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OIL AND NATURAL GAS CORPORATION LIMITED

**REVAMPING OF LPG RAIL GANTRY & REVAMPING /
AUTOMATION OF ROAD GANTRY AT PRODUCT TERMINAL AT
ONGC, HAZIRA PLANT**

**PART II
TECHNICAL BID DOCUMENT
ANNEXURE II – MECHANICAL**

DOCUMENT NO.

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**ESSAR PROJECTS (INDIA) LIMITED
ENGINEERING & PROJECT MANAGEMENT**

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1.0 GENERAL:

1.1 Facility at ONGC Hazira Product Terminal

Products (LPG, HSD, ATF, & SKO) are received from storage terminal through pipe line. Delivery of products is through Rail wagon and Road tank trucks. LPG is transported through Rail wagon and Road tank trucks. HSD/ATF/SKO is transported through Road Tank trucks.

Product dispatch facilities are as follows:

LPG dispatching comprises of Rail loading gantry with 80 No's of loading points & 2 nos. of decanting points, Road loading gantry of 08 Nos. of loading bays & 1 no decanting bay and PLT (Pipe Line Transfer) dispatch to IOC bottling plant, BPCL bottling plant. Additionally LPG PLT dispatch is planned for HPCL bottling plant.

HSD dispatching comprises of 2 nos. of loading bays in road gantry.

SKO dispatching comprises of 3 nos. of loading bays in road gantry.


ATF dispatching comprises of 2 nos. of loading bays & 1 no. open bay for ATF in Road Gantry.

Top and Bottom kind of loading arms assembly shall be used based on Carrier vehicle as illustrated below:

Sr. No	Service	Carrier Vehicle	Loading position
1	HSD, SKO, ATF	Truck	Top
2	LPG	Rail	Top
3	LPG	Truck	Bottom

The supply items system for ATF/SKO/HSD loading to be designed for following broad parameters:

Ambient Conditions :	
Minimum Temperature	5° C
Maximum Temperature	65° C

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Maximum Humidity	95%
Hazardous area classification	IEC Zone 1 &2, Gr. IIA & IIB T3; CCE(PESO) / CMRI approved
Petroleum products to be loaded	ATF, HSD, SKO
Flow Rate	Max. 750 LPM
Range of flow rate	10% to 120%
Working pressure	2 to 6 Kg/cm2
Design Pressure	15 Kg/cm2
Capacity of Tank Trucks	12 KL to 24 KL
No. of Compartments	Three to Five

The supply items system for LPG Rail wagon and Road Truck loading to be designed for following broad parameters:

Ambient Conditions :	
Minimum Temperature	5° C
Maximum Temperature	65° C
Maximum Humidity	95%
Hazardous area classification	IEC Zone 0 & 1, Gr. IIA & IIB T3; CCOE (PESO) / CMRI approved
Products to be loaded	Liquid LPG
Flow Rate	40 M3/Hr through each Loading Arm
Range of flow rate	10% to 120%
Working pressure	7 to 12.5 Kg/cm2
Design Pressure	21 Kg/cm2
Capacity of Tank Trucks	12 KL to 35 KL
Capacity of Rail Wagon	70 KL



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2.0 SCOPE OF WORK:

The scope of work of contractor comprises of Design, detailed engineering, supply, installation, testing, calibration and commissioning of Revamping of LPG Rail gantry and Revamping / Automation of Road truck loading including all statutory approval required for the project. Scope of work includes replacement of the existing system and installation and commissioning of new supplied system along with necessary modification in the existing system. Replacement means dismantling of the existing system and installation of new system.

Contractors are advised to inspect the site and ascertain the conditions prior to quoting the amount.

2.1 LPG Rail Gantry

- 2.1.1 Replacement of 16 no Isolation valves of Strainers (8 no) in main 12" liquid line in between North and South Gantry.
- 2.1.2 Replacement of drain / vent system of strainers (8 nos.). The drain / vent system are not in operable condition and are badly corroded. It is to be replaced.
- 2.1.3 Replacement of all Bay Isolation valves both in Liquid line and vapor line, Excess flow check valves both in Liquid line and vapor line along with associated piping and fittings.
- 2.1.4 Replacement of Liquid loading arm and Vapor return arm,
- 2.1.5 Replacement of drain and vent system along with associated piping and fittings.
- 2.1.6 Replacement of Decanting Gantry liquid Loading arm and Vapor return arm on South side rail gantry.
- 2.1.7 Installation of additional two nos. of decanting facilities at north side of north rail gantry.
- 2.1.8 Repair / replacement of 120 nos. flapper bridges along with winch system and supporting concrete structure.
- 2.1.9 Replacement of 1 no. flame arrestor in vent line with approach / ladder with proper working platform for two persons for facilitating repair / cleaning of flame arrestor in both the gantries – South and North.



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- 2.1.10 Replacement of Gas Pressure regulator in Fuel line with suitable bypass / isolation arrangement (1 no. 2" size regulator with 3" 600 # RF Flanged ends with a suitable bypass / isolation arrangement. Further another line has to be commissioned with new 2" size regulator with 3" 600 # RF Flanged end in parallel to the existing regulator).
 - 2.1.11 Associated Electrical system.
 - 2.1.12 All the existing 80 Nos. of digital set stop valves are to be refurbished (all SOV's, internals, tubing, spindles, indicators, isolation valves to be replaced).
 - 2.1.13 Naphtha shutdown valve SOV to be replaced, SOV will be Manual latch type.
 - 2.1.14 Installation and commissioning of four nos. of new metering system for unloading similar to the existing loading bays (consisting of flow meter, excess flow check valve, isolation valves, associated cabling etc.) for the existing LPG decanting bays (two nos. in south gantry) and for the newly proposed decanting bays (2 nos.) at north gantry.
 - 2.1.15 Provision for new rail sump (for naphtha product, capacity 33.7 m3) and pump & motor assembly with inter-connection with the existing sump & pump assembly.
 - 2.1.16 One of the bays in each gantry shall be so designed to accommodate two flow meters in series to enable checking of any meter with master meter. The proving facility shall be incorporated through TAS.
- 2.2 LPG Road Gantry**
- 2.2.1 Replacement of all loading points (8 nos.) liquid line loading arm and vapor line arm.
 - 2.2.2 Replacement of decanting bay (1 no.) liquid line loading arm and vapor line arm.
 - 2.2.3 Replacement of isolation valves, excess flow check valves and associated piping and fittings in liquid line and vapor line and drain and vent system.
 - 2.2.4 Refurbishment of 2 nos. of existing Strainer in LPG liquid line.
 - 2.2.5 Replacement of earthing system and hook up with batch controller.
 - 2.2.6 Provisioning of Emergency Shut-Down Valve (ESDV) in 10" liquid line & 4" vapor line as per OISD Guidelines similar to existing rail gantry ESDV system. Emergency shut down valves to be provided with upstream and downstream isolation valves with bypass valve arrangement and spectacle blind flange and necessary drain and vent arrangement for depressurizing.

