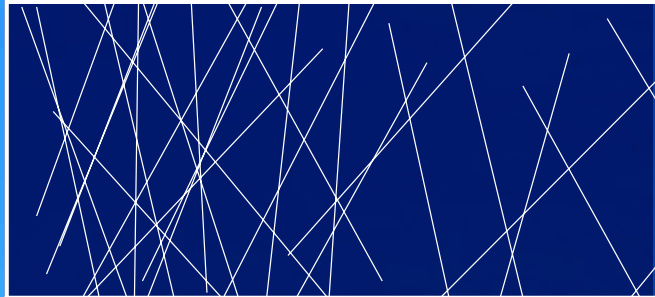




# Peerless-Aarding

A CECO Environmental Brand



**GT EXHAUST SYSTEMS,  
EMISSION CONTROLS, SILENCERS,  
DAMPERS & EXPANSION JOINTS**



**CECO**  
ENVIRONMENTAL



# DELIVERING CONFIDENCE IN CLEAN, SAFE & EFFICIENT ENERGY TECHNOLOGIES

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**Peerless-Aarding is part of CECO Environmental is a multi-division company focused on the design and manufacturing of component equipment used in environmental and flue gas handling applications.**

The Peerless-Aarding brand is a new global leader with over 140 year of experience in custom emissions management solutions for natural gas power and petrochemical processing plants.

Our customers are gas turbine manufacturers (OEM), boiler suppliers, power producers, EPC contractors or end users. Whether a problem can be solved from our standard products line or needs a tailor made solution, Peerless-Aarding takes control from design to installation. Even for complex turn-key retrofit projects.

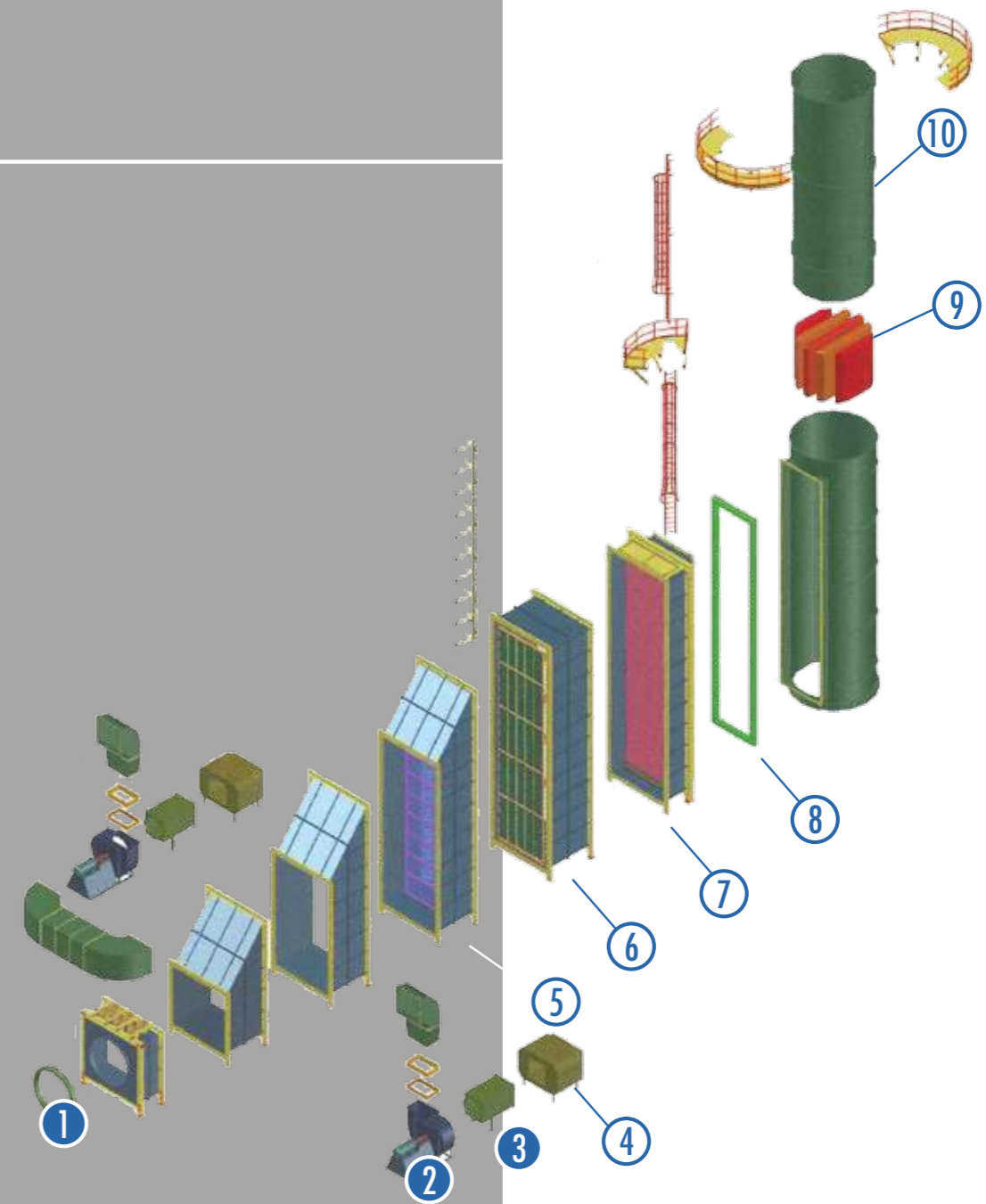
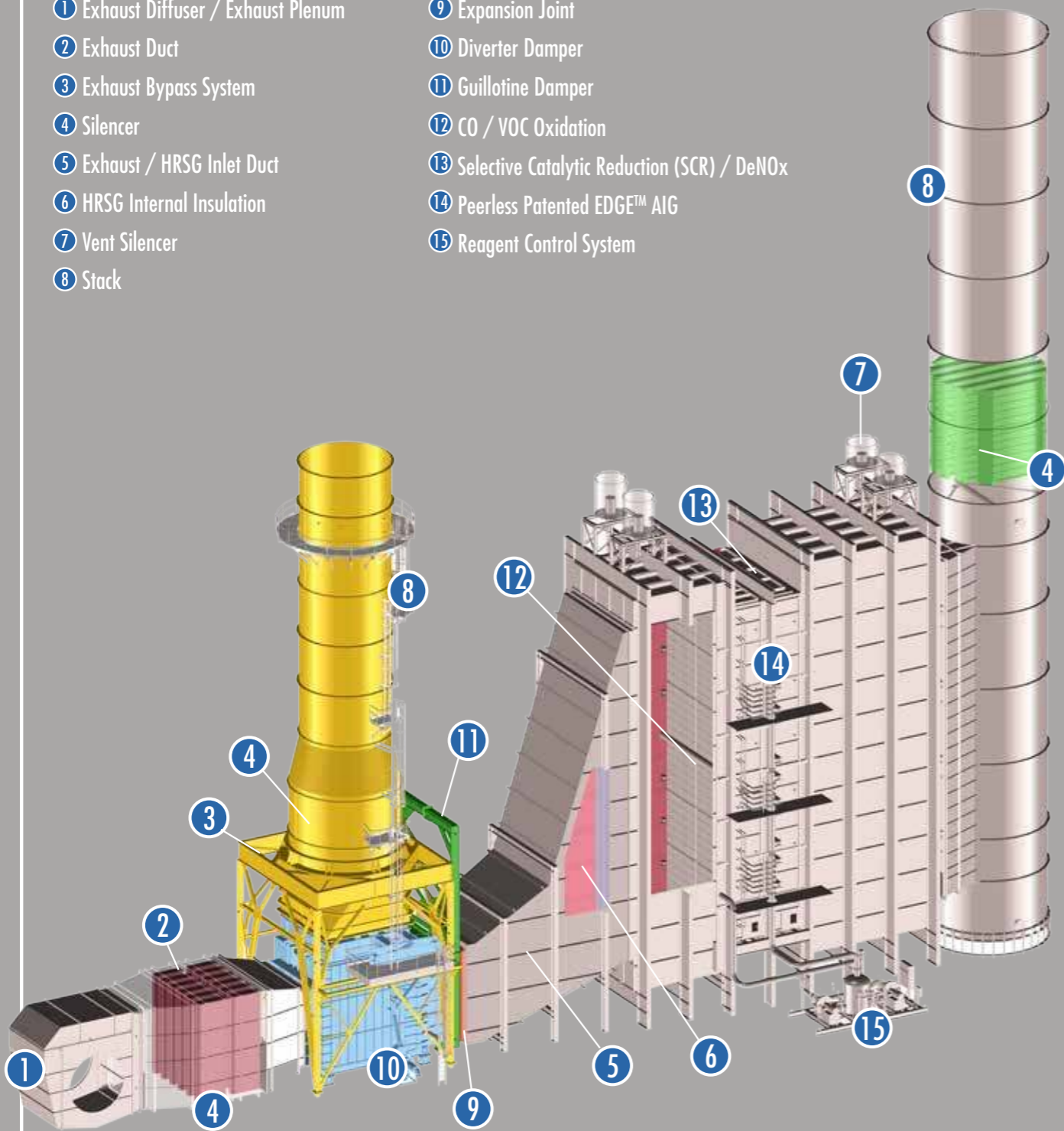
We have an expert staff of engineers and highly skilled welder assemblers in numerous locations in America, Europe and Asia as well as in China.

