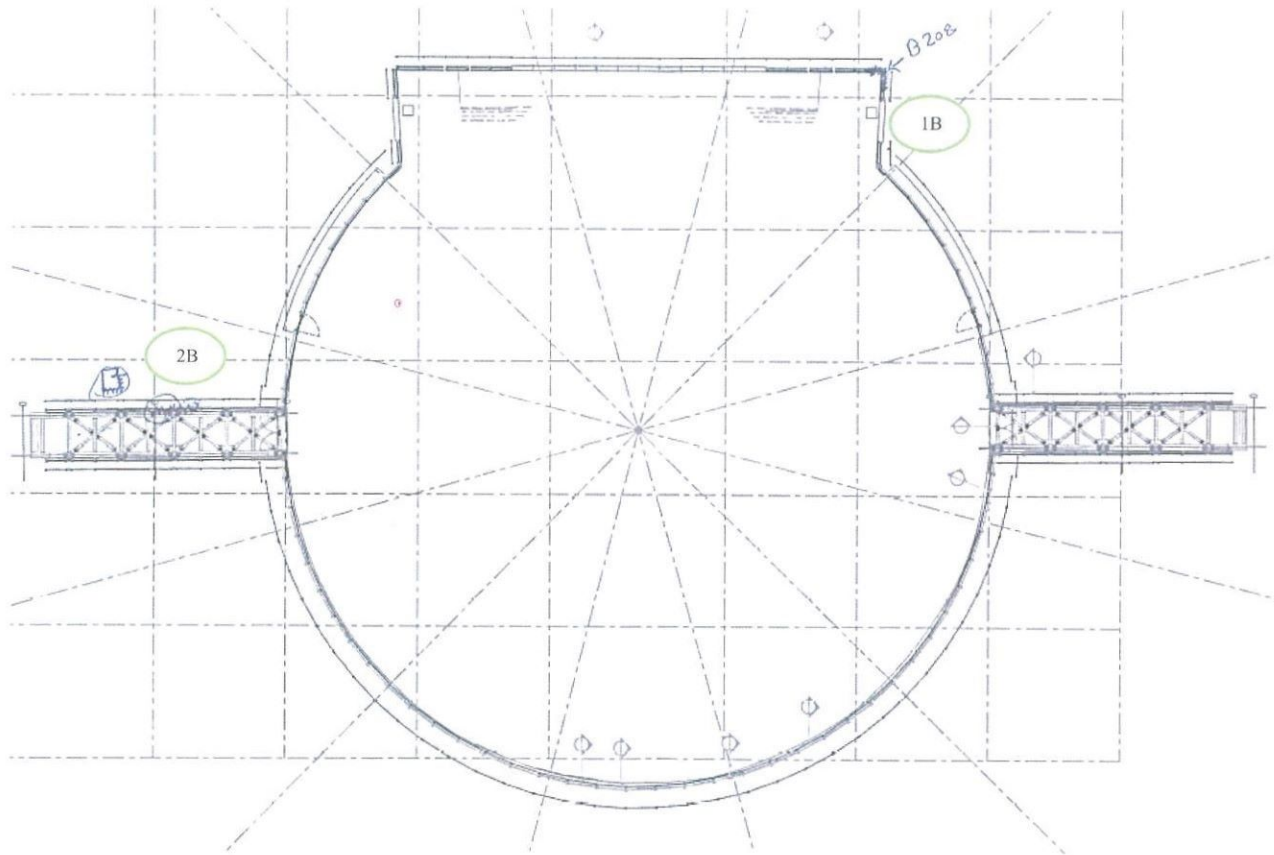
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Building B (2nd floor)

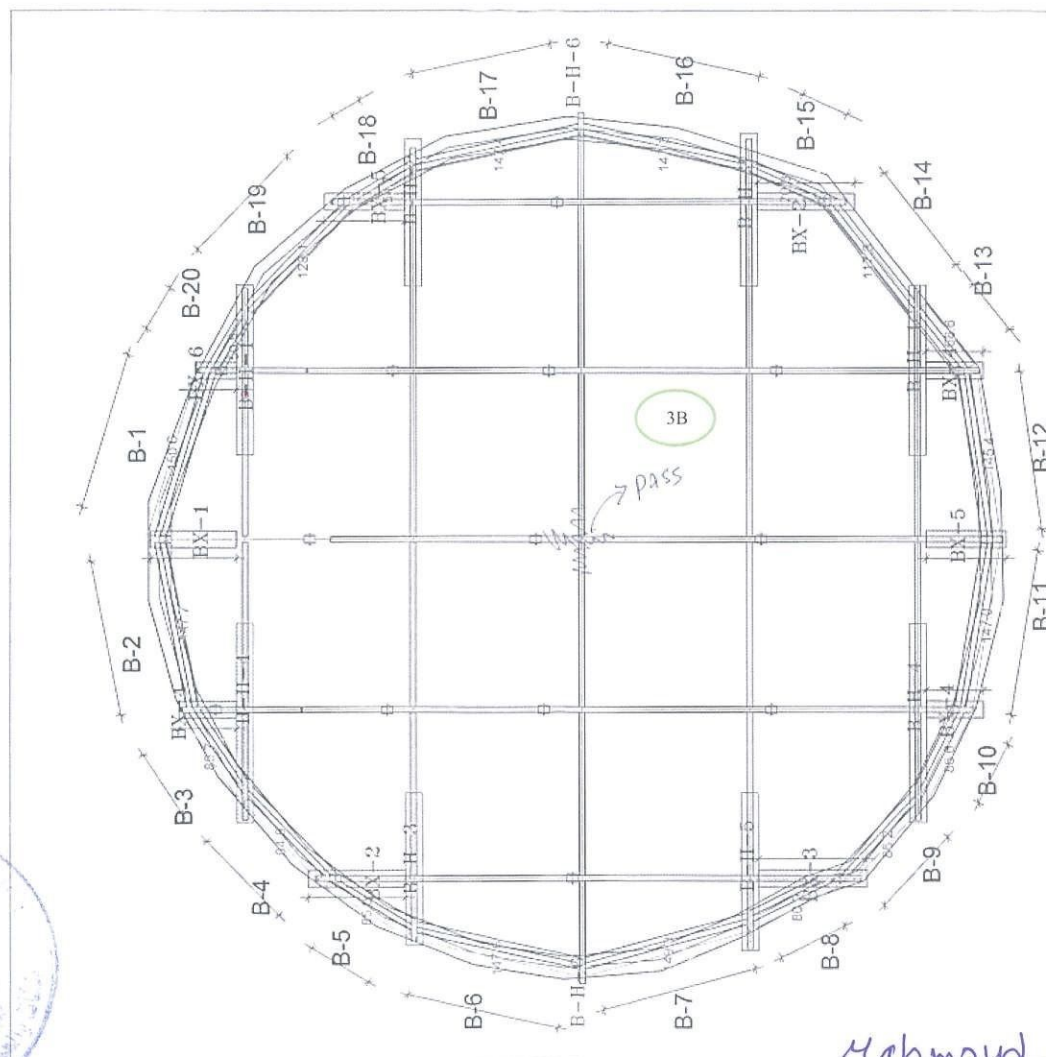


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Building B (Sky light)

