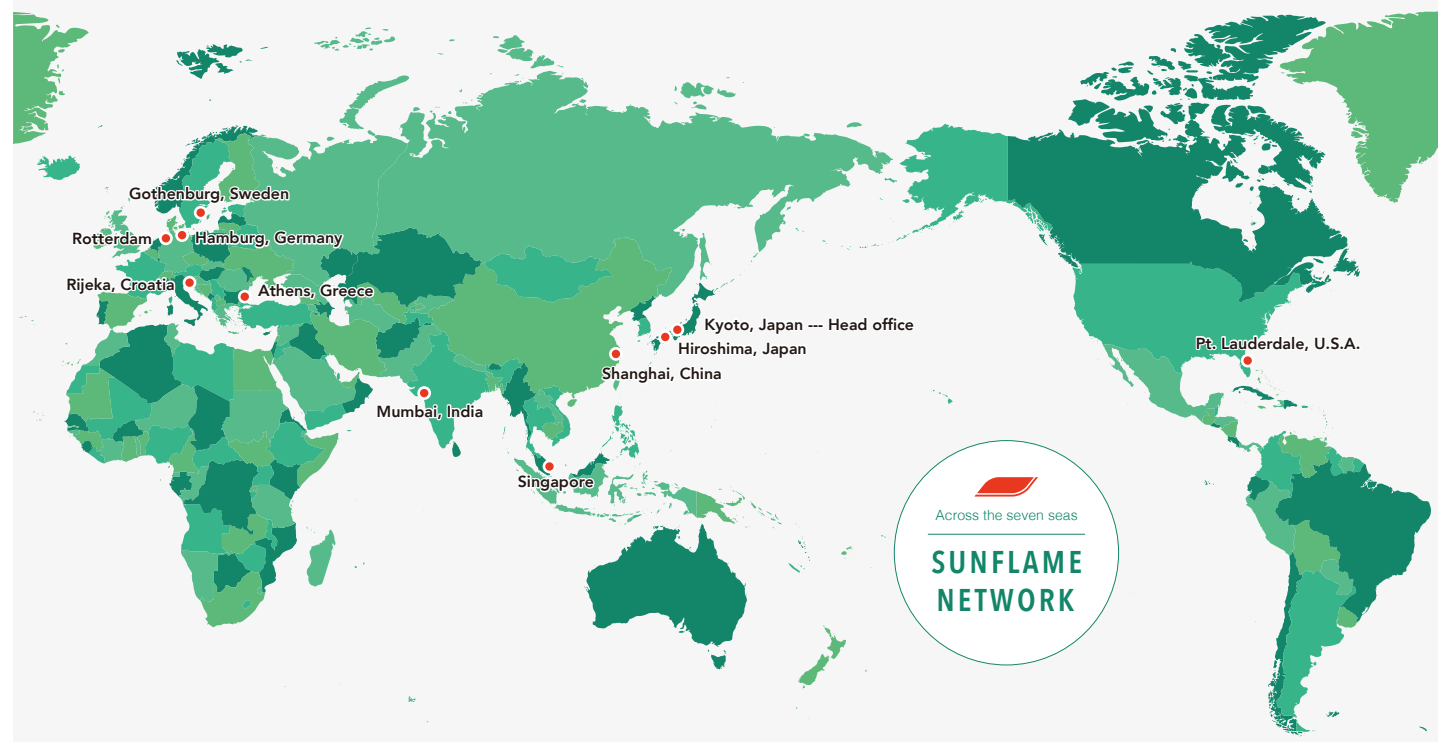


SERVICE NETWORK

After-sales service network



INCINERATOR

with ROTARY CUP BURNER

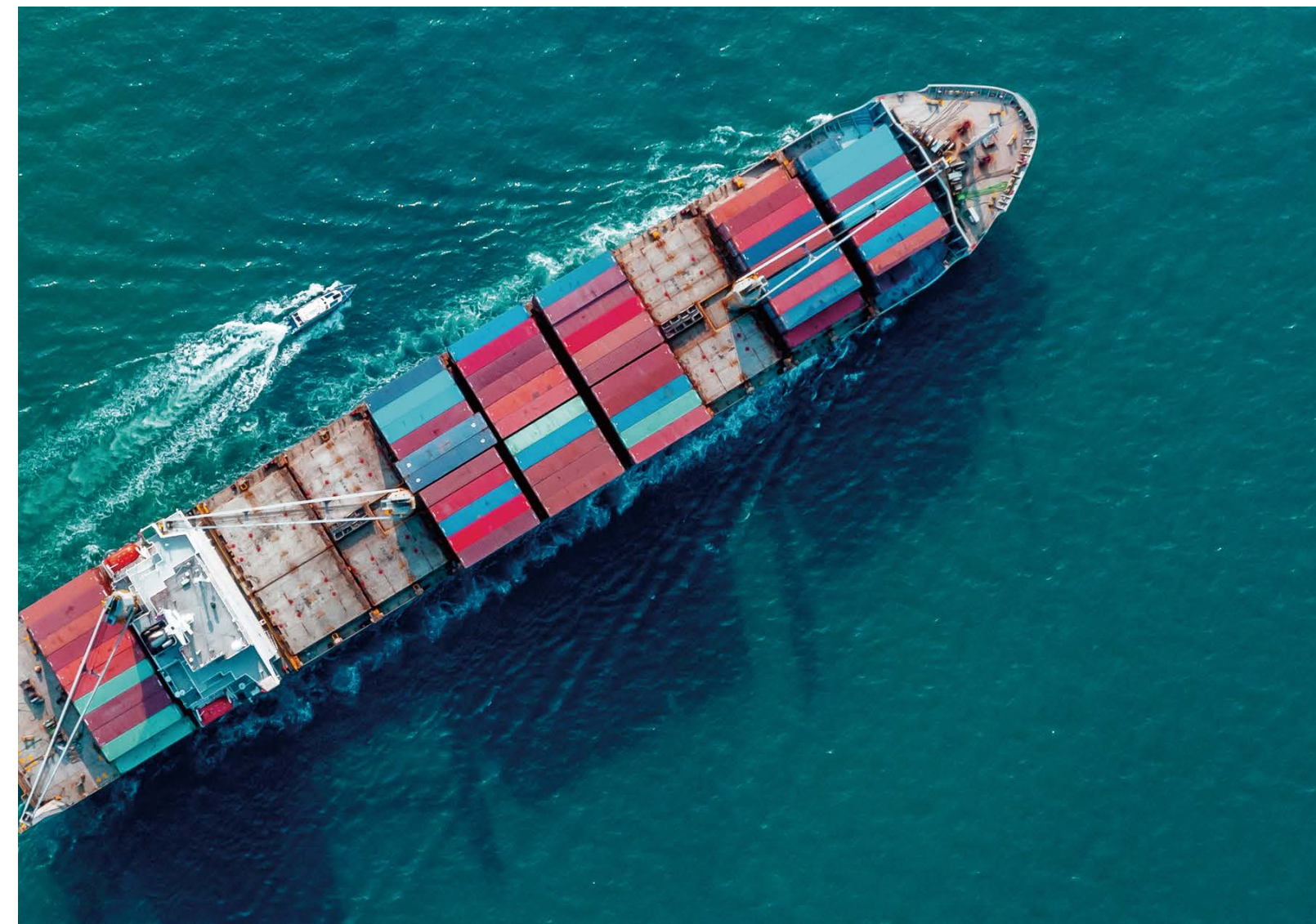
History

- 1968 "Osaka Sunflame Co., Ltd" founded as an oil burner maintenance company
- 1969 Started oil burner production and became a manufacturer
- 1972 Started manufacture of waste oil incinerators
- 1980 Released the high-performance rotary cup burners "Type SSR" and "Type R"
- 1982 Renamed company to "Sunflame Co., Ltd." and purchased factory in Kyoto
- 2001 Released the 3rd generation rotary cup burner "Type SDR"
- 2005 Obtained the ISO9001 standard through NK;
Moved company headquarters and factory to Uji, Kyoto following expanded business
- 2006 Developed a control system for large size auxiliary boilers for VLCCs
- 2008 Released the 3rd generation rotary cup burner "SDR-1500"
Developed and launched new combustion control system with graphic touch panel
- 2009 Released the Emulsion Combustion System (ECS)
- 2014 Released the 3rd generation rotary cup burner "SDR-350", "SDR-500", "SDR-700"
Developed the LNG-compatible dual fuel burner series "SDR-G" for oil and gas;
Expanded main factory to accommodate new test facility
- 2016 Released the ceramic tile refractory for incinerators
- 2017 Developed the next-generation control system equipped with logging and network functions
- 2018 Released the automatic fuel switch system for MGO and HFO;
Co-developed a level sensor check-up system and preheat support system with a client for dry boiling prevention
- 2019 Delivered the first dual fuel burner for oil and gas, the "SDR-G200" unit
- 2020 Began sales and operation of the "Sunflame Smart Support System",
a user support system using ship-to-shore communication
- 2021 Developed GCU for Gas Carrier Vessels and Gas Fuel Vessels
Sunflame Smart Support System was certified as a 'Product & Solutions' product under NK's 'Innovation Endorsement' program as the first product from a marine equipment manufacturer
Office renovation
- 2023 In-house development and start of operation of building control system "MaCo" based on equipment control technology;
Ammonia combustion test facility begins operation

HISTORY of SUNFLAME



Rotary cup burner for auxiliary boiler



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http://www.sunflame.net



INCINERATOR

with ROTARY CUP BURNER



Creating products that respond to evolving customer needs.