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Pressure relief valve of suitable capacity to be provided in upstream of ESDV valve station for pressure relieving purpose.

- 2.2.7 Installation and commissioning of one no. of metering system for the existing LPG decanting bay similar to the existing loading bays (consisting of flow meter, excess flow check valve, isolation valves, associated cabling etc.).
- 2.2.8 All the existing digital set stop valves (8 nos.) are to be refurbished (all SOV's, internals, tubing, spindles, indicators of isolation valves to be replaced).
- 2.2.9 Replacement of 4 nos. of Isolation valves (8") of strainers (2 no) in liquid line after battery limit.
- 2.2.10 Replacement of drain / vent system of filters (2 no). The drain / vent system are not in operable condition and are badly corroded. It is to be replaced.
- 2.2.11 Since the road loading shall be used for custody transfer metering, there shall be suitable proving facility to be provided as per the standards.
- 2.2.12 Replacement of 1 no. flame arrestor in vent line with approach / ladder with proper working platform for two persons for facilitating repair / cleaning of flame arrestor in LPG Road Gantry.

2.3 ATF / SKO / HSD Road gantry

- 2.3.1 Provision for stand-by road sump (for ATF / SKO / HSD products, capacity 16.9 m3) and pump & motor assembly with inter connection with the existing sump & pump assembly.
- 2.3.2 Provision of new loading arm for SKO road loading bay no. 6. Existing loading arm at the bay no. 6 is to be shifted to ATF bay no. 2.
- 2.3.3 All the existing digital set stop valves (5 nos.) are to be refurbished (all SOV's, internals, tubing, spindles, indicators, isolation valves are to be replaced.)
- 2.3.4 Provision of Emergency Shutdown Valve (ESDV) facility in all the three products (8" for ATF, 4" for SKO and HSD) lines. Emergency shutdown valves to be provided with upstream and downstream isolation valves with bypass valve arrangement and spectacle blind flange and necessary drain and vent arrangement for depressurizing. Pressure relief valve of suitable capacity to be provided in upstream of ESDV valve station for pressure relieving purpose. Bypass of ESDVs is to be provided with spectacle blinds. Also provide with suitable spectacle



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blind flanges, which are to be used for blinding pipeline when ESDVs are to be dropped for repair/maintenance.

2.3.5 Provision of suitable facility for verification / cross checking of tanker compartment volume for POL products (i.e. HSD/SKO/ATF). This will include an overhead tank of either 2 KL / 3 KL capacity along with water filling line and tanker filling line.

2.3.6 Since the road loading shall be used for custody transfer metering, there shall be suitable proving facility to be provided as per the standards.

2.3.7 Isolation valve upstream of ESDV in SKO pipeline is to be provided to act as battery limit isolation valve.

2.3.8 A pressure gauge at isolation valve along with draining facility is to be provided.

2.3.9 Fall arresting mechanism / arrangement is to be provided at POL road gantry for loading operators / drivers working / moving on the tanker.

2.4 GENERAL

2.4.1 Split Duct type Air Conditioning system for new control room (Air conditioning of control room shall be minimum 1 TR per 1000 Cubic feet area + heat load of any equipment). 100 % redundant Air conditioning system to be provided.

2.4.2 Air conditioning system to be extended for existing weigh bridge control room

2.4.3 Ventilation system for MCC room, Battery room, store room, toilet block and Air conditioning equipment room

2.4.4 Fire extinguishing system and firefighting system for the control room as per OISD norms.

2.4.5 Shifting of existing sewage sump with sump pump and associated piping.

2.4.6 Relocation of existing 2 nos. of network antenna and one number of lighting pole

2.4.7 Relocation of existing sewage sump along with associated accessories

2.4.8 Barrier gate at road truck entry area



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3.0 CODES AND STANDARDS

The material of construction of the pipes, flanges, valves, joints etc. shall be in accordance with relevant ASTM standards. The specification of the pipes and flanges shall be in accordance with relevant ASME, ANSI and API standards. Wherever international standards and codes are not available, vendor may follow his own proven standards and practices subject to ONGC approval.

API	American Petroleum Institute
ASTM	American Society of testing and materials
ASME	American Society of Mechanical Engineers
ANSI	American National Standards
OISD	Oil Industry Safety Directorate
ASME B16.5	Steel Pipe flanges and flanged fittings
AMSE B16.20	Ring-Joint gaskets and grooves for steel flanges
ASME SEC VIII	Boiler & pressure vessel code rules
ANSI/ISA 575-01	Control valve sizing, capacity test procedures, face to face dimensions, leakage
API RP 520	Fire sizing of safety and control valve
API RP 598	Control valve leakage
IS 2341:1963	Calibration vessel
OIML standard R 117	Measuring systems for liquids other than water
ISO 4185	Standard for measurement of liquid flow in closed conduit- weighing method
ISA RP SS-1 S 62-01, S82-02 S8-03, S18.1	Instrument Society of America standard and codes



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4.0 TECHNICAL REQUIREMENT

This specification outlines the minimum requirement under which the manufacturer shall design, manufacture, test and supply the loading arm for loading / unloading operations of road tanker/ rail with top/bottom loading arrangement.

4.1 Scope indicated in the P & ID as well as in the scope of work is brief scope only. LSTK contractor to physically check the system requirement and supply all the necessary advance system to complete the system requirement.