New as well as Upgrade / Retrofit systems are our specialty. Design and Engineering is realized in-house by our teams of experienced engineers specialized in mechanical, thermal and acoustical engineering dedicated for the Power and Petrochemical Market.

Manufacturing is realized worldwide, providing the most economical solution and optimal logistical project realization. All systems are manufactured according to strict quality levels and standards and manufacturing supervision and quality control is realized by experienced Peerless-Aarding Inspectors.

# CAPABILITIES

- ① Exhaust Diffuser / Exhaust Plenum
- ② Exhaust Duct
- ③ Exhaust Bypass System
- ④ Silencer
- ⑤ Exhaust / HRSG Inlet Duct
- ⑥ HRSG Internal Insulation
- ⑦ Vent Silencer
- ⑧ Stack
- ⑨ Expansion Joint
- ⑩ Diverter Damper
- ⑪ Guillotine Damper
- ⑫ CO / VOC Oxidation
- ⑬ Selective Catalytic Reduction (SCR) / DeNO<sub>x</sub>
- ⑭ Peerless Patented EDGE™ AIG
- ⑮ Reagent Control System



- ① Expansion Joint
- ② Tempering Air/Purge Fan
- ③ Fan Silencer
- ④ Fan Filter
- ⑤ CO/VOC Reactor
- ⑥ Peerless Patented EDGE™ AIG
- ⑦ DeNO<sub>x</sub> (SCR) Reactor
- ⑧ Expansion Joint
- ⑨ Stack Silencer
- ⑩ Stack/CEMS

# GT EXHAUST SYSTEMS

The current market environment is pushing the operational conditions of Industrial Gas Turbine systems to its limits. High cycling (high numbers of starts and stops) as well as high local flue gas velocities and temperatures are putting large stresses on the exhaust gas systems. Environmental regulations require stringent noise levels and Emissions on gas & steam turbine driven systems as well as on petrochemical applications.

