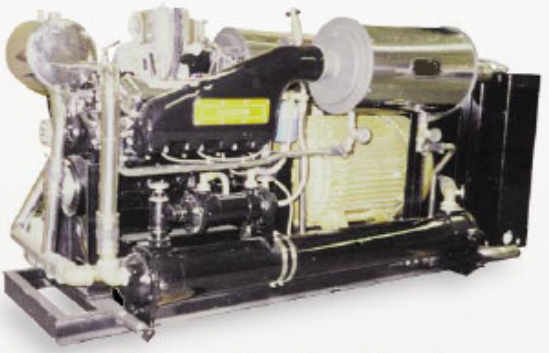
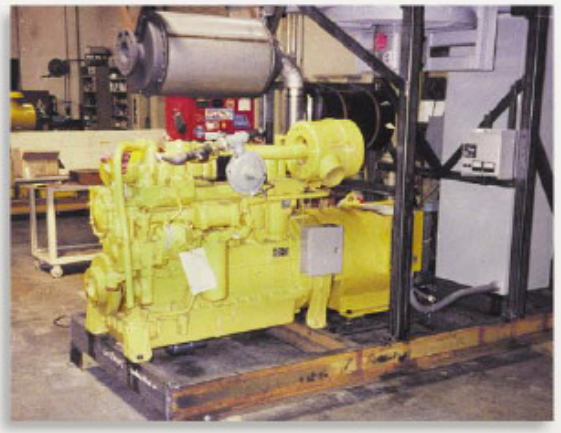
HRSA

HEAT RECOVERY SILENCER AXIAL

Specifically designed for small engine sizes, the HRSA waste heat recovery silencers are compact cylindrical heat exchangers designed for either dual or single exhaust small engines. There are 65 standard models available to meet the specific design-performance criteria. In addition to lowered exhaust noise, the unique coil type configuration and optional circulating pump allows for a secondary circulating liquid flow system. 1" NPT interconnecting piping, to and from a main liquid flow loop, provides for simple and less costly special piping modification changes. The required heat transfer surface coupled with a small water flow diversion from the main flow, adequately recovers desired Btu/hr performance and controlled outlet exhaust temperatures as required. An optional internal or external stainless steel exhaust bypass can also allow tempering or full control of the exit temperature when required.



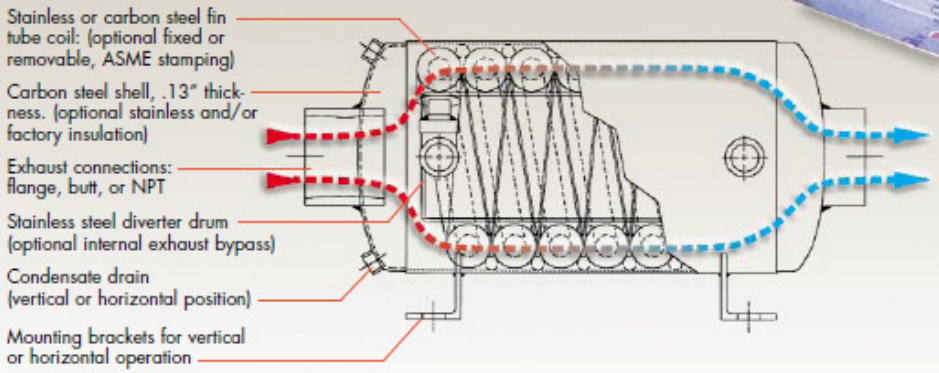
The HRSA waste heat recovery silencers shown with the smaller engines such as a 460 cu.in. V8 shown above or a smaller Caterpillar engine shown below.



Engine Exhaust Application

- Capacity: 15–150 kW
- Entering gas temps: 400–1,600°F
- Heat sink types: Engine jacket water, process water, boiler water, or ethylene glycol

