



Silencer with waste-heat recovery capability



In addition to reducing noise, Hi Eco Silencer

cuts fuel consumption, CO2 emissions at the same time!

Introduction

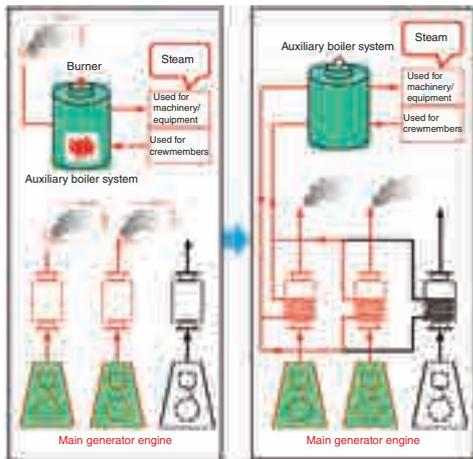
To reduce operating costs and arrest global warming, the shipping industry is, as with other fields of business, taking various actions to save energy. Presently, however, waste heat from main power generators is not recovered at all; it is released in the air untreated. As such, Taiko Engineering Co., Ltd. has added a new function of recovering waste heat (economizers) to its silencers for diesel engines the company's flagship product—7,300 units of which have been delivered to date. With the new capability, the Hi Eco Silencer can now recover waste-heat energy with high efficiency from main engines and make effective use of it. Consequently, fuel consumed in auxiliary boilers can be reduced quantitatively, leading to curtailing operating costs and greenhouse gas (GHG) emissions.

Steam supply systems for ships at anchor

Contrasted in Chart 1 are conventional and waste-heat recovery systems in which steam is supplied while ships are at anchor.

Chart 1

Steam supply systems



(1) Conventional system

A conventional steam supply system, which generates steam by working an auxiliary boiler, is described on the left side of Chart 1. In this system, all waste-heat energy from the main power generators is released in the air, because the silencers are not capable of recovering exhaust heat.

(2) Waste heat recovery system

Shown on the right is the steam supply system with a silencer, which Taiko Engineering has developed, that is capable of recovering waste heat. Heat-transfer tubes (heat exchangers) in the silencers function to recover energy from waste heat (and generate steam), enabling users to obtain a sufficient quantity of heat (steam) that can be used for on-board comforts for crewmembers and other purposes.

Features of Hi Eco Silencer

- (1) Recovers waste-heat energy and turns it into steam for reuse.
 - (i) Curtails fuel costs for using auxiliary boilers.
 - (ii) Reduces carbon dioxide (CO₂) emissions.
- (2) Capable of recovering waste heat.
 - (i) Saves space as users no longer need to have both silencers and waste-heat recovery instruments.
- (3) Adopts a water-tube system for exchanging heat.
 - (i) Achieves higher efficiencies (higher heat-recovery rates).
 - (ii) Reduces pressure losses (an advantage when scrubbers and others are added)

Results of on-board tests for Hi Eco Silencer

When construction work was completed for installing Hi Eco Silencers, Taiko Engineering made sure that machinery and equipment, plumbing, meters and other parts and components were all working properly. After that, it started power generators, auxiliary boilers and other existing machinery and equipment on board a vessel, and activated the waste-heat recovery silencers. The company then conducted on-board tests while confirming there were no problems adapting the Hi Eco Silencer to an existing steam system. Immediately after the installation work, the first on-board test was carried out. In a period of two years, the company visited the ship a total of seven times to take measurements for changes made over time in performance, fuel reduction and other aspects. As a result of investigating the quantity of fuel oil consumed in boilers from the vessel's log book, Taiko Engineering learned that the ship with Hi Eco Silencers installed consumed 0.8 kiloliters of fuel oil per day, a reduction of 0.4 kiloliters from 1.2 kiloliters used without the waste-heat recovery silencers.



Chart 2

<Results of on-board tests>

(1) Quantity of steam generated

The numerical performance target of 100 kilograms per hour or more was cleared. Taiko Engineering also confirmed that applying soot blowers was effective to lessen secular changes.

(2) It confirmed that the Hi Eco Silencer performed even higher than needed to achieve the goal of reducing pressure losses to 1.5 kilopascals or lower and attenuations to 15 decibel A or lower.

(3) With reductions in fuel costs for operating auxiliary boilers, the initial costs for installing Hi Eco Silencers can be recovered in a period of three to five years (depending on ship type).

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TAIKO SANGYO CO., LTD.



Contact: 9515-1, Mukaishima-cho, Onomichi-shi, Hiroshima Japan
 Tel.: +81-848-44-5000 Fax: +81-848-44-5779
<http://www.taiko-jpn.com>