

LABORATORY MEASUREMENT OF AIRBORNE SOUND INSULATION OF EPS CEMENT LIGHT WEIGHT PANEL TEST REPORT



ARAB CENTER FOR ENGINEERING STUDIES

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- ◆ ACES Client : CINI SOLUTIONS FOR BUSSINESS & TRADING
- ◆ Project : EVALUATION OF MATERIAL
- ◆ Product : EPS CEMENT LIGHT WEIGHT PANEL -
(Thickness 100x2400x2530 mm)

| | | | | | | | | | | | | |
|-----------|---|---|---|---|---|---|---|---|---|---|---|--------------------------------|
| Report No | T | M | Q | 2 | 0 | 0 | 1 | 0 | 9 | 6 | 2 | 19 th July, 2020 |
| | T | M | R | 2 | 0 | 0 | 5 | 0 | 2 | 1 | 1 | |

| | | | | | | |
|------|------------|-------------------|--------------|-----------|----------|-----------|
| 0 | 19.07.2020 | Issued for client | <i>Aslam</i> | <i>AS</i> | G.Z | A.S |
| Rev. | Date | Description | Prep. | Check | Approved | QM Check. |

Request No. TMQ20010962

19 July 2020

Report No. TMR20050211

Rev.0

Client : Cini Solutions For Business& Trading

Project : Evaluation Of Material

Subject : Laboratory Measurement of Airborne Sound Insulation of EPS
Cement Weight Panel

Dear Sir,

Arab Center for Engineering Studies is pleased to submit this factual report of Acoustic test for **EPS Cement light weight panel** conducted on 15th of March, 2020.

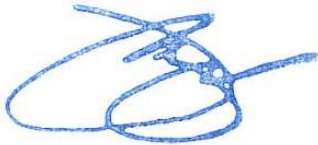
This report was carried out according to our proposal no. PT20000776 Rev.0 dated February 13th, 2020 and your confirmation for the same with reference no: Signed Quotation dated July 18th, 2020.

This report includes testing methodology, and test results including pictures taken during the acoustic monitoring.

In the event that additional information or clarifications are required, please contact our office at your convenience. We would like to take this opportunity to thank you for your confidence and look forward to be of service to you in the future.

Best Regards,

SINCERELY YOURS
ARAB CENTER FOR ENGINEERING STUDIES



ENG. GHALEB AL-ZUBI
DEPUTY BRANCH MANAGER



Arab Center
المركز العربي
For Engineering Studies
للدراسات الهندسية

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1.0 INTRODUCTION

The sound insulation test which includes the measurement of the sound reduction index for **EPS Cement light weight panel** and the full detailed report were undertaken by ACES in accordance with BS EN ISO 10140-2 "Laboratory measurements of airborne sound insulation of building elements" and the procedures are described in clause 6.

The EPS Cement panel system was installed in the opening test and tested in respect for airborne sound insulation. For this purpose, the construction had to be installed in the test opening with the dimensions of 2400 mm width x 2530 mm height with suppressed flanking transmission according to BS EN ISO 10140-5.

Please note that, from these measurements the required results have been derived and are presented in both tabular and graphic form in Appendix A.

2.0 REFERENCE STANDARDS

BS EN ISO 10140-2 Acoustics — Laboratory measurement of sound insulation of building elements Part 2: Measurement of airborne sound insulation

BS EN ISO 10140-5 Acoustics — Laboratory measurement of sound insulation of building elements — Part 5: Requirements for test facilities and equipment

BS EN ISO 717-1 Acoustics — rating of sound insulation in buildings and of building elements — Part 1: Airborne sound insulation

3.0 METHODOLOGY

3.1. Airborne Tests

High volume "pink" noise was generated from single loudspeaker in the source room, positioned to obtain a diffuse sound field. A spatial average of the resulting one-third octave band noise levels between 100 Hz and 3150 Hz was obtained by using a moving microphone technique over a minimum period of 15 seconds at each position.

The same measurement procedure was used in the receiver room.

The results of the tests were rated in accordance with BS EN ISO 717-1 "Rating of sound insulation in buildings and of building elements. Part 1 "Airborne sound insulation"

3.2. Reverberation Time

Reverberation time measurements were taken following the procedure described below in order to correct the receiver levels for room characteristics.

The source is moved to the receiver room and "pink noise" was generated and stopped instantaneously in order to measure the reverberation time in each of the one- third octave bands between 100 Hz and 3150 Hz. The internal programmer of the analyzer is used to measure the decay time of the sound in the room. This was repeated nine times in the receiving room in order to obtain an average result.

