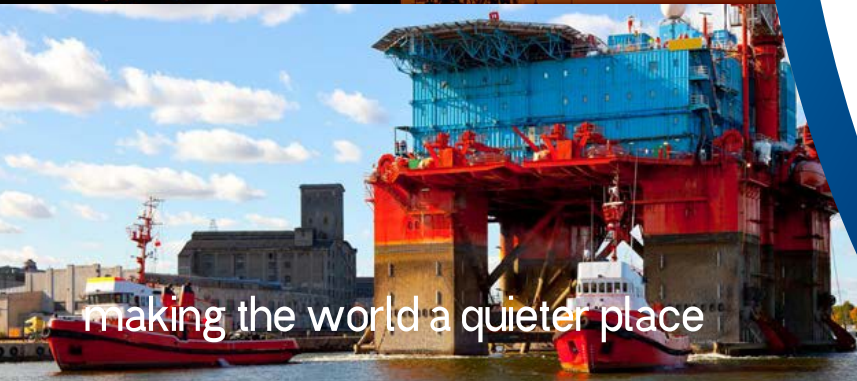




Noise Control Solutions for

POWER GENERATION AND OIL & GAS

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Power Generation Solutions

IAC Acoustics provides both turnkey solutions and discrete noise control products for power generation projects. Turnkey projects include solutions for various applications such as cogeneration plants, combined-cycle plants and critical back-up installations. Apart from turnkey packages, IAC Acoustics can also provide individual noise control systems for the following equipment:

- Diesel engines
- Gas engines
- Industrial gas turbines
- Heavy duty gas turbines
- Steam turbines
- Generators
- Boilers and HRSG
- Hot and cold chimneys
- By-pass stacks

Oil & Gas Applications

In addition to the power generation sector, IAC Acoustics also provides both standard noise control products and turnkey solutions for oil & gas projects.

Turnkey projects include solutions for:

- Gas and crude oil extraction
- Off-shore production platforms
- On-shore pipelines
- Oil refineries
- Gas gathering, petrochemical plants
- Oil & gas treatment plants
- Oil & gas storage plants
- LNG storage and regasification
- Processing plants
- Cryogenic lines

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EQUIPMENT AND SOLUTION GUIDE

