

## COCHIN PORT TRUST

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No.MD/DM/MULT-FFS/2021

Date: 22-12-2021

### NOTICE INVITING BUDGETARY OFFER

#### **BACK GROUND.**

Multi-User Liquid Terminal (MULT) has been constructed at Cochin Port for handling Gas/Liquid Cargo located in Puthuvypeen. Terminal consists of two Jetties viz. MULT Jetty (for handling liquid cargo and LPG) and Barge Jetty (for bunkers and POL handling). MULT jetty is capable of handling Tankers upto 80,000 DWT. Construction works of the Terminal was completed in September, 2018. A fire fighting System is installed in the Terminal as per OISD 156 standards (integrated for LPG and other liquids) which was tested satisfactorily for automation, flow rate, pressure and jumbo curtain profile requirements at both MULT and Barge jetties.

As the commercial operations of the Terminal was delayed, all the 6 Nos. Fire pumps and 2 Nos. Jockey pumps were de-coupled from prime movers. In order to obtain PESO approval for the Terminal and to commence the commercial operations, all the Pumps are to be re-installed and commissioned.

Preliminary PESO approval for the MULT was obtained in April, 2017. CoPT is required to obtain Final PESO approval and commissioning permission.

Cochin Port propose to entrust the work of (i) re-installation of Fire Pumps and commissioning of entire Fire Fighting Facilities including carrying out all allied work and (ii) Documentation/liaisoning work for obtaining final approval and commissioning permission from PESO for commencement of commercial operation of MULT & Barge Jetty to a reputed firm by inviting open tenders.

In order to prepare the cost estimates for inviting open tenders for the above work, Cochin Port now invites budgetary offers from reputed firms, as per the Scope of Work enclosed as Annexure-I.

The components of work consists of two parts viz. Part –A: Re-installation, testing & Commissioning of 6 Nos. Fire pumps and 2 Nos. Jockey pumps, Final testing and commissioning of automated Fire-fighting System of the Terminal. Part –B: All documentation works for obtaining final approval and commissioning permission from PESO for commencement of commercial operation of MULT & Barge Jetties.

The bidders are requested to submit the **Budgetary offers** as per the Price Schedule attached and may be sent in sealed cover superscribing “ Budgetary offer for Pump Re-installation & Associated Works at MULT” , to the Deputy Conservator, Cochin Port Trust at the address given above so as to reach us on or before **27-12-2021 at 17:00 hrs.**

Before preparation of Budgetary offers, the bidders are advised to visit the MULT Terminal site so as to understand the scope of work clearly. The visit for inspection shall be made on any working day, after obtaining the prior confirmation of Superintending Engineer (M) Tanker Terminals (Mob: 9446314127) or Asst. Engineer(M) Tanker Terminals (Mob: 9847058405), Cochin Port Trust. E-mail: [sajeev.va@cochinport.gov.in](mailto:sajeev.va@cochinport.gov.in)

The bidders may note that the offers are invited only for **budgetary** purpose. Cochin Port is not bound to award the work to any bidders based on the **budgetary** offer submitted. Cochin Port Trust will not be liable for any financial obligation to the bidders in connection with the preparation of his budgetary offer.

**Encl: ANNEXURE-I**

**CHIEF ENGINEER**

**COCHIN PORT TRUST**

PRICE SCHEDULE –BUDGETARY OFFER

Name & Address of the Firm:

Sl. No.	Description of work	Quantity	Amount in Rupees excluding GST
1	<b>Part –A:</b> Re-installation, Testing & Commissioning of 6 Nos. Fire pumps and 2 Nos. Jockey pumps, final testing and commissioning of automated Fire-fighting System of the Terminal as per the Scope of work of Cochin Port Trust including OEM supervision charges during re-installation and TPI inspection charges during performance testing of Fire-fighting Facilities as described in CoPT's Scope of Work ,all complete.	1 Operation	
2	<b>Part –B:</b> All documentation works for obtaining final approval and commissioning permission from PESO for commencement of commercial operation of MULT & Barge Jetties including liaisoning work with PESO, as per the Scope of Work of Cochin Port Trust.	1 Operation	
		Grand Total (1+2)	
	Grand Total in words:		

Signature

- Note:- (1) The bidder shall make the budgetary quote in Indian Rupees only excluding GST.  
(2) The bidder shall attach copies of their PAN, TIN and GST Registration Certificates of the firm.  
(3) The offer is invited only for budgetary purpose. Cochin Port is not bound to award the work to any bidders based on the budgetary offer submitted.