Peerless-Aarding, a Ceko Environmental brand, with its offices & partners worldwide (Europe, USA, Latin America, Eastern Europe/ Russia, Middle East and Asia). Based upon a proven track record Peerless-Aarding provides customized and turn-key solutions. Our scope includes Design, Engineering, Manufacturing and Supply of:



## GAS TURBINE EXHAUST SYSTEMS

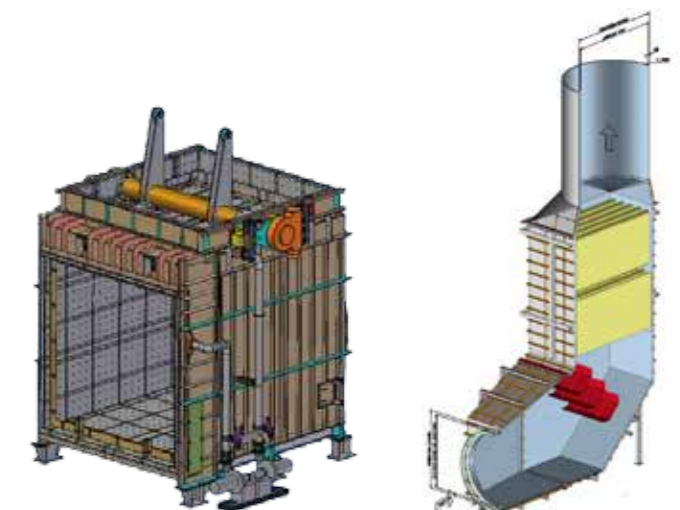
- + Diffusers, Plenum and Gas Turbine Exhaust ducts
- + Single cycle exhaust systems
- + Bypass Exhaust systems
- + Exhaust Stacks
- + Thermal Insulation
- + Boiler Internals
- + CO & SCR Systems

## DAMPERS & EXPANSION JOINTS

- + Diverters
- + Guillotine dampers
- + Louver dampers
- + Expansion joints

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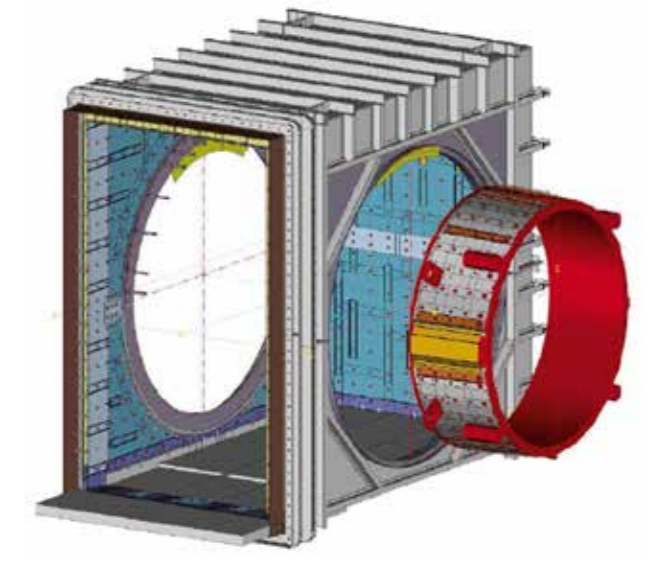




## DIFFUSERS / PLENUMS (1)

One of the major transition area's between the gas turbine exhaust and the exhaust system is the diffuser duct or gas turbine exhaust plenum duct section. On the larger & newer type IGT's the exhaust gas flow is directed into the exhaust system through a diffuser duct (straight flow) and on some specific type IGT's through a gas turbine exhaust plenum duct section changing direction of flow into a 90 degrees bend.

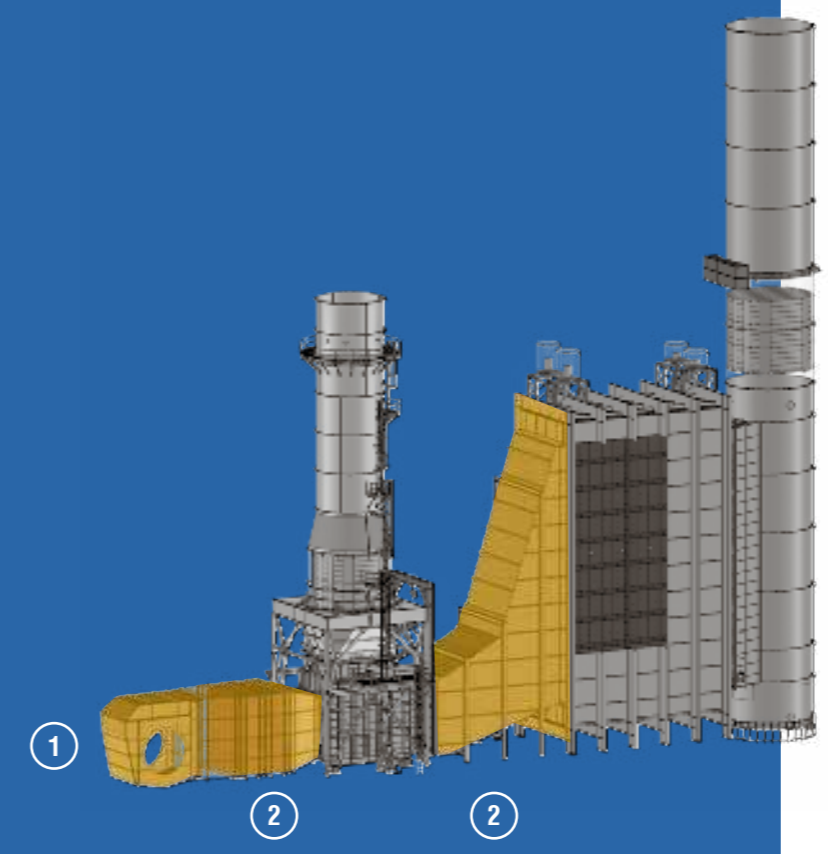
For both systems Peerless-Aarding provides diffusers and plenums specifically engineered to cope with the strong GT exhaust gas swirl characteristics as well as the high GT exhaust gas velocities and temperatures. To accommodate start stop operation as well as operation at elevated temperatures, cold casing designs specifically engineered for the applicable operational conditions are the current standard.