APPLICATION	EQUIPMENT	IAC ACOUSTICS PRODUCTS & SOLUTIONS						
		AIR INTAKE SYSTEMS	EXHAUST SYSTEMS	ACOUSTIC ENCLOSURES	VENTING TO ATMOSPHERE	VENTILATION	ACCESSORIES	TURNKEY APPROACH
		View Sections 1 to 7 for Products & Solutions from IAC Acoustics						
<div>Equipment Often Required</div> <div>Equipment Required Occasionally</div> <div>CO-GENERATION, COMBINED CYCLE, POWER PLANT</div> <div>WASTE TO POWER PLANT</div> <div>BOILERS</div> <div>NUCLEAR</div> <div>LIQUEFIED NATURAL GAS PLANTS</div> <div>CHEMICAL & PETROCHEMICAL PLANTS</div> <div>PROCESS INDUSTRIES (PAPER, SUGAR ETC.)</div>	Diesel & Gas Engines	<ul style="list-style-type: none"> Sound attenuators Static filters Self-cleaning filters Ducting Instrumentation 	<ul style="list-style-type: none"> Standard silencers (15 to 50 dBA noise reduction) Custom-made silencers (up to 60 dBA noise reduction) Reactive silencers Absorptive silencers Heat-recovery silencers Ducting Expansion joints Catalyst filters External lagging Stacks 	<ul style="list-style-type: none"> Modular enclosures ISO containers Bespoke containers Drop-over enclosures Canopies 		<ul style="list-style-type: none"> Air intake silencers Discharge silencers Duct silencers Acoustic louvres Acoustic doors Acoustic windows 	<ul style="list-style-type: none"> Expansion joints Rain caps Piping Flanges Connections Supports AVMs 	Turnkey packages (air intake, enclosure, ventilation and exhaust systems)
	Gas Turbines	<ul style="list-style-type: none"> Sound attenuators Static filters Self-cleaning filters Ducting Instrumentation 	<ul style="list-style-type: none"> Low and high frequency primary silencers Cylindrical primary silencers Rectangular by-pass silencers Cartridge inserts Expansion joints Stacks 	<ul style="list-style-type: none"> On-base enclosures Off-base enclosures Acoustic screens 	<ul style="list-style-type: none"> Start-up vent silencers Blow-down tanks 	<ul style="list-style-type: none"> Air intake silencers Discharge silencers Duct silencers Acoustic louvres Acoustic doors Acoustic windows 	<ul style="list-style-type: none"> Expansion joints Rain caps Flanges Supports AVMs 	<ul style="list-style-type: none"> Complete gas turbine acoustic packages Complete filtered air intake houses Complete exhaust systems
	Steam turbines, Generators & Auxiliaries			<ul style="list-style-type: none"> On-base enclosures Off-base enclosures Acoustic screens 	<ul style="list-style-type: none"> Safety vent silencers Blow-down tanks 	<ul style="list-style-type: none"> Air intake silencers Discharge silencers Duct silencers Acoustic louvres Acoustic doors Acoustic windows 	<ul style="list-style-type: none"> Expansion joints Supports AVMs 	Complete acoustic packages including ventilation
	Boilers & HRSG	<ul style="list-style-type: none"> Induced draft fan silencers Forced draft fan silencers 	<ul style="list-style-type: none"> Cold stack silencers Stack insert silencers Duct silencers 	<ul style="list-style-type: none"> Inlet duct shrouds 	<ul style="list-style-type: none"> Safety vent silencers Start-up vent silencers Blow-down and flash tank silencers 	<ul style="list-style-type: none"> Acoustic louvres Forced ventilation silencers 	<ul style="list-style-type: none"> Expansion joints Supports AVMs 	Complete acoustic boiler houses
	Compressors & Positive Displacement Blower	<ul style="list-style-type: none"> Sound attenuators Inlet filters Ducting Instrumentation 	In-line silencers (pressure vessels)	<ul style="list-style-type: none"> On-base enclosures Off-base enclosures Acoustic screens 	<ul style="list-style-type: none"> Blow-off silencers 	<ul style="list-style-type: none"> Air intake silencers Discharge silencers Duct silencers Acoustic louvres Acoustic doors Acoustic windows 	<ul style="list-style-type: none"> Flanges Supports AVMs 	<ul style="list-style-type: none"> Complete compressor acoustic packages Complete filter houses
	Valves			<ul style="list-style-type: none"> Acoustic enclosures 	Vent silencers or any kind of compressed gas including: H ₂ , O ₂ , CO ₂ , Steam, N ₂ and natural gas			
	Large Fans	<ul style="list-style-type: none"> Rectangular silencers Cylindrical silencers Fibre-free silencers Resonator silencers (Fine Tuned) 	<ul style="list-style-type: none"> Rectangular silencers Cylindrical silencers Fibre-free silencers Resonator silencers (Fine Tuned) 	<ul style="list-style-type: none"> Noise enclosures for fan engines 			<ul style="list-style-type: none"> Flexible connections AVMs 	Complete fan acoustic packages
	Pumps			<ul style="list-style-type: none"> On-base enclosures Off-base enclosures Acoustic screens 		<ul style="list-style-type: none"> Air intake silencers Discharge silencers Duct silencers Acoustic louvres Acoustic doors Acoustic windows 	<ul style="list-style-type: none"> AVMs 	Complete pump acoustic packages

Use this table to choose the type of solution / product suitable for your application.



Diesel and Gas Reciprocating Engines and Gen-sets

IAC Acoustics can provide diesel and gas gen-sets with the following types of noise and emission control:

Intake & Exhaust systems

- Large range of exhaust silencers (15, 25, 30, 40 and 50 dBA noise-reduction available from stock)
- Specific ranges for CHP and container applications
- Circular, rectangular or hockey-puck designs
- Radial, axial and combined inlets (twin or triple inlets)
- Standalone and integrated catalysts
- Standalone and integrated spark-arrestors
- Heat-recovery silencers
- Intake ducting and attenuators
- Any type of accessory to manage the full exhaust line, including: bellows, piping, flanges, gaskets, and thimbles
- All types of materials
-

ISO containers and Enclosures

- Noise reduction (up to 50 dBA)
- Vibration isolated and shock resistant systems
- Soundproofed combustion air inlets (with option for air filtration)
- Soundproofed ventilation for cooling engine mechanics
- Soundproofed exhaust systems
- Easy access for operators and maintenance
- Accommodation of environmental requirements (e.g. retention tank)
- Engine and personnel protection
- Fire-detection and fire-fighting equipment
- Lighting
- Fuel tank connection to the engine
- Electrical power cabinet connection to the generator IAC Acoustics has the ability to design any customized or bespoke solution to meet specific requirements.

