Mitsubishi Dual Firing Auxiliary Boiler

MC, MJC

August, 2022

BZA-S08055-R3

Contents

1. Dual Firing boiler production record

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MARINE MACHINERY & EQUIPMENT

- **More than 130 years history in the marine market**

- **Manufacturing Record;**

  Total about 6,035 sets (as of April 2022 including Main Boiler and Economizer)

  459 sets of the boilers are for Dual firing Boiler.

Robust and Proven Design !!

2. Lineup of Auxiliary and Composite Boiler

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Oil Firing

Evaporation (t/h)		～5	～10	～15	Image
Aux. boiler	MC-A 0.7MPa	1~14 t/h			
	MC-E 0.7MPa	5~8 t/h			
	MC-D 0.7MPa	1~4.5 t/h			
Composite boiler	MJC 0.7MPa	2~5 t/h			

2. Lineup of Auxiliary and Composite Boiler

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■ Dual Firing

Evaporation (t/h)		～5	～10	～15	Image
Aux. boiler	MC-AF 0.7MPa		5~11 t/h *1		
	MC-EF 0.7MPa		5~8 t/h *1		
	MC-DF 0.7MPa	1~4 t/h			
Composite boiler	MJC-F 0.7MPa	2~5 t/h			

*1：Less than 5 t/h is available.

3. Specification of MC-EF Boiler

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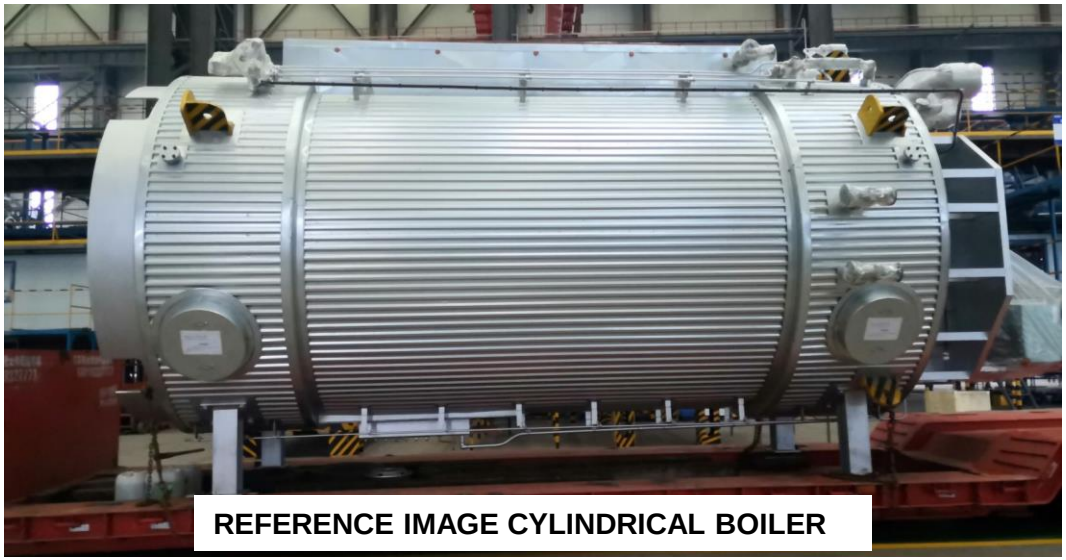
Specification

Type	MC-50EF	MC-60EF	MC-70EF	MC-80EF
Evaporation	5t/h	6t/h	7t/h	8t/h
Design Press.	0.9MPa			
Working Press.	0.7MPa			
Steam Temp.	Saturated			
Fuel	Gas, HFO, MGO, LSHFO			
FGC*1	322kg/h	387kg/h	451kg/h	516kg/h

*1 Fuel Gas Consumption CH4 : 100% (50MJ/kg LHV)



