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METHOD STATEMENT FOR

INSTALLATION, TESTING & COMMISSIONING OF FIRE PUMPS SET

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REVISION RECORD

This cover page is a record of all revisions of the document identified above by number and title. All previous cover pages are hereby superseded and are to be destroyed.

Rev. No.	Date	By	Chkd.	Approvals	Description and Page Numbers of Revisions

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1.0 PURPOSE

The purpose of generating this method statement is to define the procedure & work sequence for the correct practices for the Installation, Testing & Commissioning of Fire Pumps Set through the guidelines contained herein so as to ensure that the job execution complies with the requirements of the contract specification & approved shop drawings to which will serve for the intended function to the satisfactory level for all applicable areas in the project.

2.0 SCOPE

- This method statement covers all processes related to Installation, Testing & Commissioning of Fire Pumps Set.
- This procedure is to be read in conjunction with the relevant ITP, outlining the responsibility and the quality verification to be performed by various parties.

3.0 REFERENCES

- Latest Approved shop drawings for the required and applicable areas for Fire Fighting System.
- Specifications
- Project Quality Plan

4.0 DEFINITIONS:

PQP	: Project Quality Plan
PSP	: Project Safety Plan
QCP	: Quality Control Procedure
HSE	: Health, Safety and Environment
MS	: Method Statement
ITP	: Inspection Test Plan
QA/QC	: Quality Assurance / Quality Control Engineer.
WIR	: Work Inspection Request
MIR	: Material Inspection Record.

5.0 RESPONSIBILITIES:

- Responsibilities for ensuring that the steps in this procedure shall be carried out are specified at relevant steps in the procedure:
 - Project Manager
 - Construction manager
 - QA/QC Engineer
 - Site Engineer
 - HSE officer

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- SK

5.1 Project Manager

- The work progress shall be carried out as per planned program and all the equipment's required to execute the works shall be available and in good condition as per project planned.
- Specific attention is paid to all safety measures and quality control in coordination with Safety Engineer and QA/QC Engineer and in line with PSP and PQP.

5.2 Construction Manager

- Construction Manager is responsible to supervise and control the work on site.
- Coordination with the Construction Team & other parties involved in interfacing, report preparation & demonstration for the Testing & Commissioning activities.
- Control and sign all WIRs before issuing to Consultant for Approval.

5.3 Site Engineer

- The Site Engineer in coordination to all Foremen & Technicians will have the responsibility for the execution for the Installation of Fire Pumps Set.
- The method statement for the system shall be implemented according to the Consultant project specifications and approved shop drawings.
- Provision of all necessary information and distribution of responsibilities to his Construction team.
- The work progress shall be monitored in accordance with the planned work program and he will provide reports to his superiors.
- The constant coordination with the Safety Engineer to ensure that the works are carried out in safe working atmosphere.
- The constant coordination with the QA/QC Engineer for any works to be carried out and initiate for the Inspection for the finished works.
- He will ensure the implementation of any request that might be raised by the Consultant.
- Efficient daily progress shall be obtained for all the equipment and manpower.
- He will engage in the work and check the same against the daily report received from the Foremen.
- The passage of all the revised information to the Foremen and ensure that it's being carried out properly.

5.4 QA/QC Engineer (MEP):

- The monitoring of executions of works at site and should be as per the approved shop drawings and project specifications.
- Ensure WIRs and MIRs are being raised for activities in timely manner and inspected by the Consultant.
- He will follow and carry out all the relevant tests as per project specifications.
- Obtain the required clearance prior to Consultant's inspections.
- Should acquire any necessary civil works clearances and coordination.
- He will assist the Consultant Engineer/ Inspector during inspection.

5.5 Site Foreman

- The carrying-out of work and the proper distribution of all the available resources in coordination

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with the Site Engineer on a daily basis.

- Daily reports of the works are achieved and coordinated for the future planning with the Site Engineer.
- Incorporate all the QA/QC and Safety requirements as requested by the concerned Engineer.
- Meeting with any type of unforeseen incident or requirement and reporting the same to the Site Engineer immediately.
- Responsible for the Installation of Fire Pumps Set & other components in coordination to electricians/ technicians for any related Electrical Works required for the Fire Pumps.

5.6 Safety Officer

- The implementation of all safety measures in accordance with the HSE plan and that the whole work force is aware of its proper implementation.
- The implementation of safety measures is adequate to maintain a safe working environment on the work activity.
- Inspection of all the site activities and training personnel in accident prevention and its proper reporting to the Construction Manager and the Project Manager.
- The site is maintained in a clean and tidy manner.
- Ensure only trained persons shall operate the power tools.
- Ensure all concerned personals shall use PPE and all other items as required.
- Ensure adequate lighting is provided in the working area at night time.
- Ensure high risk elevated areas are provided are barricade, tape, safety nets and provided with ladders also to Ensure of provided warning tapes in manhole places.
- Ensure service area/inspection area openings are provided with barricade, tape, and safety nets.
- Ensure safe access to site work at all times.