Sunflame is unwaveringly dedicated to product development, always considering the on-site requirements. We constantly enhance our technologies in both hardware and software, such as the combustion technology of rotary cup burners and the control technology to optimize equipment performance. In doing so, we are committed to delivering products that satisfy our customers' evolving needs, which is the foundation of our manufacturing policy at Sunflame.

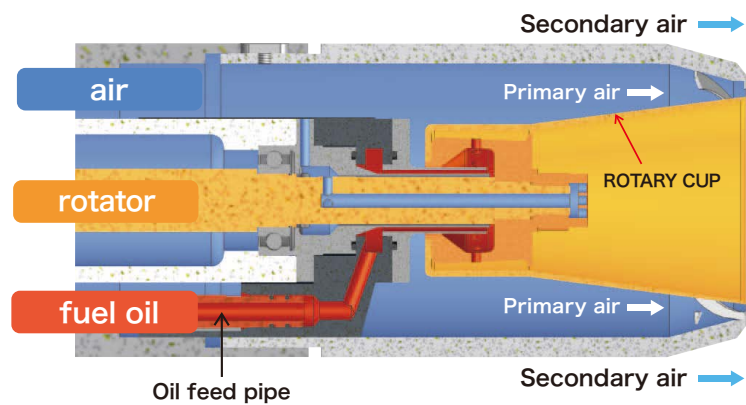
A complete onboard garbage disposal system

At sea, garbage disposal into the ocean is governed by Annex V of the MARPOL 73/78. Considering the limited space available onboard and the costs associated with offloading, we believe it is more practical to process waste using a marine incinerator. Sunflame's incinerators, which have been certified by IMO's type approval in accordance with MEPC244(66), are capable of processing all types of combustible waste including waste oils and plastics. Even in 2050 with the use of alternative fuels onboard, lubricating oils will remain in use and waste will be produced. We believe that incinerators will continue to be the preferred solution for waste management at sea.

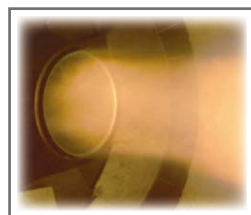
Features

- Stable combustion**
 The rotary cup burner utilizes centrifugal force and high-pressure air to atomize oil, preventing misfires caused by nozzle clogging even while using waste oils containing sludge. This feature ensures the incinerator's stable and continuous operation.
- Low oil pressure**
 The rotary cup burner ensures safety even in the untimely event of a leak because the low oil pressure of 0.06-0.3MPa within the piping prevents scattering. Additionally, this reduces the wear on components such as pumps that have a high operational load.
- Easy Maintenance**
 The rotary cup burner is attached to a hinged door and can be pulled open for easy maintenance.
- Specialized Refractory**
 We maximize the strength of our refractory through our unique construction methods such as standardizing the solidification rate and dry firing after completion. Managing the moisture content and production procedures is the key to the high quality of our refractory materials.

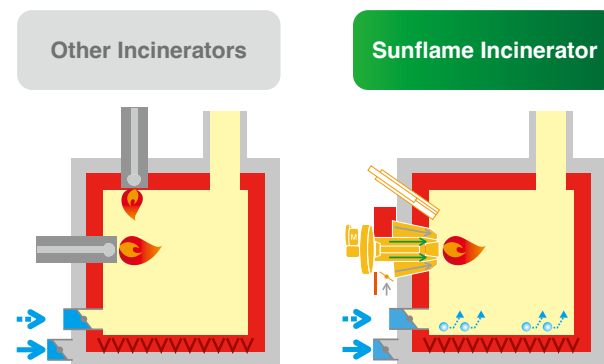
Rotary cup burner used in all incinerator models



Sunflame's incinerators incorporate rotary cup burners in all models, making them exceptionally effective for atomizing high-viscosity oils, including those of lower quality. Using our advanced combustion technology, which was initially developed for boiler burners, we ensure that even waste oils of uncertain characteristics can be processed.



An economical choice

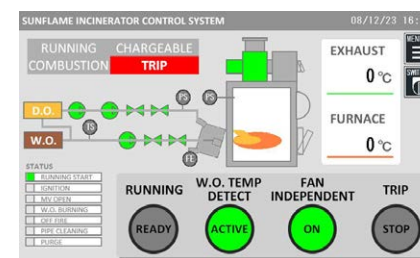


More D.O. consumption **Less D.O. consumption**

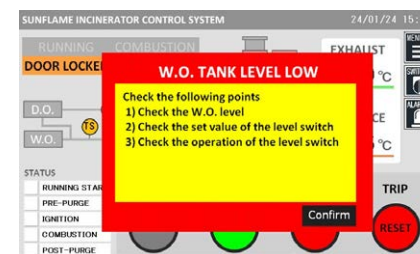
Given its capability to effectively process waste oils of uncertain characteristics, auxiliary combustion using D.O./MGO is unnecessary, therefore achieving cost efficiency.