4.2 All the gantry loading points / bay shall be preferably manufactured in the form of a skid ready to erect to minimize hot work at site. Trial assembly to be carried out in sick bay.

4.3 BOQ indicate in the tender document is tentative only. Any replacement / refurbishment required after site visit and study shall be in the scope of LSTK contractor.

4.4 Supply of equipment and warranty:
Supply of all equipment shall be from the original manufacturers as per approved vendor list. Entire warranty spares / service support, statutory approvals like PESO / Test reports / certificate of compliance etc. shall be made available from the equipment manufacturer as per approved vendor list furnished in tender documents.

4.5 LOADING ARM:

Loading Arm: Loading Arm shall generally consist of base riser, outboard arm, inboard arm, connecting pipe or drop pipe, swivel joints, vacuum breaker, balancing arrangement, supporting arrangement and locking arrangement for filling position and parking position.

Each loading arm shall essentially be completed with following

- Outboard and Inboard arms
- Connecting Pipe
- Swivel Joints
- Drain and Vent Connections
- Shut Off valve
- Counter Balance Arrangement
- Supporting Arrangement
- Locking Arrangement
- Emergency release coupling with Automatic Shut off valve
- Acme coupling set



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4.5.1 INBOARD / OUTBOARD ARM & CONNECTED PIPES

The arms shall be of seamless pipes suitable for the hydrocarbon service. It shall be of seamless Carbon steel material to ASTM A106 / Aluminum pipe material to ASTM B-345 (6061/6063T3) to avoid sparking. The equivalent flange shall be 150# or 300# (based on design condition); ASME B16.5 with material as ASTM A105 / ASTM B 23 Gr.358-T6.

The arm pipe thickness shall be selected for the specified design pressure (not less than SCH 40 in any case), and the bending and torsional stresses encountered in the loading operations.

Connected pipe / nozzle shall be provided with ACME male connector and Flange end connection. ACME coupling male and female connector shall be of cast steel and wing nut shall be of gun metal.

In the event of failure, the spring must be contained in a heavy duty cylinder to avoid any injury to the operator.

4.5.2 SHUT OFF VALVE

A shut off valve shall be provided in the connecting pipe to minimize product leakage at the time of disconnection. In case of loading arms with drop pipe, this valve shall be provided in the outboard arm. The shut off valve shall be a ball valve of Fire safe type of design with full bore and should have API monogram.

4.5.3 SWIVEL JOINT

The swivel joints shall be designed to make the arm maneuverable with the effort of a single person. The swivel joints bearing surface material and ball bearings material shall be suitable for fluid handled. The joint shall have chrome carbon steel balls in minimum two rows fixed in suitably hardened stainless steel guide ways. The seal material shall be filled PTFE with SS 316 wear and anti-extrusion rings & Inconel X-750 energizer spring.

Bearing surfaces and ball bearings shall be suitably hardened to ensure long life. The swivel joints shall be lubricated type.

The swivel joints bearing surface material and ball bearings material shall be suitable for fluid handled. Bearing surfaces and ball bearings shall be suitably hardened to ensure long life. The swivel joints shall be life - lubricated type.

The arrangement of swivel joint shall preferably allow changing of seal without complete dismantling bearings. The swivel joints shall have corrosion-proof sealing surfaces of stainless steel or vendor's proven standard material. They shall have leak detection port to enable monitoring of primary seal for possible leakage. They shall have a positive back up seal / radial O-ring to protect ball races against harsh operating condition.



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Swivel joint shall be of following constructional features.

Swivel joint in base riser shall be of split flange construction, so as to allow replacement of main seals without removal of bearing balls and dismantling of swivel joint.

All other swivel joints shall be of flanged type construction or shall be provided with flanged connection on each side of these joints for ease of maintenance.

No screwed swivel joint shall be used in the loading arm.

Swivel joint shall be of following constructional features.

Base Swivel (Material CS): Shall be of Double split flange construction with three seal design, so as to allow replacement of main seals without removal of bearing balls and dismantling of swivel joint. Swivel should have leak detection port for preventive maintenance.

Flanged swivel joint with one row of Needle Valve and one row of Ball Bearing instead of 2 Ball races is also accepted.

Intermediate Swivel joints (Material CS and Aluminum): Shall be of double ball races with same material of construction of swivel with hardened surface. Bearing balls with SST 400 grade for less wear & tear and high durability. All this swivel joints shall be of flanged type construction or shall be provided with flanged connection on each side of these joints for ease of maintenance.

No screwed swivel joint shall be used in the loading arm.

Flanged swivel joint with one row of Needle Valve and one row of Ball Bearing instead of 2 Ball races is also accepted.

4.5.4 API COUPLER


Loading coupler shall of API standards as per RP 1004 with 5/4 cams drip less design a Seal material should be compatible with petrol and diesel (PTFE or equivalent). Coupler body shall be Aluminum Hard Anodized. API couplers to be supplied by manufacturers who can give the service for the couplers as and when required and should have trained service personnel in India.

4.5.5 END CONNECTION

LPG Road filling type - Inboard end shall be Carbon steel forged flanged end, whereas the Outboard end shall also be flanged end.

LPG Rail Wagon filling type- Inboard end shall be Carbon steel forged flanged end, whereas the Outboard end shall be hammer union joint.

HSD / SKO / ATF Road filling type- Inboard end shall be Carbon steel forged flanged end, whereas the Outboard end shall be Aluminum pipe open end.

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4.5.6 BALANCING ARRANGEMENT

The arms shall be counter balanced by compression spring assembly, torsion spring box with integrated locking spring, Oil-impregnated bronze bearing for carrying spring load to Eliminate ferrous-to-ferrous contact, minimizes wear, ensures smooth operation, pneumatic cylinder or hydraulic cylinder.

The balancing arrangement shall be such that the outboard arm remains horizontal in filled condition for pressure bottom loading arm and in empty condition for atmospheric loading arm.

Balancing arrangement should have five year warranty.

4.5.7 SUPPORTING ARRANGEMENT FOR BOTTOM LOADING TYPE ARM

The arm shall be self-supported on base riser location.