REFERENCE IMAGE CYLINDRICAL BOILER

4. Feature of MC-EF Boiler

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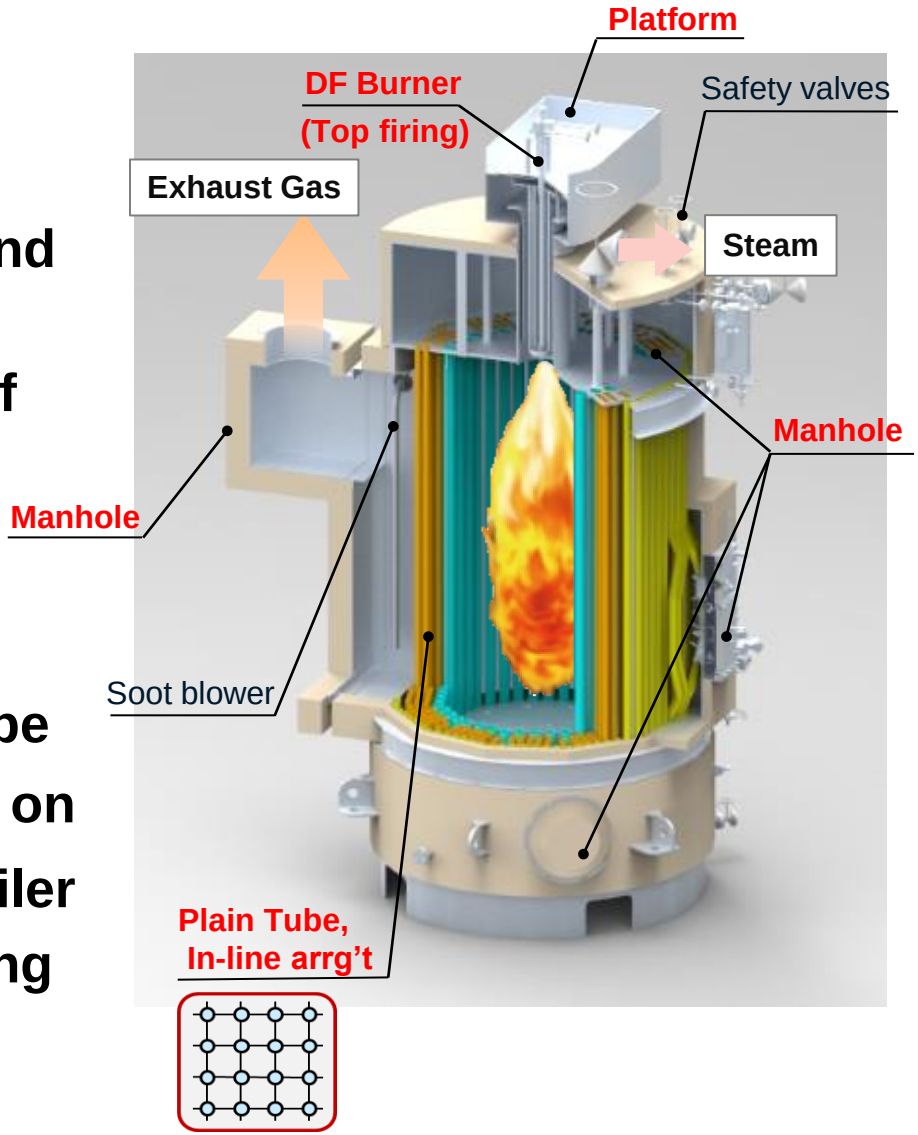
Structure

- **Top-firing** Burner
- **Water tube** type
- **Manhole** on steam/water drum and furnace side
- **Platform** for access to top part of Boiler



Feature

- **Less soot deposit** using plain tube
- Applied **MHI own control system** on basis of conventional MAC-B boiler
- Safety **Control system** considering Furnace Explosion prevention

5. Specification of MJC-F Composite Boiler

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Specification

Type	MJC -250F	MJC -280F	MJC -340F	MJC -360F
Evaporation at BNR. section	2t/h		3t/h	5t/h
Design Press.	0.9MPa			
Working Press.	0.7MPa			
Steam Temp.	Saturated			
Fuel	Gas, HFO, MGO, LSHFO			
FGC*1	129kg/h		193kg/h	323kg/h
Exh. gas flow at Eco. section	30～ 100t/h	60～ 130t/h	70～ 180t/h	

*1 Fuel Gas Consumption CH4 : 100% (50MJ/kg LHV)

