



Technical Specification for HVLR Foam Package

Modernization of Fuel Farm-IGI Airport,
Shahbad Mohammadpur, New Delhi

April 2015

Delhi Aviation Fuel Facility Private Limited
CONFIDENTIAL



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Delhi Aviation Fuel Facility Pvt Ltd, Aviation Fuelling Station,
SahahbadMohammadpur, IGI Airport, New Delhi-110061

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1 Introduction

Existing Fuelling System i.e. Fuel Farm of Delhi Aviation Fuel Facility Pvt. Ltd. (DAFFPL) for refueling aircrafts at IGI Airport, New Delhi is slated for modernization and up-gradation so as to conform to International Standards for receipt, storage and dispensing of Jet A1 fuel.

At DAFFPL fuel farm, Jet A1 fuel is brought aboveground/underground pipe from Oil Terminals of IOCL and BPCL and also by road tanker. This fuel is stored in the Cone Roof Vertical Tanks installed in the fuel farm. Presently, the aircrafts are being refueled by hydrant pumps through fuel underground Jet A1 fuel hydrant pipe line.

This document specifies the minimum acceptable requirements set by the Purchaser / Owner for design, engineering, procurement, fabrication, assembly, inspection, testing, commissioning and delivery to site of HVLR foam trolley for its use where the water / foam monitor firefighting arrangement is "No Reach" for the aviation fuel tanks of DAFFPL, IGI Airport, and New Delhi

1.1 Scope

Both these portable (trailer / trolley mounted) foam generators shall be used to fight the fire at the specific areas of tank/s where hydrant & fixed water cum foam monitor throw is not accessible.

Deviation from good engineering practice is not intended. In the absence of any omission in this specifications, good engineering practices will prevail, utilising first quality new materials and with good workmanship.

1.2 Definitions

For the purposes of this document the following definitions shall be used.:

- Must/Shall the word 'shall' is to be understood as mandatory.
- Should the word 'should' is to be understood as strongly recommended.
- May the word 'may' is to be understood as indicating a possible course of action
- Purchaser Delhi Aviation Fuel Facility Pvt. Ltd., IGI Airport, New Delhi.
- Consultant Mott MacDonald Pvt. Ltd
- Supplier/Vendor Agency responsible for manufacture or supply of equipment and services to perform the duties specified by the Consultant.

1.3 Compliance

Compliance by the Vendor, with provisions in this specification shall not relieve him of his responsibilities to supply / deliver portable trailer mounted HVLR foam generating package conforming to the requirements and guide lines as specified in the mandatory codes and standards.

In case, there is a conflict between the Purchasers supplied documents and the referenced / mandatory specifications, the more stringent one shall prevail.

Should there be any deviation/ from this Specification or associated data sheets, the Vendor shall notify the Purchaser in writing and obtain Purchaser's decision in writing in respect of such deviation/(s).

1.4 Quality Conformance

The Vendor shall prove and satisfy the Purchaser that his obligations within the scope of this document are in accordance with the relevant section of BS EN ISO 9001. Prior to commencement

of work, the Vendor shall submit a Quality Plan and procedural specifications for Purchaser's review and approval.

The Quality Plan shall define scope of work of all the sub-vendors associated with the work. This Specification shall only indicate a general requirement and shall not relieve the Vendor of his obligations to comply with the requirements of the Contract.

1.5 Safety

All work shall be performed in accordance with the safety requirements listed in the contract documentation and any mandatory standards and legislation.

1.6 Site Particulars

1.6.1 Location

The site is located at Shabad Mohammadpur adjoining to Indira Gandhi International Airport, New Delhi. The site is approachable by road.

1.6.2 Environmental Design Parameters

Table 1.1: environmental design parameters

Site address		1st Floor, Wing "A", T-III Project Office, IGI Airport, New Delhi-110037
Project		Delhi Aviation Fuel Facility Private Limited
Nearest Railway Station	:	New Delhi Railway Station
Nearest Airport	:	Indira Gandhi International Airport, New Delhi
Altitude	:	237 m
Operating Max. Temperature	:	48.4 °C
Operating Min. Temperature	:	-2.2 °C
Design Temperature	:	50 °C
Humidity, Maximum	:	100 %
Humidity, Minimum	:	25 %
Maximum Rainfall	:	20-30 mm in one hour duration
Designed Wind Velocity	:	47 m/s
Barometric Pressure	:	0.98 bar
Seismic Zone	:	Zone IV as per IS:1893

1.6.3 Design Temperature

The Maximum Design is to be considered with respect to above environmental design parameters given in table1.1.