## IMPORTANT TERMS AND CONDITIONS:

### (1) Completion Period:

- (a) Completion period for Part –A: Commissioning of Fire Fighting Facilities within 75 days from the date of receipt of CoPT’s work order and within 30 days from the date of attaining sufficient depth at the pump suction area, to be arranged by CoPT whichever is later.
- (b) Completion period for Part-B: Final PESO approval and commissioning permission from PESO for commencement of commercial operation of MULT & Barge Jetties within 120 days from the date of receipt of CoPT’s work order and within 60 days from the date of attaining sufficient depth at the suction, to be arranged by CoPT, whichever is later.

### (2) Guarantee:

All the Works carried out by the Contractor under Part- A as per the Scope of Work shall be guaranteed for a period of six months from the date of satisfactory completion/ acceptance of work by the Employer. Any spares replaced by the Contractor during the execution of Contract shall be covered under guaranteed against manufacturing defects for a period of six months from the date of satisfactory completion/ acceptance of work by the Employer.

### (3) Payment Terms: Applicable at the time of actual invitation of Quotation.

#### (i) For Part A :

- (a) 70 % of rate quoted for Part A will be paid after satisfactory commissioning of Fire Fighting System and acceptance by CoPT;
- (b) Balance payment of Part-A on satisfactory completion of all works of Part –A and Part-B and acceptance by CoPT including final PESO approval and commissioning permission for commencement of commercial operation of MULT & Barge Jetties.

#### (ii) For Part B:

100% of rate quoted for Part-B will be paid on satisfactory completion of all works of Part –A and Part-B and acceptance by CoPT including final PESO approval and commissioning permission for commencement of commercial operation of MULT & Barge Jetties.

**SCOPE OF WORK**

**BACK GROUND**

Multi-User Liquid Terminal (MULT) has been constructed for handling Gas/Liquid Cargo at Cochin Port in Puthuvypeen which is located in a declared SEZ. The Terminal consists of two Jetties viz. MULT Jetty (for handling liquid cargo and LPG) and Barge Jetty (for bunkers and POL handling). MULT jetty is capable of handling Tankers upto 80,000 DWT. Construction works of the Terminal was completed in September, 2018. A firefighting System is installed in the Terminal as per OISD 156 standards (integrated for LPG and other liquids) which was tested satisfactorily for automation, flow rate, pressure and jumbo curtain profile requirements at both MULT and Barge jetties.

Since the commercial operations of the Terminal were delayed, capital dredging has been deferred. In order to ensure sufficient Pump draft, Jack Wells were placed under all the 6 Fire pumps to facilitate testing and commissioning of the pumps.

After the commissioning of pumps, to prevent Barnacle Encrustation on pumps and prevent damage to pumps during engine trials due to sand particles entering the pump casing, all the 6 Nos. Fire pumps and 2 Nos. Jockey pumps were de-coupled from prime movers and kept inside the Pump Room. In order to obtain PESO approval for the Terminal and to commence the commercial operations, all the Pumps are to be re-installed and commissioned. The relevant portion of Fire Fighting System showing Technical Specification & Employer's Requirements incorporated in the original Request for Proposal (RFP) invited for Construction of Multi User Liquid Terminal At Puthuvypeen, Cochin Port is attached as Annexure-I for the reference of the bidders to give an overall idea of the Fire Fighting System of the Terminal.

Cochin Port propose to invite open tenders for re-installation, testing and commissioning of the Fire Pumps and for all documentation works including but not limited to preparation of all documents/drawings/study reports etc. as required for obtaining PESO approval as per the detailed scope of work mentioned in this section.

The Scope of work consists of two parts viz. **Part –A:** Re-installation, testing & Commissioning of 6 Nos. Fire pumps and 2 Nos. Jockey pumps, Final testing and commissioning of automated Fire-fighting System of the Terminal. **Part –B:** All documentation works for obtaining final approval and commissioning permission from PESO for commencement of commercial operation of MULT & Barge Jetties.

**DETAILED SCOPE OF WORK:-**

**PART-A: RE-INSTALLATION, TESTING & COMMISSIONING OF 6 NOS. FIRE PUMPS AND 2 NOS. JOCKEY PUMPS, FINAL TESTING AND COMMISSIONING OF AUTOMATED FIRE-FIGHTING SYSTEM OF THE TERMINAL.**

Contractor's Scope of work includes but not limited to the following:-

1. Removal of 6 Nos. Jack Wells provided in sea beds below 6 Nos. Fire Pumps Suction;
2. Re-installation, testing & Commissioning of 6 Nos. Fire pumps and 2 Nos. Jockey pumps
3. Final testing and commissioning of entire automated Fire-fighting System of the Terminal.