## GT EXHAUST DUCTS (2)

Exhaust ducts are mainly applied as transition between diffuser and diverter systems or between the diverter system and HRSG (inlet ducts). Main design focus is related to the high swirls, exhaust gas velocity and elevated temperatures.

Peerless-Aarding designs and provides the latest cold casing design adapted to today's stringent operational conditions. Ducts are commonly engineered including additional features such as dedicated silencer assembly supporting systems Accommodating high gas flows and start stop operation), turning vanes, fast opening & closing access doors and compensator connection flanges. In addition, all systems are designed to meet both thermal (maximum surface temperatures) and acoustical (noise levels) requirements based on either local or governmental requirements.



“Peerless-Aarding provides the design, manufacturing, and supply of the complete scope of supply from the inlet expansion joint through the stack exit.”

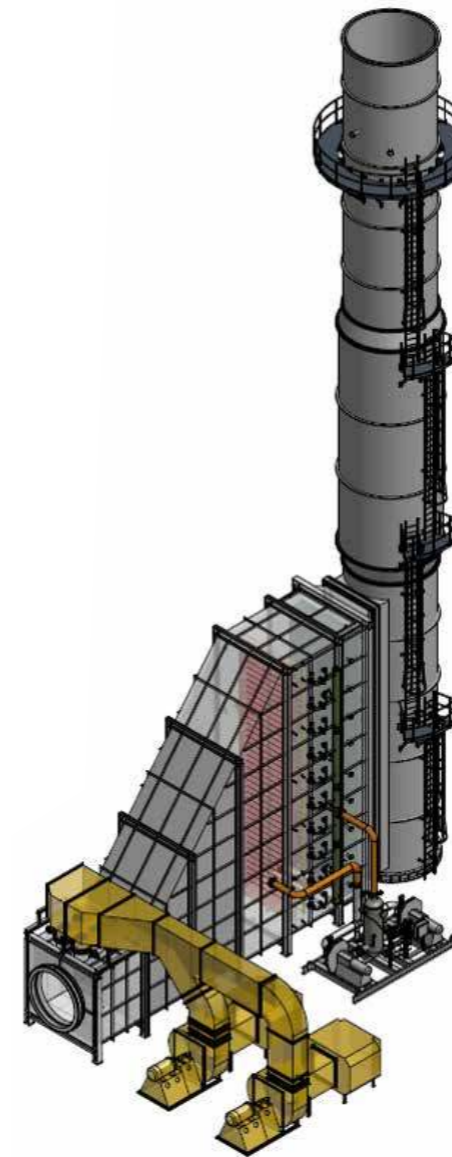
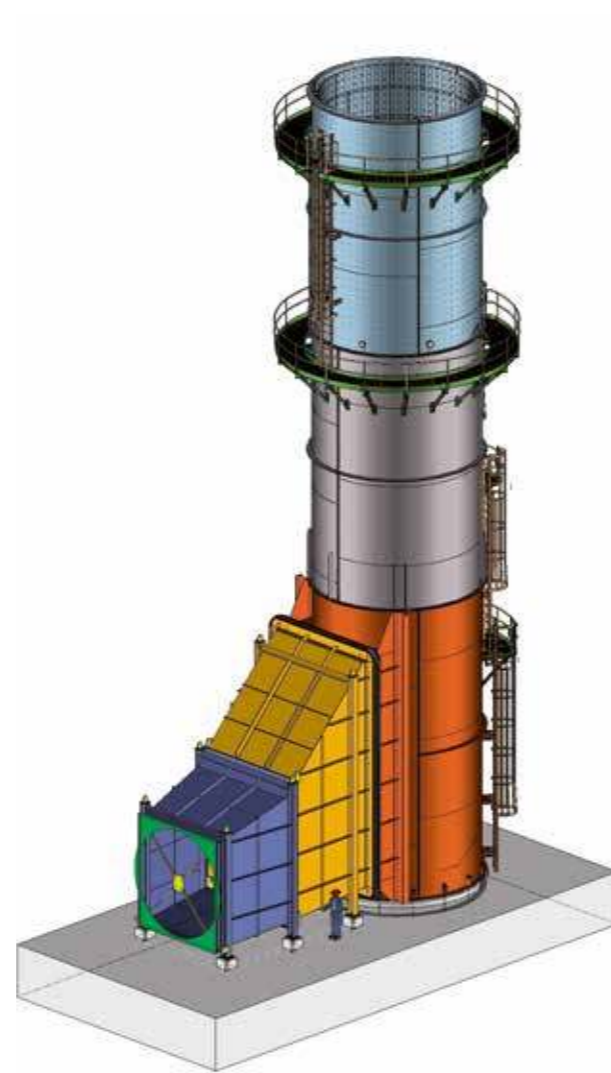
## SINGLE CYCLE EXHAUST SYSTEMS

In today's energy market there is a growing demand for peaking power. Simple cycle operation is a fast and reliable way to provide flexible power demand at short notice. Peerless-Aarding provides a range of alternatives on simple cycle exhaust systems which will support effective cyclic operation and the changes in thermal load which are part of the frequent start-stop cycles.

Each design is individually designed for internal stud spacing, stud size, liner plate thickness, to ensure the best operational conditions and unit lifetime.

Peerless-Aarding will do the design, manufacturing, and supply of the complete scope of supply from the inlet expansion joint through the stack exit. Our in-house acoustical capabilities are backed up with extensive laboratory and field measurements which allow us to develop state-of-the-art solutions for your noise control requirements.

Peerless-Aarding has extensive experience in the supply of simple cycle exhaust systems and supplies either sections of the system up to the complete exhaust systems including on-site erection and commissioning.