1.6.4 Battery limits

1. Supply of the package at DAFFPL, Delhi site on 'FOR' (free on road) door delivery basis including **unloading** at site as per the instruction of EIC (engineer in charge).
2. The per diem rate for the services of erection & commissioning supervisor shall be furnished.
3. Cost shall be inclusive of loose supplied items like special tools kit, set of commissioning spares, 2 years maintenance spares, & commissioning manual for each HVLR-set.

1.6.5 Qualification Criteria

1. The Vendor shall have the single point responsibility for the complete package/s offered.
2. The Vendor shall be a regular manufacturer and supplier of the specified trailer mounted package.
3. Vendor in the last five years should have engineered, manufactured, tested, supplied and commissioned at least TEN (10) nos. of identical or similar packages (or higher capacity packages) in terms of capacity, pressure, purity and at least FIVE (5) of these packages shall have completed the continuous trouble free operations of a minimum 8000 Hrs. as on the bid due date in the last three (3) financial years. Vendor to give documentary evidence (confirmation from the purchaser).
4. The listing of these sr. no. 3 data shall also have 'start date / end date / value in In. INR. / US \$' for their executed ordered of last 10 / 5 years as well as **current year data** with 'start date / scheduled end date / value in INR. / US \$'. The data asked shall be in three different sheets.
5. The vendor shall have full-fledged service support set-up in India or have appropriate arrangements for the same with the established local reputed company.
6. The offered packages shall be of proven make from the existing production range of the HVLR trailer package.
7. The vendor shall be required to submit the documentation and proof for above requirements. If found necessary, purchasers may at his discretion to make additional checks for the same.

1.6.6 Bid Submission

1. Two copies of bid are to be submitted in a separate sealed envelope, super scribed with the item and due date.
2. The equipment / package are to be offered on lump-sum turnkey (LSTK) price basis as per Price Preambles. The per diem rate for the services of erection & commissioning supervisor shall also be furnished.
3. The rates for mandatory spares for 2 years shall also be furnished separately.
4. Vendor shall clearly mention whether equipment shall be transported in fully assembled condition or in a knocked down condition and to be assembled at site. Vendor shall punch match marks to avoid confusion at site.
5. Bids through Telex / Fax/ E-mail are **NOT** acceptable.
6. Vendors are advised to quote strictly as per terms and conditions of the tender documents and clearly stipulate any deviations / exceptions or alternate design. The deviations / exceptions shall be listed separately for each specification / document with cross-references and proper reasons for the deviations / exceptions. In case of any deviation not listed under the 'List of deviations / exceptions to the specifications' but appear in other part of the bid, the same shall not be considered/ applicable.

7. Please note that the owner / purchaser reserve the right to reject any or all the vendors and accept complete or partial bids without assigning any reasons thereof.
8. All electrical (if any) equipment shall be designed for outdoor installation.

1.6.7 Instrument / Electrical Supply (not applicable)

1. 240 V ± 10 % AC, 50 Hz ± 5 % single phase supply shall be provided by the Owner at one point at site.
2. 430 V ± 10 % AC, 50 Hz ± 5 % three phase supply shall be provided by the Owner at one point at site.

1.6.8 Area Classification

1. The offered packages shall be used for Classified Hazardous area of the DAFFPL, Delhi site.

2 Technical Specification for High Volume Long Rang (HVLR Trolley Mounted)

2.1 Scope

This specification covers the requirements regarding design, materials, fabrication, performance testing, supply, warranty and comprehensive maintenance of UL Listed / FM Approved High Volume Long Range Foam- Cum-Water Monitor non-aspirating type, along with foam induction mechanism of following types;

- a) 1000 USGPM Trolley Mounted Variable Flow (1000/ 750/ 500 USGPM)