Touchscreen built-in control panel

The control panel is equipped with a touchscreen for a simplified machine operation and operation monitoring.



Example of Main Screen



Example of Troubleshooting Screen

Troubleshooting and alarm history display

Displaying information on the touchscreen facilitates situational awareness and history checks in the event of a malfunction. Additionally, the touchscreen shows the troubleshooting procedures which enhances response precision and ease of operation, thereby reducing the crew's workload.

Remote and accurate advice

In the event of a malfunction, having a photograph of the screen allows our team to assess its level of emergency and provide guidance on the necessary measures. Additionally, examining the data stored in the control panel enables a comprehensive evaluation of the equipment's status.

Sunflame Smart Support System

The Sunflame Smart Support System is available as an optional feature. This system utilizes IoT to collect real-time operational data from the ship's equipment, enabling the visualization of its operational status. Furthermore, by analyzing the data derived from our history of parts sales and engineer dispatches, we can offer tailored maintenance recommendations. These insights also facilitate the provision of operational advice to prevent issues and optimize fuel efficiency. Notably, this system can be installed on incinerators with touchscreens even post-delivery.

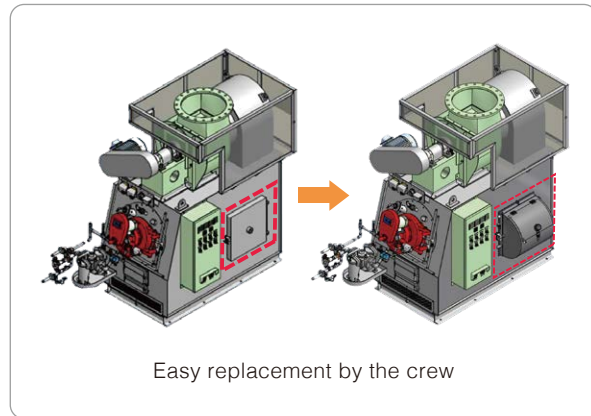


INCINERATOR with ROTARY CUP BURNER
Option / Special Model

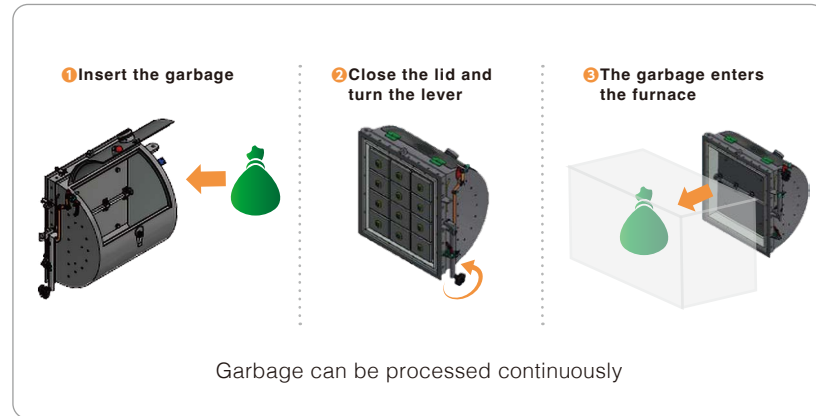
Option / Garbage feeder (double door for continuous solid waste disposal)

The 2013 update to MARPOL Annex V introduced stricter controls on the maritime disposal of waste to further prevent pollution. In alignment with these revised regulations, Sunflame designed an innovative waste loading device coined as the "Garbage Feeder". This appliance allows the continuous disposal of garbage aboard ships even during incinerator operation.