6. Feature of MJC-F Composite Boiler

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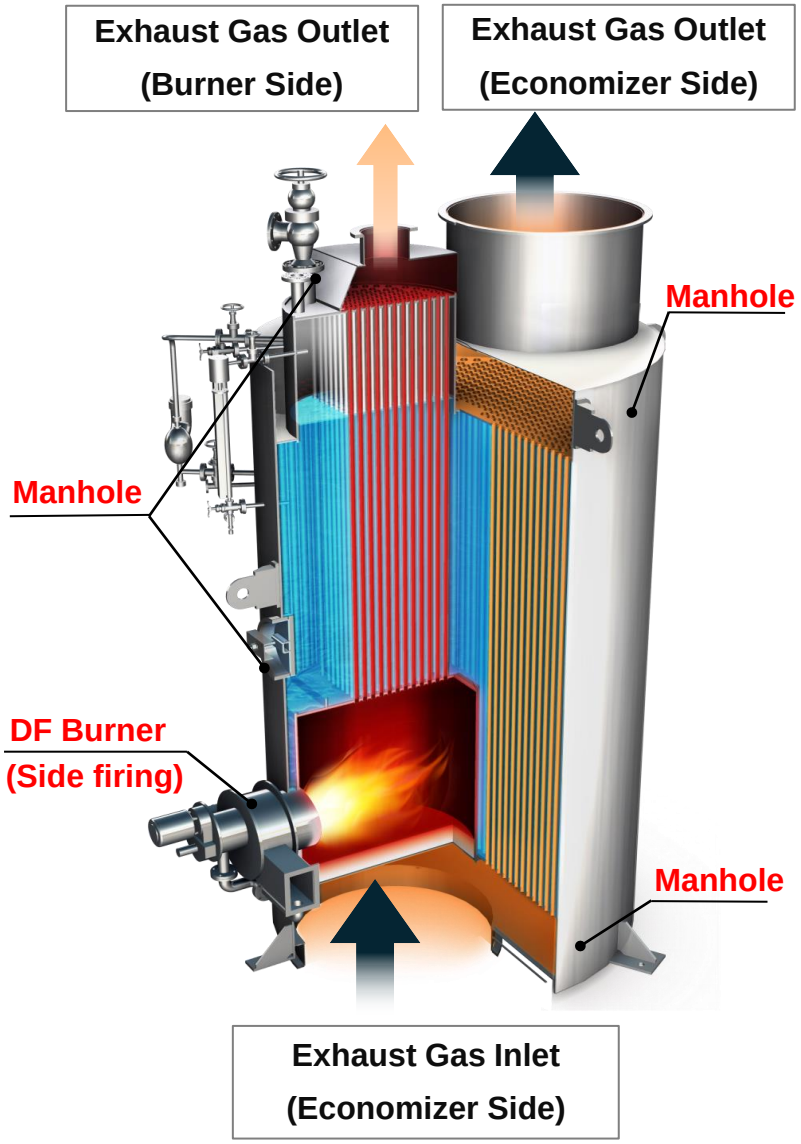
Structure

- **Side-firing** Burner
- **Smoke tube** type
- **Manhole** on water drum and exh. gas side

Feature

- Applied **MHI own control system** on basis of conventional MAC-B boiler
- Safety **Control system** considering Furnace Explosion prevention



7. Boiler Control System

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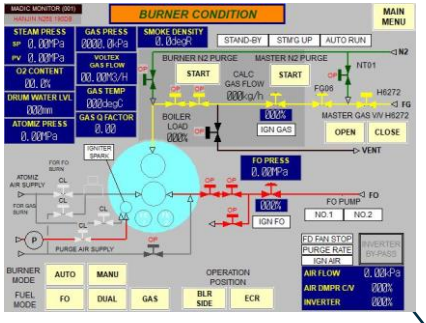
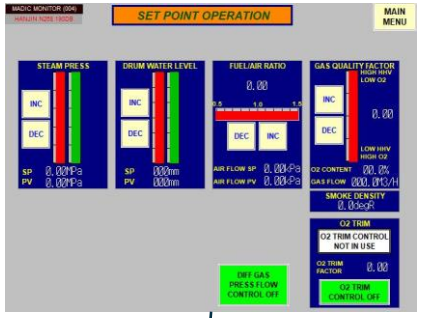
High Reliability & Safety Control System