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Gas Turbines, Steam Turbines, Generators and Auxiliaries

IAC Acoustics provides complete turbine packaging including:

- Gas Turbine enclosures
- Auxiliaries enclosures
- Complete inlet system including filtration
- Complete exhaust line, including primary and/or by-pass silencers and HRSG silencers

These can be any type such as aero-derivative, industrial or heavy-duty gas turbines

A dedicated design team develops the most cost effective and reliable solution for each project, whether for one element from the above or a complete package.

Main and associated functions:

- Noise reduction
- Filtered, cooled or heated turbine intake
- Turbine cooling / enclosure ventilation
- Full exhaust system
- Safety systems
- Active parts protection
- Heavy-duty maintenance
- Easy access for operators
- Pipe-work, cables and fire network integration
- Interface with machine
- Resistance to environmental conditions (wind, explosions etc.)

IAC Acoustics excels in:

- Filtration, ventilation, aerodynamics, noise reduction, mechanical and life guarantees
- Low pressure loss, cooling/anti-icing of induced air for turbine efficiency
- Large range of insertion loss (up to 50 dB)
- Low pressure drop exhaust systems
- Material and thermal insulation at high temperatures (550°C/1000°F)
- On-base and off-base design enclosures
- Interfacing
- Turnkey solutions
- Logistics (especially integration in OEM supply chain)
- Project management

Boilers and HRSG

Heat Recovery Steam Generators (HRSG) and large industrial boilers are among the highest sources of noise pollution in power generation, oil & gas and industrial sectors.

IAC Acoustics designs and manufactures complete noise control solutions for installations, based on more than 60 years' experience with equipment in operation all over the world.

Vent Silencers

All vent silencers from IAC Acoustics are custom-designed to suit individual projects, depending on the equipment, fluid and operating conditions. Designed and manufactured according to ASME B31.3, ASME VIII div. 1 and PED 2014/68EUU to achieve up to 65dBA noise reduction without additional acoustic treatment. Specialized packing and material can be used for extreme operating conditions.

Vent silencers are designed to meet requirements for any use such as:

- Safety valves
- Relief & start-up valves
- Blow down tanks

Stack & Flue Gas Silencers

Stack silencers are designed to reduce the noise produced by the exhaust gas at the top of stacks. They are typically installed downstream of equipment such as engines, turbines, boilers, HRSG and FGD systems. Typical applications include:

- Simple or combined-cycle power plants
- Coal fired power plants
- Industrial or petrochemical boilers
- FGD systems
- Cogeneration plants

IAC Acoustics provides a custom-made solution for boiler and HRSG flue gas treatments including:

- Acoustic splitter panels in stacks
- Acoustic splitter panels in outlet casings

Enclosures and Acoustic Shrouds

IAC Acoustics provides various solutions to reduce noise radiation from boilers and HRSG. These also include access and ventilation systems.

Sections A-C relate to equipment / Section 1-7 relate to products & solutions made by IAC Acoustics



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Compressors, Pumps and Valves

IAC Acoustics provides a complete solution, with a range of products for inlet and outlet of vacuum pumps and compressors where operating pressure inside the silencer is below 0.5barg (7.5psig). If the operating pressure inside the silencer exceeds 0.5barg (7.5psig), IAC Acoustics has specific designs to meet regulations such as PED or ASME.

Compressors can be any type: centrifugal, axial, rotary screw, rotary vane, rotary lobe, reciprocating or positive displacement blower.

These product lines offer:

- Adaptability for new or existing facilities
- A standard range that can be customized easily to meet individual needs
- Short lead times thanks to in-house lean manufacturing techniques
- A longstanding history of acoustic, thermal and hydraulic expertise
- Guaranteed performance

When operating pressure remains very high in a compression network, IAC Acoustics can supply in-line silencers to reduce noise radiation from flow. All IAC Acoustics compressor silencers are fully welded using all-steel construction (carbon as standard material, other grades such as stainless steel available upon request)

Fresh Air & Recirculating Fans

Large fans are found in most power-generation sites, mines and oil & gas applications, from boilers to flue gas desulphurisation system ventilation. Special silencers are required due to space constraints, dirty flue gases, tonal criteria etc. Also, huge noise reductions are required in low frequency noise created by boiler burners.