The supporting arrangement shall be such that there is complete flexibility in operation.

The supporting arrangement shall be such that no load or force due to bottom loading arm is transferred to piping.

4.5.8 SUPPORTING ARRANGEMENT FOR TOP LOADING TYPE

The arm shall be supported by column or stand post with antifriction bearing at top location.

The supporting arrangement shall be such that there is complete flexibility in operation.

The supporting arrangement shall be such that no load or force due to loading arm is transferred to piping.

4.5.9 LOCKING ARRANGEMENT

Suitable locking arrangement shall be provided for locking the arm in parked position. The locking arrangement can be manual or pneumatic.

4.5.10 EMERGENCY RELEASE COUPLING

Each loading arm shall be provided with one emergency release coupling (breakaway coupler) with self-closing valve on both the sections. It shall be of instantaneous shut down type to be installed either on terminal sleeve or on outboard arm downstream of the shut off valve. The breakaway coupler shall be of SS 316 L constructions, seals of Viton, PTFE type and shall be suitable for re-assembly in 5 minutes.

4.5.11 GROUNDING ARRANGEMENT



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Each bottom loading arm shall be electrically continuous, otherwise earthing conductors shall be provided across the non-insulating joints to make it electrically continuous. All flanged joints shall be earthed by copper jumpers.

4.6 BOTTOM LOADING ARM FOR LPG LOADING

Bottom Loading and Vapor Recovery Arms are required for loading petroleum products (Liquid LPG) into Road Tankers and for recovering vapors.

Bottom Loading Arms will have the following:

- 4.6.1 Bottom loading arm shall generally consist of base riser, outboard arm, flexible hose, swivel joints, balancing arrangement, supporting arrangement and arrangement for parking position dummy Adapter for parking stand post.
- 4.6.2 Design should be such that arms can fully cross over within the API RP1004 specified loading envelope.
- 4.6.3 Every Bottom Loading Arm should be fitted with API Coupler conforming to API RP 1004
- 4.6.4 All API Couplers should be easy to maintain with automatic latching and ergonomic ball type handle.
- 4.6.5 Bottom Loading System are designed using 3" (80 NB) bore Pipe, Valves, Meters, Strainers, Hoses etc.
- 4.6.6 Bottom Loading Facility for LPG will have a 2" Vapor Recovery Arm as well. Vapor recovery arm will be complete with poppeted vapor coupler to comply with API RP1004 standard. Coupler should also have a sight glass for visible warning of liquid in vapor line.
- 4.6.7 Bottom loading rack will require overfill and grounding assurance system with gantry plug and intrinsically safe signaling to truck connection as per API RP1004.
- 4.6.8 With Bottom Loading System the Tank Truck Driver should be able to carry out the following basic tasks:-
 - a) Park the Bottom Loading Tanker in correct location in the loading Area.
 - b) Connect the grounding and overfill gantry plug to the truck mounted overfill and grounding system to enable the pumping system to achieve a permissive state.
 - c) Connecting the Vapor arm to the Vapor recovery connection on the truck for loading LPG.



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- d) Connect Bottom Loading Arm API Coupler to the Tanker.
- e) Open Tanker Foot Valves/Emergency Valves and Compartment Vapor Vents.
- f) Set the Flow Meter and start loading.
- g) When loading is completed the Driver disconnects the Bottom Loading Arm and vapor recovery arm (after loading LPG) and closes the Tanker Foot Valves, Vapor vents provided on the Manhole Covers on the Top of the Tankers.

4.7 Valves:

- 4.7..1 Valve shall conform in all respects to high standards of engineering, design & workmanship and be capable of performing continuous commercial operation up to the Bidder's guarantee in a manner acceptable to the Purchaser, who will interpret the meaning of drawings and specifications and shall be entitled to reject any work or material which in his judgment is not in full accordance therewith.
- 4.7..2 Emergency Shut Down valves are to be provided with bypass arrangement. Isolation valves are to be provided in upstream and downstream of ESDV to enable for maintenance of ESDV. Necessary drain and vent arrangement to be provided for depressurizing.
- 4.7..3 All the valves shall be Bubble tight.
- 4.7..4 Maximum leakage rate shall not exceed the limitations of API 6D and API 598 (bubble tight).
- 4.7..5 Valve shall comply with API 6FA and API 607 fire testing requirements.
- 4.7..6 Valve seats shall be self-relieving type.
- 4.7..7 Valves shall be Bi-directional shutoff.
- 4.7..8 Asbestos is not permitted in the manufacturing of valves.
- 4.7..9 All valves below 40 NB shall be of forged type with Socket weld end and shall be of minimum 800 # rating.
- 4.7..10 The design of valves shall ensure a streamlined passage and gate valves shall have low pressure drop.
- 4.7..11 The seats and discs shall be easily renewable and/or shall be suitable for easy re-facing and grinding.

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- 4.7..12 Flow direction shall be clearly embossed on the valve body for globe and check valves.
- 4.7..13 All forged valves shall have bonnet construction or integral or welded type as indicated in the technical data sheet.
- 4.7..14 The valves are required to be mounted either in horizontal or vertical pipes. Hence the valve including actuator shall be suitable for mounting with the valve shaft at any angle so that the position of the hand wheel for manual operation of valve is such that it facilitates easy operation by a person standing on floor.
- 4.7..15 Valves and NRVs when it is connected to the main header will be provided with spectacle blind flange.

4.8 Piping and Fittings

- 4.8.1 All fittings shall be supplied of seamless quality confirming to ASTM SA 106 Gr. B.
- 4.8.2 Pipe 50 NB and below size shall be of minimum SCH 80.
- 4.8.3 All pipes shall be supplied with minimum length of 6.0 M. All pipes of 65 mm NB and above shall be supplied with the ends beveled for welding. There shall be no negative tolerance on length.
- 4.8.4 All pipes of 50mm NB and smaller shall be supplied in straight lengths with the plain ends.
- 4.8.5 All fittings of 65 mm NB and above shall be supplied with the ends beveled for welding.
- 4.8.6 All fittings of 40mm NB and smaller shall be supplied with the socket weld ends.
- 4.8.7 All mandatory test requirements as per ASME section II shall be carried out for all pipes.
- 4.8.8 All flanges for LPG loading facility shall be weld neck type.
- 4.8.9 Stainless steel pipes, both inside and outside, shall be pickled and passivated before dispatched.