**DETAILS OF PUMPS TO BE INSTALLED :-**

Sl. No.	Pump Description	Original Manufacturer	Total Quantity
1	Engine Driven Fire pumps - vertical turbine, 385.365 kw, 141m head, 760m <sup>3</sup> /hr @141m head, Impeller dia-430 mm BHR42-22.5 DEG 3 stage, Sl. No: 153B917004 -(#4- mfg. may 2017), Sl. No: 153B917005 -(#5- mfg. may 2017), Sl. No: 153B917006 -(#6- mfg. may 2017)	Kirloskar Brothers Ltd.,	3 Nos.
2	Engine Driven Fire pumps - vertical turbine, 245.438 kw, 91m head, 750m <sup>3</sup> /hr @91 m head, Impeller dia 425 mm, BHR42-22.5 DEG 2 stage , Sl. No: 153B917001-(#1-mfg. may 2017), Sl. No: 153B917002-(#2-mfg. may 2017), Sl. No: 153B917003-(#3- mfg. may 2017),	Kirloskar Brothers Ltd.,	3 Nos.
3	Jockey pump - 2017 April, Vertical turbine, RPM2900, Head 130.6 m, 144 m <sup>3</sup> /hr, 2017 make, VT275HL-4 stage	Kirloskar Brothers Ltd.-,	2 Nos.

**RE-INSTALLATION PROCEDURE:-**

The Engines of Fire Pumps at Sl. Nos. (1) and (2) above –Total six nos. Pumps- are already installed in position. Total six nos. Fire Pumps along with Gear Box are to be re-installed and coupled to the Engines. Electrical motors along with 2 Nos. Jockey Pumps mentioned at Sl. No.3 are to be re-installed. Re-installation of Fire Pumps and Jockey Pumps shall be done under the supervision of the manufacturers, M/s. Kirloskar Brothers Ltd. On completion of re-installation, testing and commissioning of all the Pumps, the Pump manufacturer shall issue a certificate to Cochin Port Trust to the effect that the Pumps are re-installed as per the installation procedure of manufacturer.

**1. Removal of Jack Wells:-**

Six (6 ) Nos. Jack Wells are provided in sea beds below Fire Pumps Suctions. Jack Well is made of 1.5 m height m.s. sheet bend into a radius of 0.75m. Two such pieces are fastened together to form a Jack Well and placed in sea beds below the suction of each Fire pump. All the 6 Nos. Jack Wells are to be removed from its present position and to be shifted to shore. All the Jack Wells are to be handed over to CoPT after its removal.

(Cochin Port shall make its own arrangements to provide sufficient depth at the Pump suction at CoPT's cost, before commencement of re-installation work of Fire Pumps)

## **2. Re-installation of 6 Fire pumps and 2 Jockey pumps**

### **A. Fire pump re-installation -6 Nos.**

The Scope of work includes but not limited to the following :-

- (i) Identification of dismantled items & supply of missing items, if any :

The bidders are advised to inspect the dismantled components/parts prior to submission of the Bids to ascertain availability of all the required individual items and to supply the required items , if any. Any missing items or spares have to be procured by the contractor from OEM/ Authorised dealer at the cost of the Contractor. Price shall be quoted considering the above aspect. The Parts supplied shall be of original spares of OEM.

- (ii) Preparatory works prior to assembling :-

Pump casing pipes fitted into each pump foundation has to be lifted out, cleared of rust and Barnacles, painted as per the painting scheme given in this document and refitted back and secured strongly to the pump foundation. All the corroded fasteners of the casing pipes has to be replaced with new S.S fasteners of grade SS316. Angle irons used should be GI .

If required , the 3 stage/2 stage impeller casing unit has to be dismantled, impellers have to cleared of barnacles and defective cutless bushes, if any have to be replaced, at the cost of the Contractor.

- (iii) Mobilisation of Pump Components to the Pump Room:

Dismantled pump parts including 3 stage/2 stage impeller casing, column pipes , shafts, Strainers, Stuffing Boxes, Gear boxes and cooling lines are stored in Fire pump room and First floor Foam tank area. The individual Pump components have to be mobilised to the desired location in the Fire Pump Room as per the work sequence.

(iv) Re-installation:

- (a) The 3 stage/2 stage impeller casing unit with the strainer, column pipes, shafts and stuffing box has to be assembled and erected on pump foundations and connected to the Fire water line. Gasket maker, Seals, Thread locker and S.S Locking plates have to be used while connecting flange joints as per standard practice for installation of Pumps. Nuts, bolts and washers used should be of S.S 316. Spiral gasket of suitable rating to be used wherever required.
- (b) Gear box have to be mounted on stuffing box and coupled with the engine in proper alignment.
- (c) All the cooling lines to the engine have to be defect rectified and fitted back with suitable spiral gaskets.
- (d) Engine fuel line to be connected to the diesel tank.