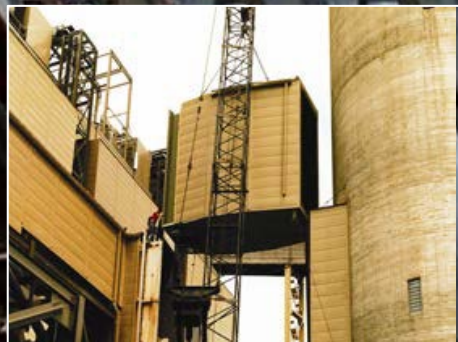
IAC Acoustics is a worldwide specialist in this sector and has the capability to produce a large range of air intake silencers for both circular and rectangular shaped suction and discharge applications.

Typical applications include:

- Induced and forced draft fans
- FGD systems
- Mine ventilation
- Scrubbers and cooling towers

Enclosures and Acoustic Shrouds

- Fan silencers are designed for minimum pressure drop but with strong construction to meet environmental requirements
- Scope is either splitter panels or a complete silencer supplied with casing
- Construction materials are based on customer requirements



Filtration

In addition to providing world-class acoustic solutions to the power generation and oil & gas industries, IAC Acoustics offers also filtration as part of a complete package. These filtration designs are based on a wide range of technical options including pulse and both static and self-cleaning oil bath filters.

Hurricane Pulse Filters

A self-cleaning air intake system to meet filtration requirements of gas turbines, diesel engines, electrical rotating machines and compressors. Constructed using heavy-duty steel, the modular “Hurricane” housing unit can be adapted to suit any airflow process for either combustion or ventilation purposes.

AutoFlo 2000

The AutoFlo 2000 is a self-cleaning, steel housing unit consisting of a rotating chain-type assembly and adhesive oil tank. Inside, woven mesh panel filters circulate in and out of oil where they are cleaned by agitation.

LP Oil Bath Filter

The LP Oil Bath uses a centrifugal process to clean intake air for engines, compressors and blowers. It functions with extremely low pressure

Air Intake Noise Control

IAC Acoustics designs and manufactures a number of different solutions to minimize noise at the air intake on all sizes of gas turbine generators. Typically, splitter configurations are designed to fit into filter houses and optimized for low pressure-drop, improving turbine performance.

Integrated Air Intake System

In addition to standalone silencers, IAC Acoustics also provides full air-intake systems with filtration, anti-fogging and de-icing systems. Where complex configurations reduce available space for silencers, IAC Acoustics also has a range of small-footprint solutions to meet required criteria in a reduced space.

Sections A-C relate to equipment / Section 1-7 relate to products & solutions made by IAC Acoustics



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Splitter Silencers for Cold Stack and Flue Gas Silencers

Splitter silencers can be located in cold stacks, boiler outlet ducts or flue gas ducts downstream of an exhaust fan. Splitter silencers are made of parallel baffles inserted into a duct (rectangular or cylindrical) or in a separate casing with connecting flanges for easy installation.

Configurations include:

- Design with parallel splitters
- Complete silencers with separate casing, stack or duct inserts and loose baffles
- Up to 250°C/500°F operating temperature
- Designed for either rectangular and cylindrical stack arrangements
- Supporting brackets for hot or cold casings (welded or bolted construction)

IAC Acoustics provides a custom made solution for boiler and HRSG flue gas treatments including acoustic splitter panels in stacks and acoustic splitter panels in exhaust outlets

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Exhaust Systems

IAC Acoustics designs and manufactures standard and customized exhaust silencers, for both vertical and horizontal configurations. In addition to standard hot-gas silencers, IAC Acoustics also provides solutions for flue gas or bypass stacks. Exhausts can be made with or without a separate casing and all types are built to a high standard and rigorously tested for optimum acoustic performance.

Engine Exhaust Silencers

- Gas or diesel engines
- Standard range for engines from 10kW up to 8.000kW
- Up to 65 dBA noise attenuation
- Gas temperature from 120°C up to 550°C (250°F to 1000°F)
- Optional equipment include catalysts and spark arrestors
- Absorptive, reactive and combined options

Emission Control

- Lean rich burn engines
- Spark ignited (natural gas or dual fuel) or compression ignited (diesel or bi-fuel)
- 3-way, gas oxidation and diesel oxidation catalysts available
- Diesel Particulate Filters (DPF)
- Up to 99.9% regulated pollutant reductions
- Selective Catalytic Reduction (SCR)
- Spark arrestors (optional ATEX certification)

Heat-Recovery Silencers

- Recover heat from exhaust gas
- Separated or combined with silencing and spark-arrestors

Gas Turbine By-Pass Silencers


Gas turbine by-pass silencers from IAC Acoustics can be designed and manufactured as a single unit, cylindrical cartridge or parallel splitter panels to go in a casing. With the ability to cope with high temperatures, IAC Acoustics silencers can either be placed in-stack or in a separate casing to suit the required pressure drop of individual projects. Manufactured using a rugged all steel construction, we can use

specialist materials for high temperatures and other project specific requirements.