## SINGLE CYCLE EXHAUST SYSTEMS

Peerless-Aarding Engineers, manufactures and supplies complete exhaust emissions control packages optimized for the lowest life cycles cost:

- + Tempering air systems for low life-cycle cost
- + Purge air systems to meet NFPA
- + Noise abatement to meet the most stringent near-field and far-field criteria
- + Stack and CEMS
- + Reagent Storage and handling
- + Reagent control and vaporization systems distribution
- + Controls integration
- + SCR catalyst
- + CO/VOC catalyst
- + Peerless EDGE™ AIG for superior performance
- + Rapid Advantage SCR - RASCR (Fast Start SCR)

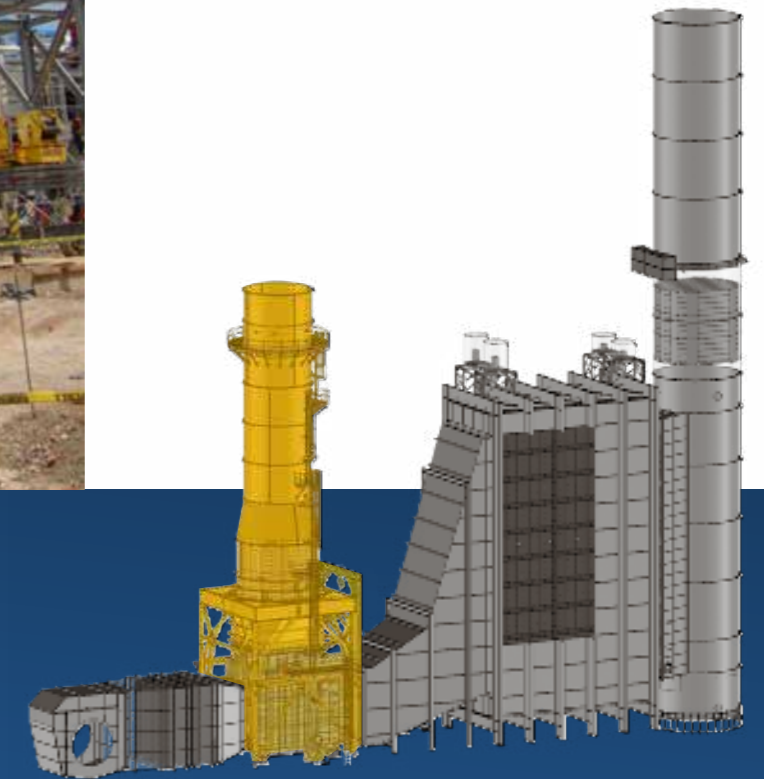
Peerless-Aarding offers pre-assembled modularized SCR and CO exhaust System packages for combustion turbines up to 440MW.

- + Modular construction for reduced erection time and smaller system footprint
- + Designs optimized for lowest life-cycle cost
- + Turnkey construction, construction management and field service support
- + Peerless performance for the lowest achievable emissions





“With optional seal air systems we can guarantee zero leakage and a man safe environment for any maintenance to the HRSG.”

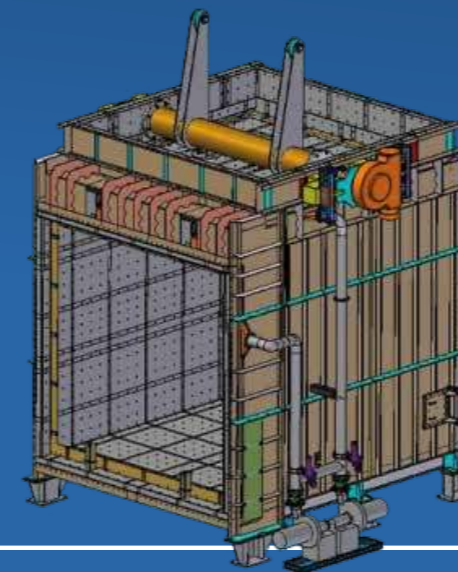


## BYPASS EXHAUST SYSTEMS

To realize higher efficiency levels gas turbine waste heat is used to generate process steam or steam turbine operation. Peerless-Aarding provides Bypass Exhaust Systems between gas turbines and HRSGs. These Bypass systems allow flexible operation of the power island as well as the capability of starting the gas turbine in rapid starting mode and allowing

the HRSG to gradually come online. This approach offers the flexibility of fast power and increases the life of an HRSG. In today's business environment bypass exhaust systems provide a solution for the option between baseload and peaking/modulating operation.

Peerless-Aarding Bypass Exhaust Systems are fitted with state of the art diverter systems from our facility in Canada. The diverter valves can be designed as pivot or toggle type and can accommodate both hydraulic and electric drives. With optional seal air systems; zero leakage and a man safe environment for any maintenance to the HRSG can be provided.



“With the experience of more than 2000 references worldwide, Peerless-Aarding has the know how to execute the complete engineering in-house. “