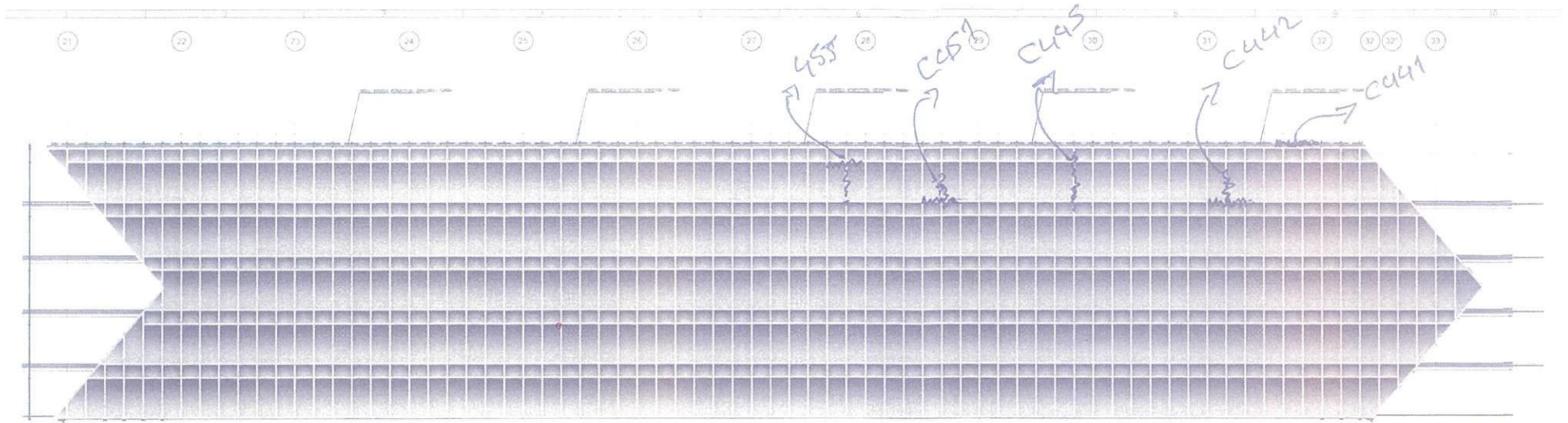


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Building C (Front view)

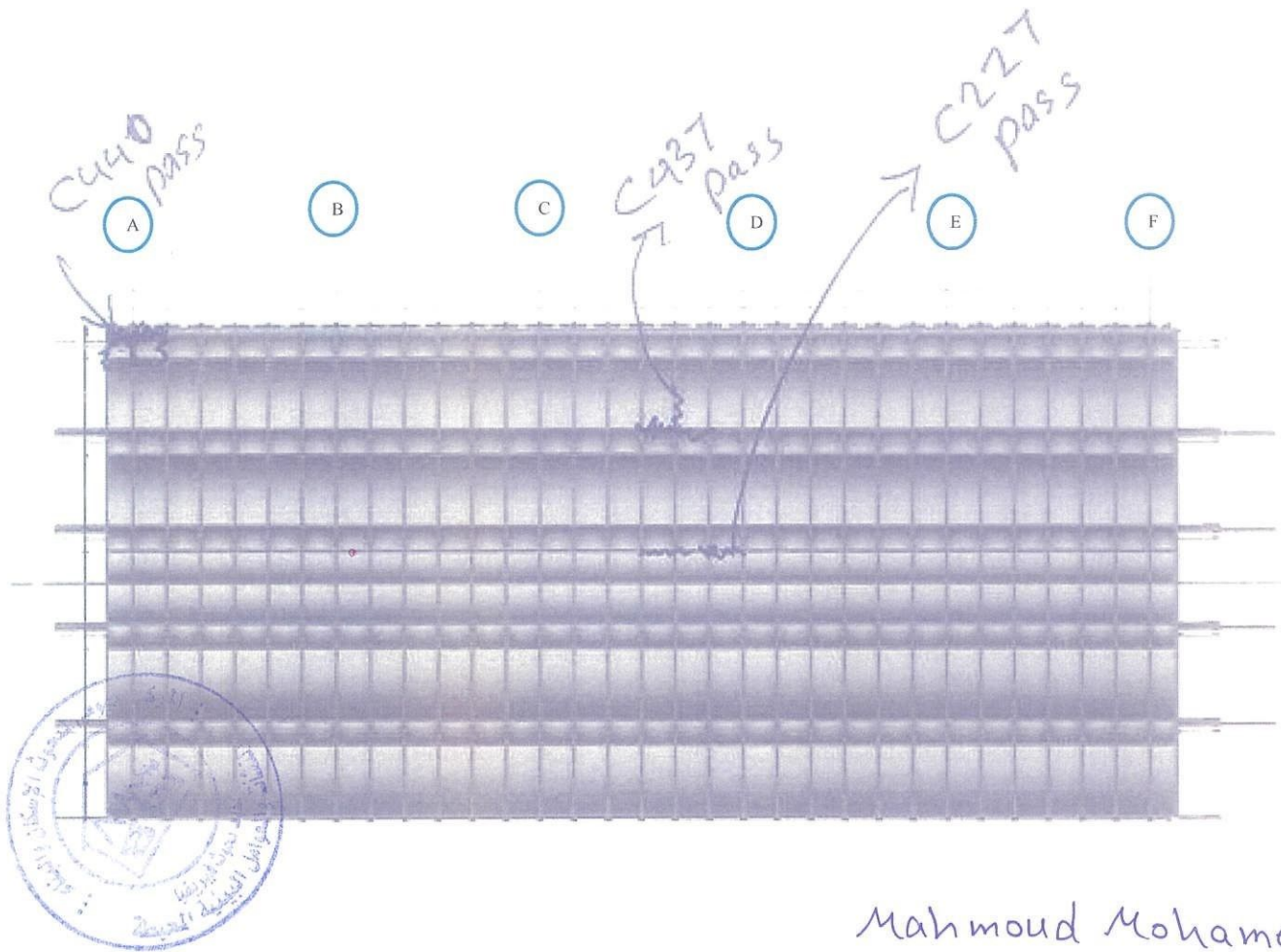


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Building C (Side view)