5.7 Store Keeper (SK)

- Responsible for overall Store operations in making sure to store the material delivery to the site and keep it in suitable area that will keep the material in safe from rusty and damage.
- He will acknowledge the receiving of Materials at site in coordination with QA/QC & concerned Engineers.

6.0 EQUIPMENT:

- Tool box
- Measuring tape
- Marker
- Wood-saw
- Half round file
- Wooden half round file
- Hack-saw frame
- Drill machine
- Concrete bit
- Anchor punch
- Chain Block
- Marking line-dori

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- Screw driver (flat & set)
- Fix spanner (4mm to 32 mm)
- Adjustable spanner
- Threading Machine
- Spirit level
- Ladders/ Scaffoldings
- Fork Lift
- Ammeter
- Digital Multimeter
- Pressure Gauges
- Torque Wrench
- Safety requirements tools such as safety shoes, safety helmet, safety glasses, fluorescent vest, and safety gloves to ensure maximum ability of safe work and dust mask when required.

7.0 PROCEDURE

7.1 Safety

- Ensure only trained persons shall operate the power tools.
- Ensure all concerned personnel shall use PPE (Personal Protective Equipment) and all other items as required.
- Ensure adequate lighting is provided in the working area whenever required.
- Ensure service area/work area openings are provided with barricade, tape, and safety nets.
- Ensure that all people engaged in the Installation of Fire Pumps are experienced & have received proper & adequate training related to the activity.
- Access to the work area shall only be permitted when an assistant is available & work permit has been issued to perform such activity.

7.2 INSTALLATION PROCEDURE

- Move the assembled Pump set in the common base frame to the Pump Room. Fork lift will be used for shifting the pump sets to the Pump Room.
- Mark the location of Anchor Bolts as per the Approved Drawings. Only approved Anchor Bolts shall be used. Rubber pad shall be provided between the plinth & base frame for vibration isolation.
- After the anchor bolt holes have been located, check to ensure that they match pump bolting position. Then fix the anchor bolts as per manufacturer's recommendations.
- When anchor bolts are inserted in the bolt holes on the plinth, position the pump set on the plinth with rubber pads in between. Chain block of adequate capacity will be used for the same.

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- Connect the suction & discharge piping to the pump set header as per the approved shop drawings.
- Connect the piping between the pump headers to the pressure switches as per the manufacturer's recommendations.
- Connect Exhaust pipe from the diesel engine up to the discharge point as per the approved shop drawings.
- Complete electrical & BMS connections to the control panel & from the control panel to the pumps as applicable to the project specifications & manufacturer's recommendations.
- After work completion, inspection will be raised for consultant's approval & recommendations.

7.3. TESTING & COMMISSIONING PROCEDURE

7.3.1. PRE-START UP

- 7.3.1.1 Visual inspection shall be done for the overall pump assembly.
- 7.3.1.2 Ensure that there is no visible signs of cracks, damages or rust on the pumps.
- 7.3.1.3 Ensure that all mechanical & electrical installation has been done according to the approved shop drawings & manufacturer's recommendations.
- 7.3.1.4 Ensure that pumps assembly base are securely anchored with foundation bolts on the concrete floor.
- 7.3.1.5 Ensure that pumps assembly base is grouted sufficiently to absorb any vibration.
- 7.3.1.6 Ensure that pumps assembly base level & aligned with all connecting piping.
- 7.3.1.7 Ensure that pumps rotates freely when turned by hand.
- 7.3.1.8 Ensure that pumps are installed in the proper direction of flow in relation to the system and the suction & discharge.
- 7.3.1.9 Suction & discharge piping supports with rigid stand independent of the pump assembly.
- 7.3.1.10 Eccentric reducer installed on the pump suction side.
- 7.3.1.11 OSY gate valve installed on the suction side of the pump.
- 7.3.1.12 Control Valve & Check valve installed on the pump discharge line.
- 7.3.1.13 Ensure that the following are installed properly & correctly:
 - Casing relief valve before check valve.
 - Drain pipe for stuffing box.
 - Automatic air release valve.
 - Compound vacuum suction gauge.
 - Discharge gauge.
 - Pressure relief valve for diesel pump.
- 7.3.1.14 Sensing lines are connected to their respective controllers.
- 7.3.1.15 All motors and control wirings are connected.
- 7.3.1.16 Water tank & Diesel tank is filled.
- 7.3.1.17 Battery filled with acid.
- 7.3.1.18 Oil level in engine crank case is verified.

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- 7.3.1.19 Engine cooling system is filled with coolant.
- 7.3.1.20 Cooling water inlet & outlet are connected.
- 7.3.1.21 Cooling loop waste outlet is piped to drain.
- 7.3.1.22 Exhaust pipe is connected.
- 7.3.1.23 Fuel line is properly connected to the engine.
- 7.3.1.24 Air inlet filter is installed in the engine.
- 7.3.1.25 Fresh air supply is adequate for engine combustion and room ventilated.
- 7.3.1.26 Flow meter is installed with two butterfly valves before and after.