The above types of HVLR shall be supplied in accordance to the respective data sheets and this specification. In case of conflict between this specification and respective data sheet, the provisions of the data sheet shall govern. The above HVLRs are intended for use in fire-fighting application at Fuel Farm of Delhi Fuel Facility Pvt. Ltd., IGI Airport New Delhi. The scope of this tender shall include, but not limited to following;

- Design, Procurement of brought out items, fabrication & Supply of UL Listed / FM Approved High Volume Long Range Foam-Cum-Water Monitor non-aspirating type, along with foam induction mechanism as per respective data sheets. Foam induction mechanism shall be capable of feeding foam concentrate to the monitor from a horizontal distance of 60 meters from the monitor nozzle. **JRCP (Jet Ratio Control Proportioner) will be provided along with 4 nos. of 63 mm diameter Rubber Rlined Pipes (RRL) each of 15 meters length (total length 60 meters) and with suitable SS 316 couplings for joining these pipes.**
- Carrying out various Factory & Site Performance Testing of the HVLR as per this specification and data sheet.
- Comprehensive AMC (Annual maintenance contract) for 3 years post warranty period of 2 years.

2.2 Monitor & Foam Induction

2.2.1 Monitor

- a) The Monitor shall be designed for mounting on movable type trolley / Stand Post Type at fixed locations with Fixed / Variable flow as per the respective data sheet. The monitor shall have feature of variable flow / Fixed Flow as per the respective data sheet, flow to be adjusted manually. The monitor shall be capable to give discharge in the form of hollow jet and Fog/ Spray arrangement. Such adjustments shall be possible manually. All the operation of the monitor viz. Horizontal movement, Vertical movement, Jet/spray adjustment should be possible manually from Monitor (without use of power).
- b) The monitor shall be able to discharge following flows at a pressure of 7.0 Kg/cm² (g)* at the mating/mounting flange as per the enclosed data sheet. The foam compound shall be AFFF/AR-AFFF.

Table 2.1: Flow Capacity

Type of HVLR	Flow Capacity
2 nos. x 1000 USGPM Trolley Mounted	Variable Flow - 1000/ 750/ 500 USGPM with Single Nozzle

With pressure of 7.0 Kg/cm² (g) at base flange (first flange from the existing hydrant line, which shall be 300 mm above the main hydrant line), and Nozzle at 300° from horizontal (mating / mounting flange as reference) the Monitor shall be capable of giving following minimum kinematic performance as per the respective data sheet.

Table 2.2: Kinematic Performance

Type of HVLR	Min Kinematic Performance
2 nos. x 1000 USGPM Trolley Mounted (Water/ Foam)	HORIZONTAL 500 USGPM – 50/45 m at 30° 1000 USGPM- 50/45 m at 30° VERTICAL 500 USGPM 16 / 15 m at 25 m at 45° 20 / 18 m at 20 m at 60° 1000 USGPM 20 m at 35 m / 20 m at 30 m at 45° 26/22m at 20m at 60°

- c) Throw to be calculated on the basis of arithmetic average of throws (measured from monitor base flange to approximate centre of the footprint) in downwind & upwind directions at still wind conditions (maximum 4 km. /hr. as per New Delhi Region) at the time of performance test. Flow variation of + 5 % is permissible.
- d) The nozzle shall be able to produce foam with foam expansion ratio of 1:3 to 1:7, in line with relevant NFPA / UL / FM standards (with valid test certificates for expansion ratio, foam viscosity, drain time & burn back resistance tests) & monitor shall have suitable nozzle for connecting hose for hook-up with foam induction mechanism.
- e) The pattern of the Water/foam jet nozzle shall be adjustable from straight to 140°. Wide spray.
- f) The monitor shall have traversing mechanism to give 340° in either direction in horizontal plane and (+) 90°&(-) 45° in vertical plane through swivel joints operated by worm and worm wheel operated geared unit. There shall be separate hand wheels for horizontal and vertical movement of the monitor. The arrangement shall be such that monitor movements can be done by a single person. All the gear mechanisms shall be sealed by proper enclosure to avoid accumulation of dust on lubricated parts. Both the traversing mechanisms shall be self-locking type. There shall also be a hand operator to change the position of nozzle (Jet/spray adjustment).
- g) The Swivel Joints shall have SS ball bearing with efficient sealing.
- h) The monitor shall be variable flow adjustment type / Fixed Flow type as per the respective data sheet. For variable flow type HVLR, it should be possible to set all Flow settings easily and quickly at site by the operator.
- i) There shall not be any flanged joint on the monitor body, except one at base Flange. Other Joints between monitor body & nozzle shall be threaded / welded type.
- j) A pressure gauge to indicate the inlet pressure shall be fitted on the monitor body near inlet of nozzle. Pressure drop across the monitor should be less than 10 PSI.