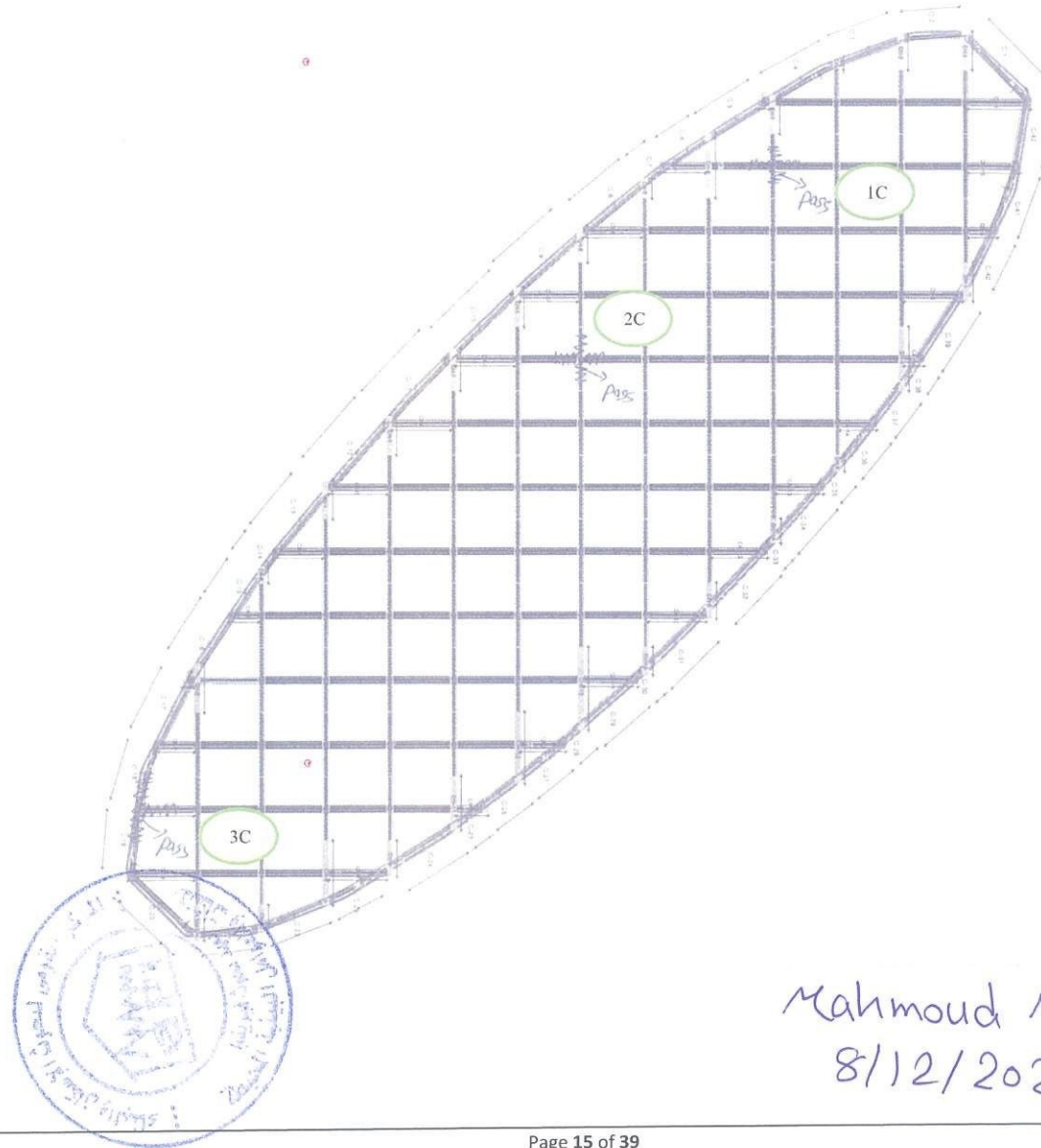


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Building C (Sky light)



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G. O. L. C. A.

Annex 2: The Photos during inspection.



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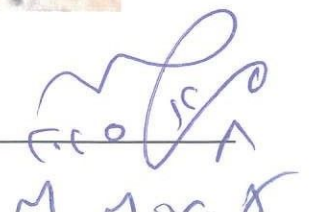
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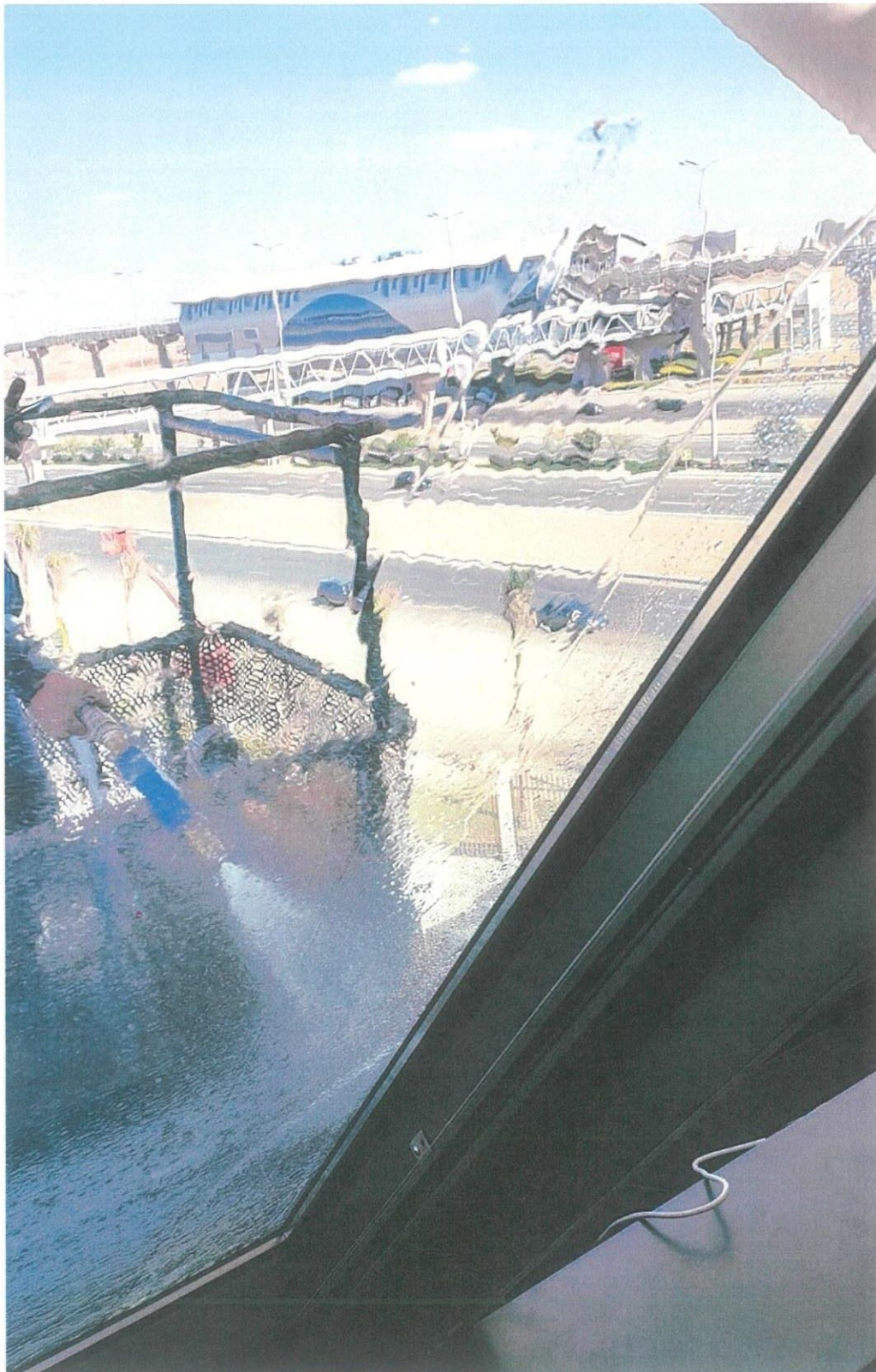
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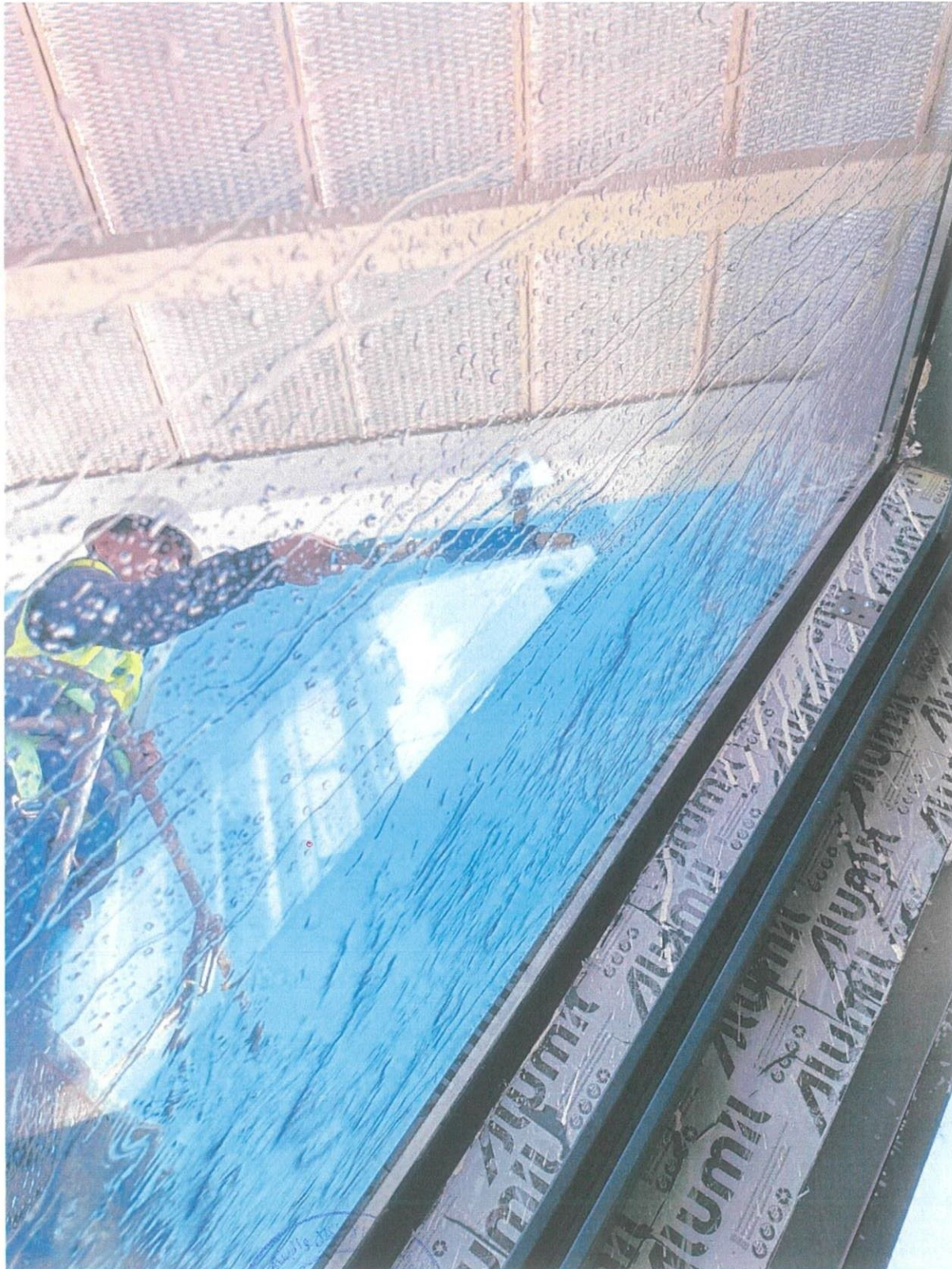


