

LNG Steam Knowledgebase

001. Starting Boiler from Cold (From dead ship conditions)

[Ref: Mitsubishi Propulsion Boiler Type – MB-4E-NS]

- Assumptions

- Dead ship condition – neither shore power nor shore power is available.
- Diesel oil to be used until steam has been raised enough to heat bunker fuel.
- Stand-by diesel generator is providing power for initial start up.

- Procedures

- Fill boiler with deaerated water from the deaerator (if possible).
- It is advisable to fill the boiler 50~80mm above the normal water level to provide for additional storage
- Prepare boiler for starting – all systems boxed up and ready for commissioning.
- Line up fuel pump from diesel oil tank to the burner manifold.
- Start pumping diesel oil, bleed off enough through the recirculation line, or through the burner (putting the bled heavy oil in a bucket) to make the line primed with DO.
- Ensure the burner & the tips selected are for diesel oil operation.

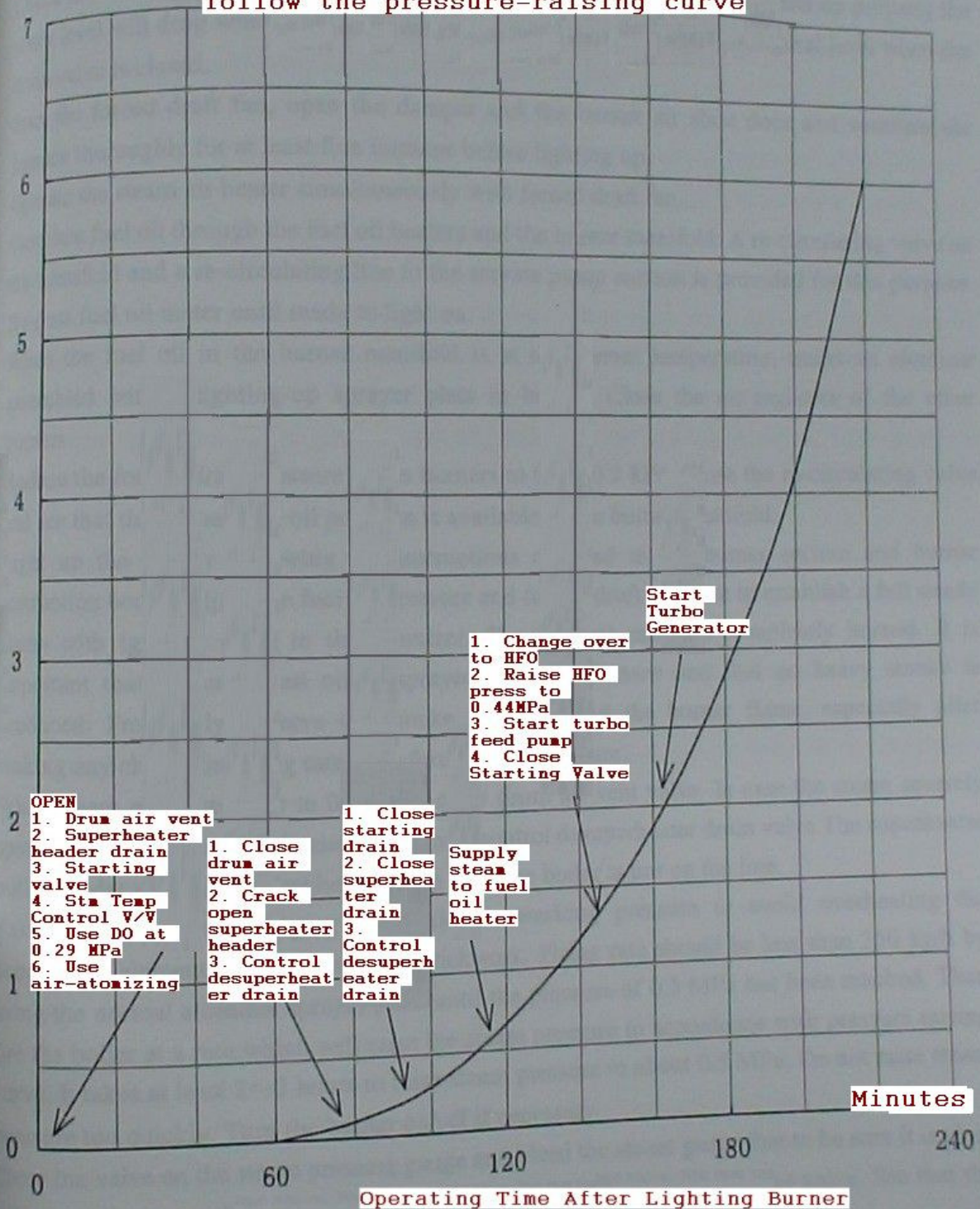
- Diesel oil must be supplied to the burners at the designated oil pressure in order to obtain proper atomisation.
- Ensure that the following valves are OPEN before lighting up the burners.
 - Steam drum air vent valve
 - Superheater header drain valves
 - Starting valves (Vent to atmosphere at the superheater outlet)
 - Starting valve outlet drain valves
 - Control desuperheater drain valves
 - Steam temperature control valve
- As steam is not available, use atomizing air.
- Purge the furnace.
- Once the purging is satisfactory and the drum water level is acceptable, permission to light up burner is given.
- Light up a burner on low fire setting, fuel oil pressure is 0.3 MPa and the fuel rate is 250 kg/h.
- When steam pressure is up to, 0.1 MPa close steam drum air vent.
- Superheater outlet header vent must be left open until the boiler is put on line.
- Close the superheater header drain valves.
- Close the starting valve outlet drain valves.
- Control desuperheater drain valves.
- After drum pressure 0.2 MPa, start warming up aux. steam lines.
- Line up turbo feed pump and have it ready for starting.
- Keep the starting valve open till the boiler is put on load.
- Start steam heating for HFO settling tank.
- Line up steam on HFO heaters.
- Have the burner/ tips changed to HFO burning.
- Secure the burners.