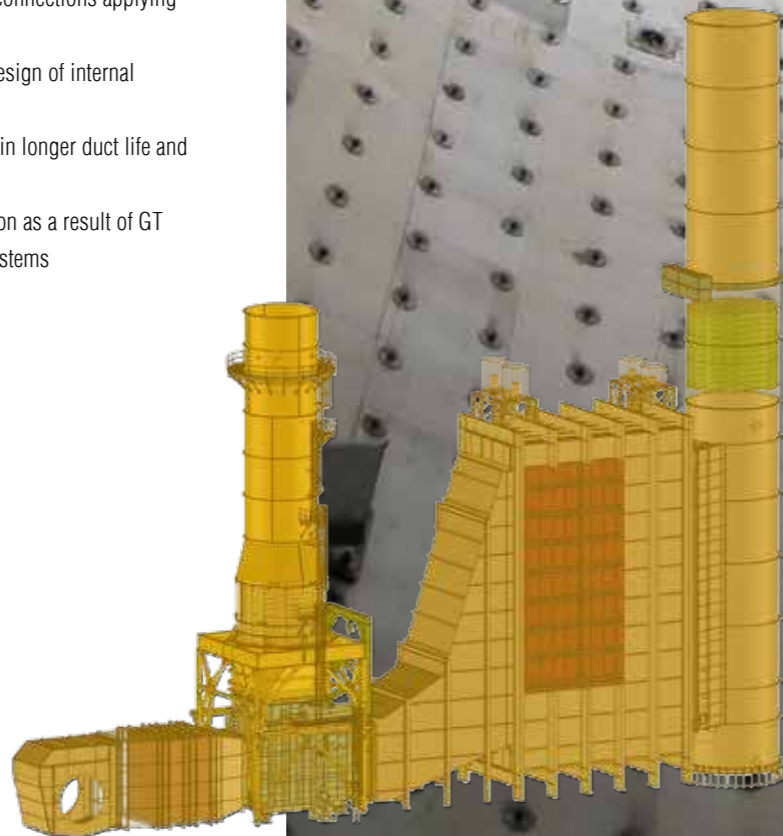
## INTERNAL INSULATION

### Cold Casing Design

Peerless-Aarding has developed an in-house design of internal insulation systems based upon the latest operational requirements and newest materials. In our cold casing design, the insulation system is fitted to the casing interior using a custom designed support system. The protective sheeting is engineered based upon the most economical & effective distance (insulation thickness) from the cold outer casing wall by studs, nuts and washers enabling free thermal expansion of the metal sheeting in relation to the outer casing wall (floating plate principle).

### Peerless-Aarding design includes:

- + Lower exterior duct/casing temperatures resulting from the use of custom designed internal insulation
- + Eliminating or reducing external duct sliding connections applying cold design
- + Ease of maintenance as a result of sectional design of internal insulation and optimised field joint designs
- + Minimizing external duct movement resulting in longer duct life and less strain on flexible joints/bellows
- + Options to include higher temperature operation as a result of GT upgrade or installation of additional burner systems



“Peerless-Aarding / Burgess-Aarding Flue Gas Silencers have been designed by our in-house team of acoustical engineers & experts.”

## FLUE GAS SILENCER

Peerless-Aarding / Burgess-Aardings Flue gas silencers are custom designed to keep noise emissions within acceptable levels. Current gas turbine operation requires the latest design, engineering and advanced material selections.

Whether flue gas silencers are mounted in a silencer duct, a hot or cold stack or have to be able to operate in high flue gas velocities or elevated and fluctuating temperatures (start-stop mode), Peerless-Aarding can provide the most effective solution in line with Gas Turbine output and Single cycle or bypass/HRSG design considering basic design criteria such as;

- + Sound power level/noise output of gas turbine
- + Noise requirement of power plant required dynamic insertion losses of silencer
- + Pressure drop requirements
- + Dimensions of duct/stack
- + Other noise sources, e.g burners
- + Other noise reducing parts of the system, e.g. boiler & elbow
- + Maximum flow velocity

The Peerless-Aarding / Burgess-Aarding Flue Gas Silencer offers the following advantages;

- + In-house design by our team of acoustical engineers & experts
- + Most effective and economical design
- + Patented designs
- + Fabrication based upon a full welded construction

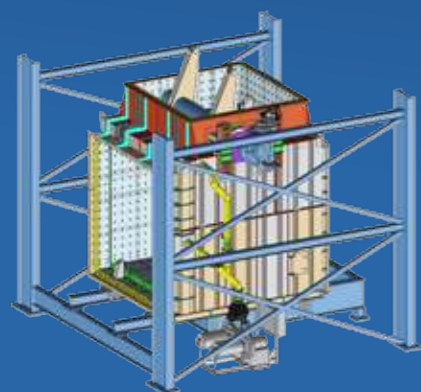




# DAMPERS & EXPANSION JOINTS

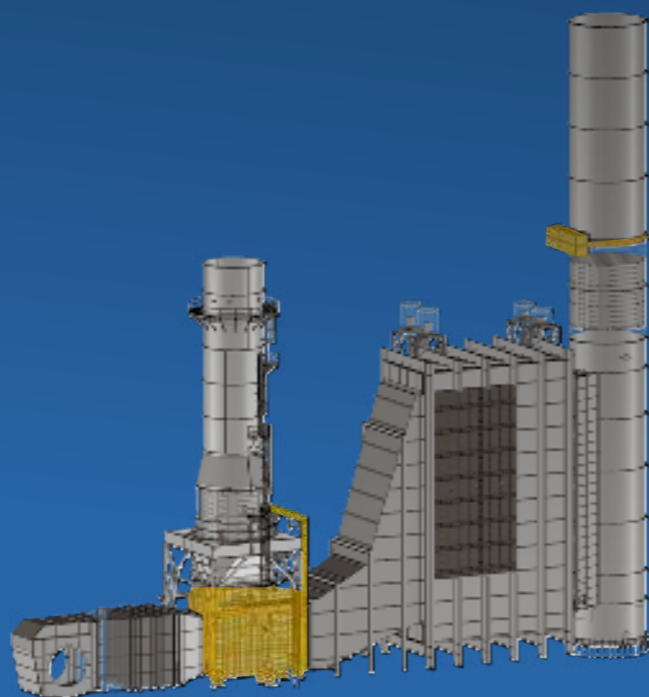
## DIVERTERS

The diverter is an isolation device that can be used for HRSG exhaust duct applications. Peerless-Aarding manufactures a low leak and a zero leak style diverter. The low leak design is used when a small amount of flue gas leakage can be tolerated across the closed diverter blade. Peerless-Aarding has extensive experience in the design and supply of toggle-type and pivot-type diverter dampers for HRSG, Waste Heat recovery, natural gas turbine, and other systems that require diversion of the gas stream. We have designed and installed diverter dampers in systems ranging from small turbine units to the largest turbines in the world such as the GE Frame 9F.