- k) A drain connection with valve shall be provided near the base flange.
- l) Monitor will be painted with following painting specifications:
 - i. Surface preparation – sand / shot blasting to SA 2½.
 - ii. Primer (2 coats of epoxy base red oxide zinc phosphate primer) of 40 micron DFT max. + One coat of MIO; (micaceous iron oxide paint) 75 DFT.
 - iii. Finishing Coats: Two Finishing coats of Polyurethane paint of 40 DFT microns. The finishing coats shall be as per IS: 2932 and conforming to shade no. 536 of IS:5
- m) The monitor shall be so designed as to resist the nozzle reaction forces during operation and shall be capable of being handled by one person.
- n) It should be also possible to operate the monitor at 10.5 Kg/cm² pressure at Inlet flange.

2.2.2 Foam Induction System

- a) **'JRCP (Jet Ratio Control Proportioner) will be provided along with 4 nos. of 63 mm diameter Rubber Relined Pipes (RRL) each of 15 meters length (total length 60 meters) and with suitable SS 316 couplings for joining these pipes.** The induction system should be UL listed or FM approved.
- b) The Foam Induction system should be capable of feeding foam concentrate to the monitors from a horizontal distance of up to 60 meters from the Monitor Nozzle so as to comply with the performance criteria stipulated in the tender.
- c) The inlet and outlet of foam Inductor shall be provided with Standard 63- mm male and female instantaneous couplings as per IS:903.
- d) The length of the foam pick up tube shall be 3-4 Meters. It should be possible to induct 3% foam for all the flow settings for variable flow HVLR and at rated flow for fixed flow HVLR, however, variation of +20% of the induction rate is permissible. Manual valve shall be provided at foam inductor to set foam induction as per flow setting of the monitor.
Alternately, the change in flow rate of the foam induction system using different orifice plates can be accepted provided this system is approved by UL / FM. The entire three / two orifice shall be integrated into one unit for ease & quick operation.
- e) Vendor to design and fabricate a suitable capacity trolley made of channels with MS plate of minimum 5 mm thickness welded and mounted on two standard make solid rubber tyres with solid beam axle on heavy duty elliptical springs which can take the load of entire unit. All the operating area with chequered plate coated with aluminium paint) shall be provided.
- f) Trolley shall be designed to withstand the maximum vertical /horizontal thrust forces envisaged during operation of monitor.
- g) A suitable towing eye bolt of 80 mm diameter at the front of the trolley, of sufficient strength, should be provided so that trolley can be towed.
- h) Suitable lockers shall be provided to accommodate following.
 - i) Toolbox shall also be accommodated in the locker.
 - j) Braking system shall be provided. Trolley shall be designed in such a manner that during full operation, it should not get dragged and fully stable.
- k) Supporting legs (4 nos.) made of heavy grade MS pipes and foldable front bar for facilitating manual towing shall be provided.
- l) Trolley shall be equipped with reflectors both in front & back.
- m) Trolley should have proper anchoring system to hold the trolley firmly during operation of monitor.
- n) The trolley shall be properly painted with epoxy paints (As per 2.1.1-I) for external corrosion protection as per the data sheet, wherever applicable.
- o) Bidder shall design and fabricate the trolley in such way that it shall be maneuverer easily with full capacity of foam compound and accessories. The trolley shall also have provision for towing the trolley by external prime mover.