- Sound pressure level as low as 75 dBA at 1m from the stack outlet
- Acoustic efficiency up to 50 dBA noise reduction
- Flow rate up to 2200 t/h
- Gas temperature up to 650°C/1200°F



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Acoustic Enclosures



Based on its modular construction panels, IAC Acoustics is able to provide cost-effective solutions to house any noisy machine such as gas turbines, reciprocating engines, generators and compressors. With both factory and site construction options available, complete acoustic buildings can be made either as standalone enclosures or rooms housing multiple sets.

IAC Acoustics can also integrate other functions as part of a package such as ventilation, access with high-spec acoustic doors, control with high-spec acoustic windows, fire-detection, fire-suppression and lighting..

Product Range

- Modular acoustic enclosures for noisy plant and machinery
- Soundproof rooms for product testing
- Factory offices and control rooms
- Partial acoustic enclosures with sliding covers for quick access
- Acoustic barriers and screens
- Sound absorptive wall linings and ceiling baffles
- Acoustic doors and windows
- Silencers and acoustic louvres for ventilation and mechanical plant equipment

For over 60 years, IAC Acoustics has successfully created complete acoustic structures and walls using a proven and cost effective method.



The flexibility of the IAC Acoustics Moduline™ panel system means that the following types of noise control solutions can be configured:

- Straight walls / barriers
- Partial enclosures / shields
- Access control, including doors, windows and hatches
- Complete enclosures including acoustic roofs and isolated / floating floors
- Silent ventilation packages for all types of enclosure from personnel shelters to power generation plant rooms:

Vent Silencer

Vent silencers are typically used on safety valves, control valves, snort valves and ejectors. All vent silencers from IAC Acoustics are custom-designed to suit individual projects, depending on the equipment, fluid and operating conditions.

Designed and manufactured according to ASME B31.3, ASME VIII div. 1 and PED 2014/68EU, up to 65dBA noise reduction can be achieved without the need for additional acoustic treatment. Specialized packing and material can be used for extreme operating conditions such as desert, tropical or icy environments.

Vent silencers are designed to meet requirements for any use such as:

- Safety valves
- Relief & Start-up valves
- Blow down tanks

Vent silencer reliability is a matter of safety due to the pressure encountered in most applications. This means that products need to be manufactured to meet specific regulations and standards, combining high pressure piping to release gas pressure and absorbing technologies to reduce huge noise generated by the release valve.

IAC Acoustics is an approved supplier for all industries and applications available including the most demanding ones such as nuclear, oil & gas, LNG trains and super critical boilers.

In addition to manufacturing vent silencers, IAC Acoustics also offers a range of additional products and accessories including flanges, rain-hoods, mobile inlet pipes, multiple inlet arrangements, bird screens, supporting brackets, external lagging or any other device that will help customers.



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Acoustic Louvres

IAC Acoustics is a leading global manufacturer of rugged, high performance acoustic louvres and has completed thousands of installations worldwide.

Applications include:

- Fresh air intake for ventilation systems
- Mechanical equipment screens and penthouses
- Noise barriers
- Process air intakes
- Cooling tower inlets / exhausts and screens

IAC Acoustics can provide louver solutions to reduce environmental noise problems, carrying out all relevant noise surveys and acoustic analysis. can be used to match the overall scale and aesthetics of a new building.

Both IAC Acoustics Noishield™ and Slimshield™ louvres are available in an array of standard modular sizes, meaning that a wide range of performance requirements can be met. By using this range of acoustic louvres, it overcomes architectural consistency issues, especially where space is limited.

Duct Silencers

All IAC Acoustics silencers have been developed to meet specific requirements from acoustic consultants, consulting engineers, contractors and operators. They provide the most economical choice for solving a wide diversity of noise control problems encountered in HVAC engineering.

Quiet-Duct® Rectangular Silencers

Available for conventional applications including low frequency, IAC silencers have acoustic performances which have been specifically engineered for low frequencies in the 63 Hz, 125 Hz, and 250 Hz octave bands.