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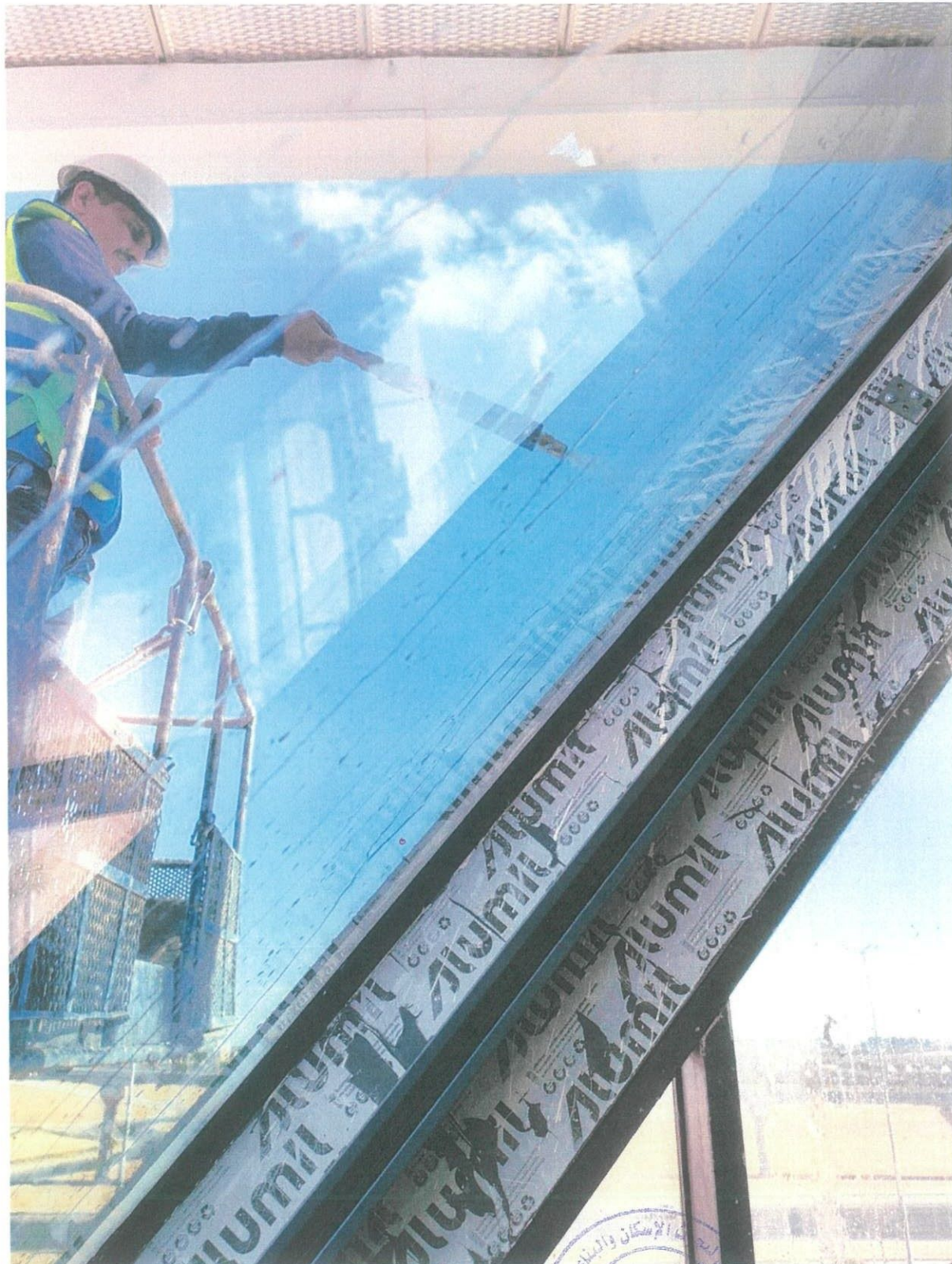