2.3 Material of Construction

Table 2.3: Material of Construction

Item/Part	Material of Construction
Nozzle	SS316 / SS-316 L / Brass
Monitor Body	SS316 / SS-316 L
Flange (150 # rating, ANSI B16.5 rating size 200/150 mm NB)	SS316 / SS-316 L
Swivel Joints	SS316 / SS-316 L
Worm	SS316 / SS-316 L
Gear	SS316 / SS-316 L
Spindle for worm	SS316 / SS-316 L
Hand-wheel for Nozzle, horizontal/vertical movement	SS316 / SS-316 L / SS-304
Pick up tube	PVC tube reinforced with high tensile steel wire helix as per ASTM D1785 sch.80 (3-4 meter length)
Drain connection	SS316 / SS-316 L
Drain valve	SS316 / SS-316 L
Foam strainer(removable type)	SS316 / SS-316 L
Foam Induction device / system / mechanism	SS316 / SS-316 L
Foam Induction Couplings(63 mm)	SS316 / SS-316 L / Brass
Nuts/bolts/studs at Monitor	SS316 / SS-316 L
Mounting Brackets for Motors/Limit Switches.	SS316 / SS-316 L / SS-304

2.4 Approval

The Monitor, Foam Nozzle and Foam Induction device / mechanism shall be UL Listed or FM approved with following features;

- Nozzle : Non-Aspirating Nozzle
- Monitor Flow (Foam solution) : Fixed / Variable (as per the respective data sheet) in single nozzle
- Operating Pressure : 100 PSI
- Induction : Aqua powered variable flow foam induction mechanism / device (single) suitable for all the flow rates of monitor for Variable flow HVLR / rated flow for fixed flow HVLR, as per the respective data sheet.

2.5 Workmanship and Finish

All the parts shall have good workmanship and finish. All burrs and sharp edges shall be removed. Passages for foam/water shall have smooth finish.

2.6 Painting and Marking

All external surfaces shall be properly shot blasted & painted as per specification.

Each monitor shall be clearly and permanently marked (embossed on SS plate) with the following:

- a) Manufacturer's/Supplier's name:
- b) Year of manufacturer:
- c) Purchaser's name and Order Reference:
- d) Capacity:
- e) UL / FM marking for monitor / nozzle /Inductor

2.7 Site work

During erection, installation and commissioning of the monitor at site, Bidder shall have to depute their supervisor for supervising erection & commissioning assistance. Bidder shall quote L.S. charges for supervision for each monitor along with the priced offer.

Bidder shall quote Lump Sum charges for supervision assistance during installation of monitors & associated jobs.

Supervision charges shall be inclusive of all to and fro travel to the location, local transport, boarding & lodging, communication charges etc. complete.

2.8 Exclusion

Fire water mains up-to inlet base flange of monitors is excluded from Bidder's scope.

Construction of support platform /elevated platform / structure .However, design & construction details for support Platform to be provided by the bidders.

2.9 Performance guarantee

The manufacturer shall guarantee the material, workmanship and the performance of the entire unit for a period of two-year from the date of acceptance of the material at site. The Bidder shall rectify any mechanical defect, faulty workmanship or operational defects found or replace the item(s) during this period without any extra cost to DAFFPL.

2.10 Packing

- a) The entire unit shall be packed in proper crates to ensure that no damage takes place during transportation.
- b) All the equipment shall be divided into multiple sections for protection and ease of handling during transportation. The equipment shall be properly packed for the selected mode of transportation, i.e. by ship, rail or trailer. The equipment shall be wrapped in polythene sheets before being

- placed in crates/ cases to prevent damage to finish. The crates/ cases shall have skid bottoms for handling.
- c) Special notations such as “Fragile”. “This Side Up”, “Centre of gravity”, “Weight”, ‘Owner’s particulars’, ‘ Purchase Order No.’ etc. shall be clearly and indelibly marked on the packages together with other details as per purchases as per purchase order.
 - d) The equipment may be stored outdoors for long periods before installation. The packing shall be completely suitable for outdoor storage in areas with heavy rains and high ambient temperature unless otherwise agreed. In order to prevent movement of equipment/components within the crates, proper packing supports shall be provided.
 - e) A set of instruction manuals for erection, testing and commissioning, a set of operation and maintenance manuals and a set of final drawings shall be provided and enclosed in waterproof cover.
 - f) Packing should be strictly done separately for DAFFPL, IGI Airport, New Delhi, with clear demarcation on the casing about the destination address to avoid any confusion / re-transportation.