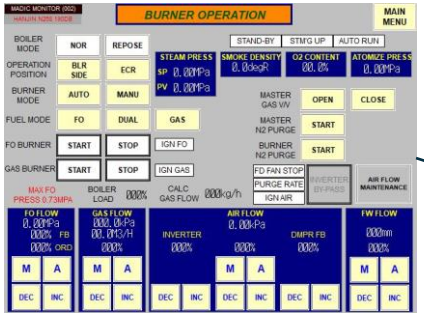
MADIC : Mitsubishi Automatic Digital Illustrated Control System

- **ABC : Automatic Boiler Control**
  - **ACC : Automatic Combustion Control**
    - **Master control**
    - **Fuel flow control**
    - **Air flow control**
  - **FWC : Feed Water Control**

- **BMS : Burner Management System**
  - **Burner Ignition / Extinguish**
  - **Burner Purge Sequence**
  - **Boiler Shut-down for safeguard**







Emergency operation

Boiler control panel

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Countermeasure for Furnace Explosion

● Monitoring and Interlocking function

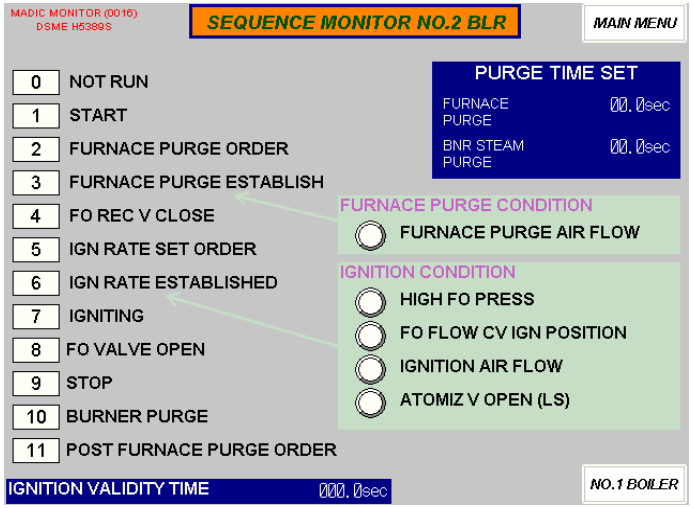
- Purging of furnace before igniting the burner (more than 6 times air volume)
- Purging of furnace after extinguishing the burner
- Purging of residual fuel after extinguishing the burner
- Several interlock for burner ignition safety.
- Monitoring of flame condition

● Ignition Stability

- Ignition by a pilot burner flame
- Confirmation of pilot burner flame during ignition

● Duplication of safety devices

- Flame scanners
- Fuel Shut-off Valves



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GCU function

- **Dual fuel burner is capable of oil or gas individual firing and oil/gas dual firing.(FO mode/Gas mode/Dual mode)**
- **Boiler can be used as GCU**

Purpose	Fuel mode	Remark
Initial gas filling up (N2⇒LNG)	Dual	LNG mixed with N2 gas (N2 contents : 0 to100%)
Gas free (LNG⇒N2)		
Fuel tank pressure adjustment	Gas	LNG (Pure methane)