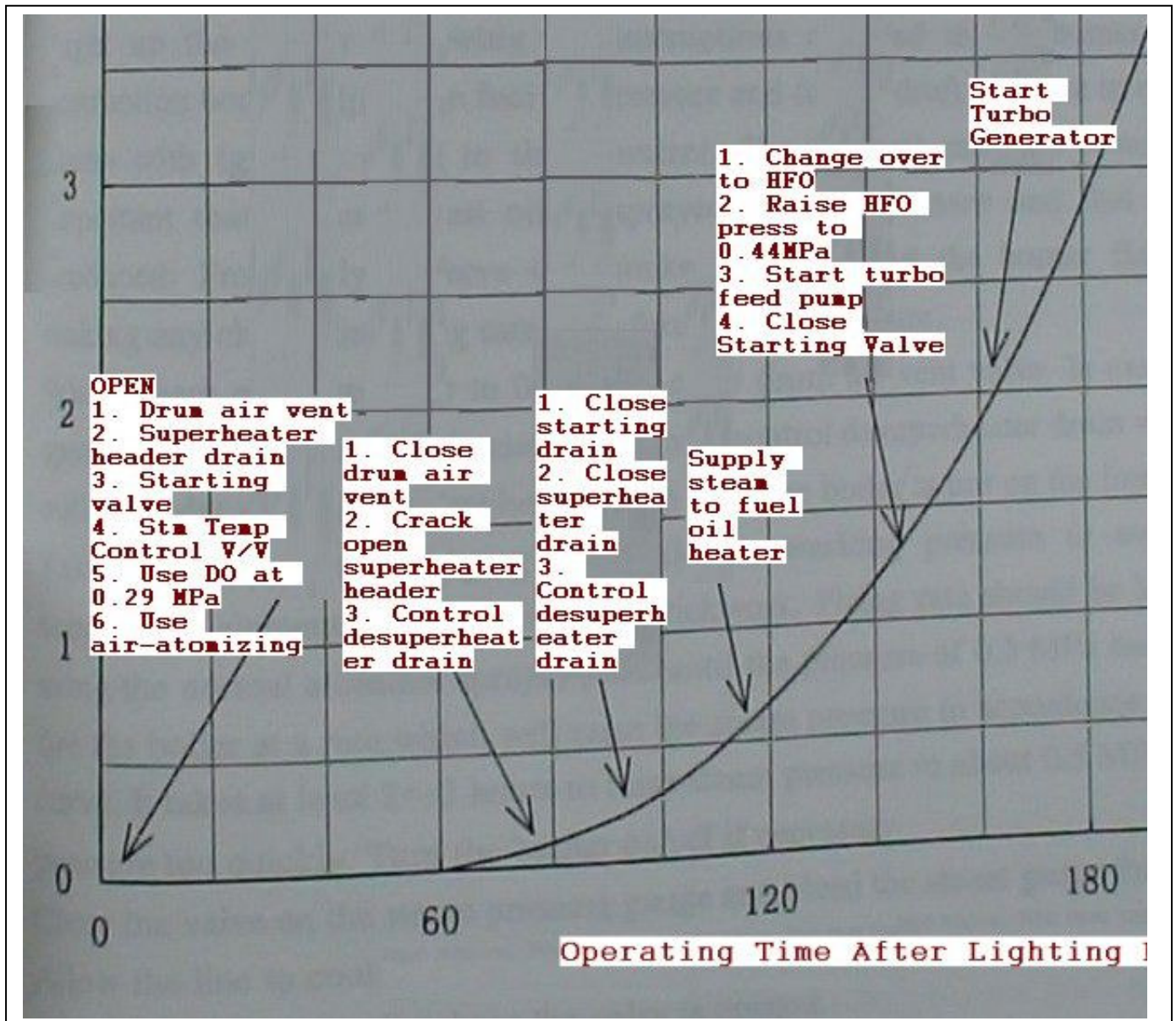
- Circulate bunker fuel through the fuel oil heaters and piping until oil at the proper temperature is available at the manifold.
- When HFO is warm enough for pumping change over to HFO.
- Relight the burner continue raising pressure as per the rate suggested in the 2 graphs below.

Boiler Start Up Procedure [Cold Start]

Drum Pressure [MPa]

Combustion rate should be used as a guide for start up and should be controlled appropriately so as to follow the pressure-raising curve





- When the steam pressure is up to 1.0~1.5 MPa start warming the turbo feed pump, main generator and other machineries.

- After a drum pressure of 1.5 MPa has been reached, change atomizing fluid from air to steam [keep fuel oil pressure at 0.45 MPa].
- Start turbo feed pump.
- Close starting valve.
- Start the turbo generator.
- When the turbo generator is stable, switch over to turbo generator and secures the diesel generator.
- Drain and warm up connecting piping to the main and auxiliary steam lines.
- It is essential that all connecting steam piping is cleared of condensates and warmed up to approximately operating temperature before they are connected to the boiler.
- When the steam pressure is about 0.3~0.4 MPa below normal operating pressure, check the safety valve with easing gear.
- Lift the disc well off the seat to give a strong blow and release the lifting lever quickly to reseat the valves sharply.

NOTE: Combustion rate should be used as a guide for start-up and should be controlled approximately so as to follow the pressure raising curve. To prevent damage to the superheater tubes, combustion rates should not be increased.

When it takes time raise pressure, the starting valve should be throttled, so that the combustion rate will follow the pressure raising curve.