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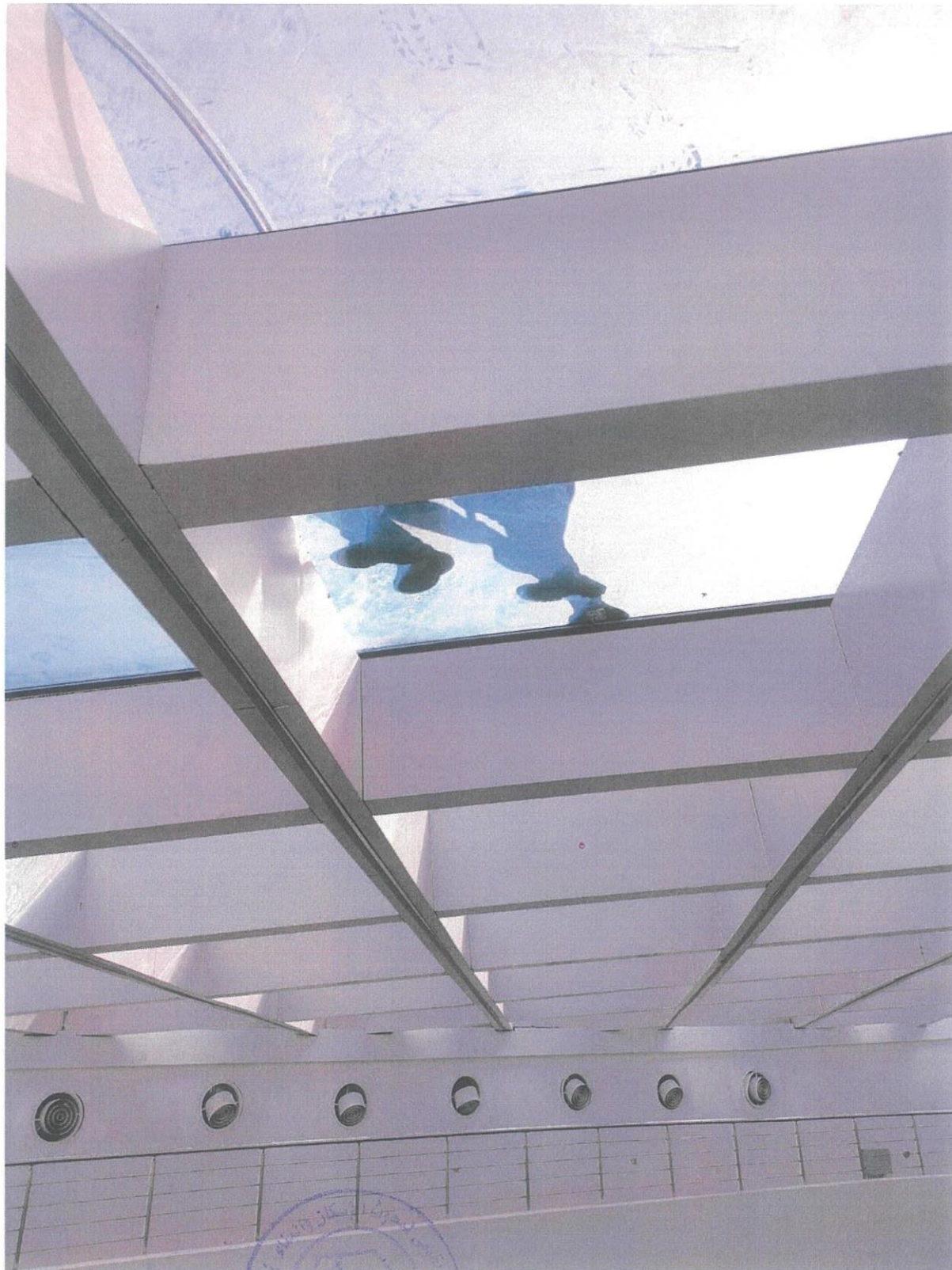
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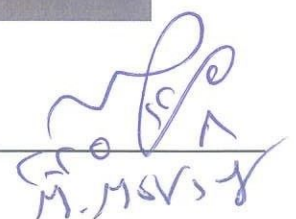
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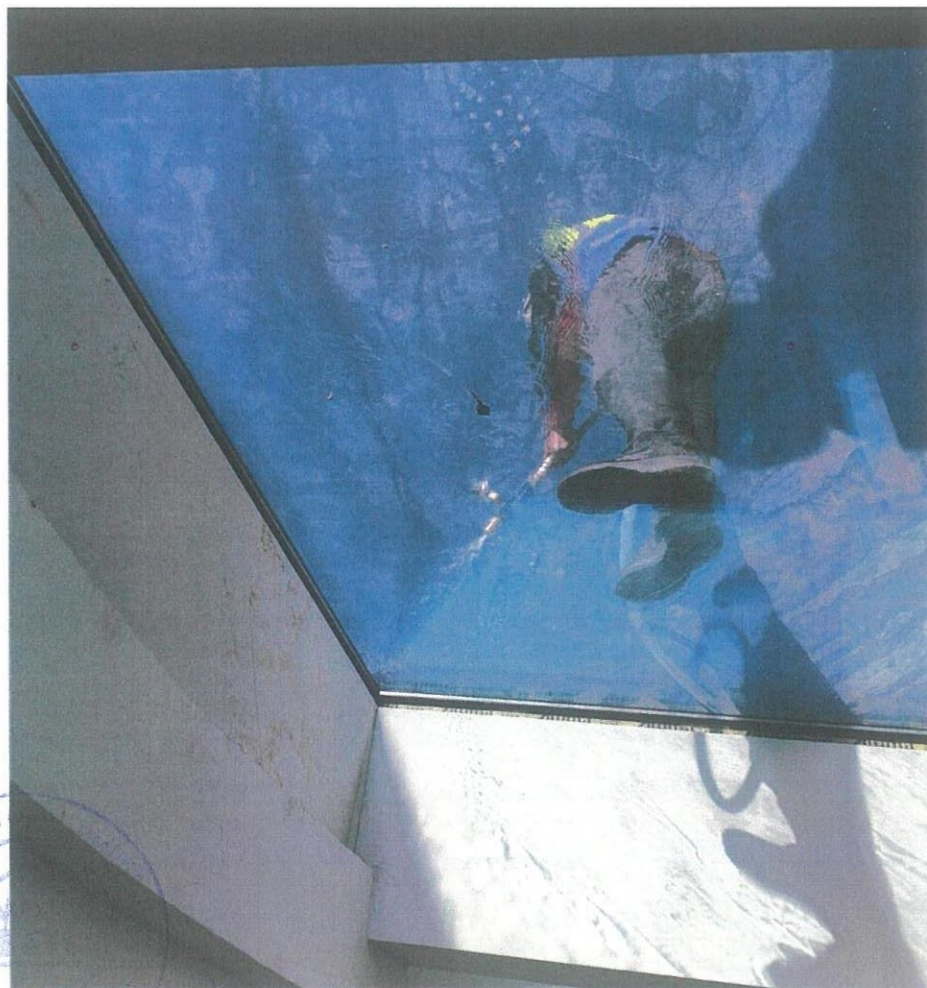