2.11 Inspection & Testing Of Monitors

2.11.1 Factory inspection:

Bidder shall furnish Quality Assurance Plan (QAP) along with the Bid. The QAP shall include stipulations as given below with respect to Third Party Inspection Agency (TPIA). Prior to dispatch from Bidder’s shop the following acceptance tests shall be carried out by the Bidder to the complete satisfaction of owner’s representative/ DAFFPL’s authorized inspection agency without any extra cost to owner. All consumable (e.g. water, foam compound etc.) shall be arranged by Bidder at his own cost. Bidder shall arrange all facilities to carry out inspection & testing.

- a) Review of material Test Certificates by TPIA.
- b) Visual and dimensional check by TPIA Hydraulic test of each monitor body at minimum 25 Kg/cm² or hydraulic test pressure specified by UL Listing or FM whichever is higher. The pressure shall be held for minimum five minutes without any leakage or distortion of the any part. (100% by TPIA, 100 % performance by Bidder)
- c) Performance test shall be carried out for all the monitors & witnessed 100% by the TPIA. Testing shall be carried out to verify the following performance parameters as per above specification :
 - i. Measurement of Flow Rates (Fixed / Variable) as per the respective data sheet, at 7 Kg/cm² pressure at inlet flange. (Variation of +5% is acceptable).
 - ii. Horizontal Movement at highest flow setting for variable flow HVLR and rated flow for fixed type HVLR (as per respective data sheet) flow manually by hand wheel.
 - iii. Vertical at highest flow setting for variable flow HVLR and rated flow for fixed type HVLR (as per respective data sheet) flow manually by hand wheel.
 - iv. Jet / spray pattern adjustment manually using lugs/handle.
 - v. Horizontal & vertical Throw for foam & water at all the flow settings for variable flow HVLR / rated flow for Fixed flow HVLR, pressure at inlet flange 7 Kg/cm²)
 - vi. Foam Expansion ratio 1:3 to 1:7

- vii. Foam Induction rates at all the flow settings for variable flow HVLR / rated flow for Fixed flow HVLR.
- viii. Smooth functioning of Changeover of flows by single person without using tools.

2.11.2 Site Performance test:

Bidder to demonstrate performance of all the monitors for vertical throw with Foam and water in line with tender requirements of Horizontal distance of monitors from Tanks and Height of Tanks.

2.11.3 Approved Third Party Inspection Agency (TPIA):

Our registered Third Party Inspection Agencies are LRIS / DNV/ IRS / EIL / TUV

2.12 Information/Documents required from bidder

2.12.1 With Bid

Details and drawings of the offered foam cum water monitor with Bill of Material of monitor & accessories. Details & Drawings shall be in line with UL listing or FM approval document of the Bidder.

Following Performance details;

- a) Projectile curves of both water and foam streams showing horizontal & vertical throw for foam and water for all the three flow rates at Nozzle angles 30°, 45° & 60° from horizontal planes.
- b) Foot print (shape, size, area) of both streams at landing zone.
- c) K-factor of the nozzle with supporting calculations.
- d) Test reports indicating foam properties discharged from nozzle (1:3 to 1:7), which includes expansion ratio; drain time, foam viscosity and burn back resistance.
- e) Pressure drop across the monitor.
- f) Bidder to give details of the proposed foam induction system and schematic sketch of the monitor with Foam induction and foam source along with the technical bid.
- g) Valid certificates of UL Listing or FM approval of offered manually operated foam-cum water monitor, foam nozzle and foam induction mechanism.
- h) General Arrangement Plan (GAP) incorporating the stipulated inspection and testing requirements.

2.12.2 AT The Time of Delivery of HVLRs:

- a) Four sets of documents (duly certified by TPIA) to be provided to DAFFPL in Hard & Soft form.
- b) Successful bidder on award of work shall submit GA Drawing (s) of Monitor giving details on Foam induction system, mounting arrangements & Schematic arrangements of monitor to DAFFPL's site team for site preparation. The technical data & other requirements as specified in the tender documents and as agreed during technical stage shall be fully complied by the successful bidder without any deviation. Any deviations from the tender requirements noticed during installation or after commissioning, the same shall be rectified / replaced by the bidder without any additional cost to DAFFPL.
- c) As built drawings of monitor assembly.
- d) Installation procedure.