7.3.2 SEQUENCE OF OPERATION

A. ELECTRIC PUMP:

- A.1. Open suction valves.
- A.2. Check that pump is full of water and that all air contained in the pump been escape through the air release valve.
- A.3. Compress packing evenly with gland (hand tight).
- A.4. Lower setting of pressure switch to prevent pump from starting.
- A.5. Check incoming voltage for all phases.
- A.6. Place isolator and breaker in "ON" position & check "Power ON" light is illuminated.
- A.7. Press start the stop to check the direction of rotation and adjust.
- A.8. Bleed the system to create pressure drop.
- A.9. When the pump start, check if full load current value is within the electric motor name plate rating.
- A.10. Check packing adjustment to obtain slight leak.
- A.11. Stop the pump & allow jockey pump to pressuring the system again.

B. DIESEL PUMP:

- B.1. Open suction valves.
- B.2. Check that pump is fill of water and that all air contained in the pump been escape through the air release valve.
- B.3. Compress packing evenly with gland.
- B.4. Close the pressure relief valve using maximum spring pressure.
- B.5. Lower setting of starting pressure.
- B.6. Start engine manually on either battery.
- B.7. Adjust relief valve to open at tested pressure of the system.
- B.8. Stop engine and open system valve.
- B.9. Bleed the system to create pressure drop.
- B.10. When the pump start check the following:
 - Engine Speed.
 - Oil pressure
 - Fuel Pressure
 - Abnormal noise or vibration
 - Cooling water drain
- B.11. Check packing adjustment to obtain slight leak.
- B.12. Stop the pump by putting selector switch "OFF" Position and allow jockey pump to pressurize the system again.

7.3.3 FLOW TEST

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A. ELECTRIC PUMP

- A.1.** Close system valve.
- A.2.** Open gate valve for flow meter discharge valve & keep butterfly valve after flow meter fully close.
- A.3.** Press start button to start the pump.
- A.4.** Adjust flow by butterfly valve after the flow meter.
- A.5.** Take suction & discharge pressure and ampere readings at shut off rated, 150% of rated flow and another intermediate flow.
- A.6.** Plot the pump curve and match it with the factory test curve.

B. DIESEL PUMP

- B.1.** Close the system valve.
- B.2.** Open gate valve for flow meter discharge valve & keep butterfly valve after flow meter fully close.
- B.3.** Press start button to start the pump.
- B.4.** Adjust flow by butterfly valve after the flow meter.
- B.5.** Take sectional discharge pressure and RPM of the engine at shut off, rated, 150% of the rated flow and another intermediate flow.
- B.6.** Plot the pump curve and match it with the factory test curve.

7.3.4. AUTOMATIC OPERATION

7.3.4.1 Open system valve & turn all isolating valves to the fully open position.

7.3.4.2 Set pressure switches to the following setting valves:

- All fire pump stop pressure = fire pump shut off pressure + minimum suction pressure.
 - Jockey pump start pressure = stop pressure – 10 psi
 - Electric pump start pressure = jockey start pressure- 5 psi
 - Diesel pump start pressure = electric pump start pressure- 10 psi
- Use 10 psi for each additional pump
The final pressure should not exceed the pressure rating of the system.

7.3.4.3 Place all switches for all control panels to the auto mode.

7.3.5 CONTROL PANELS

- Control panels are designed to operate by three methods as follows:
 - a. Automatic Mode**
 - b. Manual Mode**
 - c. Emergency Start**

7.3.5.1 Automatic Mode

- In case of any pressure drop in line due to hose reel, fire hose, sprinkler opening or any small leak in the lines & or if the pressure reach to the cut-in-pressure point for the jockey pump it will start automatically and stop automatically at cut-off pressure. If the jockey pump couldn't maintain the pressure in the system & pressure drop to cut-in pressure of the duty pump it will

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start automatically & stop manually or automatically after 10 minutes if the pressure reached to the cut-off point.

➤ In case of electric supply failure or mechanical failure of the electric pump, then the diesel engine pump will start automatically when the pressure in the system reach to cut-in pressure of the standby pump and it should stop manually from the control panel after assuring there is no requirement of fire pump to keep running or automatically after 30 minutes if the pressure reached to the cut-off point.

7.3.5.2 Manual Mode

➤ In case of emergency, the pumps can run in manual mode function for jockey pump by placing selector switch in “hand mode”. Electric pump by depressing the “start” push button and diesel pump it can start either from control panel or engine itself by putting selector switch in “Manual” mode and depressing “crank push button” for a few second (3-4 second only just to reach firing condition of the engine) or from the engine instrument panel. All pumps should stop manually if run in manual mode by returning switch to OFF position or depress stop push button.

7.3.5.3 Emergency Start

➤ In case of any problem in the control circuit of Electric & Diesel Controller, fire pumps can run through emergency start handle to mechanically close the contactor.

8.0 ATTACHMENTS

8.1 Inspection & Test Plan

8.2 Installation Check List

8.3 Testing & Commissioning Check List

8.4 Risk Assessment