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MAKING
THE
WORLD

Data Centres

A COMPLETE SOLUTION TO NOISE
CONTROL AND ACOUSTIC PACKAGES

A QUIETER
PLACE



Introduction

WORLD CLASS NOISE CONTROL
EXPERTISE YOU CAN TRUST

IAC Acoustics is world-renowned for providing cost effective solutions to noise problems encountered in all fields of commercial construction, industry and transportation.

With many years experience gained from working with major providers around the globe, IAC Acoustics can offer a complete service for controlling data center noise. As facilities increase in size, power and cooling capacity loads rise, resulting in a greater noise impact on employees and neighboring communities. IAC Acoustics has the necessary tools, products and solutions to reduce and control those noise emissions within acceptable limits.

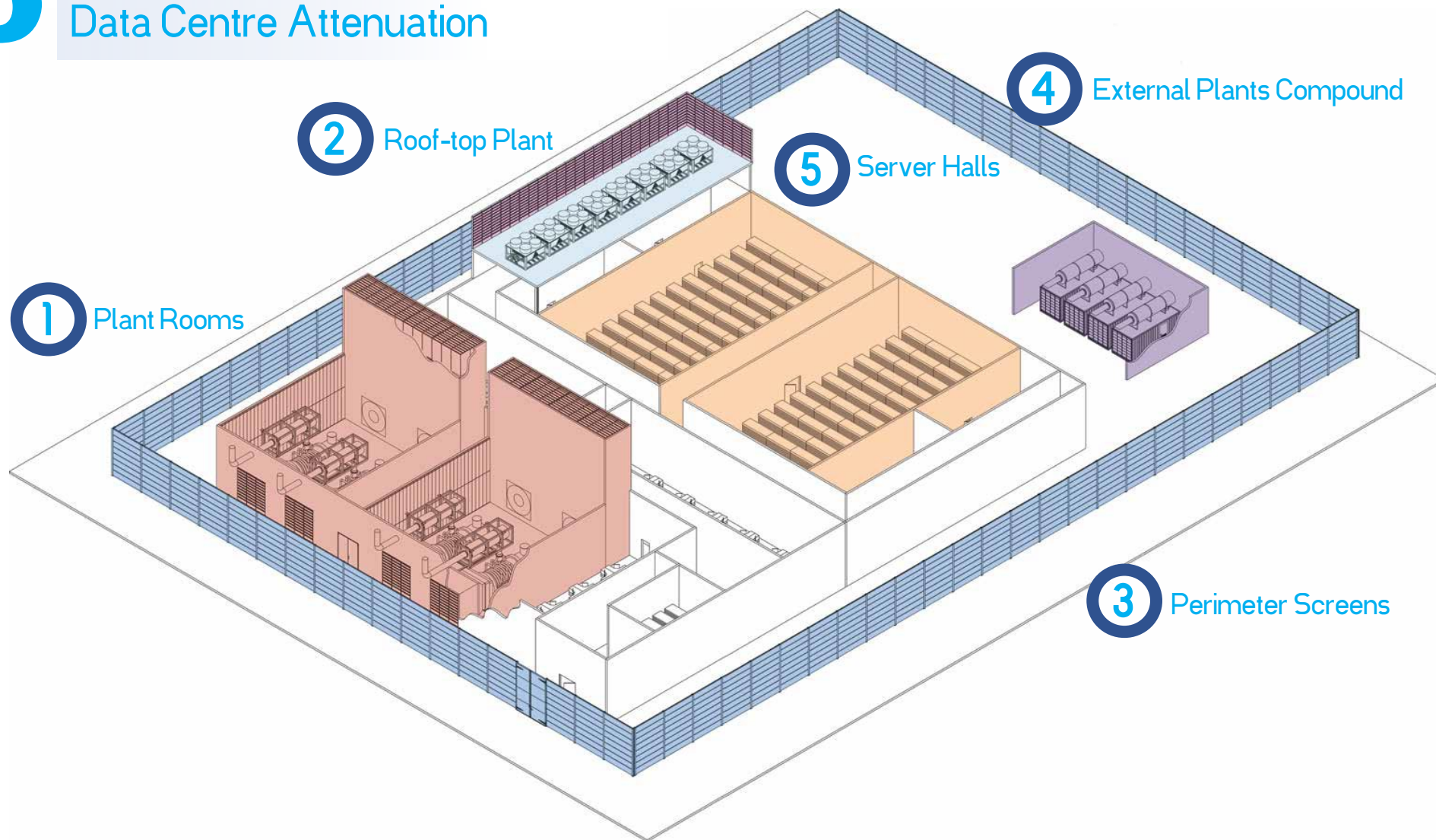
With a full turnkey service available, from initial site survey, through design, manufacture and installation, to final commissioning and certification, IAC Acoustics can provide you with a 'one stop shop' for all your data center noise control requirements. Rest assured that by working closely with the project architect, engineers, consultants and builder, all planning conditions and noise legislation will be addressed and complied with, minimizing risk to project completion / handover and ensuring timely commencement of your operations.

