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## Fire Fighting Systems

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# **Fire Fighting Systems**

- 1. Introduction of FFS**
- 2. Installation / Readiness of FFS Site**
- 3. Panel Information & Cabling**
- 4. Pre Commissioning Checks**
- 5. Commissioning**
- 6. Routine Checks**

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# Introduction of Fire Fighting Systems

What is FFS ?

It is a system for protection of arena / industry / commercial building etc.. against fire. The system starts & operates automatically without manual intervention incase there is a fire.

The system consists of –

Pumps, Motors, Diesel Engine, Control Panels, Pressure transmitters, Smoke detectors, Fire Extinguishers, DCS (Digital Control System) etc..



# Introduction of Fire Fighting Systems

## Operation of FFS

Under normal circumstances the FFS keeps the fire hydrant system under pressurised condition with water ready for emergency usage.

In case of fire, the fire sprinklers open up, sprays water to extinguish the fire. Also, fire hydrants are used for extinguishing the fire.

Due to which, the pressurised pipeline experiences a pressure drop. This pressure drop is sensed by the pressure switch installed on the main header pipe line which in turn gives signal thru Control Panel to Jockey Pump to start. Jockey pump starts & tries to build up the pressure as per the system demand. In case Jockey pump is unable to build up the required pressure in the hydrant line then first the main motor driven & then the main diesel engine driven pumps start.



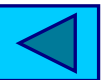
## Introduction of Fire Fighting Systems

**Jockey Pump** – During normal condition, to maintain the header pressure against the minor pressure drops which may be due to gasket leakages, manual opening of hydrant valve to release air entrapped etc.. In case of fire, Jockey pump shall start first to maintain the required water pressure.

Individual Jockey pump has separate Pressure Switch for start & stop of pump.

**Main Pump (Motor driven)** – If Jockey pump is unable to build up the required pressure, then first the main motor driven pump starts. Each motor driven pump has it's individual set Pressure Switch.

**Main Pump (Engine driven)** – If power fails due to fire, the diesel engine driven pump starts sensing the pressure drop in the header line. It may also start if motor driven pumps are unable to develop sufficient pressure.



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## **Installation / Readiness of FFS Site**

1. Erection and Levelling of Pump + Motor / Pump + Engine.
2. Alignment of pump / motor / engine with and without piping.
3. Completion of Silencer piping with rigid support.
4. Completion of piping from diesel tank to engine inlet & engine outlet to diesel tank.
5. Connection of pump suction and delivery piping and flushing of pipe lines. Ensure proper supports are provided.
6. Availability of sufficient water in suction.
7. Installation of Suction and Delivery Pressure Gauges.



## **Installation / Readiness of FFS Site**

8. Installation of Pressure Switches with 3 way valve for individual pumps with cabling.
9. Providing Cooling outlet connection from Heat Exchanger.
10. Motor Cabling.
11. Installation of Pump Gland & gland packings.
12. Cable termination of Battery to Engine starter motor.
13. Availability of coolant & DM Water for Engine.
14. Provision of sufficient diesel for Engine driven pump.
15. Ensure that the batteries are in charged condition.



## Installation / Readiness of FFS Site

15. Cabling from engine control panel supplied by engine manufacturer to automatic diesel engine control panel supplied by pump manufacturer.  
(Cable size – 10 Core X 1.5 Sq.mm multi stranded copper cable).

16. Availability of Engine Oil.  
(15W40 or 20W40 recommended by engine manufacturer).

17. Pump bearing lubrication Oil / Grease (As applicable) –

MANUFACTURER	Ring oil/Bush type Bearings	Grease Grease Lubricated Bearing
Indian Oil Corporation	Servo System-46	Servogem-2/3
Hindustan Petroleum	Enclo-46	Lithon-2/3
Bharat Petroleum	Hydral-46	Multipurpose Grease-3

18. Motor meager test for healthiness of motor.

19. Electric Power Supply for Control Panels.



## Installation Do's and Don'ts

### Do's

- Install the engine on horizontal, hard area. This area should be properly ventilated. It should have access to maintenance areas.
- All the mounting structure should properly rest on the ground.
- Check with civil engineers and architects before mounting the engine on slabs, beams, raised structures, above ground floor, etc.
- Check fire hazard possibility near fuel, oil storage.
- Plan release direction of the exhaust.
- Judge engine size properly. Seek help from Greaves service dealers or area offices for this purpose.
- Provide adequate safety measures around installation area.