**B. Jockey pump re-installation -2 Nos**

- (i) Identification of dismantled items & supply of missing items, if any :

The bidders are advised to inspect the dismantled components/parts prior to submission of the Bids to ascertain availability of all the required individual items and to supply the required items , if any. Any missing items or spares have to be procured by the contractor from OEM/ Authorised dealer at the cost of the Contractor. Price shall be quoted considering the above aspect. The Parts supplied shall be of original spares of OEM.

- (ii) Preparatory works prior to assembling :-

Pump casing pipes fitted into each pump foundation has to be lifted out, cleared of rust and Barnacles, painted as per the painting scheme given in this document and refitted back and secured strongly to the pump foundation. Defect/damage of casing pipes to be defect rectified by the Contractor. All the corroded fasteners of the casing pipes has to be replaced with new S.S fasteners of grade SS316. Angle irons used should be GI .

If required , the 4 stage impeller casing unit has to be dismantled, impellers have to cleared of barnacles and defective cutless bushes, if any have to be replaced, at the cost of the Contractor.



(iii) Mobilisation of Pump Components to the Pump Room:

Dismantled pump parts including 4 stage impeller casing, column pipes , shafts, Strainers, stuffing boxes and motors are stored in Fire pump room and First floor Foam tank area. The individual Pump components have to be mobilised to the desired location in the Fire Pump Room as per the work sequence.

(iv) Re-installation:

(a) Pump strainer along with the 4 stage impeller unit, column pipes, shafts and stuffing box have to be assembled and installed on Jockey Pump foundation and connected to the Fire water line. Gasket maker, Seals, Thread locker and S.S Locking plates have to be used while connecting flange joints as per standard practice for installation of Pumps. Nuts, bolts and washers used should be of S.S 316. Spiral gasket of suitable rating to be used wherever required.

(b) Electrical motor to be mounted on top of stuffing box, to be properly aligned and electrical connections to be made.

PRE-COMMISSIONING WORKS:

The following pre-commissioning works are included but not limited to the Contractor's Scope of work:-

(a) Engines of Fire Pumps:-

At present Cochin Port is taking occasional no-load trials of the Engines of Fire Pumps. Contractor is required to check the Engine performance in the loaded condition and if any further servicing of Engines by OEM is required, the same shall be arranged by the Contractor under intimation to Cochin Port. All the expenses including spares, consumables, service charges etc. incurred by the Contractor towards servicing of Engines by OEM will be reimbursed to the Contractor on productions of bills.

(b) Motors of Jockey Pumps:-

Jockey Pumps are de-coupled from Motor during 2018 and running trials could not be carried out thereafter. During load trials, if any malfunctioning/defects noticed on motors, the same shall be rectified by the Contractor under intimation to Cochin Port. All the expenses including spares, service charges etc. incurred by the Contractor towards servicing of Motors will be reimbursed to the Contractor on productions of bills.

(c) Foam Line System :-

One each Engine driven and motor driven Foam Pump are to be checked , serviced if required , and to be made operational. Leaks/operational flaws of Foam line proportionator also has to be rectified, if required.

(d) Control System:-

Any operational fault in the Control system, deluge valves and solenoid valves of Fire water and Foam lines are to be rectified by the Contractor at his cost.

(e) Fire Monitors :

All the Fire Monitors installed at both the Jetties are to be checked, carry out the corrections wherever required, and ensure that all the Monitors satisfies its stipulated performance parameters.

(f) Pressure Gauges :-

All the Pressure Gauges of Fire Fighting System which are stored in the Control Rooms are to be refitted in the designated points.

(g) Under-deck Fire Protection System

An under-deck Fire Protection System has been installed with 72 Nos. MVW S Spray Nozzles of Dia 15 mm. During the operational trials/commissioning stage, if any line defects are noticed, the same has to be rectified by the Contractor.

(h) Miscellaneous items:-

Miscellaneous items viz. Single Headed Hydrant Valve, Fire Hose Boxes which are stored at MULT has to be fitted back. The Contractor is required to check and correct, if required and ensure that the items such as Public Address System, Talkback Field Stations, MCPs, VHF Communication System, Flame Sensors, Gas Detectors , Horn Loud Speakers, Siren, mimic panel, Fire Alarm Panel, Fire Monitor Remote Control Panel at Control Building and Local Panel at Breasting Dolphins etc. provided in the terminal, performs its functions satisfactorily, at Contractor's cost.

(i) Greasing:-

All the Gate Valves and Fire Monitors of Fire Fighting System are to be cleaned and greased to ensure its smooth operations.

(j) Consumables :

The contractor is required to fill up the Foam and Diesel to the respective tanks during pre-commissioning stage. Foam and Diesel for operations/trials will be supplied to the Contractor at MULT site by CoPT at free of cost.