With over 65 years experience and a track record in noise control that is second to none, IAC Acoustics has the necessary expertise to provide an optimum solution to your noise control problem.

making the world a quieter place

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5 Key Areas of Data Centre Attenuation



Noise control for all aspects of data centre operations

AS LARGER MORE POWERFUL CENTRES ARE CONSTRUCTED THEIR NEED FOR ANCILLARY SERVICES SUCH AS POWER CONSUMPTION COOLING SYSTEMS ELECTRICAL DISTRIBUTION AND STORAGE AND AUXILIARY TESTING INCREASES

Bank of America

amazon

Google™

Santander

LLOYDS
BANKING
GROUP

EQUINIX

TelecityGroup

intel

Data centres consume large amounts of electricity, create lots of heat and operate 24/7, meaning their operation is often critical. Given that whoever the data centre is run by – be it a government, financial institution or third party, carrier-neutral provider, the key to success is to achieve as close to 100% uptime, 365 days per year. With huge cost implications resulting from significant service outages, modern data centres have to be secure, robust and near fail-safe with back-up procedures in place for all services.

The large quantity of mechanical equipment and servers present in a typical data centre require carefully thought out means for controlling the resulting noise. IAC Acoustics can provide a full solution to all aspects of data centre noise with products for the following critical areas:

Power Generation

Back-up power is a vital part of any data center operation. This critical lifeline should the mains power be interrupted, is also one of the biggest sources of noise if not appropriately treated. With some plant rooms generating 110dB+, this noise needs to be carefully contained.

Cooling Systems

Keeping server halls running efficiently and to reduce the risk of component failure means keeping everything at a constant temperature. Due to the large quantities of cooled air required, multiple noise sources, including chillers, pumps, compressors, air handling units and fans will need to be attenuated.

Electrical Distribution & Storage

Due to the amount of power required for a data centre, the main incomers need to pass through transformers before they reach the low voltage IT equipment. The resulting low frequency hum associated with transformers can be an issue if located near to offices and may need to be enclosed if placed outside.

Auxiliary Testing

Although back-up systems are designed to ensure a fail-safe operation, stand-by generators, UPS, fire suppression systems and other mechanical plant need to be tested regularly. Doing so, creates potential noise problems at regular intervals, which need to be reduced to acceptable limits.

DATA CENTRE

IAC acoustic louvres and acoustic barrier panels on a data center in London UK



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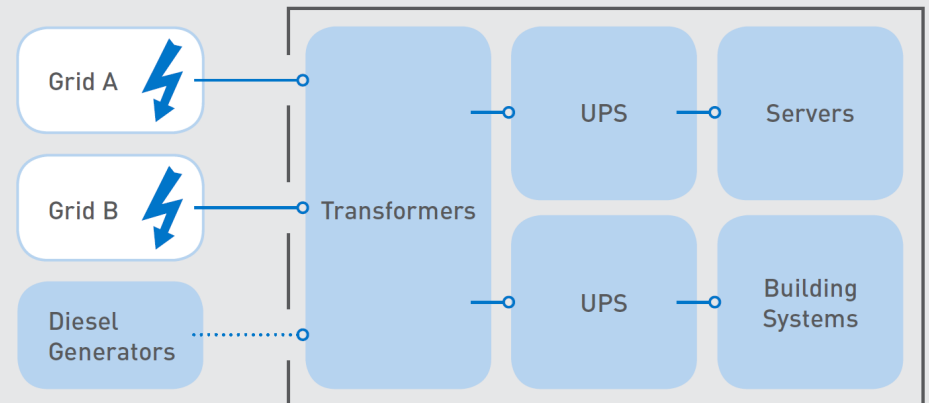
Ensuring high attenuation for critical back up systems

MOST LARGE DATA CENTERS HAVE MULTIPLE BACK UP SYSTEMS TO DEAL WITH POWER OUTAGES AND COMPLETE BLACK OUTS FROM UTILITY PROVIDERS WITH USUALLY MORE THAN ONE INPUT FROM THE GRID IF COMPLETE FAILURES OCCUR THEN BATTERIES UPS SYSTEMS AND BACK UP GENERATORS ARE USED TO ENSURE NO DISRUPTION TO THE SERVERS OR BUILDING SYSTEMS

Depending on the size and scale of the data center, back-up generators tend to either be containerized, sitting outside, or situated in plant rooms within the data center complex, but usually in a dedicated building.