3.3. Background Noise

The background noise levels in the receiving room was measured during the tests and the receiving room levels are corrected in accordance with BS EN ISO 1040-2. The dominant source of background noise observed during the tests was road traffic noise from adjacent roads.

4.0. INSTRUMENTATION

The main details of instrumentation and equipment used during the sound insulation tests are given in Table No.1

Table No.1 – Instruments used during the test

| Instrument | Manufacturer and Type | Serial Number |
|--|--|---------------|
| Sound level meter & analyzer | SVANTEK 979 Sound & analyzer Calibration No: 69414 | 69414 |
| Omni-directional mid frequency sound source. (Loudspeaker) | Qsources BVBA Type Qohm | 8109B |
| Qam Measurement power amplifier. | Qsources BVBA-INFRA | 3130 |
| Pink Noise Source | L, linear output between 45-20000 Hz | 3130 |
| Calibrator | Acoustic Calibrator SV 35A class I IEC 60942:2003 Calibration Number: 48982 | 58074 |
| Specialist Software | Savan Pc++ | Ver. 3.3.0 |

5.0 PRODUCT IDENTIFICATION

The test sample consists of EPS Cement light weight panel having the physical characteristics stated in the Table No.2

Table No.2 – Physical characteristic of product

| Sample Description | Width (m) | Height (m) | Nominal Thickness (mm) | Mass per unit area (analytical determination) (kg/ m ²) |
|--|-----------|------------|------------------------|---|
| EPS Cement light weight panel (Thickness 100 mm) | 2.400 | 2.530 | 100 | 65 |

The EPS Cement light weight panel (100 mm thick.) is a green building material, which can be used for commercial, industrial and residential construction. It has density 649 kg per m³.

6.0. MEASUREMENT OF SOUND TRANSMISSION IN ACCORDANCE WITH BS EN ISO 10140-2.

In the laboratory, airborne sound transmission is determined from the difference in sound pressure levels measured across a test sample installed between two reverberant rooms. The difference in measured sound pressure levels is corrected for the amount of absorption in the receiving room. The test is done under conditions which restrict the transmission of sound by paths other than directly through the sample. The source sound field is randomly incident on the sample.

The test sample is located and sealed in an aperture within double wall between the two rectangular reverberant rooms, both of which are constructed from solid block with reinforced concrete floors and roofs. The partition wall has a dimension of 2.4m wide x 2.5m high and 410mm nominal thickness and forms the whole aperture of the common area between the two rooms.

One of the rooms is used as the receiving room and has a volume of 77.5 cubic meters. It is isolated from the surrounding structure and the adjoining room by the use of resilient mountings and seals ensuring good acoustic isolation. The adjoining source room has a volume of 63.3 cubic meters.

Broad band noise is produced in the source room from an electronic generator, power amplifier and loudspeaker. The resulting sound pressure levels in both rooms are sampled using a moving microphone with sweep radius 1 m and connected to a real time analyzer. The signal is filtered into one third octave band widths, integrated and averaged. The value obtained at each frequency is known as the average sound pressure level for either the source or the receiving room.

The change in level across the test sample is termed as the sound pressure level difference:

$$D = L1 - L2$$

Where:

D: is the equivalent Sound Pressure level difference in dB

L1: is the equivalent Sound Pressure level in the source room in dB

L2: is the equivalent Sound Pressure level in the receiving room in dB

The Sound Reduction Index (R) also known by the American terminology Sound-Transmission Loss is defined as the number of decibels by which sound energy randomly incident on the test sample is reduced in transmitting through it and is given by the formula:

$$R = D + 10 \log_{10} S/A \dots \text{in decibels}$$

Where:

S: is the area of the sample

A: is the total absorption in the receiving room

The Sound Reduction Index is an expression of the laboratory sound transmission performance of a particular element or construction. It is a function of the mass, thickness, sealing method of mounting etc. and is independent of the overall area of the sample.

However, when an example of this partition is installed on site, the sound insulation obtained will depend upon its surface area, as well as the absorption in the receiving room. The larger area allows to greater sound energy transmitted. Also, the overall sound insulation is affected by the sound transmission through other building elements, some of which may have an inferior performance to the sample tested. In practice, therefore, the potential sound reduction index of a construction is not fully realized on site. Furthermore, the sound reduction index of a particular sample of that construction can only be measured accurately in a laboratory, because only under such controlled conditions can the sound transmission path be limited to the sample under test.

R_w , C and C_{tr} have been calculated in accordance with the relevant section of BS EN ISO 717-1, from the results of laboratory tests carried out in accordance with BS EN ISO 10140-2

7.0 TEST ITEM SETUP AND INSTALLATION

The test element was installed by the builders of the manufacturer for the determination of the airborne sound insulation and this is done using high acoustical materials between sample and borders of separation wall to suppress the flanking and indirect transmission.