(k) Diesel Tanks:

Seven Nos. of Dedicated Diesel Oil Day Tanks are available for the operation of Fire Pump Engines and Foam Pump Engine which are to be cleared off contaminants before filling the Diesel collected from Cochin Port's Divisional Stores for commissioning/ trials.

#### TESTING AND COMMISSIONING PROCEDURE OF FIRE FIGHTING SYTEM:

At the time of execution of Contract for the construction of MULT, extensive tests/ trails of Fire fighting System have been carried out during various stages from manufacturing to till final commissioning and acceptance and the performance of the entire Fire Fighting System was certified by Third Party Inspection Agency, M/s. IRS.

After re-installation & commissioning of Fire Pumps, Jockey Pumps and all connected accessories, the Contractor has to arrange performance/acceptance testing of entire Fire Fighting System. Testing of Fire Pumps and Jockey Pumps in Tower and Hydrant line for automation are to be done as per the specified testing procedure indicated as Appendix-II. The items to be performance tested are (i) Jumbo Curtain Nozzle (ii) Hydrant System Monitors (iii) Tower Monitors . Performance Parameters to be achieved for the above three items are furnished as Appendix-III. The items which require functional tests are deluge valves, solenoid valves, talkback field station and mimic panel with siren corresponding to the activation of MCPs, Gas Detectors and Flame Sensors, etc.. The Contractor is required to carry out all necessary work to achieve the above performance requirements/functionality and to obtain final PESO approval and commissioning permission of the MULT.

#### **Third Party Inspection:--**

The Contractor shall appoint M/s. IRS (who were the Third Party Inspection Agency for the performance tests of fire fighting systems conducted after the original installation in 2018) as Third Party Inspection Agency (TPIA) for this Contract at Contractor's cost to witness the performance/acceptance testing and commissioning of the entire Fire Fighting System after re-installation of Pumps by the Contractor as per the scope of work. TPIA has to certify that the entire Fire Fighting System achieves the specified performance parameters as per Annexure-III. Performance/Acceptance testing shall be carried out to the satisfaction of Third Party Inspection Agency and Employer.

The employer will accept the work of re-installation performed by the Contractor as per the scope of work of the contract based on satisfactory performance report duly signed by TPIA after witnessing the performance/acceptance testing and commissioning of the entire Fire Fighting System and on receipt of final PESO approval and commissioning permission of the MULT.

#### **PART-B: ALL DOCUMENTATION WORKS FOR OBTAINING FINAL APPROVAL AND COMMISSIONING PERMISSION FROM PESO FOR COMMENCEMENT OF COMMERCIAL OPERATION OF MULT & BARGE JETTY.**

1. CoPT had obtained Preliminary PESO approval vide *letter No.G-22(47) 127/V dated 03-04-2017 subject to the following conditions:*
  - (i) **Hazardous Area Classification Drawing:** Preparation and submission of Hazardous Area Classification Drawing, preparation of a comprehensive and

exhaustive list of all the electrical equipments/instruments, light fittings and junction boxes, starters etc. installed on the MULT and Barge Jetty Platforms and the Backup Area within the battery limits of the Terminal and their approval references from CCE, Nagpur.

- (ii) **Revised Hazop Study** shall be conducted after freezing of the design including status of compliance of the recommendations. (Environmental Impact Assessment Study for MULT was conducted by M/s. WAPCOS Limited in which the Hazop Study was one of the items and the report was submitted in June, 2014. In their report, it is indicated that *“ In principle Operators are expected to repeat the analysis atleast every five years in order to maintain the residual risk as low as reasonable practical.”* It is also indicated that *“ Hazop analysis revision is required when considerable modifications, upgrades or re-design of existing facilities are carried out, etc. )“*.
  - (iii) Status of Compliance with respect to applicable standards/ codes including OISD 156
  - (iv) As built plans/drawings shall be submitted incorporating the safety distances and requirement laid down in OISD 156 .
  - (v) *Preparation and submission of Pre-commissioning Safety Audit Report.*
  - (vi) Submission of Para-wise completion report in respect of requirements of OISD Standard 156 for applicable Fire Fighting facilities for considering commissioning permission.
2. The Terminal consists of Fuel Oil Storage tank farm with 20 kl tanks x 2 nos. as required for D.G.Sets and Fire Water Pumps Diesel engines, 20 KL Slop Tank at each manifold (total 2 Nos. Tanks) , one number 4 KL under-deck slop tank at MULT Jetty and one number 2 KL under-deck slop tank at Barge Jetty, for Storage and handling facility, which requires PESO approval.