Noise control for back-up generators needs to be considered at the design stage as their operation can occur at any time of day or night and tend to be one of the noisiest parts of a data center operation. This is particularly

important for those situated close to residential areas where background noise levels tend to be low. Careful consideration needs to be made, not only when generators are required in an emergency, but also during regular, scheduled testing exercises to ensure they work effectively in a crisis situation. Whilst testing procedures are usually carried out during the day, noise control measures need to be put in place for night time operations should the need arise.



Ensuring high attenuation for critical back up systems

WHEN GENERATORS ARE PLACED INDOORS PROVISION NEEDS TO BE MADE FOR ADEQUATE AIRFLOW FOR BOTH COOLING AND COMBUSTION FORCING AIR INTO AN ENCLOSED SPACE CREATES UNWANTED SOUND ADDED TO THE NOISE CREATED BY THE GENERATOR ITSELF PLANT ROOMS TEND TO BE THE GREATEST SOURCE OF NOISE OF ANY DATA CENTRE OPERATION

“Our application engineers can help you to achieve the optimum solution whilst controlling noise to the required levels.”

Plant Room

Acoustics IAC Acoustics has carried out many projects across the world where large plant rooms have been acoustically treated to meet the strict noise criteria, not only to protect on-site workers, but also neighboring communities. Rooms containing generators are typically treated with sound absorbing panels and acoustic access systems to contain noise and reduce reverberation. Absorptive wall lining systems, acoustic doors, windows and screens are available to cater for even the most demanding specifications.

Due to plant rooms requiring constant air flow to feed the engine intakes, openings to atmosphere need to be acoustically treated to prevent noise escaping. Depending on the noise level inside the plant room and

the acoustic and weathering specification of the building envelope, attenuators and / or acoustic louvres can be used to bring resultant noise levels down to the permitted levels. In addition to the plant room, acoustic treatment and intake systems, IAC Acoustics can also provide engine exhaust silencers. With the ability to calculate the optimum solution depending on engine size, number of sets and the acoustic criteria to be achieved.

From the initial design, IAC Acoustics can help optimize the noise control required to meet the acoustic specification and comply with any site planning conditions.



Plant Room Noise Control Products Available from IAC Acoustics

Noise Control Issue Resolved

Acoustic Louvres

Reduce the amount of noise radiated from mechanical plant such as chillers, coolers and air handling units, whilst allowing the passage of air for combustion and cooling – i.e., intake systems and ventilation panels.

Intake Silencers / Attenuators

Can be scaled to fit inside the plant room and designed to give the optimum acoustic performance based on the available space. Typically, the larger the space, the more flexibility for additional attenuation.

Acoustic Wall / Ceiling Linings

Plant rooms are typically constructed using concrete / block walls which offer a good transmission loss from room to room. By lining the room with absorbent panels, this further reduces the noise by lowering reverberation times and reducing internal sound levels. Acoustic linings are also used if the host structure does not offer enough in terms of density / transmission loss performance. IAC Acoustics can provide combination panels when required to reduce noise break-out and control reverberation.

Acoustic Doors, Windows and Screens

Access systems to plant rooms also need treatment as without careful thought, these can be weak points in the acoustic structure. Options for fire ratings are also available for all acoustic doors (both personnel and plant access), acoustic windows and fire-rated glass screens.

Anti Vibration Mounts

Anti vibration mounts can be fitted to plant and equipment to reduce structure borne noise transfer. The optimum mount choice can be calculated to ensure the best possible performance. Mounts and hangers can also be provided for pipes and exhausts hung from the plant room ceiling / soffit.

Hot Gas Exhaust Systems and Accessories including Thermal Wrapping

Reduces noise to an acceptable level prior to hot exhaust gases being released to the atmosphere. Thermal wrap can be applied as necessary to decrease radiated heat from the exhaust system and reduce the need for additional cooling.

HVAC Silencers / Attenuators

Reduces noise from air handling and distribution systems. These silencers can be tailored to suit the application and may also be used in conjunction with acoustic weather louvres on any openings to the atmosphere.



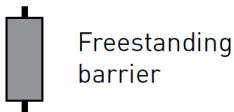
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Power generation

External generator and plant equipment compounds

CONTAINING THE NOISE FROM GENERATORS AND OTHER MECHANICAL PLANT EQUIPMENT WHEN HOUSED OUTDOORS NEEDS CAREFUL CONSIDERATION TO ENSURE RELIABLE AND SAFE OPERATION

Barrier Options



Freestanding barrier



Clad-on / face fixed barrier



Noishield™ (aerofoil blade) acoustic louvres



Slimshield™ (linear blade) acoustic louvres

External generator and plant equipment compounds

When generators are located outside, they are typically self contained units with the intake and exhaust systems integrated into standard sized containers. When this is the case, and without additional acoustic enclosures being built, the noise generated can become substantial when multiple engines are running simultaneously.