- e) All inspection and testing records.
- f) Operating and instruction manual.
- g) Testing and maintenance procedure/manual.
- h) All documents shall be submitted in English language only.

2.13 Commissioning assistance

The DAFFPL shall give commissioning call through email/ Fax to the Bidder, the Bidder shall depute their representative within 10 days of the commissioning call. The broad scope of erection and commissioning includes but not limited to the following:

- a) Erection / trials Supervision of HVLR and its components at different isolated 'No reach' corners of each tank of the DAFFPL, Delhi facility.
- b) Basic Training to Operating Personnel at Site
- c) Checking of mechanical functionality of HVLR and all its components and providing final clearance for commissioning of monitors.
- d) Commissioning spares, if applicable has to be provided by the Bidder and the same is deemed to be included in the quoted rate.
- e) Owner shall arrange for erection team with standard tools and tackles required for erection. Special commissioning and testing tools, if required shall be arranged by Bidder.
- f) Commissioning report to be prepared and jointly signed by Bidder and owner.

2.14 Method of Measurement

The item shall be measured in numbers.

2.15 Basis of Payment

Payment terms shall be as per "DAFFPL" terms and conditions.

3 Data Sheet for 1000 USGPM Trolley Mounted Variable Flow Foam-Cum-Water Monitor (UL/FM Approved)

Table 3.1: Data Sheet

SN	Description	Specification	Bidder's Confirmation
A	General		
1	Location	Outdoor	
2	Type	Stand Post Type (Fixed) Trolley Mounted, Single Barrel, Lever Operated, Non Aspirating, Field, Adjustable Variable flow.	
3	Scope of Supply	Monitor: UL Listed / FM Approved. Nozzle: UL Listed / FM Approved. Foam Induction Mechanism: UL Listed / FM Approved). Trolley	
4	Qty.	2 sets	
5	Approval	UL Listed/ FM Approved (copy of UL Listing / FM approval for the offered Monitor shall be submitted along with the Technical Bid)	
6	Manufacturer Name	Bidder to specify	
7	Model No.	Bidder to specify (Monitor / Nozzle/ Foam Induction System)	
B	Operating Condition		
1	Fluid Handled	Water / Foam Solution	
2	Temperature	Ambient	
3	Pressure	Max 12.6 Kg/cm ² (g) Min 7.0 Kg/ cm ² (g)	
C	Design Features		
1	Monitor	Operation Type: Manual Movement: Horizontal - 340° Vertical -105° (+90° to, (-) 15°.	
2	Nozzle	Type: Water cum Foam Diffuser type with Hollow Jet and Fog / Spray Forms with Foam Pick up tube Pattern: Adjustable from straight to 140°	

SN	Description	Specification	Bidder's Confirmation
		wide spray Foam Expansion Ratio: 1:3 to 1:7	
3	Foam Induction Mechanism	'JRCP (Jet Ratio Control Proportioner) will be provided with along with 4 nos. of 63 mm diameter Rubber Relined Pipes (RRL) each of 15 meters length (total length 60 meters) and with suitable SS 316' couplings for joining these pipes. Able to induct 3% foam. Capable of Feeding Foam concentrate to the monitor from a horizontal distance of up to 60meters from monitor nozzle/Centralized Foam System Inlet / Outlet: 63mm male/ Female instantaneous coupling as per IS:903 Foam Pick up tube – 3-4 meters	
4	Performance	Operating Pressure- 7.0 Kg/cm ² Flow Rate- Variable (1000 USGPM) with single nozzle	
5	Min Kinematic Performance with 7Kg/cm ² pressure at Inlet Flange(Water / Foam)	Horizontal 1000 USGPM – 70/65m at 30°	
		Vertical: 1000 USGPM 22m at 35m / 22 m at 30m @ 45° 26 / 24 m at 20m at 60°	
D	Materials		
1	Nozzle	SS316 / SS-316 L / Brass	
2	Monitor Body	SS316 / SS-316 L	
3	Flange	SS316 / SS-316 L	
4	Swivel Joint	SS316 / SS-316 L	
5	Worm	SS316 / SS-316 L	
6	Gear	SS316 / SS-316 L	
7	Spindle for worm	SS316 / SS-316 L	
8	Hand-wheel for Nozzle, horizontal/vertical movement	SS316 / SS-316 L // SS-304	
9	Pick up tube	PVC tube reinforced with high tensile steel wire helix as per ASTM D1785 Sch.80 (3-4meter length)	
10	Drain connection	SS316 / SS-316 L	