The Contractor's Scope of work includes but not limited to the following:-

- (i) Preparation of all documentations/auto-cad drawings/study reports etc. as required by PESO while granting preliminary approval dated 03-04-2017 indicated above and also the additional documents required by PESO during the processing stage if any, in order to obtain final approval and commissioning permission from PESO for commencement of commercial operation of MULT & Barge Jetty.
- (ii) All liaisioning work/follow up with PESO officials and for completing all formalities as required by PESO while processing final approval and commissioning permission for MULT & Barge Jetty from PESO.

(The bidder may take into consideration all the aspects mentioned at (1) and (2) above, while preparing various documents/study reports for obtaining Final approval and commissioning permission for MULT & Barge Jetty from PESO. Responsibility of completing all the required formalities/documentation for obtaining final approval and commissioning permission for MULT & Barge Jetty from PESO vest with the Contractor)

Responsibilities of Cochin Port Trust:-

- (i) Provide the set of “As built drawings” available in PDF Format (Contractor is required to prepare auto-cad drawing) showing all the details of facilities provided in the MULT & Barge Jetty;
- (ii) Provide copy of Hazard and Operability Study conducted by M/s. WAPCOS Limited during 2015.
- (iii) Remittance of requisite statutory fees to PESO for obtaining the PESO approval will be made by CoPT.

**FIRE FIGHTING TESTING PROCEDURE**

**PRE – CHECKS**

1. Close interconnection valve between tower and hydrant system.
2. Open all gate valves in the Fire Fighting System and ensure all the drain valves are closed.
3. Confirm that all deluge valves in hydrant and tower monitor lines are closed.
4. Check and confirm that all engines are ready to start (check fuel line, battery connections etc.)

**TESTING OF TOWER LINE AND JOCKEY PUMP 1**

**Line pressurization and Jockey Pump No.1 Test (Serial No.1 to 9)**

1. Line up Jockey 1 for Tower System. ( confirm delivery valve of jockey 1 is open and jockey 2 is closed).
2. Open Tower 1 water monitor deluge valve from remote.
3. Start any one engine (4/5/6) manually and fill the line till water gushes out through the Tower 1 water monitor.
4. Stop the engine which was running, manually.
5. Close the Tower 1 water monitor deluge valve from remote.
6. Select Jockey 1 and put all fire pumps in auto mode.
7. Check and confirm whether Jockey 1 starts and stops at  $12.5 \text{ kg/cm}^2$  ( **10 sec delay given for stop- Pr. may shoot upto  $15 \text{ kg/cm}^2$** ).
8. Gradually open **tower line drain valve** (manually).
9. Check and confirm whether Jockey 1 re-starts at  $11 \text{ kg/cm}^2$ .

**Testing of Tower Fire water system (Serial No.10 to 21)**

10. If Jockey-1 functions are satisfied, then further open **tower line drain valve**.
11. Check and confirm whether engine 4 starts when the line pressure drops to  $10 \text{ kg/cm}^2$ .
12. Open Tower 1 water monitor deluge valve from remote.
13. Check and confirm whether engine 5 starts at  $9.5 \text{ kg/cm}^2$ .
14. Open Tower 1 water foam monitor deluge valve from remote .
15. Check whether engine 6 starts at  $9 \text{ kg/cm}^2$ , if not, automation programming is perfect.
16. Fully open tower line drain valve.
17. Check and confirm whether low header hooter sounds at  $8.5 \text{ kg/cm}^2$ , if yes, Tower System Control is in order.
18. Close tower line drain valve .
19. Open Tower 2 water and water foam deluge valves from remote.
20. Check and confirm the throw in all 4 monitors.
21. Check and confirm all monitor movements are in order from control room.

### **Foam Pump Motor/Engine Testing (Serial No.22 to 27)**

22. Open Foam line solenoid valve for Tower 1&2.
23. Start foam pump engine from remote and check foam throw.
24. If foam pump works satisfactorily, stop foam pump engine from remote.
25. Start foam pump motor from remote and check foam throw.
26. If foam pump works satisfactorily, stop foam pump motor from remote and engines 4 & 5 manually.
27. Close Tower monitor deluge valves and foam line solenoid valves from remote.
28. Jockey 1 automatically pressurises line back to 12.5 Kg/cm<sup>2</sup>.

The test is to be conducted with Engine 4 and Engine 5 batteries alternatively disconnected to verify fail start options.