8.0. TEST ROOMS AND MEASURING CONDITIONS

All the rooms tested were in a finished state, with doors fitted, walls painted and all sockets installed.

Table No.3 – Details of Lab. Rooms

| Test Element | Volume Source Room (m ³) | Volume Receiving Room (m ³) | Test Area (m ²) | Temp. °C | Relative humidity % |
|---|---------------------------------------|--|------------------------------|----------|---------------------|
| EPS Cement light weight panel (Thickness 100 mm) | 63.3 | 77.5 | 6.0 | 24.5 | 55.8 |

9.0 RESULTS

9.1 Sound Reduction index,

The sound reduction insulation is determined according to BS EN ISO 10140-2. The single number quantity R_w and the corresponding spectrum adaption terms are determined according to EN ISO 717-1.

The results of testing are summarized in the tables below, for airborne tests, the higher the value, the better the performance.

Table No.4 – Result of Sound Reduction Index measurement for EPS PANEL LW

| Test Specimen | Mass per unit Area (analytical determination) (kg/m ²) | Sound reduction index, R_w | Spectrum adaption terms (C, C_{tr}) | Minimum Requirement, R_w |
|--|--|------------------------------|--|----------------------------|
| EPS Cement light weight panel (Thickness 100 mm) | 65 | 47 | -1,-3 | - |

The sound reduction index R_w per one third octave band from 100HZ to 5000 HZ is shown in tabular form and graphically on graph sheet

10.0 Measurement of flanking transmission for the acoustic laboratory

This is calculated by covering the specimen on both sides with additional flexible layers, by 13 mm gypsum board on a separate frame at a distance which gives a resonance frequency of the system of layer and airspace well below the frequency range of interest. The airspace contains sound-absorbing material. With this measurement W_{Dd} , W_{Df} and W_{Fd} are suppressed.

Table No.5- Determination of flanking transmission

| Material | Sample size, m | Spectrum adaption terms (C, C_{tr}) | R'_w |
|---|----------------|--|--------|
| Specimen covered by 13 mm gypsum board and rock wall material on both sides | 2.4x2.5 | -1,-3 | 56 |

APPENDIX – A

**Sound reduction index according to ISO 10140-2
Laboratory measurements of airborne sound insulation between rooms**

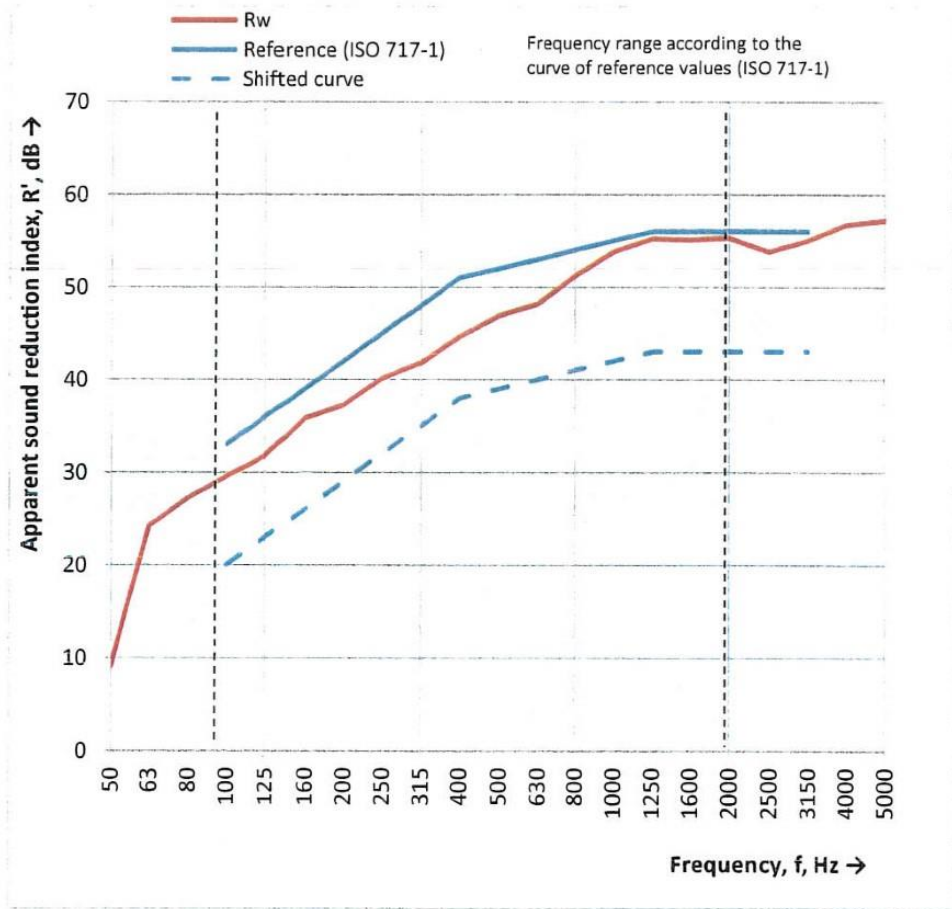
Client: CINI SOLUTIONS FOR BUSSINESS & TRADING