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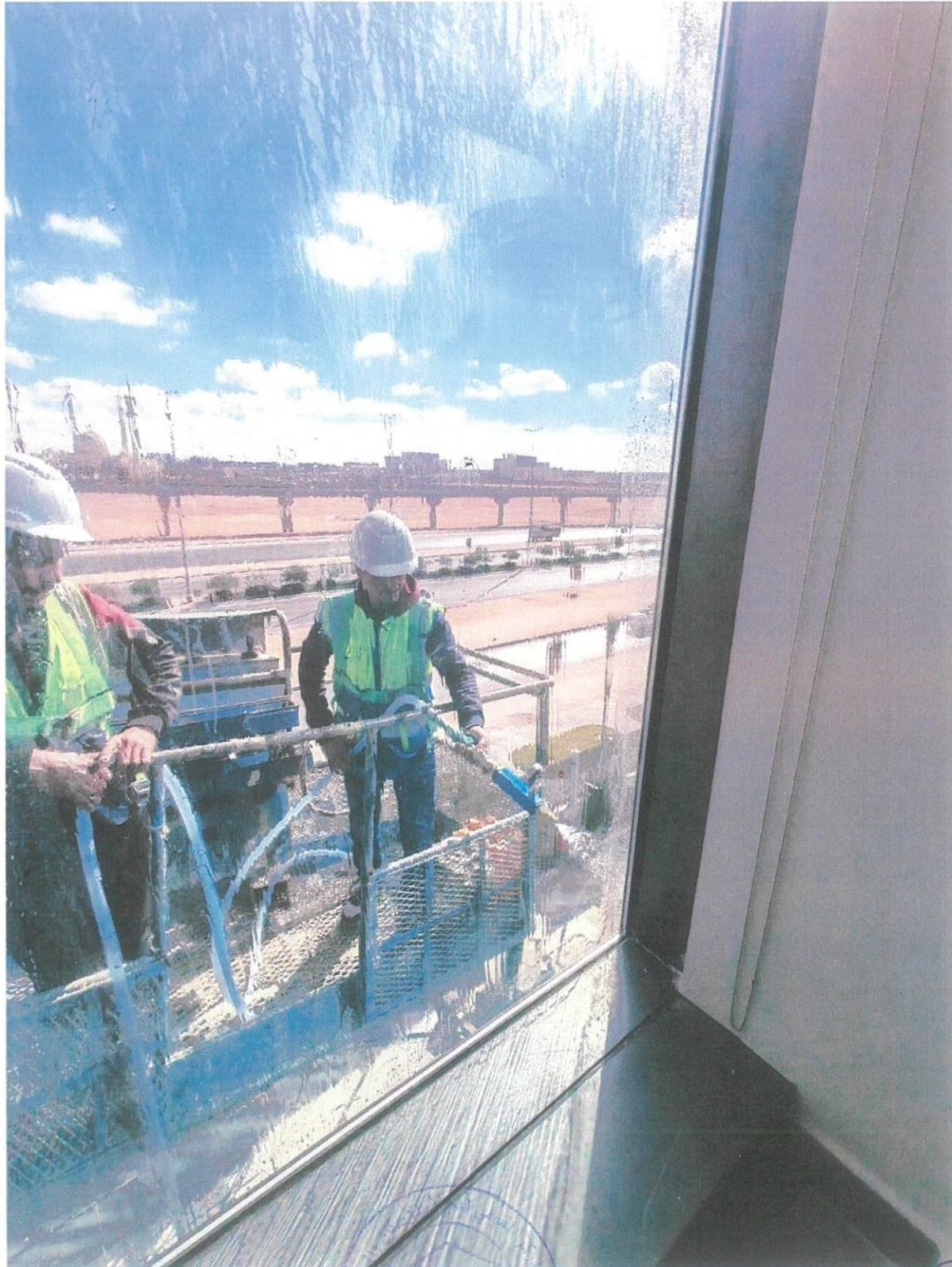
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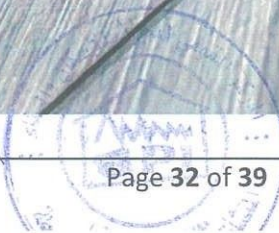
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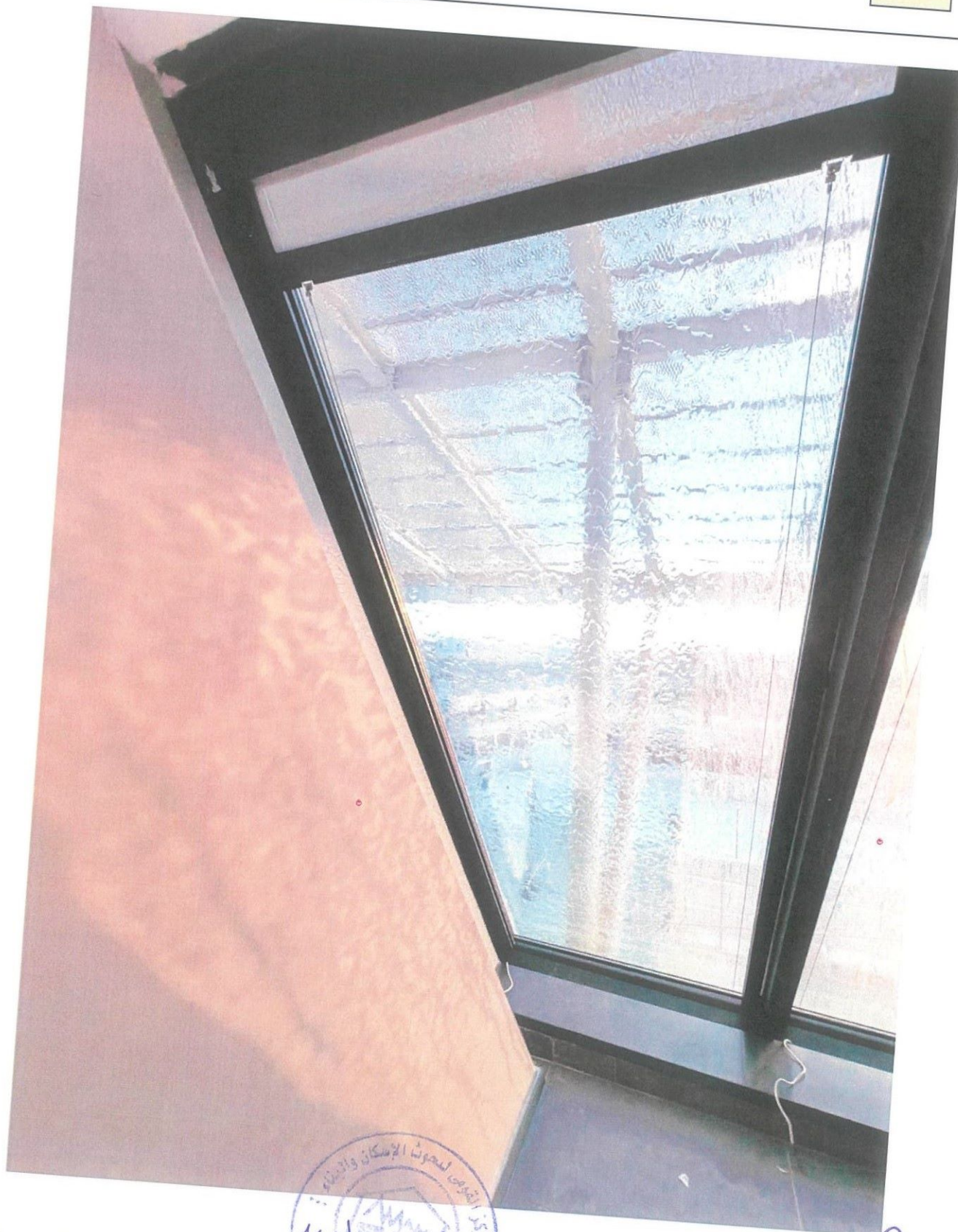
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Client Name: Alu-Metalo

Report No.BPI/ ADL/ 2025/2690

Client Code: BPI/H/CO.469

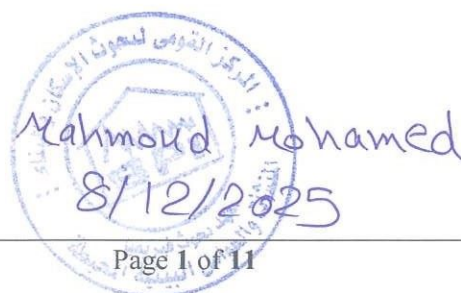
Evaluation of Curtain Wall system against air leakage at

Petrobel building in Capital City, Egypt

In accordance with ASTM E-783

December 2025

Ahmed Adel



M. Mohamed
8/12/2025



Client Name: Alu-Metalo
Report No.BPI/ ADL/ 2025/2690

Client Code: BPI/H/CO.469

**Subject: Evaluation of fixed curtain wall system against air leakage in
Accordance with ASTM E-783 standard.**

Project details	
Customer (client) name	Alu-Metalo
Adress	الكيلو ٢٦ شارع عادل والي - طريق مصر اسكندريه الصحراوي - ٦ اكتوبر - الجيزه
Contact person	Sherif Zohny
Project Name and location	Project Name: Petrobel Location: Capital City
Owner	Petrobel
Consultant	Proger
Contractor	Sky
Subcontractor	Alu-metalo
Sample specifications	
Building name	A
Sample type and name	Curtain Wall
Glass type and thickness	The glass consists of 8mm guardian, 22mm Spacer, and 6+6 lamination clear
Sample dimension	(1.20×2.60) m
Sample co-ordinate (axis, elevation, ..etc.) (for in site tested samples)	As shown in the shop drawing
Sample description (rain gutter, dust plug, brushes, ,,,)	Curtain Wall is composed of aluminum framing and glazing.