### **ENGINE 4 BATTERY DISCONNECTED**

1. Disconnect Engine 4 battery connections.
2. Gradually open Tower line drain valve.
3. Check and confirm whether engine 5 starts at 9.5 kg/cm<sup>2</sup>
4. Open Tower 1 water monitor deluge valve from remote.
5. Check and confirm whether engine 6 starts at 9 kg/cm<sup>2</sup> if yes, automation programming is perfect.
6. Open Tower 1 water foam monitor deluge valve from remote.
7. Check and confirm low header hooter sounds at 8.5 kg/cm<sup>2</sup>.
8. Close tower line drain valve .
9. Stop Engines 5 and 6 manually.
10. Close Tower 1 water monitor and water foam monitor deluge valves from remote.
11. Jockey 1 automatically pressurises line back.

### **ENGINE 5 BATTERY DISCONNECTED**

1. Reconnect Engine 4 battery connections and disconnect Engine 5 battery connections.
2. Gradually open tower line drain valve.
3. Check and confirm whether Engine 4 starts when line pressure is 10 kg/cm<sup>2</sup>.
4. Open Tower 2 water monitor deluge valve from remote.
5. Check and confirm whether Engine 6 starts at 9 kg/cm<sup>2</sup> , if yes, automation programming is in order.
6. Open Tower 2 water foam monitor deluge valve from remote.
7. Check and confirm whether low header hooter sounds at 8.5 kg/cm<sup>2</sup>.
8. Close Tower line drain valve .
9. Stop engines 4 and 6 manually.
10. Close Tower 2 water monitor and water foam monitor deluge valves from remote.
11. Jockey-1 automatically pressurises line back.

### **INFERENCE:**

1. Tower monitor line automation is perfect.

2. Jockey 1 lower and upper limit pressure switches, tower line pressure switches for engine 4, 5, 6 and low header pressure working satisfactorily.
3. Tower monitor 1&2 - water monitor, water foam monitor deluge valves and foam line solenoid valves working satisfactorily.
4. All movements of tower monitor are satisfactory.

NOTE DOWN :

1. Individual pump delivery pressure #4- #5- # 6-
2. Line pressure when 2 pumps running - 4/5- 5/6- 4/6-
3. Remotest point pressure (tower 1 water monitor pr.), when 2 Tower system pumps running and all 4 tower monitor deluge valves open – ( 7.5 Kg/CM<sup>2</sup> desired)

**TESTING OF HYDRANT LINE AND JOCKEY PUMP 2**

**Line pressurization and Jockey Pump No.2 Test (Serial No.1 to 9)**

1. Line up jockey 2 for hydrant system . (confirm delivery valve of jockey 2 is open and jockey 1 is closed).
2. Open Jumbo curtain 1 deluge valve.
3. Start any one Engine (1/2/3) and fill the line till water gushes out through Jumbo curtain 1.
4. Stop the engine which was running, manually .
5. Close the Jumbo curtain 1 deluge valve from remote.
6. Select Jockey 2 and put all pumps in auto mode.
7. Check and confirm whether Jockey 2 starts and stops at 12.5 kg/cm<sup>2</sup> ( **10 sec delay given for stop- Pr may shoot up to 15 kg/cm<sup>2</sup>**).
8. Gradually open hydrant line drain valve .
9. Check and confirm whether Jockey 2 re-starts at 11 kg/cm<sup>2</sup>.

**Testing of Hydrant Fire water system (Serial No.10 to 25)**

10. If Jockey 2 functions are satisfied, then further open hydrant line drain valve.
11. Check and confirm whether Engine 1 starts when line pressure is 8 kg/cm<sup>2</sup>.
12. Open Jumbo curtain 2 deluge valve from remote.
13. Check and confirm whether engine 2 starts at 7.5 kg/cm<sup>2</sup>.
14. Open Jumbo curtain 3 deluge valve and Jumbo curtain 4 deluge valve from remote.
15. Check whether Engine 3 starts at 7 kg/cm<sup>2</sup>, if not, automation programming is perfect.
16. Open Under deck deluge valve.
17. Check and confirm that low header hooter sounds at 6.5 kg/cm<sup>2</sup>.
18. Close hydrant line drain valve.
19. Note the remote point pressure at MD 2 and profile of jumbo curtain.
20. Open 2 no: s Ground water monitor valves manually at Mult jetty.
21. Open foam line solenoid valve to Ground water monitors.
22. Start foam pump motor from remote.
23. Check and confirm foam mixing. If found satisfactory, stop Engines 1 and 2 manually and foam pump motor from remote.
24. Close Jumbo curtain and Under deck deluge valves , Ground water monitor valves and Foam line solenoid valves.



