

INTEGRATED ACOUSTIC ENGINEERING FOR A PREMIER SCHOOL CASE STUDY

Kinetics engineered and delivered a comprehensive acoustic treatment package for a premium School in Dubai, covering 2 generator rooms, 1 chiller yard, and 35 rooftop Mashrabiya acoustic assessment locations. The solution included 584 m² of 100 mm acoustic ceiling treatment for generator rooms, 227 m² of 50 mm acoustic perforated metal wall lining for the chiller room, and 125 m² of 100 mm acoustic barrier treatment for the chiller yard.



THE BACKGROUND

The project required acoustic design, engineering, fabrication, supply and installation for critical MEP noise sources across the campus. The scope covered 2 emergency generator rooms, 1 central chiller yard with 5 chillers, and rooftop mechanical equipment located behind architectural aluminium Mashrabiya screens. The rooftop acoustic study covered 35 rooftop equipment/Mashrabiya locations, including active rooftop HVAC equipment serving mosque, academic, science, early years, music, sports, staff, facility management, dining and administration buildings.

AT A GLANCE

Location:	Dubai, UAE.
Building Type:	School
Generator Room Acoustic Treatment:	584 m ² of 100 mm acoustic perforated metal ceiling lining.
Chiller Room Wall Treatment:	227 m ² of 50 mm acoustic perforated metal wall lining.
Chiller Yard Acoustic Barrier:	125 m ² of 100 mm acoustic barrier.
Chiller Yard Wall System:	150 mm hollow block wall, 4.03 metres high, positioned 2.2 metres from the first chiller.
Inclined Chiller Barrier:	1.6 metres high, installed at 70° angle.
Rooftop Mashrabiya Scope:	35 rooftop locations assessed, including AHUs, FAHUs, ERVs and roof equipment.
Insulation Density:	48 kg/m ³ .

THE CHALLENGE

The main challenge was to control breakout noise from multiple high-noise mechanical systems while maintaining the architectural appearance and operational requirements of the campus. The generator rooms contained 2 generators with octave-band sound pressure levels at 1 metre reaching 96 dB at 63 Hz, 96 dB at 125 Hz, 104 dB at 250 Hz, 106 dB at 500 Hz, 104 dB at 1 kHz, 101.8 dB at 2 kHz, 95.6 dB at 4 kHz and 91.4 dB at 8 kHz. These levels created a strong risk of reverberation build-up and breakout noise transmission if the rooms were not properly treated.

The chiller yard consisted of 5 chillers, each weighing 8,070 kg, with a total sound pressure level of 78.1 dBA at 1 metre. The chiller yard noise had to be controlled toward a nearby luxury villa, making environmental noise compliance a critical requirement. The adopted environmental noise criteria for the surrounding mixed-use residential condition were 50–60 dB(A) during daytime and 40–50 dB(A) during night-time.

The rooftop scope added another layer of complexity. Mechanical equipment was positioned behind aluminium Mashrabiya screens, which served an architectural purpose but required acoustic enhancement to control equipment breakout noise. The rooftop equipment assessment covered 35 rooftop locations, with sound power levels ranging up to approximately 95 dBA. Two roof locations were identified with no equipment at roof level, while the remaining locations required acoustic review for AHUs, FAHUs, ERVs and associated rooftop systems.

THE SOLUTION

Kinetics developed a combined acoustic strategy using barriers, absorptive linings, attenuators and perforated metal acoustic panels. For the generator rooms, each generator was provided with acoustic treatment requirements for both intake and discharge paths. Generator Room 1 required intake insertion loss of 17 dB at 63 Hz, 18 dB at 125 Hz, 33 dB at 250 Hz, 37 dB at 500 Hz, 37 dB at 1 kHz, 36 dB at 2 kHz, 29 dB at 4 kHz and 19 dB at 8 kHz. Its discharge path required 22 dB, 25 dB, 33 dB, 37 dB, 37 dB, 36 dB, 29 dB and 19 dB respectively across the same octave bands.