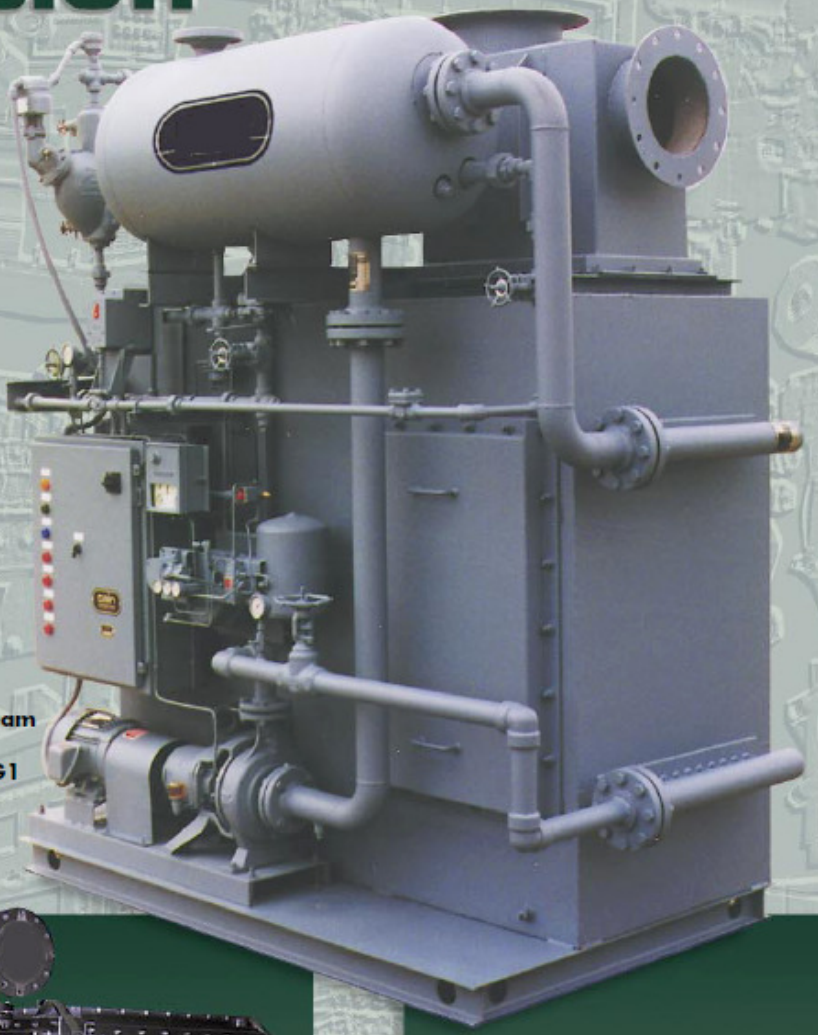
HRSA SERIES FOR: COMPACT CYLINDRICAL DESIGN



The HRSA design utilizes full counter flow heat transfer for achieving very low outlet exhaust gas temperatures. All stainless steel construction for specific condensing applications is available. The HRSA can be mounted vertically or horizontally as required. The HRSA with its light weight construction and cylindrical configuration lowers the exhaust from 1000°F to 300°F with a 25 dBA reduction while operating with natural gas or diesel fuel oil.

EXHAUST HEAT RECOVERY

Gas & Diesel Cogeneration Systems



Exhaust Steam Generator Series – ESG1

Heat Recovery Silencer Radial Series – HRSR

U-Tube Heat Recovery Series – UTR

Heat Recovery Silencer Axial Series – HRSA

"Manufacturing Waste Heat Transfer Products To Save Energy"

HEAT TRANSFER SYSTEMS FOR ENGINE EXHAUST RECOVERY

INTRODUCTION

This catalog covers the Product lines for the gas and diesel engines, gas turbines, and micro turbine generator retrofit applications. For these applications, we offer over 500 standard products to choose from, and can typically provide a comprehensive analysis and quotation to fit your exact needs within 24 hours. Our equipment can be adapted and assembled to fit any application or complete installation.

COGEN APPLICATIONS

- Hospitals
- Manufacturing Plants
- Schools
- Office Buildings
- Shopping Malls
- Drilling Platforms
- Oil & Gas Plants
- Marine

EQUIPMENT VARIETY

- Exhaust steam generators
- Large exhaust recovery silencers
- Smaller specialized exhaust recovery silencers
- Special heat transfer configurations
- Recirculating engine jacket water boilers