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Client Name: Alu-Metalo
Report No.BPI/ ADL/ 2025/2690

Client Code: BPI/H/CO.469

1. Introduction:

The main objective of this work is to carry out air infiltration test for the curtain wall façades ONLY (any joints, cracks or opening between the assembly and the adjacent wall are excluded) according to

- **ASTM E-783** “Standard Test Method for Field Measurement of Air Leakage through Installed Exterior Windows and Doors”.

- The selected fixed Curtain Wall sample from the **Petrol project in Capital City** with dimensions of **1.2 × 2.6 m** was tested, the tested sample was previously selected and approved by the consultant.
- The air leakage test was performed at a static air pressure difference of 75 Pa, as per the technical specification of the project that is prepared by the consultant.

This report represents the result of air leakage test carried out for Petrol project in Capital City of the project.

2. Scope

2.1. Scope and purpose of ASTM E 783:

- This test method provides a field procedure for determining the air leakage rates of installed exterior windows, curtain walls and doors.
- This test method is applicable to exterior windows, curtain walls and doors and is intended to measure only such leakage associated with the assembly and not the leakage through openings between the assemblies and adjacent construction.

3. Façade description:

The façades of the buildings at petrobel are composed of Curtain Wall and cladding system; Curtain Wall composed of aluminum framing and glazing. The glazing consists of 8mm guardian, 22mm Spacer and 6+6 lamination clear. The dimension of selected fixed Curtain Wall sample is 1.2 m * 2.6 m and its location is shown in annex 2

4. Preparation of inspected sample:

The tested sample has been selected by consultant without any interference on our part.

The test specimen, consisting of the installed curtain wall system, was thoroughly inspected prior to testing. This inspection confirmed that the specimen was in the as-installed condition with no

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observable deterioration or damage to the surrounding construction, the curtain wall unit, or its perimeter seals. Furthermore, the specimen was visually verified to be dry at the time of the test. No modifications or preparation (such as taping or sealing specific components) were performed, ensuring that the air leakage measurements represent the performance of the unit under normal service conditions.

5. Apparatus

- **Test Chamber:** A test chamber or box made of plywood, plastic, or other suitable material and sealed against the test specimen. Test chambers mounted on the interior must be made so that interior surfaces and joints of the specimen can be easily observed for water penetration during the test. No part of the testing chamber shall come in contact with or restrict any point where water penetration may occur. At least one static air pressure tap shall be provided to measure the chamber air pressure versus the ambient (interior-exterior) air pressure.
- **Air System:** A controllable blower, compressed air supply exhaust system, or reversible blower designed to supply the required maximum air pressure difference across the specimen. The system must provide essentially constant air flow at a fixed pressure for the required test period.
- **Pressure Measuring Apparatus:** A device to measure the test pressure difference.
- **Air flow metering system:** a device to measure the air flow into the test chamber or through the test specimen. The schematic diagram of the air testing apparatus is shown in Figure 1.

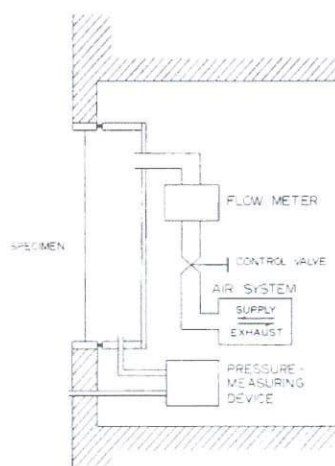


Fig. 1: General Arrangement of Air Leakage Test

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6. Summary of Testing Method

The test consists of sealing a chamber to cover the interior or exterior face of a test specimen, supplying air to or exhausting air from the chamber at a rate required to maintain the specified test pressure difference across the specimen, and measuring the resultant air flow across the specimen.

- Test pressure difference if no value is designated, 75 Pa.

For determination of the system (chamber) air leakage, the joints of the window frame were first covered with a mil sheet of Polyethylene film. The extraneous air leakage was then determined by exhausting a measured flow (Q_e) of air from the test chamber to achieve an appropriate pressure differential (ΔP) across the chamber wall. At the given ΔP , the measured Air flow was recorded and deemed extraneous or system leakage Q_e . The mil sheet was then removed. The total window / extraneous air leakages, Q_t was then measured and recorded. The window - frame leakage at the applied (ΔP), Q_{cw} was then calculated from the relation:

$$Q_{cw} = Q_t - Q_e \quad (1)$$

Where, Q_{cw} : air leakage through the tested window, (L/s).

Q_t : air leakage through the tested window and extraneous (chamber) leakage, (L/s).

Q_e : extraneous (chamber) air leakage, (L/s).

Then, the rate of air leakage for the window per total area Q_A can be calculated using the equation:

$$Q_A = Q_{cw} / A, \text{ (L/s.m}^2\text{)} \quad (2)$$

Where, A: total unit sample area (m^2).

7. Results and observations:

- The air leakage through the tested sample was measured at a static differential air pressure of 75 Pa. The resulting air leakage value is presented in Table 1, while the air leakage rate result is shown in Table 2.

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Geo. A.



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Report No.BPI/ ADL/ 2025/2690

Client Code: BPI/H/CO.469

Table 1: Air flow rate through tested sample

	Air flow, L/S	
	Sealed (Q_e)	Not Sealed (Q_t)
	6.5	6.78
	6.51	6.77
	6.51	6.76
	6.52	6.77
	6.53	6.76
	6.54	6.77
	6.56	6.77
	6.57	6.78
	6.51	6.79
Avg.	6.53	6.77

Table 2: The Result air leakage rate

Test name	pressure, Pa	Floor	Position	Room No.	Result, L/S m^2	Status
Air leakage	75	second	Axis (07-08)	A 216	0.078	Pass

7. Remarks:

- 1- All tests have been conducted in the presence of the consultant and main and sub-contractor representatives.
- 2- As per AAMA MCWM-1-89 standard Air leakage through the curtain wall shall not exceed $0.3 \text{ L/s} \cdot m^2$
- 1- The tested areas have been selected by the consultant without any interference on our part.
- 2- The above-mentioned tables show the location and status of the tested area.
- 3- The above-mentioned results are Valid only for the tested areas.
- 4- The photos of the test sample are attached in Annex 1, while the tested points and its plan location is presented in attached drawing in Annex 2.