Generator Room 2 required intake for the sound attenuator insertion loss of 22 dB at 63 Hz, 21 dB at 125 Hz, 33 dB at 250 Hz, 37 dB at 500 Hz, 37 dB at 1 kHz, 36 dB at 2 kHz, 29 dB at 4 kHz and 19 dB at 8 kHz. Its discharge path required 20 dB, 22 dB, 30 dB, 34 dB, 34 dB, 33 dB, 26 dB and 16 dB respectively. In addition, both generator rooms required wall and ceiling acoustic lining using 100 mm thick acoustic perforated metal absorption panels with 0.7 mm GI perforated sheet, 48 kg/m³ Rockwool insulation infill and black glass tissue covering. The total installed 100 mm generator room ceiling treatment area was 584 m².



For the chiller yard,

Kinetics designed a layered acoustic control system using 100 mm acoustic barrier construction, 150 mm hollow block walling and internal acoustic wall lining. The chiller yard solution included a vertical 150 mm hollow block wall with a height of 4.03 metres, positioned 2.2 metres from the edge of the first chiller. A 100 mm acoustic wall lining was installed along the proposed block wall at the same height. In addition, an inclined acoustic barrier with a height of 1.6 metres was mounted at a 70° angle on the top edge of the second chiller. The chiller room treatment included 125 m² of 100 mm thick acoustic barrier and 227 m² of 50 mm thick acoustic perforated metal absorption wall lining.



For the rooftop Mashrabiya areas,

Kinetics assessed breakout noise from rooftop equipment to a 1 metre receiver position after the Mashrabiya. The proposed acoustic barrier behind the Mashrabiya was designed to match the Mashrabiya height, with all existing Mashrabiya heights considered in the analysis. The rooftop acoustic barrier was assessed with High sound transmission class value (STC) up to 45 dBA



The primary absorption product used was Kinetics APMP Acoustic Perforated Metal Panel. The APMP system is constructed from 0.7 mm thick perforated galvanized steel or aluminium over Rockwool or fiberglass absorption infill with 48 kg/m³ density. The panels include black glass tissue to prevent fibre migration and can be powder-coated in selected RAL colours. The system provides NRC 0.90 sound absorption performance, with absorption coefficients of 0.95 at 125 Hz, 1.07 at 250 Hz, 0.89 at 500 Hz, 0.77 at 1 kHz, 0.86 at 2 kHz and 0.75 at 4 kHz for 100 mm thickness. The panel core is Class A per ASTM E84, non-combustible, with Flame Spread Index below 20 and Smoke Developed Index below 5.

THE RESULTS

Integrated Noise Control Across Critical MEP Areas

The completed acoustic strategy provided a coordinated solution across the campus's main noise-generating zones, including generator rooms, the chiller yard and rooftop Mashrabiya areas. By addressing each source individually while maintaining one unified acoustic approach, Kinetics helped the project team manage noise breakout from multiple mechanical systems without compromising operational reliability or architectural intent.

Generator Room Acoustic Performance

The generator room treatments helped control high-energy mechanical noise by reducing reverberant build-up within the rooms and limiting breakout noise through the intake and discharge paths. The use of acoustic ceiling treatment and absorptive internal finishes improved the overall acoustic condition of the generator spaces and supported compliance with the required environmental noise criteria.

Chiller Yard Noise Mitigation

For the chiller yard, the engineered acoustic barrier and internal wall absorption system helped reduce direct sound propagation toward the nearby luxury villa. The solution controlled chiller plant breakout noise while maintaining the functional access and ventilation requirements of the mechanical area.

Rooftop Mashrabiya Acoustic Control

The rooftop acoustic assessment helped define a practical noise-control approach for equipment located behind the architectural Mashrabiya screens. The recommended acoustic barrier strategy improved rooftop mechanical noise control while preserving the visual design intent of the aluminium Mashrabiya façade.

Compliance and Long-Term Value

The final solution was developed in accordance with ASHRAE noise and vibration control guidance, Dubai Municipality Building Code 2021 and applicable environmental noise criteria. The completed package delivered a durable, fire-safe and low-maintenance acoustic solution suitable for long-term performance in demanding MEP environments.





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