Easy retrofit on existing vessels



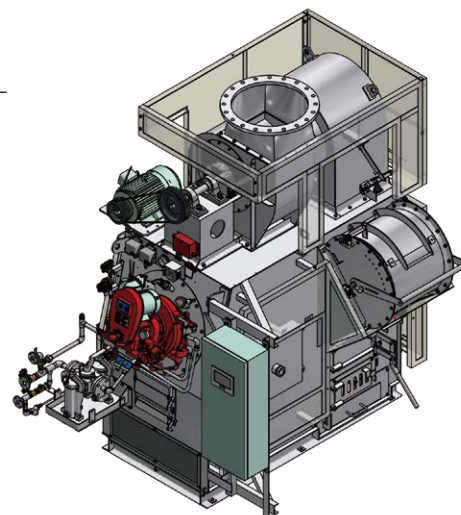
How to load garbage



Model / Incinerator specialized for solid waste disposal

OSG type

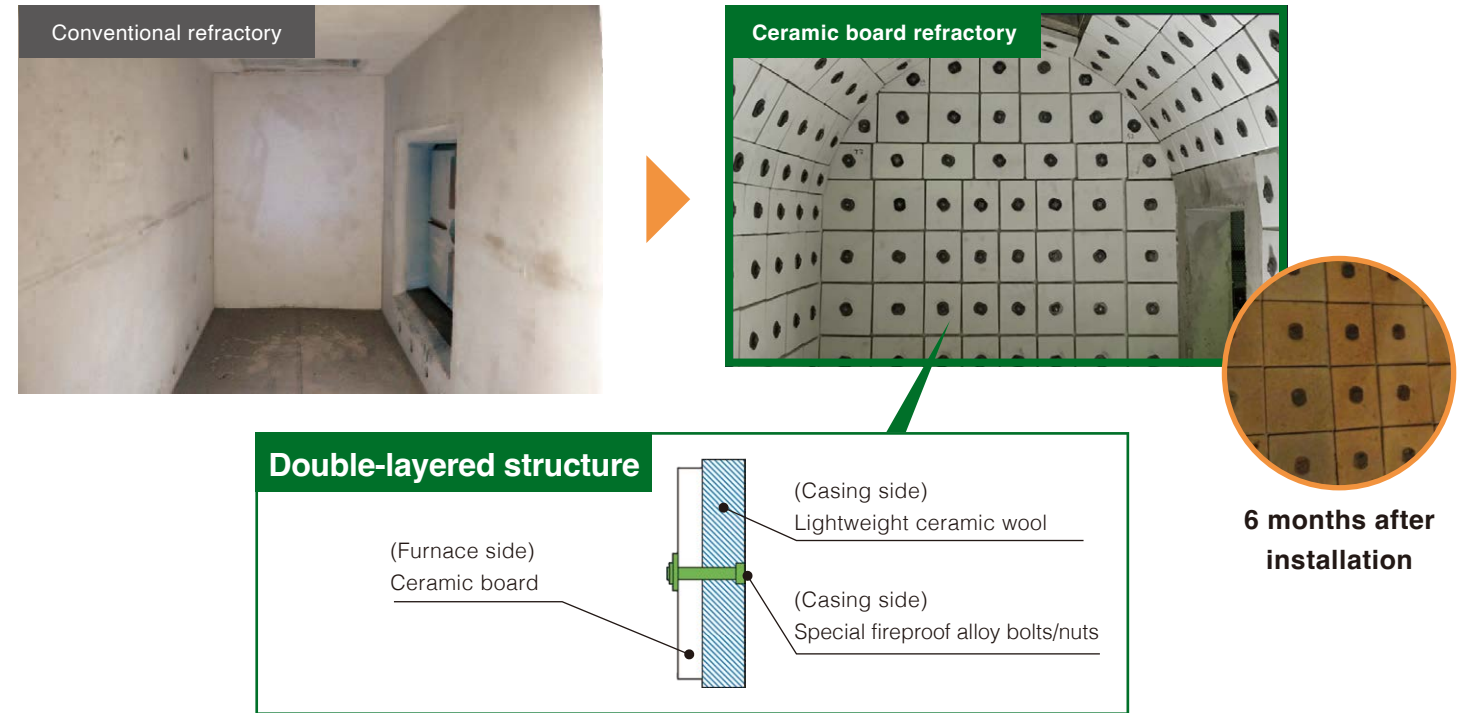
This incinerator features a large-capacity double door which enables the continuous loading of voluminous solid waste. It is also equipped with a rocking fire grate designed to agitate solid waste as well as an ash removal port that is accessible during waste oil combustion. This particular model is tailored not only for waste oil treatment but also for efficient solid waste disposal. Additionally, the large-capacity double door is compatible with and can be retrofitted onto the standard OSV model.



Option / Ceramic board refractory

Patented IMO Type Approved

The design features a dual-layered structure: the casing is insulated with lightweight ceramic wool, while the furnace side is reinforced with ceramic boards. These layers are fastened with specialized heat-resistant steel bolts and nuts. This efficient design allows for targeted replacements, minimizing labor for maintenance. Its adaptability to both newly constructed and existing ships significantly reduces maintenance costs for all types of vessels.



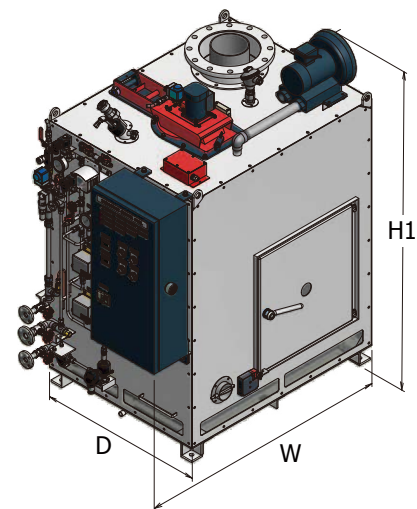
Comparison with conventional refractory

	Ceramic board type	Conventional refractory
Partial repair	⊙ Can be easily installed by crew member	× Requires extensive removal beyond the damaged area
Repair time	⊙ Very short at about 10 minutes per piece	× Takes about 2 days per surface
Weight	⊙ Very light at 800g per piece	× Uses heavy materials weighing 25kg per box
Finish quality	⊙ Consistent quality regardless of the installer's skill	× Quality based on the installer's skill
Inventory Control	⊙ Long-term storage is possible	× Prone to hardening and difficult to preserve