Date of test: 15-03-2020

Description and identification of the test sample: EPS Cement light weight panel (Thickness 100 mm)

Area S of separating element: 6.0 m²
 Source room volume: 63.3 m³
 Receiving room volume: 77.5 m³

| Frequency f Hz | R _w (one-third octave) dB |
|-------------------|--|
| 50 | 9.1 |
| 63 | 24.2 |
| 80 | 27.2 |
| 100 | 29.5 |
| 125 | 31.8 |
| 160 | 35.8 |
| 200 | 37.2 |
| 250 | 40.1 |
| 315 | 41.8 |
| 400 | 44.6 |
| 500 | 46.9 |
| 630 | 48.2 |
| 800 | 51.2 |
| 1000 | 53.8 |
| 1250 | 55.2 |
| 1600 | 55.1 |
| 2000 | 55.3 |
| 2500 | 53.8 |
| 3150 | 55.0 |
| 4000 | 56.7 |
| 5000 | 57.2 |



| Rating according to ISO 717-1 | | | |
|--|---------------------------------|--------------------------------|----------------------------------|
| R _w (C; C _r) = 47 (-1; -3) dB | C ₅₀₋₃₁₅₀ = -1 dB | C ₅₀₋₅₀₀₀ = 0 dB | C ₁₀₀₋₅₀₀₀ = 0 dB |
| Evaluation based on Laboratory measurement results obtained by an engineering method | C _{tr,50-3150} = -3 dB | C _{tr,50-5000} = -3dB | C _{tr,100-5000} = -1 dB |

| | |
|---------------------|------------------------------|
| No. of test report: | Name of test institute: ACES |
| Date: 15-03-2020 | Signature: Mohamed Jamal |

APPENDIX - B

1. Construction and Testing



APPENDIX - C: Calibration Certificate

RESPONSE
Characteristics: A, 1/2, 400 Hz Bandpass

| Level [dB] | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
|-----------------|------|------|------|------|------|------|------|------|------|-------|
| Indication [dB] | 10.8 | 20.7 | 30.6 | 40.5 | 50.4 | 60.3 | 70.2 | 80.1 | 90.0 | 100.0 |
| Error [dB] | -0.5 | -0.4 | -0.3 | -0.2 | -0.1 | 0.0 | 0.1 | 0.2 | 0.3 | 0.4 |

Notes: Indicated in special chamber, with reference microphone GRA S type 40XN No 7.421

INTERNAL NOISE LEVEL (electrical - compensated)
LEVEL METER function: Range: Low; Blacklight - off; Calibration factor: 100

| Level [dB] | A | B | C |
|-----------------|------|------|------|
| Indication [dB] | 112 | 110 | 108 |
| Error [dB] | -0.1 | -0.1 | -0.1 |

INTERNAL NOISE LEVEL (acoustical - compensated)
LEVEL METER function: Characteristic: A (Blacklight - off)

| Indication [dB] | Low | High |
|-----------------|-------|-------|
| Indication [dB] | 142.0 | 140.0 |
| Error [dB] | 0.0 | 0.0 |

CALIBRATION (electrical)
LEVEL METER function: Characteristic: HF10 1-75 Hz; Input signal: 1 (dB)

| Reference frequency [Hz] | Corrected value [dB] | Indication [dB] | Error [dB] |
|--------------------------|----------------------|-----------------|------------|
| 100 | 120.0 | 120.0 | 0.0 |
| 15 | 118.0 | 118.0 | 0.0 |
| 1000 | 119.5 | 119.5 | 0.0 |
| 100 | 119.7 | 119.7 | 0.0 |

CALIBRATION (vibrational)
LEVEL METER function: Range: High; Input signal: 1 (m/s)

| Reference frequency [Hz] | Corrected value [dB] | Indication [dB] | Error [dB] |
|--------------------------|----------------------|-----------------|------------|
| 100 | 120.0 | 120.0 | 0.0 |
| 15 | 118.0 | 118.0 | 0.0 |
| 1000 | 119.5 | 119.5 | 0.0 |
| 100 | 119.7 | 119.7 | 0.0 |