4.9 Flapper Bridge

- 4.9.1 Flapper Bridge shall be provided with rubber bush below Flapper Bridge to avoid sparking while contacting with the wagon.

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4.9.2 Flapper Bridge to be provided with winch system. Existing winch for Flapper Bridge to be replaced with new winch system along with rope. Winch shall be designed in such a way that Flapper Bridge will be operated by a single person. Location of winch to be selected in such a way that it is easily approachable from operating platform.

4.9.3 Flapper Bridge shall be supported from the existing structure. Required modification to accommodate the flapper bridge in the available structure to be done. Damaged Civil and structure part shall be repaired and if required additional strengthening to be done.

4.9.4 Grating of Flapper Bridge shall be serrated type.

4.10 Decanting Sump with Sump Pump for POL road gantry and Naphtha facility

4.10.1 POL Road Gantry area Sump

- A) Sump shall be of the same capacity of the existing sump.
- B) Sump to be manufactured in accordance to ASME Sec VIII Div-I.
- C) Required tolerance for corrosion and manufacturing to be maintained.
- D) Required corrosion protection arrangement to be provided.
- E) Necessary tank grounding arrangement to be provided.
- F) Required statutory approval to be obtained for Tank.
- G) Tank to be provided with U Stamp.
- H) Tank to be hydro test at works before dispatch.
- I) Required certificates to be provided along with tank.
- J) Inlet piping from Road gantry to be connected to the new sump.
- K) Necessary isolation arrangement with required isolation valves to be provided.
- L) New Pump shall be of the same flow, head and capacity to the existing pump.
- M) Pump discharge end to be connected to the existing pump discharge header with necessary isolation valves.
- N) Necessary isolation arrangement on the existing pump discharge header to be provided.
- O) Wherever isolation valve is below ground, necessary pit arrangement to be provided for valve operation and maintenance.

4.10.2 Naphtha Rail Gantry area Sump

- A) Sump shall be of the same capacity of the existing sump.
- B) Sump to be manufactured in accordance to ASME Sec VIII Div-I.
- C) Required tolerance for corrosion and manufacturing to be maintained.
- D) Required corrosion protection arrangement to be provided.
- E) Necessary tank grounding arrangement to be provided.



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- F) Required statutory approval to be obtained for Tank.
- G) Tank to be provided with U Stamp.
- H) Tank to be hydro test at works before dispatch.
- I) Required certificates to be provided along with tank.
- J) Inlet piping from Road gantry to be connected to the new sump.
- K) Necessary isolation arrangement with required isolation valves to be provided.
- L) New Pump shall be of the same flow, head and capacity to the existing pump.
- M) Pump discharge end to be connected to the existing pump discharge header with necessary isolation valves.
- N) Necessary isolation arrangement on the existing pump discharge header to be provided.
- O) Wherever isolation valve is below ground, necessary pit arrangement to be provided for valve operation and maintenance.

4.11 Sewage Sump with sump pump

- A) Existing sewage sump to be dismantled.
- B) Sewage generated from the existing weigh bridge control room toilet, marketing office all toilet blocks sewage to be terminated to the new sewage sump.
- C) Sump shall be made of Concrete.
- D) Sump shall be provided with required capacity. Capacity to be work out based on the no. of person utilizing toilet block. However minimum 50 persons capacity to be considered.
- E) Necessary sock pit and septic tank arrangement to be provided.
- F) Sewage line from the existing toilet blocks to be terminated to the new sewage sump. Necessary chamber to be provided wherever necessary. Required slope towards sewage sump to be maintained for smooth flow of sewage. Wherever there is change in direction of pipe, necessary chamber to be provided.
- G) New Pump shall be of the suitable capacity.
- H) Pump discharge end to be connected to the existing line at appropriate nearby location. Existing pump discharge line size is 80 NB.
- I) Piping shall be of suitable material.
- J) Wherever isolation valve is below ground, necessary pit arrangement to be provided for valve operation and maintenance.

4.12 PACKAGED AIR CONDITIONER UNITS

4.12.1 Air cooled DX ductable high static split AC unit for Control room and Battery room with UPS room areas shall be provided for 24 x 7 days. Air conditioning system shall be designed in such a way that minimum capacity for air conditioning shall be 1 TR per 1000 cubic feet + Heat Load of the equipment + 100 % Stand By Capacity.



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4.12.2 Air conditioning system is to be extended in the existing weigh bridge control room.

4.12.3 The following room to be provided with Air conditioning.

Sl. No.	Area	Room Inside temp. (in °C)	Relative Humidity %	Type of AC System
1.	UPS room	22 ± 2.0°C	55±5%	Air cooled DX Ductable high static split AC unit
2.	PLC room	22 ± 2.0°C	55±5%	
3.	Control room	22 ± 2.0°C	55±5%	
4.	F & G Panel room	22 ± 2.0°C	55±5%	
5.	Engineers room	22 ± 2.0°C	55±5%	

4.12.4 The following room to be provided with ventilation system.

Sl. No.	Area	Type of System
1.	MCC Room	Ventilation System
2.	Air Conditioning equipment room	
3.	Battery Room	
4.	I & C Store room	
5.	Mechanical Store room	
6.	Electrical Store room	
7.	Toilet Blocks	
8.	Any Other Room	

4.12.5 The Air conditioning system, materials and equipment provided shall comply with the latest edition of the ASHRAE, ARI & IS codes and standards.

4.12.6 The PACKAGED Air conditioner units shall be mounted on attractive, corrosion – resistant, thermally & acoustically insulated cabinets. The refrigerant circuit shall be completely piped at factory & transported with operating charges of refrigerant & oil. The circuit shall include thermostat, expansion valve, distributor, liquid strainer and de-hydrator liquid line shut-off valve. It will be protected by Hi-Lo pressure stat. R-407C OR R-410A refrigerant shall be used.

