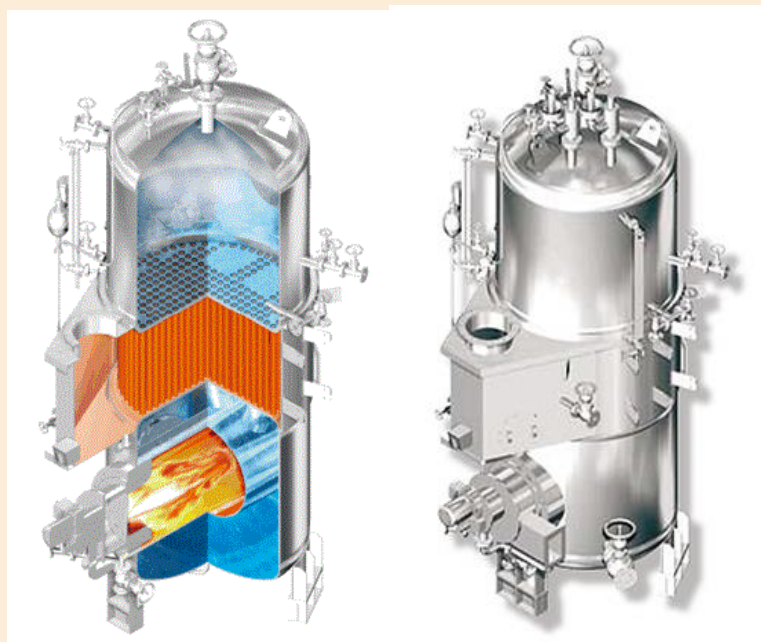


Maintenance / General Inspection of MHI BOILERS



We are pleased to announce our principals' MITSUBISHI recommendation concerning:

- Aux. Boiler Maintenance Work in Dock
 - Periodical Maintenance for Long-Term Operation (Control and Electric).
- Boiler can be operated more safely with reliability.
Cost for Periodical Maintenance is inexpensive in comparison to off-hiring due to unexpected trouble.

You may be assured that we and our principals MITSUBISHI will offer to your esteemed company the very best in efficiency and we are looking forward to cooperating with you in all future spare parts and service queries.

Should you require any further clarification, please do not hesitate to contact us.

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1. Aux. Boiler Maintenance Schedule (MHI-MME Recommendation)

	Description	Scope	Schedule						Remark
			2.5years	5years	7.5years	10years	12.5years	15years	
Boiler Body & Equipment			○	○	○	○	○	○	
1)	General inspection	(1) Steam drum (2) Water drum (3) Header (4) Boiler inside(Air & gas side) (5) Refractory							
2)	Bumer inspection	Bumer							
3)	Associated equipment	(1) Piston valve (2) Butterfly valve (3) Valve (4) Safety valve (5) Soot blower							
Boiler Control System			○	○	○	○	○	○	Another Presentation
4)	Boiler control system general inspection	(1) Control panel (2) Control valve (3) Transmitter (4) Solenoid valve							

Periodical inspection will prevent big trouble of aux. boiler

1. Current Situation

Urgent dispatching of our engineers due to insufficient maintenance and/or aged parts for these 2 years.

CPU of controller broken	: 3 Times
Pilot burner broken	: 2 Times
Other parts broken	: 8 Times
FO pump discharge pressure control	: 2 Times
Boiler did not fire and/or unstable fire	: 13 Times



But, most of above troubles can be prevented ...

2. Solution

To avoid such trouble, ...

General Maintenance of Control System is effective.

- **Checking** for Aged/Decrepit parts
- **Replacement** of parts by the boiler engineer
- **Adjusting** of boiler control condition for stable operation
- **Safety Device** Checking for safety operation
- The ship crew can be **Trained** for Operation and **Trouble Shooting** Procedure

3. Sample of Trouble

For example: Trouble on Burner Ignition

BURNER START



FURNACE PURGE



FD fan Vane open to furnace purge set point
Air flow over furnace purge rate

SETTING for IGNITION



FO C/V open to ignition set point
FO pressure over ignition set point
FO temperature normal
FD fan Vane open to ignition set point
Air flow to ignition set point

BURNER IGNITION



Pilot burner start
Flame detect

START FIRING

Equipment

← **Operation Switch, Limit Switch**

← **FD fan C/D, Positioner, Vane**

← **Air flow TR, Detect piping**

← **FO C/V, Positioner**

← **FO press TR, Detect piping**

← **FO temp sensor**

← **FD fan C/D, Positioner, Vane**

← **Air flow TR, Detect piping**

← **Igniter, Pilot burner pump**

← **F/E, Flame detect relay, Timer**

4. Major Maintenance Items of Boiler Control System MITSUBISHI HEAVY INDUSTRIES MARINE MACHINERY & EQUIPMENT

CONTROL PANEL

Indication & SW.



Inside Equipment



Controller Battery



Power Supply Unit



DETECTING ELEMENT

Transmitter



Detecting pipe



FO Temp. Controller



Press. switch



Limit switch



OPERATING ELEMENT

Control Valve
Diaphragm



IP positioner



Piston valve



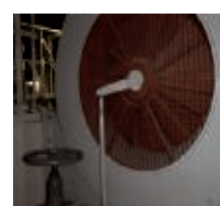
Solenoid valve



Local controller



FDF Inlet Vane



BURNER

Pilot Burner



Flame Sensor

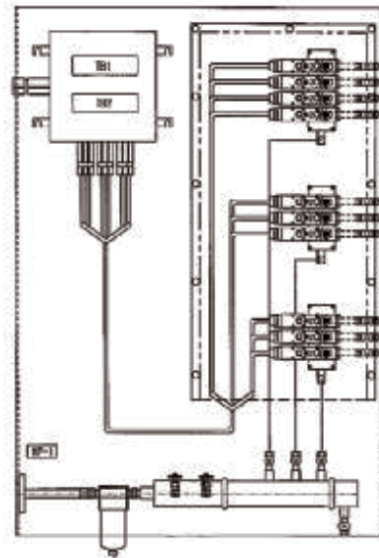


Air Damper

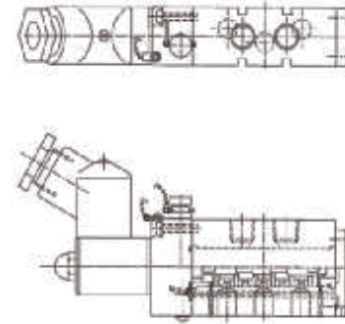


5. General Inspection of Solenoid valve

- General Inspection of solenoid valve.
- Operation check of solenoid valve.



Solenoid Valve Board



Solenoid Valve

Note)

The solenoid valve “MB15G” series made by Kaneko Sangyo had already been stopped production.

We recommend to replace to new solenoid valve made by other manufacturer for stable and safety operation.

6. Recommended parts for General Inspection



- We can prepare recommended parts for General inspection.

No.	Parts Name	Quantity
	<Recommended parts for Boiler Control Panel>	
1	LITHUM METAL BATTERY FOR CPU UNIT	2
2	LITHUM METAL BATTERY FOR MONITOR (for BCP)	2
3	FLAME EYE TIMER	4
4	CPU POWER SUPPLY UNIT	2
5	PANEL FAN (BGB)	2
	<<Recommended parts for Field Equipment of Control System>	
1	REPAR KIT FOR AIR REGULATOR OF CONTROL VALVE	12
2	VALVE POSITIONER PILOT FOR CONTROL VALVE (HEP)	6
3	VALVE POSITIONER PILOT FOR CONTROL VALVE (KGP/KGT)	3