There are some adjustments that can be made to the containerized generators to reduce the exhaust noise by installing larger, more effective silencers. In addition to this,

acoustic barriers can be installed around the compound, consisting of both solid panels and acoustic louvres if air flow is still required. Acoustic barriers can be placed on all sides to form a pen or on certain sides to shield noise in particular directions. By forming a complete pen, this has a positive impact on the acoustic performance, with the additional benefit of increased security.

Chiller enclosures can be formed from freestanding acoustic louvre screens which provide aesthetic façades with integral noise control and airflow characteristics

Generator Compound Products Available from IAC Acoustics		Noise Control Issue Resolved
Acoustic Louvres		Can be used within solid acoustic barriers or as standalone screens if ventilation / airflow is required.
Solid Acoustic Barriers		Solid screens can help to shield airborne noise, either as a fully enclosed compound, or on particular flanks. Barriers can be designed with the absorptive face on one or both sides, depending on the application.
Intake / Exhaust Silencers and Absorptive Linings		Additional silencing can be achieved by installing more effective silencers and lining to pre-packaged acoustic containers.
Acoustic Enclosures		Enclosing noisy equipment provides effective noise control.

TRADITIONAL METHODS OF COOLING TYPICALLY
CREATE NOISE AS A BY PRODUCT TO THEIR
PRIMARY FUNCTION FANS COMPRESSORS PUMPS
AND HEAT EXCHANGERS ALL MAKE SIGNIFICANT
CONTRIBUTIONS TO THE NOISE ASSOCIATED WITH
DAY-TO-DAY DATA CENTRE OPERATIONS

Cooling

Keeping data centers cool whilst minimizing noise

In a given data center, there may be thousands of servers each containing electronic components such as the processors which create heat when in operation. If this is not dissipated, then the processor's efficiency decreases, to the point where it can sometimes cause component failure. Due to this threat, cooling data centers is essential to their successful operation, but the costs to do so are considerable.

A typical set up consists of cool air passing through the floor upward towards the servers to dissipate the generated heat. Considering the scale of some data centers and the need to

have a constant temperature within the server halls, no matter what the outside conditions, this creates a very complex issue in terms of HVAC design.

By considering the impact of noise when designing a complex air handling system, future compliance issues can be resolved prior to building work commencing. IAC Acoustics can help with this process by working with design consultants and M&E contractors to provide the optimum solution

Cooling and HVAC Products Available from IAC Acoustics

Duct Silencers / Attenuators

Clean and Pack less
Duct Silencers

Splitters

Noise Control Issue Resolved

Used to reduce the noise in air handling systems of any size / scale.

For clean environments, silencers can be modified whereby the acoustic infill is wrapped to avoid fiber transfer into the air stream. For ultra-clean environments, Pack less silencers can be used where no infill is present within the silencer body.

For large ducts and air movement openings, splitters can be installed to reduce airborne noise entering a room or space. These can be designed to optimize efficiency, minimizing pressure drop and maximizing acoustic performance.

“All IAC
attenuators are
acoustically
certified and
laboratory
tested to
international
standards.”



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Equipment testing

Ensuring quiet testing procedures for noisy equipment

BACK UP SYSTEMS ARE IN PLACE IN DATA CENTRES TO ACHIEVE A NEAR 100% UPTIME ENSURING GENERATORS WILL START WHEN REQUIRED IN AN EMERGENCY IS PARAMOUNT BECAUSE OF THIS REGULAR TESTING OF EQUIPMENT IS NEEDED

When testing a generator, or multiple sets at once, typically a load bank is used to regulate the generated electricity and turn the energy into heat. As the amount of energy generated can be quite substantial, and hence create considerable amounts of heat, load banks need to be cooled, usually by means of large fans.

When load banks are used, the noise created can be quite significant, with multiple fans operating at once, sometimes across, multiple load banks. As a result, noise control measures typically need to be employed to reduce any impact on workers and neighboring communities.

Cooling and HVAC Products Available from IAC Acoustics	Noise Control Issue Resolved
Exhaust attenuators / chimneys	Reduce the noise created by fans used to remove the excess heat from load banks.
Acoustic louvres	Allow cool air to pass over the load bank when in use while still reducing the amount of noise emitted.



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