4.12.7 The indoor unit will be floor mounted inside the room with other required accessories. The outdoor unit will be kept outside the building. The both units to be connected by insulated refrigerant piping. The insulated drain pipe from indoor unit to be connected to nearest drain point. The power & control cable are to be provided with required electrical local starter. The

supply air from indoor unit to be distributed through diffusers & grilles connected with G.I. ducting network to keep the place at required design conditions & return to AC unit from return path. The fresh air will be provided as per requirement by fan with control damper & pre-filter.


4.12.8 Air filter shall be provided for the fresh air as well as total air. The air filter shall be dry panel type. It shall have large surface area & good dust holding capacity. The filter shall be capable of handling air with dust concentration 10 mg/cum of air. The cleaning efficiency of the filter shall be more than 90 % down to 10 microns. The filter shall be easily replaceable type.

4.12.9 Cabinet of PACKAGED AC unit shall be provided with suitable openings with flanges for fresh air ducts with hand operated control dampers. Thermostat, humidistat & strip heaters shall be provided for control of temperature & humidity as per the inside design conditions.

4.12.10 Booster fan has to be provided at the return air passage with flameproof motor. The condenser shall be of air cooled type.

4.12.11 CENTRIFUGAL FANS

- A) All the centrifugal fans shall be of DWDI or SWSI as required. The fan shall have end suction and discharge in the direction as required. All centrifugal fans shall be coupled to the drive motors with V-belts.
- B) Speed of the fan shall be preferably within the 1000 rpm and outlet velocity shall be within 12 m/sec.
- C) The centrifugal fan impellers shall be formed backwardly with non-overloading characteristics, welded to the back plate and shroud, if any. The fan wheel shall be balanced statically and dynamically.
- D) Centrifugal fan housing shall be of welded construction and provided with flanges at outlet for duct connection. The large size fans shall be split casing type.
- E) Fan shall be connected to duct with a flexible canvas connection.
- F) A common base frame shall be provided for fan and driving motor and whole assembly shall be mounted on vibration isolators.
- G) Dampers at the outlet of centrifugal fan shall be of approved multi-bladed type with neoprene edging on blades for tight shut off.
- H) Each damper blade shall be provided with bronze / gunmetal bearing at each end of spindle.
- I) Operating lever along with the necessary linkages shall be provided at an accessible position for operating the dampers.
- J) Suitable fixing device for locking the damper at desired position and an indicator to show the percentage of opening of damper shall also be provided.
- K) Centrifugal fans shall be provided with adjustable V-belts and sheaves. All belts shall be sized for 250% rated horsepower.

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- L) All V-belts drives shall be equipped with removable guards that do not impede the airflow to the fan inlet and belt tensioning device. There should be minimum two belts per drive.
- M) Pulleys shall have minimum two grooves to prevent start up failure and premature belt failure. Pulleys shall be balanced statically and dynamically.
- N) Fan shall be operating below first critical speed. First critical speed of the rotating assembly shall be at least 25% above the operating speed.
- O) Centrifugal fan shall be mounted on self-aligning heavy-duty ball bearing or roller bearing of adequate capacity and life.
- P) Bearing shall be grease/oil lubricated and provided with fittings for lubrication from outside.
- Q) The bearings shall be located in an easily accessible location to facilitate maintenance. The minimum adjusted rating life for Bearings at operating conditions shall be 40,000 hrs.
- R) Sound level of fans shall not exceed 70dB (A) at 1 meter distance from the rotating fan parts.
- S) Inlet screen shall be provided at centrifugal fan suction made out of 14 SWG galvanized wire knitted in 25 mm square mesh. Suitable flanges to protect the edges of the screen shall be provided.
- T) Double deflection rubber in shear or rubber in compression type vibration isolator shall be provided for each fan. Rubber bushes, washers, wherever needed for the vibration isolators shall be included in the supply. Sufficient number of such isolators shall be provided to ensure isolation of foundation from vibration of the equipment.

4.12.12 AIR FILTERS

- A) Type of air filters specified herein is required to filter the outside air for conditioned premises for housing the sophisticated equipment.
- B) The maintenance of clean environment is utmost important for proper functioning of all these equipment and the whole power station.
- C) Air filters shall be made of best quality material and shall be of high reliability proven design.
- D) All filters shall be designed for horizontal airflow and vertical mounting unless otherwise indicated specifically.
- E) The filter shall be H.D.P. dry panel type. The filter media shall be designed to hold dust, sand, lint etc. and prevent it from being dislodged by vibration or other cause and passing through filter.
- F) The filter media shall be non-flammable type and shall be suitable for operation under extreme conditions of humidity up to and including 100% RH.
- G) The filter media shall have resistance to corrosion and contaminant producing action and perform throughout its life without the possibility of deterioration.
- H) The filter shall be of washable type and the filter media shall be constructed from several layers of H.D.P. stitched together with G.I. wire mesh on both side for support and crimped to form deep folds for maximum filtration area-low differential pressure high dust retention capacity and high flow rate.



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- I) The filter folds shall be separated by aluminum spacers to ensure uniform distribution of airflow through the filter media. Proper sealing between filter and filter casing shall be done to obviate the possibility of air leakage.
- J) Each filter panel shall consist of an aluminum frame.
- K) Face velocity shall not exceed 2.5 m/sec. and pressure drop shall be limited to 6 mm W.G. and 12 mm W.G. in clean and dirty conditions respectively.
- L) The filtration efficiency of pre filters shall be not less than 90% down to particle size of 10 microns.
- M) The filters shall be in panels of size about 600 x 600 unless otherwise indicated specifically.
- N) The filter-mounting frame shall be made of M.S. rolled section and hot dip galvanized to withstand corrosion. Necessary fabrication and G.A. drawings for mounting frame shall be furnished by Vendor. The mounting frame shall be designed strong enough to take the load of double the pressure drop in dirty condition of the filters.
- O) The following materials shall be used for the construction of various parts of filters.
 - i) Filter media - as given in general description.
 - ii) Filter frame - Aluminum
 - iii) Nut – Bolts - Galvanized.
 - iv) Gasket - Neoprene
 - v) Bush, Springs - Galvanized
 - vi) Filter mounting frame - M.S. Rolled section hot dip galvanized.