FO Dual Gas

Fuel Mode Transition

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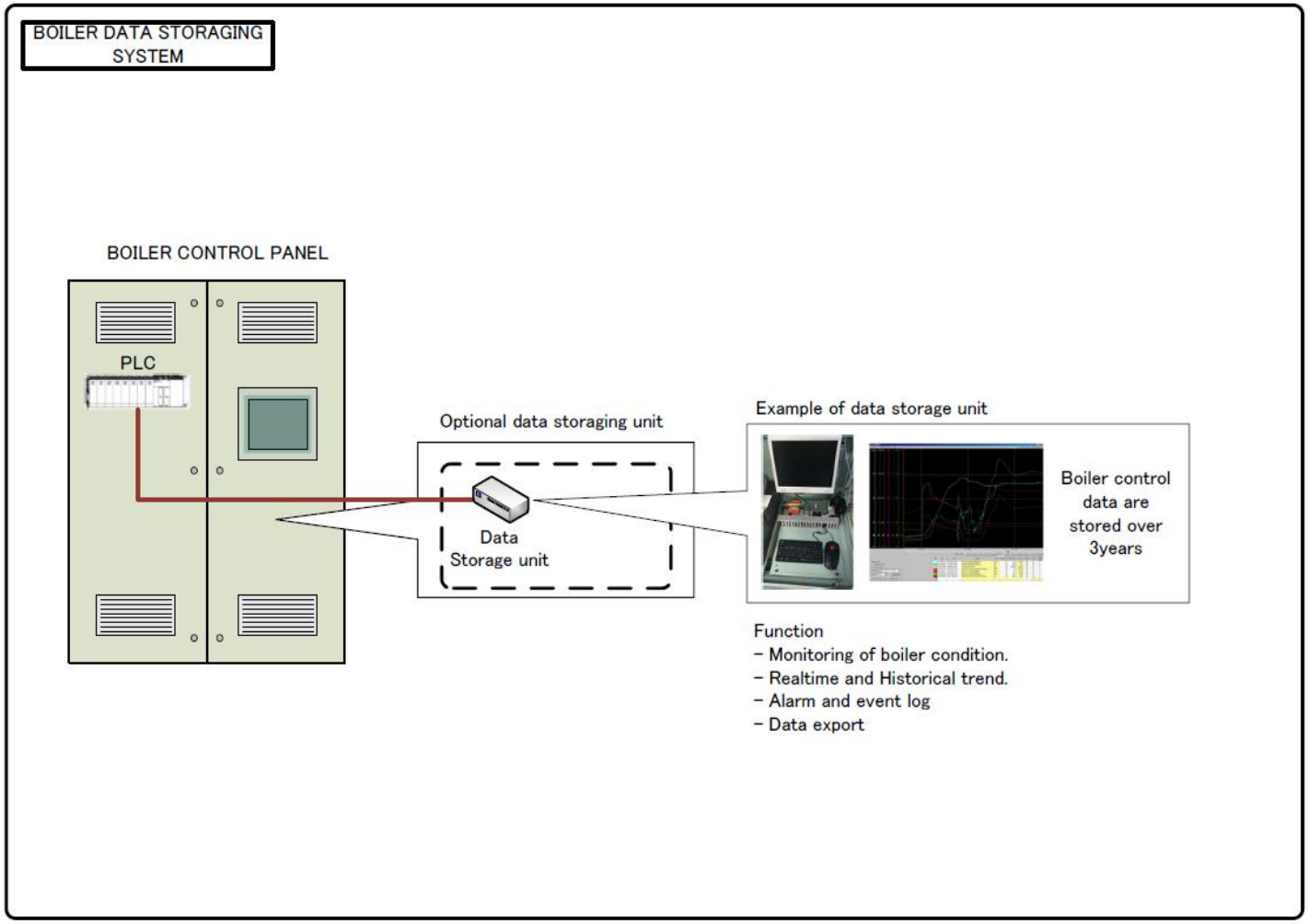
Boiler data storage system

- **Data collection can be available.**



8. Dual Fuel Burner

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■ Burner selection

- Burner maker is Volcano or Sunflame
- Burner is varied depending on the steam evaporation

Evaporation	Burner type (Maker)	Control system supplier
1～4 t/h	SDR (Sunflame) or Vignis (Volcano)	Burner maker
5～11 t/h	SFFGII (Volcano)	MHI-MME

8. Dual Fuel Burner

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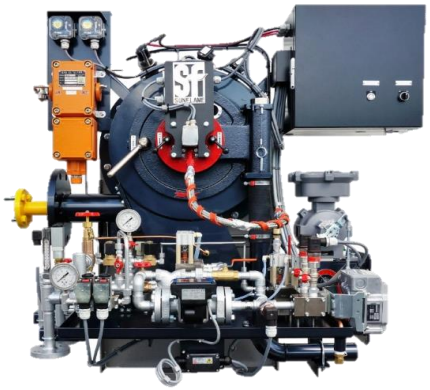
■ Burner specification