SYSTEM FUNCTION

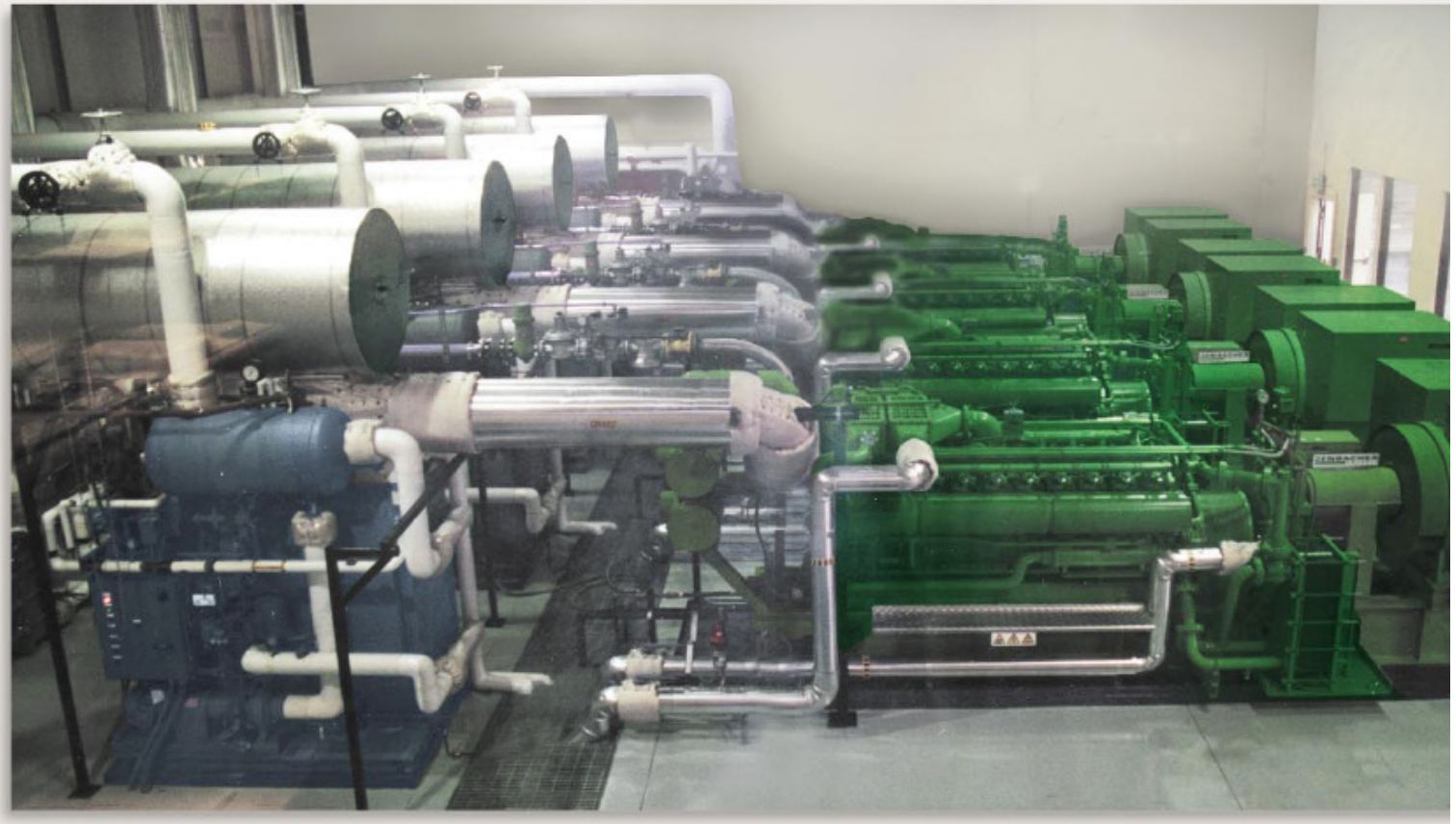
Btu is transferred from the exhaust stream to heat sinks such as water, glycol, therminol fluids, or steam production. Suitable fuel types for combustion sources include natural gas, propane, digester gas, diesel fuel, and light to heavy fuel oils.

PROPOSAL CONSIDERATIONS

- Large or irregular exhaust connections
- High or varying exhaust temperatures
- Particular pinch point requirements
- Exhaust or liquid control
- Special heat sink requirements
- Special heat transfer metallurgy requirements
- Specific maintenance concerns
- Optional equipment requirements
- Installation space and weight concerns
- Package system requirements

ANTICIPATED RESULTS

- Tremendous fuel savings typically pay for equipment and installation within 1 to 3 years of average use.
- Pollution reduction due to lowered annual fuel usage.
- Lower exhaust temperatures and significantly reduced sound output levels (final sound attenuation is typically 15 - 25 dBA).



EXHAUST STEAM GENERATOR

The fully packaged ESG1 is selected from 48 pre-engineered standard models with output capabilities of 20 to 500 boiler hp and operating steam pressures from 3 to 450 psig. The ESG1 is shipped complete, ready for operating as either a primary or supplementary steam source.

The ESG1 package is made up of three basic sections:

- finned tube heat transfer section
- steam flash circulating drum assembly
- modulating full port exhaust bypass system

Full operating steam pressure from a cold start in less than 10 minutes.

OPERATION & CONTROL

The integral forced circulating water pump continually circulates high temperature water from the steam flash drum assembly to the heat transfer core assembly. Btu is transferred from the exhaust to a high flow superheated water/steam mixture. The super-heated water is returned to the steam drum which contains dry pipe, baffles, and lance assemblies, where it flashes into 99% dry stream as its exits out to the system.

As the water is generated into steam and exits the boiler, the modulating boiler feedwater system controls continuous feedwater flow for constant drum water level control. Fail safe controls are built in for full exhaust bypass in the event of electrical or pneumatic loss.

The steam pressure controller maintains the operating steam pressure as it controls the modulating exhaust bypass assembly. This provides solid operating steam pressure under various operating steam load demands.

Engine Exhaust Application

- Capacity: 400kW – 7MW
- Entering gas temps: 600 – 1,600°F
- Heat sink types: Supplemental steam demand and/or primary steam source for steam heating or process steam.