4.12.13 REFRIGERANT PIPING

- A) The VENDOR shall be in accordance with the schedule of quantities of supply, lay and install pipes, pipefitting's and valves.
- B) All pipes, Valves, Supports, Anchor Bolts, "U" fasteners, Strainers, Elbows, Reducers, Flanges, consumable like Welding Rods, Oxygen/Acetylene gas Gaskets, Bolts, Nuts, Washers, Jointing material supporting material shall be supplied by the Vendor.
- C) Unit rates shall be inclusive of all fittings, i.e. flanges, tees, reducers the Vendors shall ascertain the quantities required from the piping layout included.
- D) The piping shall be designed for an internal pressure representing the most severe condition of coincident pressure & temperature expected in normal operation including fluid head.
- E) All Drain Piping shall be in Heavy Duty PVC or Polypropylene with sleeve insulation.
- F) The pipes shall be new and shall be free from damage, rust, denting, bending or any other distortion.
- G) Care should be taken to align the pipes to one another exactly; the pipe levels shall be maintained throughout its run using spirit levels.
- H) All erected piping shall be tested hydrostatically (pneumatically) at a pressure of 25 KG/cm2 and Vacuum tested up to medium vacuum of around 40 mm Hg absolute & held with vacuum pump in operation for at least 4 hrs.

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- I) Plant room piping shall have adequate number of pressure gauges and temperature indicator to facilitate commissioning.
- J) Pipe insulation shall be free from tears, holes or any other perforations.
- K) The insulation joints shall be sealed with Bitumen and the outside surface shall be coated with bitumen.

4.12.14 AIR DISTRIBUTION SYSTEM

- A) The air-distribution ducting for air-conditioning system will be sized based on equal friction method to have an initial velocity not exceeding 9 m/ sec (7.5 m/s. for PACKAGED air-conditioning system) and friction rate not exceeding 0.9 pa/ m.
- B) Ducts shall be of Galvanized Iron & gauge shall be as per IS: 655 & Galvanized Iron coating thickness grade shall be 275 gms/ m2 as per IS: 277: 2003.
- C) All ducting work shall be strictly reinforced to prevent sagging buckling & vibration, as per IS: 655 or better.
- D) All joints shall be flanged & airtight.
- E) Straight ducts shall be fabricated in segments of maximum 3 m length. The ducts shall have flanged ends & shall have drilled holes for connecting by bolts.
- F) Bolt holes shall be drilled at a linear distance of 100 to 150 mm center to center.
- G) Rubber gaskets of minimum 3 mm thickness shall be used to join the duct segments.
- H) Bends & elbows shall have a bend turning radius not less than 1 to 1.5 times depth of rectangular duct.
- I) Angle bends of 30, 45 & 60 degree shall be used as far as possible.
- J) All ducts shall be tested for leaks, breathing, chattering and vibration noises, where any of these condition exist the same shall be corrected immediately.
- K) The design of the ducting for supplying conditioned air to premises shall be a balanced one. Balancing shall be achieved by providing suitable volume control dampers.
- L) Ducts shall be fabricated using lock-forming machine.
- M) Ducts shall be supported suitably from wall/ ceiling by brackets/ hanger rods, using grip bolts or from RCC bars of slab using trapeze hangers. Duct shall rest on supporting angle or channel & this supporting angle or channel shall be supported by CS rod or angles or channel on both side of ducts with weld or bolts.

Supporting details for low-pressure system shall be as given below:

LARGER SIDE OF DUCT (mm)	SUPPORTING ANGLE/ CHANNEL (mm)	VERTICAL ROD DIAMETER (mm)	MAXIMUM SPACKAGEDING BETWEEN SUPPORTS (mm)
Up to 900	40 X 40 X 6	10	3,000



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901 to 1,500	50 X 50 X 6	10	3,000
1,501 to 2,400	50 X 50 X 6	10	2,400
2,401 and above	65 X 65 X 6	12	2,400

Supporting details for high-pressure system shall be as given below:

LARGER SIDE OF DUCT (mm)	SUPPORTING ANGLE/ CHANNEL (mm)	VERTICAL ROD DIAMETER (mm)	MAXIMUM SPACKAGEDING BETWEEN SUPPORTS (mm)
Up to 1250	50 X 50 X 6	15	2,400
1251 to 2100	65 X 65 X 6	15	2,400
2,101 and above	MC 75 X 6	15	2,400

- N) Zinc coated anchor fasteners or embedded plates shall be provided for upper attachments to the building. The CONTRACTOR shall provide anchor fasteners. The PURCHASER shall provide embedded plates. The CONTRACTOR shall provide duct supports from angle cleats welded to the embedded plates. Anchor fasteners shall be loaded to maximum 20% of the maximum rated capacity specified by the manufacturer. The PURCHASER shall approve all anchor fasteners used for supporting duct.
- O) All support structure should be sand blasted before painting.
- P) In case of insulated duct, anchor fasteners shall be selected based on actual total load.
- Q) **FLEXIBLE CONNECTIONS**
Where sheet metal duct connects to the intake or discharge of fan units, a flexible connection of fire retarding double layer heavy duty canvas material of at least 150 mm width shall be provided. The material shall be attached to angle frames by means of a steel band over the end of the flexible connection. The material shall be secured between the band and the angle frame by bolting. Sleeve shall be made smooth and the connecting ductwork rigidly held by independent supports on both ends. The flexible connection shall be suitable for fan intake and outlet pressures.
- R) **TRANSFORMATION**
Duct transformation shall be used to change the shape of duct and shall be made for easy and noiseless flow of air. Maximum slope of transformation shall be 1: 4.
- S) **BENDS, OFFSETS AND BRANCH CONNECTIONS**
All bends, offsets and branch connections shall be made for smooth and noiseless flow of air and minimum pressure drop. In case of full radius bend, optimum ratio of centre line radius of bend to duct dimension of 1.25 shall be considered. However, due to space constraint



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shorter radius bend or square bend with guide vanes may be provided. The CONTRACTOR shall furnish the details of guide vanes i.e. number of vanes etc. in the drawing. A volume control damper shall regulate the flow of air to the branch duct.