FREQUENCY RESPONSE (electrical)
1/3 OCTAVE analysis: Characteristic: HP; Range: High; Input: 175 dB

Calculated Response

| Frequency [Hz] | Indication [dB] | Corrected Value [dB] | Error [dB] |
|----------------|-----------------|----------------------|------------|
| 100 | 120.0 | 120.0 | 0.0 |
| 150 | 118.0 | 118.0 | 0.0 |
| 200 | 119.5 | 119.5 | 0.0 |

INTERNAL NOISE LEVEL (electrical)
LEVEL METER function: Range: Low; Blacklight - off

| Indication [dB] | HP10 | H.A. | WB10 |
|-----------------|-------|-------|-------|
| Indication [dB] | 112.3 | 111.3 | 111.3 |
| Error [dB] | -0.1 | -0.1 | -0.1 |

All frequencies are nominal center values for the 1/3-octave bands.



Al Bader Nuclear Gauge & Equipment Service Centre

مركز البدر لخدمة الأجهزة والمقاييس النووية

Calibration Certificate



CL-131

Form No. 001-EN, E-CAL-M-012 & Revision 1 Date: 15/01/2013 Page 1/1

| | | |
|---|---|--|
| Name of Customer : Arab Center for Engineering Studies (ACES) Industrial Area Zone No. 37, Street No. 11, Gate No. 471 P.O. Box. 44970118, Doha, Qatar | | Certificate No. 1007006 Date of Issue 11-07-2013 Date of Calibration 26-07-2013 Calibration Due Date 26-07-2015 |
| Date of Receipt/Ref. No. 01-07-2013 (As per on Site Calibration) Service Request No. 2632 | | |
| Details of Observation of Unit Under Calibration | | Identification No. 1501.01Q Serial No. 60414 Instrument Description Sound & Vibration Analyser |
| Range 25 to 140dB Resolution 0.1dB Accuracy 1.5dB Acceptance Criteria ± 1.5 dB | Visual Inspection Satisfactory Make/Model Svanick - S/AN 975 Received Condition In Tolerance Returned Condition In Tolerance | |

Results of Calibration

| Range of UUC | Input Sound given by sound level calibrator @ 1 kHz in dB | Reading Observed by UUC in dB | Error in dB | \pm Tolerance in dB | \pm Uncertainty dB | Result |
|--------------|---|-------------------------------|-------------|-----------------------|----------------------|--------|
| 25 to 140dB | 94 | 94.3 | 0.3 | 1.5 | 0.3 | Pass |
| | 114 | 114.1 | 0.1 | 1.5 | 0.5 | Pass |

Remarks:

- Average of minimum five readings are reported.
- Calibration points & calibration certificate are given based on customer requirements.
- Above reported readings are "As Adjusted". The user should determine the suitability of the device for its intended use.
- These results are obtained at the time of calibration and for the instrument supplied only and they do not carry any implication regarding the long term stability of instrument being tested.
- This report may not be re-issued, except in full, without permission from the laboratory.
- Environment condition during calibration: 20 \pm 2°C, 40 to 90% RH.
- Uncertainty of measurement is 0.5% maximum level at all frequencies from 1 to 2.
- Reference calibration method is: ISO 9000/PRC/ISO 912.
- Accuracy, Tolerance & Acceptance Criteria stated as per customer requirement and manufacturer technical specification.

| Details Of Reference standards Instrument Used For Calibration | |
|---|--|
| Name Sound Level Calibrator Identification No. BNGENCLC 448 Serial No. 1137344 Range 94 dB and 114 dB Resolution 0.1 dB Valid Up to 25-08-2025 | Temperature/Humidity BNGENCTH 724 T: 26.894 10 to 60°C, 10 to 99% RH 0.1°C / 1% RH 25-09-2019 |
| System Certificate No. 186 | Certificate no. & Traceability of reference standard with international standards Sound Level Calibrator is calibrated and traceable to International Standard through ISO 17025 accredited Laboratory Certificate No. Q/03/0001/ENCL |
| 441 | Humidity Traceability is calibrated and traceable to International Standard through ISO 17025 accredited Laboratory Certificate No. Q/03/0001/ENCL |

| | | |
|--|---|-----------------------------------|
| Calibrated By Syed Shabbaz Alam Technician | Reviewed By Calibration Engineer | Approved By Centre Manager |
|--|---|-----------------------------------|