QUALITY CONTROL

The ESG1 is manufactured, tested, and stamped in accordance with the requirements of Section I of the ASME Boiler and Pressure Vessel Code, and National Board. Boiler trim includes all safety controls and alarms to meet state and federal codes. Final assembly, electrical wiring, and factory adjustments are completed under a strict set of guide lines.

OPTIONAL COMPONENTS

Automatic Sootblower
Sootblowers are available either as a manual push button start or fully automatic with timed sequencing. Sootblowers are considered when firing with fuel oil and/or incomplete combustion. Sootblowers are also considered when manual cleanings are not feasible in order to maintain peak performance.

Continuous Blowdown with Intermittent Conductivity Sampling Assembly
Maximize boiler efficiency by periodically sampling surface blowdown water and controlling total dissolved solids. Maintaining optimal levels of concentrations will control the costs of water, energy, and chemicals. Assembly includes: motorized valve, probe, and piping assembly.

Hinged Access Door for full heating surface inspection
Hinged access doors are considered when firing with fuel oil and/or incomplete combustion requiring full access on a regular basis for manual cleaning. A hinged access door can be incorporated for 100% finned tube viewing and attention.

FEATURES

The ESG1 is an easy choice when compared to the "old technology" of a conventional firetube boiler:

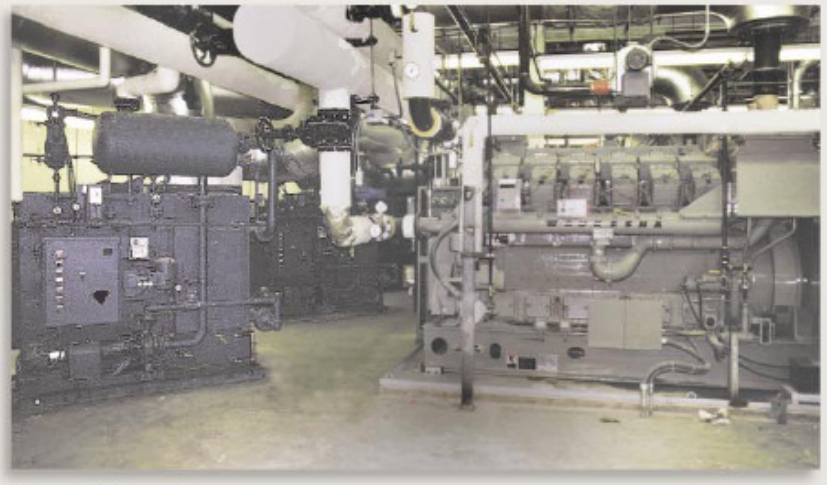
- Completely self-contained "package" design reduces engineering, installation and maintenance costs.
- Size requires only ½ the floor space and ½ the weight of conventional boilers, which reduces building size, structural support costs, and shipping costs.
- Ease of tube replacement requires no overhead cranes, special rigging, special crews, or extra roof height above the unit, while reducing down time.
- Many shapes and sizes are available to fit limited space and maintain performance requirements.
- Produces greater than 99% dry steam.
- Provides 100% turndown capability.
- 5–10 minute time from startup to full output.
- Integrated exhaust modulating bypass for safe automatic steam control.
- Explosion-proof heat transfer exchanger.
- Low friction loss for minimum static exhaust back pressure.
- High circulating flow to minimize scale buildup.
- No thermal expansion concerns with cold boiler feedwater.
- Performance aimed at the lowest pinch point in the industry, (final leaving exhaust temperature minus operating steam temperature) for maximum thermal efficiency.

MINIMUM CONNECTIONS

The ESG1 requires only the following connections for a cost effective installation:

- steam outlet
- exhaust flange inlet and outlet
- single main power
- single main blowdown
- feedwater inlet
- pneumatic control air
- cooling water inlet and outlet

Hospital, Renton, Washington
(4) Model ESG1-616B19CSS
Recovering Btu from (4) Jenbacher JMS-320, 900kW natural gas engines.
Reducing each 2,498 SCFM from 977°F to 392°F.
Delivering 1,863 pph steam @ 90 PSI operating (150 PSIG design).



Hospital, Chicago, Illinois
(3) Model ESG1-616B18CSS.
Recovering Btu from (3) Waukesha 3516, 1,100kW natural gas engines.
Reducing each 2,392 SCFM from 1,135°F to 438°F.
Delivering 2,173 pph steam @130 PSI operating (150 PSIG design).

Water Purification Plant, Burlington, Ontario
Model ESG1-A12D18CSS
Recovering Btu from a Caterpillar 3516, 800kW natural gas engine. Reducing 2,382 SCFM from 770°F to 344°F.
Delivering 1,277 pph steam @130 PSI operating (150 PSIG design).