### Don'ts

- Never install the engine on inclined surface.
- Remember that a good installation reduces running cost, maintenance cost, provides reliable and safe service.

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## Panel Information & Cabling

### Control Panel supplied by Engine Manufacturer

Parameters available are –

- ◆ RPM reading
- ◆ Lube Oil Pressure
- ◆ Water temp.
- ◆ Lube Oil temp.
- ◆ Battery Voltage
- ◆ Number of Hours of Engine Operation

Also fault signals available are –

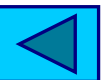
- ◆ Engine Over Speed
- ◆ High Water temp.
- ◆ Low lube Oil Pressure
- ◆ Engine fail to start



## Panel Information & Cabling

### Function of Control Panel supplied by Pump Manufacturer

1. To Start the pump as header pressure drops.
2. Battery charging.
3. To provide all engine fault signals from engine control panel to DCS
4. Make provision of start up of engine in manual mode.



## Panel Information & Cabling

Cabling is required to be done at site from Control panel of Engine manufacturer to Control Panel supplied by Pump Manufacturer for getting signals as mentioned below.

- |  |                           |
|--|---------------------------|
| 1) Positive Signal                             | 7) High Water Temp.       |
| 2) Negative Signal                             | 8) Engine failed to Start |
| 3) Engine Start Signal                         |                           |
| 4) Engine Stop Signal                          |                           |
| 5) Low Lube Oil Pressure (LLOP – fault signal) |                           |
| 6) Over Speed                                  |                           |



## Panel Information & Cabling

Cabling to be done other than Control panel of Engine manufacturer as mentioned below.

- 1) Pressure Switch of main header.
- 2) Level Switch of Diesel tank.



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## Pre Commissioning Checks

Following checks are recommended -

- 1) Levelling of Pump.
- 2) Alignment with & without piping.
- 3) Proper connection of pipelines – Pump Suction & delivery, Engine silencer, HE Cooling inlet & outlet & diesel tank.
- 4) Pressure Switch setting.
- 5) Priming of Pump.
- 6) Air removal from pipe line connecting Pressure Switch & gauge.
- 7) Free hand rotation by pump.



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## Commissioning

After finishing all pre - commissioning checks, commissioning activities start.

- ✓ Coupling the pump with the driver.
- ✓ Install the coupling guard.
- ✓ Open auxiliary supplies like cooling / flushing / oil. Ensure venting of each circuit. Attend leakages, if any. Check flows & pressures in individual circuit.
- ✓ Open the valve in suction line, vent line completely.
- ✓ Keep discharge valve closed.
- ✓ After the pump is primed, valve in venting line may be closed..



## Commissioning

- ✓ Check suction pressure.
- ✓ Start the pump to operate first on recirculation, if provided.
- ✓ Then the discharge valve is gradually opened & the pump is taken on load.
- ✓ Sometimes, there may be heavy leakage or smoking from the gland packing.  
Gland is tightened (or loosened) over a period & set at a point where adequate leakage flow is established.
- ✓ Various Parameters are required to be monitored & recorded during commissioning & also during further operation. Refer attached Protocol.



## Fire Fighting Equipment

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## **Routine Checks**

1. Check Engine Oil & coolant before starting.
2. Ensure Oil / greasing of pump / Motor bearings.
3. Monitor gland leakage & replace gland packing if leakage increases.
4. Check Battery charging & battery voltage.
5. Check for Clogging of filters for fuel & Air.
6. Check Diesel level in diesel tank.
7. Draining of diesel from diesel tank for removal of settled foreign particles.



# Thank You