25. Jockey 2 automatically pressurises line back.

The test is to be conducted with Engine 1 and Engine 2 batteries alternatively disconnected to verify fail start options

**ENGINE 1 BATTERY DISCONNECTED**

1. Disconnect Engine 1 battery connections.
2. Gradually open hydrant line drain valve.
3. Check and confirm that Engine 2 starts at 7.5 kg/cm<sup>2</sup>.
4. Open Jumbo Curtain 5 Deluge Valve at barge jetty from remote.
5. Check and confirm that Engine 3 starts at 7 kg/cm<sup>2</sup>, If yes, automation programming is perfect.
6. Open Jumbo curtain 6 deluge valve at barge jetty from remote.
7. Check and confirm whether low header hooter sounds at 6.5 kg/cm<sup>2</sup>.
8. Close hydrant line drain valve.
9. Open 2 nos. Ground water monitors at barge jetty and open Foam line solenoid valves.
10. Start Foam pump motor from remote and check foam mixing.
11. Note the remotest point pressure at barge jetty and profile of jumbo curtain.
12. If working is satisfactory, stop engines 2 and 3 manually and foam pump motor from remote.
13. Close all deluge and solenoid valves.
14. Jockey 2 automatically pressurises line back.

**ENGINE 2 BATTERY DISCONNECTED**

1. Reconnect Engine 1 battery connections and disconnect Engine 2 battery connections.
2. Open hydrant line drain valve.
3. Check and confirm that Engine 1 starts when line pressure is 8 kg/cm<sup>2</sup>.
4. Further open hydrant line drain valve.
5. Check and confirm that Engine 3 starts at 7 kg/cm<sup>2</sup>, if yes, automation programming is perfect.
6. Fully open hydrant line drain valve.
7. Check and confirm that low header hooter sounds at 6.5 kg/cm<sup>2</sup>.
8. Stop Engines 1 and 3 manually.
9. Close hydrant line drain valve.
10. Jockey 2 automatically pressurises line back.

**INFERENCE:**

- 1) Hydrant line automation is perfect.
- 2) Jockey 2 lower and upper limit pressure switches, hydrant line pressure switches for engine 1,2,3 and low header pressure working satisfactorily.
- 3) Hydrant line deluge valves and foam line solenoid valves at mult and barge jetties are working satisfactorily.

Note down:

- |                                       |       |      |      |
|---------------------------------------|-------|------|------|
| 1) Individual pump delivery pressure  | #1-   | #2-  | #3-  |
| 2) Line pressure when 2 pumps running | -1/2- | 2/3- | 1/3- |

- 3) Remotest point pressure when 2 hydrant pumps running (barge jetty- /md2- ) ( 7.5 kg/cm<sup>2</sup> desired)

Engine Performance Parameters during Tests & Trials:-

Trials of each engine shall be conducted for atleast 20 minutes continuously and the engine performance parameters have to be recorded.

APPENDIX-III

<b>TESTING &amp; COMMISSIONING PROTOCOL</b>				
<b>1<sup>st</sup> Stage: Hydrant System- MULT Jetty</b>				
Sl. No.	Name of the Equipment to be performance tested	Check Point	Observation	Remarks
<b>A</b>	<b>Jumbo Curtain Nozzle</b>			
1	2 Main Engine Driven Fire Fighting Pump BHR 42	Discharge Pressure : 8.5 kg/cm <sup>2</sup>		
2	4 Nos. Jumbo Curtains	Pressure of JCN: 7 kg/cm <sup>2</sup>		
		Height : 14 m (in still wind condition)		
		Width: 33 m(in still wind condition)		
<b>B</b>	<b>Monitor/Hydrant</b>			
1	1 Main Engine Driven Fire Fighting Pump BHR 42	Discharge Pressure : 8.5 kg/cm <sup>2</sup>		
2	1 No. Ground Water monitor	Operational check		
		Horizontal throw of water-64 m(in still wind condition)		
		Horizontal throw of Foam-55 m for 3 minutes (in still wind condition)		
3	2 Nos. Hydrants	Operational check		
4	Remote Point Pressure	7 kg/cm <sup>2</sup>		
<b>2<sup>nd</sup> Stage: Tower Monitor –MULT Jetty</b>				
<b>A</b>	<b>Tower Monitor</b>			
1	2 Main Engine Driven Fire Fighting Pump BHR 42	Discharge Pressure : 13.5 kg/cm <sup>2</sup>		
2	2 Nos. water /Foam Monitor	Pressure of Water/Foam monitor: 11 kg/cm <sup>2</sup>		
		Horizontal throw of water -90 m (in still wind condition)		
		Vertical throw of water-25 m (in still wind condition)		
		Horizontal throw of Foam-90 m (in still wind condition)		
		Vertical throw of Foam -25 m (in still wind condition)		
3	2 Nos. Water Monitor	Pressure of Water monitor: 11 kg/cm <sup>2</sup>		
		Horizontal throw of water -90 m (in still wind condition)		
		Vertical throw of water-25 m (in still wind condition)		