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Calibration Chart

G.R.A.S. 40AE 1/2" Prepolarized Free-Field Microphone

The 40AE is a 1/2" precision microphone for general purpose acoustic measurements in the audio-frequency range. The microphone complies with the requirements in IEC Standard 61094 part 4 and can be used for measurements according to IEC Standard 651 Type 0 and Type 1

The free-field microphone is designed to essentially measure the sound pressure, as it existed before the microphone was introduced into the sound field. At higher frequencies the presence of the microphone itself in the sound field will change the sound pressure. In general the sound pressure around the microphone cartridge will increase due to reflections and diffraction. The free-field microphone is designed so that the

The resulting output of the free-field microphone is a signal proportional to the sound pressure, as it existed before the microphone was introduced into the sound field. The free-field microphone should always be pointed towards the source ('0° incidence'). In this situation the presence of the microphone diaphragm in the sound field will result in a pressure increase in front of the diaphragm. The microphone is then designed so that the sensitivity of the microphone decreases with the same amount as the acoustical pressure increases in front of the diaphragm. This is obtained by increasing the internal acoustic damping in the microphone cartridge. The result is an output from the microphone, which is proportional to the sound pressure as it existed before the microphone was introduced.

Specifications

| | | |
|--------------------------------|------------------------|-----------|
| Nominal Sensitivity : | | |
| at 250 Hz | | 50 mV/Pa |
| Frequency Response: | | |
| ±1 dB | 5 Hz - 10 kHz | |
| ±2 dB | 3.15 Hz - 20 kHz | |
| Dynamic Range: | | |
| | from 15 dBA re. 20 µPa | |
| | to 148 dB re. 20 µPa | |
| Polarization Voltage: | | 0 V |
| Pistonphone Volume Correction | | -0.011 dB |
| Typical gain with Preamplifier | | |
| 1/2" Preamplifier | Typ. -0,24 dB | |
| 1/4" Preamplifier with GRC010 | Typ. -0,24 dB | |

Frequency Response Raw Data

| Frequency [Hz] | Pressure [dB] | Free-Field [dB] | Frequency [Hz] | Pressure [dB] |
|----------------|---------------|-----------------|----------------|---------------|
| 250 | 0.00 | 0.00 | 2500 | -0.47 |
| 280 | 0.00 | 0.00 | 2800 | -0.58 |
| 315 | 0.00 | 0.00 | 3150 | -0.72 |
| 355 | -0.01 | -0.01 | 3550 | -0.91 |
| 400 | -0.02 | -0.02 | 4000 | -1.10 |
| 450 | -0.05 | -0.05 | 4500 | -1.33 |
| 500 | -0.02 | -0.02 | 5000 | -1.57 |
| 560 | -0.02 | 0.00 | 5600 | -1.86 |
| 630 | -0.03 | 0.00 | 6300 | -2.19 |
| 710 | -0.04 | 0.01 | 7100 | -2.58 |
| 800 | -0.05 | 0.04 | 8000 | -3.04 |
| 900 | -0.06 | 0.06 | 9000 | -3.67 |
| 1000 | -0.08 | 0.11 | 10000 | -4.39 |
| 1120 | -0.10 | 0.15 | 11200 | -5.25 |
| 1250 | -0.12 | 0.15 | 12500 | -5.91 |
| 1400 | -0.16 | 0.16 | 14000 | -6.54 |
| 1600 | -0.20 | 0.17 | 16000 | -7.47 |
| 1800 | -0.26 | 0.18 | 18000 | -8.94 |
| 2000 | -0.31 | 0.14 | 20000 | -10.64 |
| 2240 | -0.38 | 0.14 | | |

Traceability Table

| Instrument | Model | Serial Number | Traceable To | Calibration Date |
|-------------------------------------|----------|---------------|--------------|------------------|
| Pistonphone | 42AP | 46344 | PTB | 19. July 2017 |
| NI data-acquisition signal analyzer | PCI-4461 | 20500138 | DFM | 13 June 2016 |