## LOUVER DAMPERS

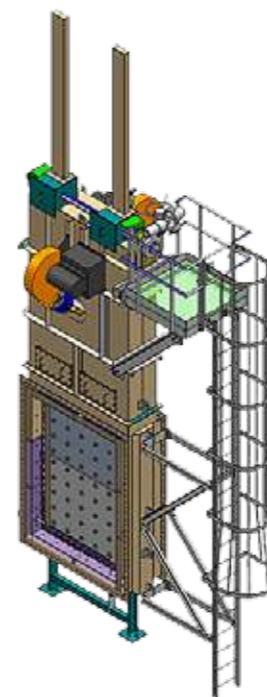
Where precise flow control is required, Peerless-Aarding can offer a complete line of heavy-duty louver dampers. Single Louvers for low leak applications and Double Louvers for total exhaust gas flow isolation. We have a proven design for a large range of applications. If we don't have one we will design one for you!



“Peerless-Aarding has extensive experience in the design and supply of toggle-type and pivot-type diverter dampers for HRSG, Waste Heat recovery, natural gas turbine, and other systems that require diversion of the gas stream.”

## GUILLOTINE DAMPERS

Guillotine dampers are used when tight shut-off is required to isolate specific portions of an exhaust gas system for maintenance or by-pass purposes. When isolating a gas turbine from an HRSG, Peerless-Aarding offers a complete line of heavy-duty guillotine dampers to meet your requirements. Designs available from Peerless-Aarding include: Open-bonnet or Enclosed bonnet designs and optional 100% isolation with seal air fans. Peerless-Aarding has supplied guillotine dampers in the largest ducting sizes in the industry.



## EXPANSION JOINTS

The primary purpose of an expansion joint is to provide a point of flexibility in flue ducts and relieve stress caused by system movement. Our non-metallic (Composite and Elastomeric) expansion joints incorporate the latest advancements in engineering and materials technology. Our expansion joints are available for design applications for a large operational temperature range.





# MARKETS

Peerless-Aarding provides products and services to the following markets:

- + Power Generation Market
- + Refinery / Petrochemical Market
- + Engine Test Cell Market
- + Natural Gas Transmission Market

## POWER GENERATION MARKET

Within the Power Generation Market, the products of Peerless-Aarding can be placed within:

- + Coal Fired Power Plants
- + Gas and Oil Fired Power Plants

Peerless-Aarding supplies worldwide the products to end-users, EPC's, turbine suppliers, boiler suppliers and engineering-contracting companies for eventual balance of plants solutions.

## REFINERY PETROCHEMICAL MARKET

### ENGINE TEST CELL MARKET

Peerless-Aarding provides new as well as retrofit silencer and exhaust systems for Aero Engine test cells and hush houses.

Major strength of Peerless-Aarding is an extensive experience and in house engineering and engineering techniques providing solution driven designs, products and services. Peerless-Aarding focus is on high temperature insulation applications and acoustic engineering.

### NATURAL GAS TRANSMISSION MARKET

Blowdown separator silencers for the natural gas transmission market ensure the safe discharge of hazardous gases in both emergency and routine scenarios.

## PEERLESS-AARDING EMISSION CONTROL SYSTEMS

Peerless-Aarding specializes in NOx and CO/VOC Emission control systems for new and retrofit applications:

Power Generation

- + Simple Cycle Combustion Turbines
- + Heat Recovery Steam Generators (HRSG)
- + Utility Boilers
- + IC Engines

Refinery / Petrochemical

- + Refinery Heaters
- + Reformers
- + Petrochemical and Process Heaters

Industrial

- + Industrial Boilers
- + Process Units



## SERVICE & RETROFIT MARKET

Peerless-Aarding provides products and services both for new projects as well as within the service and retrofit markets.

Today's changing market conditions with a growing and ageing fleet of heavy industrial equipment and requirements for a higher flexibility and higher output is stretching the boundaries of component life. Peerless-Aarding offers a range of services either extending life, upgrading or retrofitting existing exhaust gas systems and acoustical systems.

Many Older type Gas Turbine units face extensive wear and tear in the exhaust system. Minor defects in the insulation package often result in a fast and widespread damage increasing the number of trips and reducing availability.

Peerless-Aarding provides engineering solutions including upgraded materials, a better insulation package and advanced engineering simulation techniques to ensure effective thermal and acoustic design of the exhaust system.

Spare parts and field services are provided for a large range of systems, regardless of the make or model of the equipment.

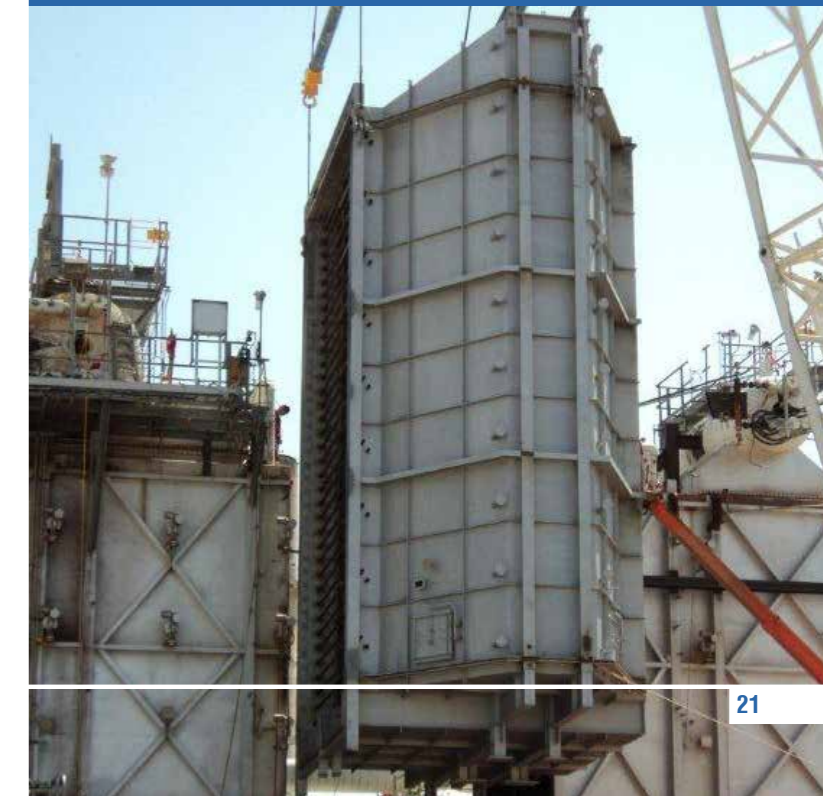
Repair on these aging exhaust systems has its limitations as a result of damages by hot spots and progressive base material degradation. As a result patch up repairs will not provide an effective operational solution and upgrade or replacement are the only options for life extension of the system.