Model / Space-efficient incinerator for small vessels

OSV2-190S [SIZE] W: 1,314 D: 860 H1: 1,658

The IMO's garbage disposal regulations apply to domestic vessels, but space constraints in the engine room make installing traditional incinerators challenging. The "OSV2-190S" addresses this with its compact designed tailored for such ships, complying with the latest IMO standards. Equipped with a high-performance rotary cup burner, it matches the waste oil processing capabilities of larger incinerators. Its design includes a wide loading port of 400W x 450H, facilitating the disposal of bulky waste despite the unit's space efficiency.



Product lineup

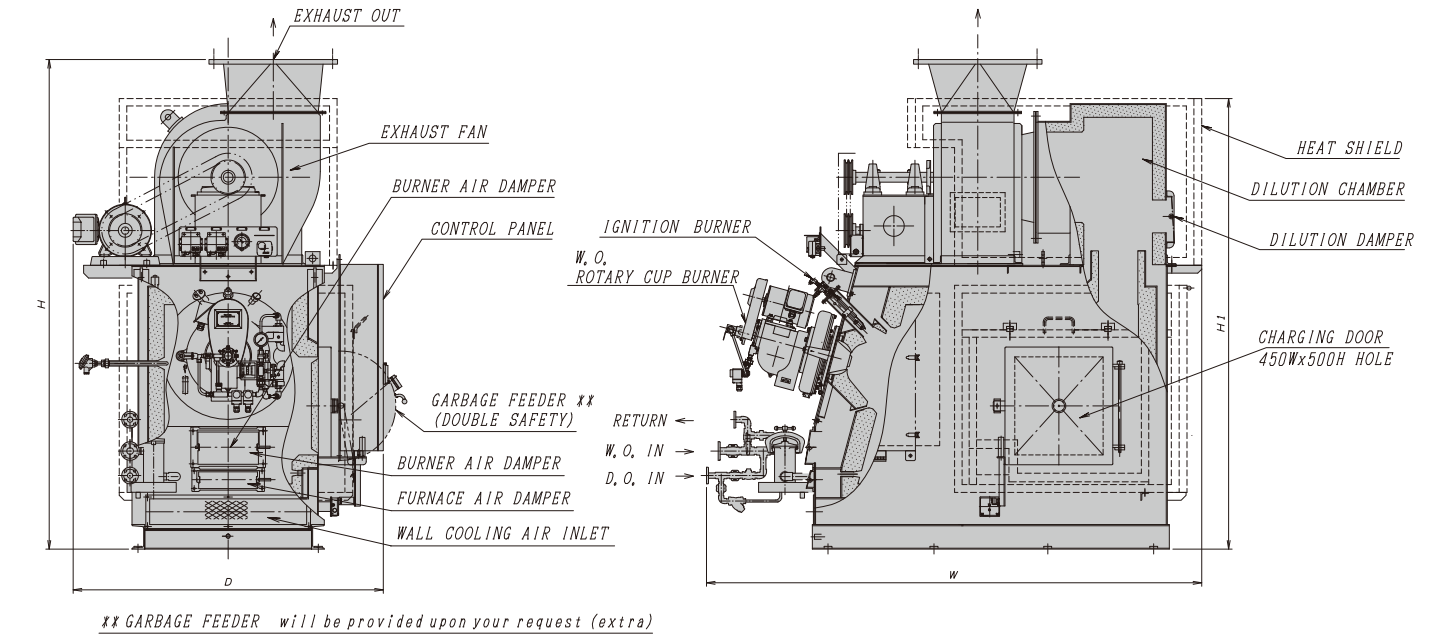
We offer a wide range of products that can handle capabilities from 190kW (163,000kcal/hr) to 2400kW (2,060,000kcal/hr) to match your needs.