Maker		Volcano		Sunflame
Burner type		SFFGII	Vignis	SDR
Fuel spray method	OIL	Steam/Air atomizing type		Rotary cup type
	GAS	External mixing		External mixing
Turn down ratio		4.6～10:1	10:1	10:1
Appearance				

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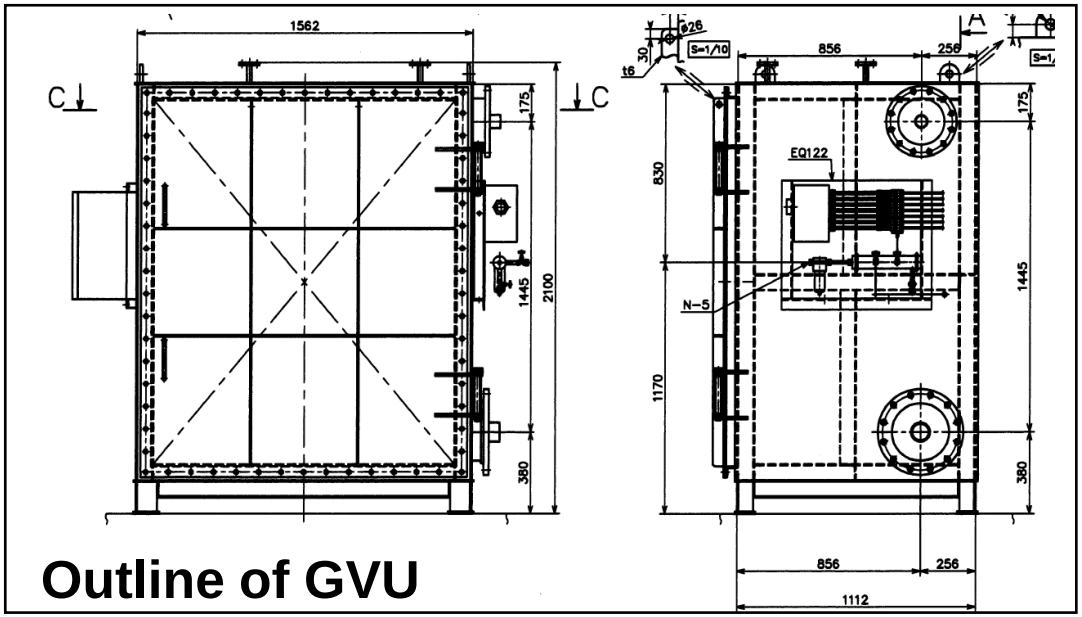
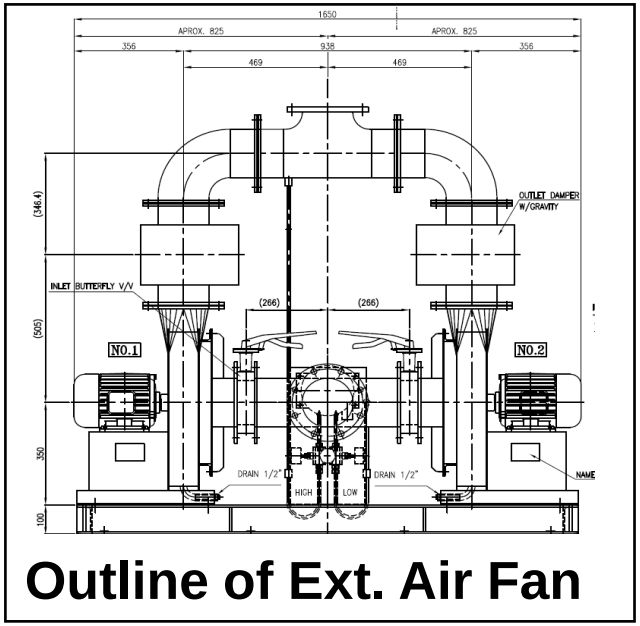
Special Accessories for Dual Firing Boiler can be provided

- **Extraction Air Fan Unit**

- **Gas Valve Unit with Enclosure**
  - Gas Detector
  - Junction Box & Solenoid valve board
  - Safety devices etc.



Outline of GVU



Outline of Ext. Air Fan

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