SN	Description	Specification	Bidder's Confirmation
11	Drain valve	SS316 / SS-316 L	
12	Foam strainer(removable type)	SS316 / SS-316 L	
13	Foam Induction device / system / mechanism	SS316 / SS-316 L	
14	Foam Induction Couplings(63 mm NB)	SS316 / SS-316 L / Brass	
15	Nuts/bolts/studs at Monitor	SS316 / SS-316 L	
E	TRAILOR		
1	Description	Trailer with Piping & Manifold Connections, JRCP Foam Induction System as per specifications. Foam Tank is Not required.'	
2	Inlet Connection	63mm Male Instantaneous Coupling with Inbuilt NRV and SS Ball Valve	
3	Drain Connection (header)	1/2" with SS Ball Valve	
4	Size X No. of Inlet Couplings	Min of 63mm inlet coupling with independent isolation SS Ball /Butterfly valve.	
5	Trailer Body (Structure, Plates, Axle)	Carbon Steel	
6	Water Pipes (Trailer & manifold)	Carbon Steel (Min Schedule 40thk. / HW class C ERW)	
7	Trailer Nuts & Bolts	Carbon Steel (Chromium Plated)	
8	Towing Eye	Yes (Carbon Steel)	
9	Towing Handle	Yes (Carbon Steel)	
10	Castor Wheel	1 No. on Front Side (PVC)	
11	Tyre	2 Nos. standard Solid rubber tyres .Bidder to specify the size and make in the technical bid	
12	Accessories	Brake (CS) Jack Leg Assembly (CS) Mud Guard (CS) Leaf Springs (CS) Standard Reflector (Rear & Front) Aluminium coated Chequered Plates	
F	Test & Inspection		
1	Visual & Dimension (10% Witness by TPIA & 100% Review	Yes	

SN	Description	Specification	Bidder's Confirmation
2	Hydrostatic Test (100 % by TPIA, 100 % Performance by Bidder)	25 Kg/cm ² (g) for 5 minutes, without any leakage or distortion of the any part.	
3	Performance Tests (100 % by TPIA, 100 % Performance by Bidder)	Measurement of Flow Rates: (1000USGPM) at 7 Kg/cm ² pressure at inlet flange Horizontal Movement at 1000 USGPM flow Manually by hand wheel. Vertical Movement at 1000 USGPM flow Manually by hand wheel. Jet/spray pattern adjustment manually using lugs/handle Horizontal & vertical Throw for foam & water at all the three 1000 USGPM settings (pressure at inlet flange 7 Kg/cm ²) Foam Expansion Ratio Induction rates at all the three 1000 USGPM settings Smooth functioning of Changeover of flows by Single person without using tools.	
4	Site Performance Tests	100% with Foam after installation	
G	Painting		
1	Monitor	As per Specifications (1.2.1-L)	
2	Trailer	As per Specifications (1.2.1-L)	
H	Documents Required		
1	UL Listing / FM Approval of the offered HVLR - Monitor, Foam Induction mechanism & Foam Nozzle	Bidder to submit along with the Technical Bid	
2	GA Drawing of the HVLR and Foam Induction System	Bidder to submit along with the Technical Bid	
3	Schematic Sketch of the monitor with foam induction and foam source	Bidder to submit along with the Technical Bid	
4	Projectile Curves for Water & Foam	Bidder to submit along with the Technical Bid	
5	Foot Print at Landing Zone	Bidder to submit along with the Technical Bid	

Technical Specification for HVLR Foam Package

Modernization of Fuel Farm-IGI Airport, Shahbad Mohammadpur, New Delhi

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SN	Description	Specification	Bidder's Confirmation
6	K Factor of the Nozzle	Bidder to submit along with the Technical Bid	
7	Pressure Drop across monitor	Bidder to submit along with the Technical Bid	
8	Valid test certificates for expansion ratio, foam viscosity, drain time & burn back resistance tests	Bidder to submit along with the Technical Bid	