TYPE	SPEC	CAPACITY			MOTOR CAPACITY				SIZE W x D x H (H1)	EXH. GAS DUCT DIAMETER	WEIGHT
		COMBUSTION MJ/H kcal/H	WASTE OIL kg/H	SOLID WASTE kg/H	BNR.	I.D. FAN	PRIMARY AIR FAN	W.O. PUMP			
OSV	OSV2-190S	684 163,000	19	5	0.4x2	3.7x4	0.28x2	0.4x4	1,314x860x(1,658)	250A	1,400
	OSV-240SAI	860	26	20	0.4x4	2.2x4	ON BNR.	ON BNR.	2,255x1,410x2,042(1,952)	300A	2,350
		210,000									
	OSV-360SAI	1,300	38	30	0.4x4	3.7x4	ON BNR.	ON BNR.	2,255x1,425x2,042(1,952)	400A	2,400
		310,000									
	OSV-600SAI	2,160	64	50	0.75x4	5.5x4	ON BNR.	ON BNR.	2,525x1,580x2,496(2,297)	500A	3,100
		516,000									
	OSV-900SAI	3,240	97	75	1.5x4	5.5x4	ON BNR.	ON BNR.	2,925x1,944x2,956(2,711)	600A	4,700
		770,000									
	OSV-1200SAI	4,320	129	100	0.4x2	7.5x4	3.7x2	0.75x4	2,890x2,120x(2,791)	700A	6,100
1,030,000											
OSV-1500SAI	5,400	161	125	0.4x2	15.0x4	3.7x2	0.75x4	3,150x2,120x(2,791)	800A	6,600	
	1,290,000										
OSV-2400SAI	8,640	258	200	0.4x2	22.0x4	3.7x2	0.75x4	4,950x2,138x2,825	1000A	8,900	
	2,060,000										
OSG	OSG-360SDA	1,300 310,000	38	48	0.4x4	3.7x4	ON BNR.	ON BNR.	2,525x1,871x2,459(2,415)	400A	3,750
	OSG-600SDA	2,160	64	80	0.75x4	5.5x4	ON BNR.	ON BNR.	2,525x2,036x2,714(2,515)	500A	3,800
		516,000									
	OSG-900SDA	3,240	97	120	1.5x4	5.5x4	ON BNR.	ON BNR.	2,918x1,936x3,060(2,900)	600A	5,600
		770,000									
	OSG-1200SDA	4,320	129	160	0.4x2	7.5x4	3.7x2	0.75x4	2,890x2,380x(2,791)	700A	7,000
		1,030,000									
	OSG-1500SDA	5,400	161	200	0.4x2	15.0x4	3.7x2	0.75x4	3,150x2,380x(2,791)	800A	7,500
		1,290,000									