## PEERLESS-AARDING EMISSION CONTROL RETROFIT

As environmental regulations become more stringent, the most economical solution to achieving full NO<sub>x</sub> compliance likely is retrofitting existing plants with SCR technology. Peerless-Aarding' experienced and innovative engineers help you achieve strict emission reductions in your facility's existing space with minimal disruption.

Peerless-Aarding engineers have decades of experience providing emission-reduction technologies to combustion sources in power plants, refineries and chemical plants. Peerless-Aarding' expertise in engineering, designing, procuring and building SCR systems allows for flexibility to suit a facility's particular needs and schedules.

In addition to emission-reduction projects, Peerless-Aarding engineers have the experience and expertise needed to upgrade existing emission-control systems by enhancing current SCR systems with catalyst improvements and additions, ammonia system upgrades and burner modifications.



- A Peerless-Aarding office
- Projects

# PEERLESS-AARDING PROJECTS

“Our strength comes from our extensive know-how on a wide variety of emission and acoustic solution for GT exhaust systems.”

## NORTH AMERICA

- + Greenfield, Canada  
Supply of steam vent silencers
- + Brazos Valley, USA  
Supply of exhaust gas systems and flue gas silencers
- + Cane Run, USA  
Supply of stack dampers
- + El Segundo, USA  
Supply of internal insulation and boiler internals
- + Hines II, USA  
Supply of internal insulation and boiler internals
- + Richmond County, USA  
Supply of steam vent silencers
- + Sutton, USA  
Supply of steam vent silencers
- + Temple & Sherman, USA  
Supply of internal insulation and boiler internals
- + Wayne County, USA  
Supply of steam vent silencers

## LATIN & SOUTH AMERICA

- + Belgrano & San Martín, Argentina  
Supply of steam vent silencers
- + Pilar, Argentina  
Supply of steam vent and flue gas silencers
- + UTE Parnaíba, Brazil  
Supply of simple cycle exhaust systems
- + Termoflores II & III, Colombia  
Supply of steam vent silencers
- + EPM, Colombia  
Supply of exhaust bypass systems
- + Rio Bravo, Mexico  
Supply of exhaust systems
- + Pemex Nuevo, Mexico  
Supply of exhaust gas systems
- + Pemex Tabasco, Mexico  
Supply of exhaust gas systems
- + Manzanillo, Mexico  
Supply of steam vent and flue gas silencers
- + Tamare & Bachaquero, Venezuela  
Supply of internal insulation and boiler internals

## EUROPE

- + Ivago Gent, Belgium  
Supply of exhaust gas systems
- + AES ELSTA  
Supply of exhaust ducts
- + Te-to Zagreb, Croatia  
Supply of internal insulation system and flue gas silencers
- + Megalopolis, Greece  
Supply of steam vent silencers
- + Schiphol, the Netherlands  
Supply of aircraft engine and testcell retrofit & upgrade
- + Hemweg & Diemen, the Netherlands  
Supply of internal insulation and boiler internals
- + Magnum, the Netherlands  
Supply of internal insulation and boiler internals
- + Tuapse, Russia  
Supply of steam vent and flue gas silencers
- + Baglan, UK  
Supply of internal insulation system

- + Corby, UK  
Supply of exhaust ducts

## AFRICA

- + Arzew, Algeria  
Supply of internal insulation and boiler internals / Supply of bypass flue gas silencers
- + Sidikrir & El Atf, Egypt  
Supply of internal insulation and boiler internals / Supply of internal insulation for bypass stacks

## MIDDLE EAST

- + Al Rasheed, Iraq  
Supply of simple cycle exhaust systems
- + Mukhaizna, Oman  
Supply of internal insulation and boiler internals
- + PP12, Saudi Arabia  
Stack dampers, vent silencers and flue gas silencers
- + Rafha, Saudi Arabia  
Supply of simple cycle exhaust systems

- + Rabigh 6, Saudi Arabia  
Supply of steam vent silencers
- + Tabuk, Saudi Arabia  
Supply of simple cycle exhaust systems
- + Qatargas, Qatar  
Supply of exhaust gas systems
- + Fujairah, UAE  
Supply of steam vent silencers

## ASIA

- + BLNG Shell, Brunei  
Supply of exhaust ducts
- + Samalkot, India  
Supply of steam vent and flue gas silencers
- + Sengkang, Indonesia  
Supply of steam vent silencers
- + Keppel, Singapore  
Supply of steam vent and flue gas silencers
- + BangPa, Thailand  
Supply of steam vent silencers
- + Mapta Phut, Thailand  
Supply of exhaust plenum ducts

## AUSTRALIA & NEW ZEALAND

- + Pinjarra I & II, Australia  
Supply of exhaust gas systems and flue gas silencers
- + Wheatstone, Australia  
Supply of bypass stack, louver dampers, guillotine dampers and expansion joints
- + Yarwun, Australia  
Supply of steam vent silencers
- + Huntly, New Zealand  
Supply of exhaust gas systems

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