Tested by
Ahmed Adel

A. Adel

Reported by **M. Morsy**

Assoc. prof. M. Morsy

Mahmoud Mohamed

Assoc. prof. M.M. Abd Elrazik

8/12/2025

Reviewed by

Prof. M. A. Hassan

Client Name: Alu-Metalo
Report No.BPI/ ADL/ 2025/2690

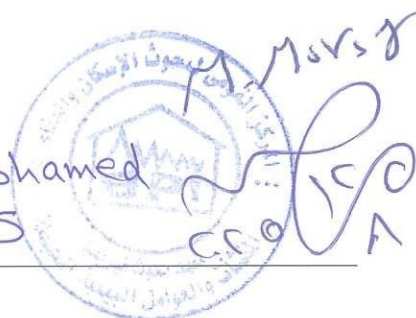
Client Code: BPI/H/CO.469

Annex 1: photos during test



Ahmed Adel

Mahmoud Mohamed
8/12/2025



Client Name: Alu-Metalo
Report No.BPI/ ADL/ 2025/2690

Client Code: BPI/H/CO.469



Ahmed Adel



Mahmond Mohamed
8/12/2025

M. Morsy
8/12/2025

Client Name: Alu-Metalo
Report No.BPI/ ADL/ 2025/2690

Client Code: BPI/H/CO.469



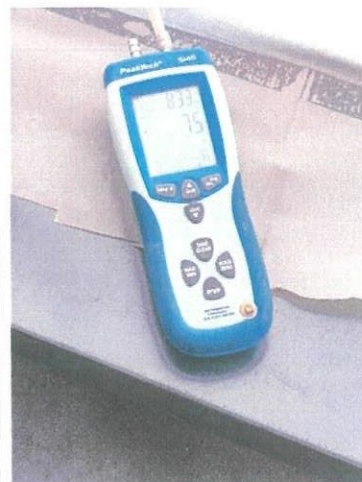
Mahmoud Mohamed
8/12/2025

Ahmed Adel

M. Mervat

Client Name: Alu-Metalo
Report No.BPI/ ADL/ 2025/2690

Client Code: BPI/H/CO.469



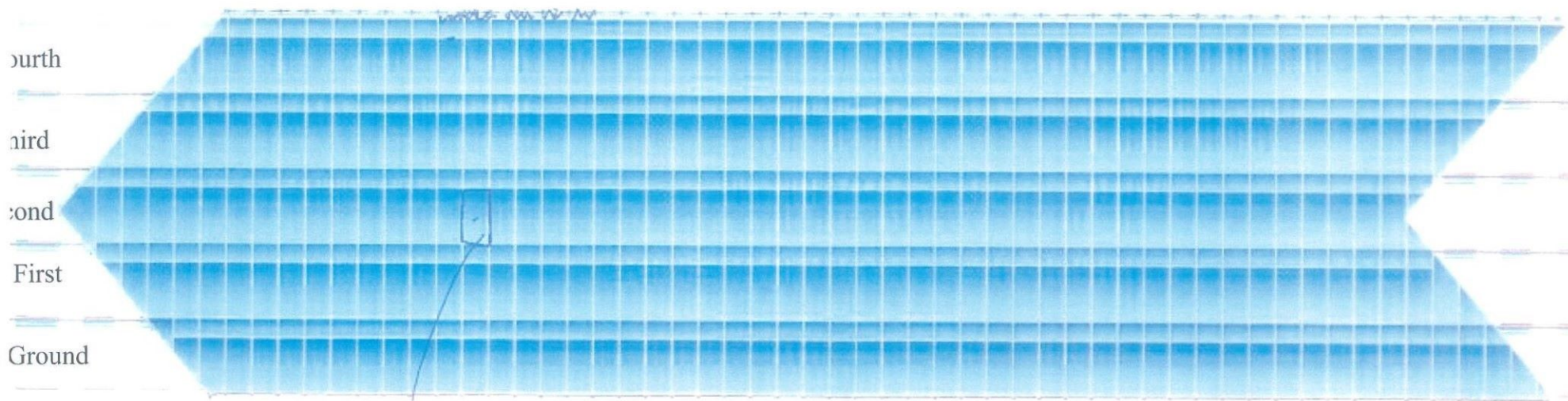
Mahmoud Mohamed
8/12/2025

Page 10 of 11

Ahmed Adel

GRO
A. M. A.

Annex 2: Attendance Drawing



air test
AZ16

Rahmoud Mohamed
8/12/2025

Ahmed Adel

M. Mansour
cro
p

المركز القومي لبحوث الإسكان والبناء

معهد فيزيقا المنشآت

نفاذية الماء والهواء

نموذج: طلب إجراء اختبار

كود النموذج: HBRC-BPI-F-7.1-01

رقم الطلب: HBRC-BPI-ADL-2025-2753

طلب اختبار عينات غير روتينية (نفاذية)

السادة المركز القومي لبحوث الاسكان والبناء - (معهد فيزيقا المنشآت)

تحية طيبة وبعد ،،،

يرجى التفضل بالموافقة على إجراء الاختبارات المبينة على العينات المرفقة وفقا للبيانات التالية:

المشروع:

المنطقة:

التصنيف:

المواصفات:

كود العميل:

الجهة الطالبة: الوميتا

المحافظة: المدينة:

الجهة المالكة للمشروع:

الجهة المنفذة (المقاول):

الإستشاري:

بيانات أخرى إضافية:

كود / وصف العينة

واجهات مبني زجاجية - BPI/ADL/2025/2690

وصف الاختبار

ASTME 783 - اختبار تسرب الهواء - لعدد عينة واحدة 70 point - AAMA501.2 - اختبار نفاذية المياه

وصف خدمة مطلوبة

بنود مكملة

☐ تقرير باللغتين العربية والانجليزية

☐ تقرير باللغة الانجليزية

☐ يوجد ملفات مرفقة من قبل الجهة طالبة الاختبار

☐ يوجد جدول مرفق بعينات إضافية

☐ أرغب في خدمة إرسال صورة التقرير من خلال البريد الإلكتروني

☐ أرغب في خدمة الرسائل القصيرة للإخطار بانتهاء النتائج

بيانات مندوب الجهة طالبة الاختبار

وتفضلوا بقبول وافر التقدير والاحترام ،،،

رقم التواصل: 01150030544

الإسم: امين السيد

التاريخ: 02-نوفمبر-2025

البريد الإلكتروني:

اجمالي الرسوم: 115,510.00

رسوم الاختبار: 105000

رسوم الخدمات: 0

رسوم الضريبة: 10500

رعاية أسر الشهداء: 5

دعم متحدى الإعاقة: 5

مكتب استلام العينات

تاريخ استلام تقرير النتائج:

تاريخ استلام العينة:

اسم مستلم العينات:

التوقيع:

صفحة () من ()

تاريخ الاصدار:

رقم الاصدار:

د. م. / محمود محمد

٢٠٢٥ / ١١ / ٢



المركز القومي لبحوث الإسكان والبناء
معهد بحوث فيزيكا المنشآت والعوامل البيئية المحيطة



طابعا ب م ا ن ة

تاريخ الطلب: ٢٠٢٥ / ١١ / ٢
اسم العميل: ابو عيتالو
عنوان وتليفون العميل: ١١١١٠٩٧٧٢٧ / ابو رفاش

وصف العينة	العدد	مكان وطبيعة المعاينة	ملاحظات
مياهات زجاجية		العامة الاطارية - بين بتر و ميل	
اصدار اكثر من نسخة للتقرير	لا نعم		

اجمالي تكلفة المعاينة واعداد التقرير = ١٠٥٠٠٠ جنيها (فقط وقدره) واثني وخمسة آلاف جنيه

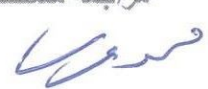
بخلاف ١٠% قيمة الضريبة المضافة

يتم توريد المبلغ الاجمالي بغيزا أو بشيك باسم المركز القومي لبحوث الاسكان والبناء أو بتحويل بنكي علي رقم حساب ح/تمويل البحوث العلمية
٩/٥٥٤/٨٣٦١٨/٢ رقم الوسيلة ٣٢١٠٤٦٠١ حتي يتسني لنا البدء في عمل اللازم.

الطريقة	المعايير	المعاينة	المرجع
	ASTM-E 783	AAMA-501.2 (70 point) water	

المعمل لديه الامكانيات الكاملة والقدرة علي تلبية متطلبات العميل المذكورة عالية لاجراء المعاينة المطلوبة باستخدام المواصفة القياسية الفنية الخاصة بتلك المعاينة إن وجدت.

ملحوظة هامة: يعتبر هذا العقد بمثابة وثيقة اتفاق بين المعمل والعميل لاداء الخدمة المذكورة وعاليه وفي حالة اي حيود عن البنود المتفق عليها به يجب إعلام العميل فورا ولا يتم البدء في المعمل إلا بعد الحصول علي موافقة كتابية من جانبه ويرفق به اي ملحقات تعدل علي بنود تم الاتفاق عليها.

توقيع العميل: 
مراجعة مسئول النشاط: 
توقيع / مدير المعمل: 
٢٠٢٥ / ١١ / ٢

Tel : (02) 33356722 / 33356853
FAX : (02) 3351564



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87 El-Tahrir St., Dokki, Cairo, Egypt