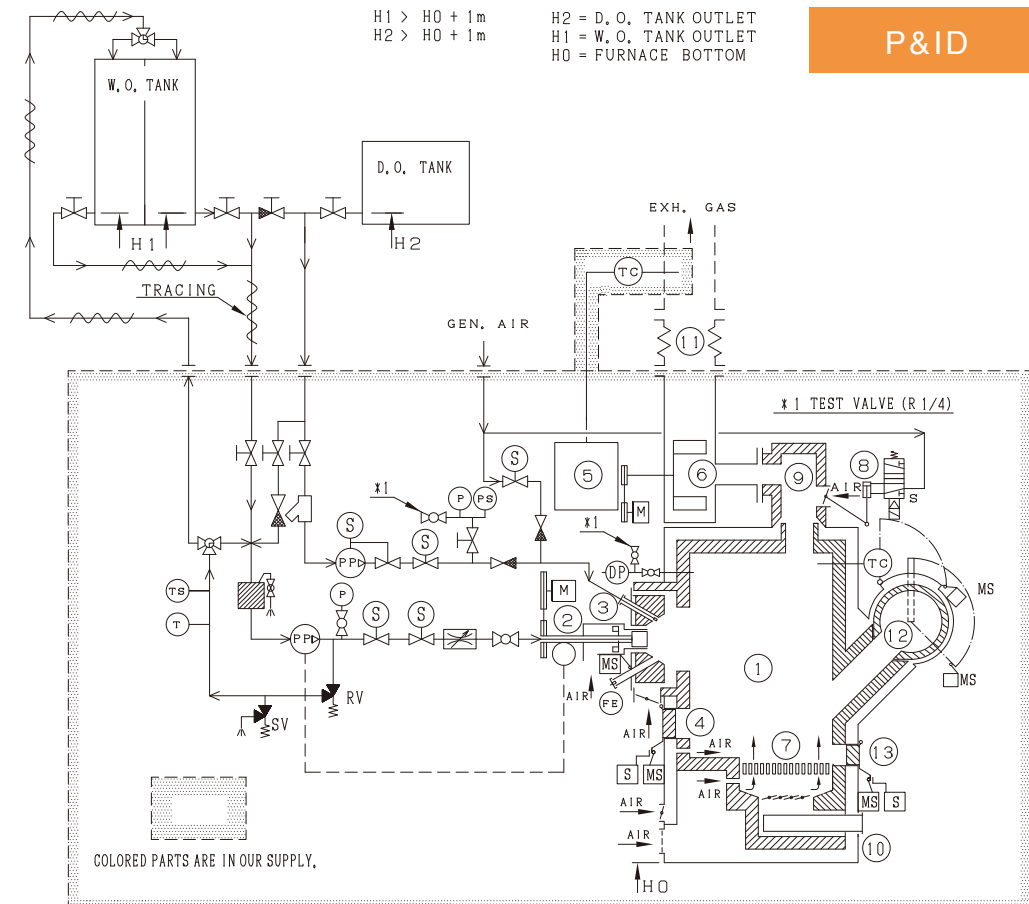
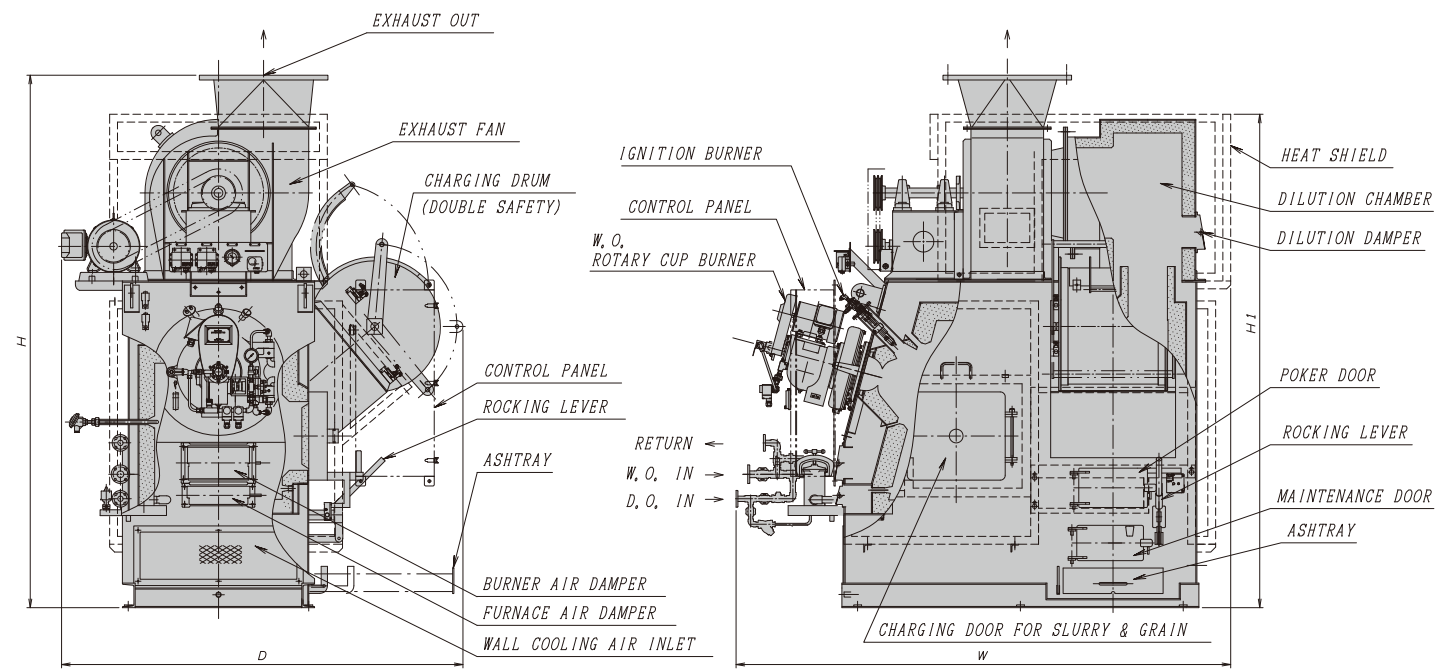
*Numbers included in the model number are incineration capacity in kilowatts.
 *I.D. fans are installed separately for OSV-1200SAI and above and OSG-1200SDA and above.
 *Specifications for Japanese-flagged vessels slightly differ; please contact us for details.
 *The above product lineup, specifications, and other catalog items are subject to change without notice.

Outline Drawing

OSV model



OSG model



P&ID

MARK	NAME
PP	PUMP
M	MOTOR
S	SOLENOID
T	THERMO-METER
TC	THERMO-COUPLE
TS	THERMO-STAT
P	PRESSURE GAUGE
PS	PRESSURE SWITCH
DP	DIFF. PRESS. SWITCH
FE	FLAME EYE
MS	LIMIT SWITCH
RV	RELIEF VALVE
SV	SAFETY VALVE
1	FURNACE
2	MAIN BURNER UNIT
3	IGNITION BURNER UNIT
4	CHARGING DOOR
5	CONTROL PANEL
6	EXHAUST FAN
7	ROCKING GRATE (OSG-TYPE ONLY)
8	DILUTION DAMPER UNIT
9	DILUTION CHAMBER
10	ASH TRAY (OSG-TYPE ONLY)
11	EXPANSION JOINT (OUT OF OUR SUPPLY)
12	CHARGING DOOR (OSV-TYPE : SINGLE) (OSG-TYPE : DOUBLE)
13	POKE DOOR (OSG-TYPE ONLY)