Conic-Flow® Tubular Silencers

Similarly to Quiet-Duct®, our Conic-Flow® range has been specifically engineered for low frequencies in 63 Hz, 125 Hz, and 250 Hz octave bands.

D-Duct Acoustic Diffuser Silencers

These are available for axial fan systems. The combined inner diffuser cone and outer square jacket casing makes these units aerodynamic regain devices as well as silencers.



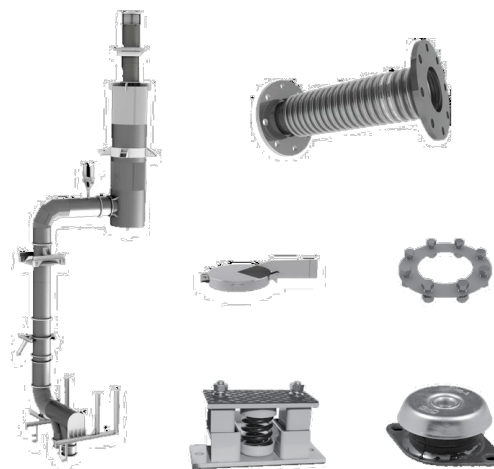
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Accessories

IAC Acoustics offers a wide range of accessories to build exhaust systems ("ACM"/"ACI" product line) and reduce vibrations for all applications ("AVM" product line)

From standalone items to fully integrated systems, the IAC Acoustics range of accessories will fit almost any need in the marketplace. Although standard sizes are available for many accessories, specific solutions can be engineered to customer specifications.



Our channel partners and product specialists stand ready to assist you in selecting the right accessories to meet customers' needs. Most of our standard accessories come with a high heat resistance black paint finish, however other materials can be used to meet individual requirements.


Sub-Assemblies:

- Flexible connectors
- Bellows
- Y connectors
- Expansion bellows
- Safety covers
- Thimbles
- Roof jacks
- Rain caps
- Elbows
- Outlet extensions

Stand alone Items:

- Pipe hangers
- Brackets
- Clamps
- Flanges
- Gasket kits
- Couplers, reducers/expanders
- Anti-vibration mounts, including spring, captive rubber mounts and ceiling hangers

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Acoustic Buildings and Enclosure Packages

Acoustic packages for oil & gas applications are designed to minimize on-site installation, reduce maintenance costs and provide high accessibility at all times. Packages include, design studies, acoustic panels, supporting structures, ventilation and exhaust systems.

- Noise reduction ratings from 15 to 50 dBA
- Indoor or outdoor arrangements
- Modular solutions
- Easy access for operators

- Integration of lighting, ventilation, fire detection and/or fire-fighting systems, instruments, pipes, air conditioning and fittings
- Package with air inlet and outlet for ventilation
- Exhaust integration
- Acoustic doors and windows

Complete Noise Control Packages

For EPCs, OEMs and packagers, IAC Acoustics also provides complete filtration and acoustic solutions. By choosing a complete package, IAC Acoustics guarantees the overall noise reduction whilst optimizing the efficiency of the equipment. IAC

Acoustics works closely with packagers and OEMs to get high performance of individual installations whether they are located in ambient or harsh environmental conditions.

Complete Project Management

In addition to providing physical solutions for noise control, IAC Acoustics can also manage complete projects from initial site survey and technical specification to manufacture, installation, site assistance and final site commissioning.

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Gen-Set Packages

Gen-set packages include acoustic treatment of the whole equipment to meet overall performance and noise guarantees. It includes all areas including combustion air, mechanical noise with enclosures, ventilation for cooling engine mechanics and exhaust systems.

Gas Turbine Packages

Gas turbine packages are the combination of standardized design with a variety of modular add-ons to meet specific customer requirements and provide the ideal solution for

successful projects. These packages include gas turbine, gearbox, generator (in case of power-generation), compressor (in case of oil & gas applications) and all systems mounted on or off skids. Gas turbine packages include, enclosures, supporting structures, complete inlet systems including filtration, complete exhaust lines, including primary silencer and/or by-pass silencers. IAC Acoustics has the capability to work on both new projects and retrofit works.

Compressor Packages

Compressor packages are designed for a wide range of oil & gas engineering purposes to ensure maximum reliability and efficiency, operational safety, trouble-free operation and easy maintenance.

Compressor packages ease transport and reduce site installation work to a minimum.



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