APPENDIX - D

Acoustic specialist training certificate



**CERTIFICATE
OF
ATTENDANCE**

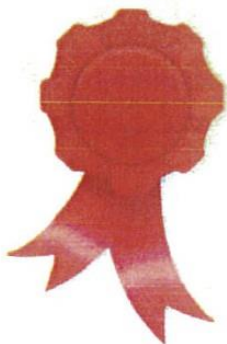
THIS CERTIFIES THAT

Mr. MOHAMMED GAMAL ABDULRADI ALSAYED

**HAS SUCCESSFULLY COMPLETED THE
TRAINING PROGRAM FOR**

Building Acoustic Test

Held on 12-14 June 2018, in Doha - Qatar



SIGNATURE

Middle East Regional Manager
Ph.D. Eng. Michel KARROUM

TITLE

14.06.2018

DATE



Arab Center
For Engineering Studies

المركز العربي
للدراسات الهندسية

TEST REPORT ON RESISTANCE TO CROWD PRESSURE TEST OF EPS CEMENT LIGHT WEIGHT PANEL

Page 1 of 1

| | | | |
|--------------------------|--|-------------------|---------------------------|
| ACES Client | CINI SOLUTIONS FOR BUSSINESS & TRADING | Report No. | TMR20050267 |
| Owner | N.P. | Date Reported | 19-07-20 |
| PMC | N.P. | Sample No. | TMS20019333 |
| Project Client | N.P. | Request No. | TMQ20010962 |
| Consultant | N.P. | Client Reference | Full Payment in Advance |
| Contractor | N.P. | Project No. | - |
| Project Name | Private | | |
| Sample Description | EPS Cement Light weight Panel | Sample Located By | Supplier's Representative |
| Sample Source / Supplier | N.P. | Sampled By | Client's Rep. |
| Sample Location | N.P. | Sampling Date | N/A |
| IR No. | N.P. | Casting Date | N/A |
| Lot Size | N.P. | Sampling Method | - |
| Age of Specimen(Days) | N/A | Sample Size | 1 Sample |
| Test Method | BS 5234-2:1992 Annex G | Sample Brt. In By | N/A |
| Test Method Var. | Nil | Date Received | 18-07-20 |
| Remarks | Nil | Date Tested | 18-07-20 |
| | | Tested By | Arif |

Note: N.P. indicates information not provided by the Client

N/A: Not Applicable

| Load No. | Applied Sustained Load | Sustaining Time Duraton (min) | Deflection (mm) | Residual Deflection (mm) | Test Result (As condition of the specimen tested) |
|----------------------------|------------------------|-------------------------------|-----------------|--------------------------|---|
| 1 | Preload of 200 N | 1 | -0.16 | -0.07 | Passed (No Damage or No Crack) |
| 2 | 0.75 kN/m | 2 | -0.94 | -0.45 | Passed (No Damage or No Crack) |
| 3 | 1.5 kN/m | 2 | -1.45 | -0.14 | Passed (No Damage or No Crack) |
| 4 | 3.0 kN/m | 2 | -2.93 | -0.09 | Passed (No Damage or No Crack) |
| BS 5234-2:1992 Requirement | | | | | There shall be no collapse or damage that would render the partition dangerous, due to any of its parts becoming dislodged or shattered, in a manner that could cause injury. |

Remarks :- The test results related only to the specimen(s) tested

- The wall assembly is composed of Column (H-Beam) 150x150x6mm thick; length of 6250mm, Column (H-Beam)100x100x6mm thick; length of 6250mm, 5mm thick C-Channel (100x50; length of 6900mm) and angle bar (50x50x2mm; length of 6900mm).
- There is gap 15 mm between the wall panel and column



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ص.ب. ١٩٥٧٩، الدوحة، قطر هاتف: ١٤١ ٨٧٠ ٤٤ ٩٧٤ + فاكس: ١٤٦ ٨٧٠ ٤٤ ٩٧٤ +
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TEST REPORT ON PULL DOWN TEST

Page 1 of 1

| | | | |
|----------------|--|------------------|-------------------------|
| ACES Client | CINI SOLUTIONS FOR BUSSINESS & TRADING | Report No. | TMR20050229 |
| Owner | N.P. | Date Reported | 19-07-20 |
| PMC | N.P. | Sample No. | TMS20019333 |
| Project Client | N.P. | Request No. | TMQ20010962 |
| Consultant | N.P. | Client Reference | Full Payment in Advance |
| Contractor | N.P. | Project No. | - |
| Project Name | Private | | |

| | | | |
|-----------------------------------|----------|-------------------|---------------------------|
| Sample ID | As Below | Sample Located By | Supplier's Representative |
| Source | N.P. | Date of Fixing | - |
| Test Location | N.P. | Date of Testing | 18-07-20 |
| Sample Location Coordinates (QND) | N/A | | |
| IR No. | N.P. | Number of Tests | As Below |

| | | | |
|--------------------|---------------------------------|------------------------------------|-------------------------------|
| Test Method | Internal Procedure | Type of Base Material | EPS Cement Light weight Panel |
| Method Variation | Nil | Ambient Temp. °C | 24.7 |
| Apparatus Type | Anchorage with hanging load | Concrete Age | N.P. |
| Moisture Condition | - | Tested By | Arif |
| Testing Location | ACES Lab St. 41 Industrial Area | Testing Location Coordinates (QND) | E,221671-N,379307 |

Note: N.P. Indicates information not provided by the Client

NA : Not Applicable

Test Results:

| No. | Sample ID | Maximum Applied Load (kN) | Relative Movement (mm) | Failure Type |
|-----|---|---------------------------|------------------------|--------------|
| 1 | 8 mm dia. Anchor Bolt Embedded on EPS Cement Light weight Panel | 50 | - | No Failure |
| 2 | | 50 | - | No Failure |

Remarks :The test results related only to the specimen(s) tested.

:This test report shall not be reproduced except in full, without written approval from ACES.

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TEST REPORT ON COMPRESSIVE STRENGTH OF EPS CEMENT LIGHT WEIGHT PANEL

Page 1 of 1

| | | | |
|-----------------------------------|--|------------------------------------|-------------------------|
| ACES Client | CINI SOLUTIONS FOR BUSSINESS & TRADING | Report No. | TMR20050274 |
| Owner | N.P. | Date Reported | 19-07-20 |
| PMC | N.P. | Sample No. | TMS20019333 |
| Project Client | N.P. | Request No. | TMQ20010962 |
| Consultant | N.P. | Client Reference | Full Payment in Advance |
| Contractor | N.P. | Project No. | - |
| Project Name | Private | | |
| Client's Sample Description | EPS Cement Light weight Panel | Sample Located By | Supplier's Rep. |
| Sample Location | N.P. | Sampled By | Client's Rep. |
| Sample Location Coordinates (QND) | | | |
| Source / Supplier | N.P. | Sampling Date | 18-07-20 |
| Sample Reference | N.P. | Sampling Cert. | N.P. |
| IR No | N.P. | Sampling Method | N.P. |
| Lot. No. | N.P. | Nominal Size | 100x100x100 mm |
| Test Method | BS EN 772-1 | Sample Brt. in By | Client's Rep. |
| Method of Variation | Nil | Dated Received | 18-07-20 |
| Tested By | Arif | Dated Tested | 18-07-20 |
| Test Location | ACES Lab St. 41 Industrial Area | Testing Location Coordinates (QND) | E,221671-N,379307 |

Note: N.P. indicates information not provided by the Client N/A : Not Applicable

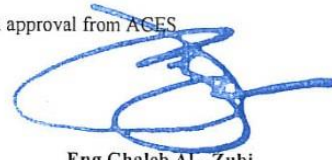
| Spec. No. | Dimensions (mm) | | | Max. Load at Failure (kN) | Comp. Strength (N/mm ²) |
|-----------|-----------------|-----|-----|---------------------------|-------------------------------------|
| | L | W | T | | |
| 1 | 100 | 100 | 100 | 30.5 | 3.05 |
| 2 | 100 | 100 | 100 | 29.6 | 2.96 |
| 3 | 100 | 100 | 100 | 28.6 | 2.86 |
| Average | | | | | 2.96 |

Remarks : -The test results related only to the specimen(s) tested

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TEST REPORT ON THERMAL TRANSMISSION PROPERTIES BY MEANS OF THE HEAT FLOW METER APPARATUS

| | | | |
|-----------------------------|--|-------------------|-------------------------|
| ACES Client | CINI SOLUTIONS FOR BUSSINESS & TRADING | Report No. | TMR20050269 |
| Owner | N.P. | Date Reported | 19-07-20 |
| PMC | N.P. | Sample No. | TMS20019333 |
| Project Client | N.P. | Request No. | TMQ20010962 |
| Consultant | N.P. | Client Reference | Full Payment in Advance |
| Contractor | N.P. | Project No. | - |
| Project Name | Private | | |
| Client's Sample Description | EPS Cement Light weight Panel | Sample Located By | N/A |
| Source | N.P. | Sampled By | Client's Rep. |
| Sample Location | N.P. | Sampling Date | 18-07-20 |
| Sample Reference | N.P. | Sampling Method | ASTM C518-17 |
| Test Method | ASTM C518-17 | Sample Brt. in By | Client's Rep. |
| Test Method Var. | Nil | Dated Received | 18-07-20 |
| Tested By | Arif | Dated Tested | 18-07-20 |

Note: N.P. indicates information not provided by the Client N/A: Not Applicable

Test Results:

| No. | Sample Dimension as Tested | | | Mean Temperature (°C) | Thermal Conductivity (w/m.k) | Thermal Conductance (U-Value) (W/m².K) |
|-----|----------------------------|------------|----------------|-----------------------|------------------------------|--|
| | Length (mm) | Width (mm) | Thickness (mm) | | | |
| 1 | 300 | 300 | 100 | 25 | 0.11 | 1.1 |

Remarks : -The test results related only to the specimen(s) tested.

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