T) VOLUME CONTROL DAMPERS (VCDs)

VCDs shall be fabricated of minimum 18 G GSS and shall be of robust construction. VCDs shall be of single blade type for round duct and opposed blade type for rectangular duct. VCDs shall have a locking device mounted outside the duct to hold the VCDs in a fixed position without vibration. Fully open and fully closed position shall be marked for easier operation of VCDs.

U) FIRE DAMPERS

All supply and return air ducts at plant room crossings and at all floor crossings shall be provided with fire dampers. These shall be multi-leaf dampers of at least 90 minute fire rating. Fire damper blades and outer frames shall be of 16 G GSS construction. The damper blades shall be pivoted on both ends using chrome-plated spindles in self-lubricated bronze bushes. Stop shall be provided on top and bottom of damper housing made of 16 G GSS or AL or SS. For preventing smoke leakage, side metallic compression seals shall be provided. Fire damper shall be provided with factory fitted sleeves. Access doors shall be provided within the duct in accordance with the manufacturer's recommendation. Actuator for dampers shall develop sufficient torque for easy operation, electrically operated & interlocked with plant's fire protection system.

V) CAULKING AND DRAIN

Wherever duct passes through wall or slab, all the openings between masonry ductwork shall prevent air movement. Where duct passes through the floor, a drain trap of 100 mm width across the width of the duct and 50 mm depth shall be provided with a suitable plug at the lowest point in the bend.

W) ACCESS DOOR

Access door shall be provided in duct before and after such items installed in the duct, which require maintenance and at all fire damper locations. All access doors shall be fabricated of the same material as the ductwork and shall have minimum two hinges. Hinges shall be zinc plated and pins shall be of brass. Access doors shall be of minimum of 305 x 350 mm size. At least two heavy solid brass fasteners and a brass handle are required for each door. A continuous neoprene rubber gasket shall be adhered to the opening frame with adhesive.

X) DIFFUSER & GRILLES:

- i) Supply air grill/ diffuser shall be used for distribution of air in the premises and shall be mounted on the duct collars.



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- ii) Air distribution grills shall be of square/ rectangular Anodized aluminum of standard size. Manually operated volume control and direction control dampers shall be provided along with the supply air grills. The volume and direction control dampers shall be designed for smooth operation.
- iii) The type and quantity of diffusers and grilles shall be provided, as specified in drawing. The CONTRACTOR shall ensure that the diffusers and grilles offered are of requisite capacity, throw and terminal velocity. Diffusers and grilles shall be fabricated from CS, factory coated with rust resistant primer or extruded aluminum section with powder coating. Whenever VCD is provided with diffusers or grilles it shall be located within the duct collar. Diffusers and grilles shall be of flush or stepped pattern.
- iv) Ceiling diffuser shall be equipped with fixed air distribution grids, removable key operated volume control dampers and anti-smudge rings. The extruded aluminum diffusers shall be provided with removable central core and concealed key operation for volume control damper. Grilles with VCD shall be double acting. Grilles without VCD shall have fixed blades or adjustable blades.

Y) PLENUMS

Plenums shall be fabricated of 18 G GSS for low-pressure system and 16 G GSS for high-pressure system. Type of reinforcement and supporting details shall be as specified elsewhere. Plenums shall be constructed to withstand 133% of rated plenum pressure without structural failure. Wall and roof deflection at rated pressure shall not exceed 10 mm per meter of width.


Z) GRAVITY DAMPER

Gravity dampers (Self-acting dampers) shall be provided to ensure pressurization of premises. Dampers shall be of gravity type designed such as not to allow infiltration of air from outside. The louvers of the dampers shall be mounted freely on spindles to allow the damper to open freely with the pressure developed in the premises. The pressure inside the premises shall be 2-3 mm WC.

The quoted unit prices for ducts shall include all wastage allowances, reinforcement angles or flats, duct supports, flanges & gaskets for joints, nuts & bolts, anchor fasteners, angles, channels, flexible connections at equipment inlet & outlet, dampers, access doors, turning vanes & straightening vanes. These accessories shall neither be separately measured nor be paid.

AA) INSULATION

All materials shall be new, fresh, incombustible, fire retardant, rot-proof, non-hygroscopic, vermin proof, fungus proof, non-injurious to health, chemically inert, non-corrosive to steel and aluminum (even if soaked in water for extended periods) and shall be guaranteed to

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withstand continuously and without deterioration the minimum and maximum temperatures to which these shall be subjected to under the specified applications.

The insulation materials and any component of the finished insulation job shall not react chemically, singly or in combination, with water or moisture to form substances that are more actively corrosive to applied surface than water or moisture alone.

In order to protect the workers from the hazards of insulation materials, suitable protective gadgets shall be provided. Required safety precautions shall be taken during handling and application of insulation.

The insulation material shall be kept dry at all times during transport, storage and installation. Decking and covering tarpaulins alone are not adequate for any length of time and shall not be allowed except in extreme emergencies and only for short period. Stacking of insulation materials directly on ground shall not be done. No wet insulation shall be installed. If wet insulation is present, it shall be removed and replaced with new dry insulation. The insulation may be protected with plastic film but shall be vented to prevent sweating.

- i. ACOUSTIC INSULATION: Ducts shall be acoustically lined from inside. The insulation shall be fixed to the sheet metal with cold setting adhesive compound. The surface of insulation exposed to air flow shall be covered with fiber glass tissue and 26 G perforated AL or SS sheet having at least perforation with 40% free area and perforation diameter not more than 3 mm. The AL or SS sheet shall be neatly finished to give a true inside surface. AL or SS sheet shall be secured by GS bolts and nuts. The duct dimension shall be increased as necessary to compensate for liner thickness to provide net free area.
- ii. THERMAL INSULATION: Duct thermally insulated from outside & insulation material used shall have minimum density of 35 kg/m³.

4.13 TRAILER MOUNTED AND RAIL MOUNTED SKY LIFT

4.13.1 1 No. Four Wheeler trailer mounted hydraulically operated sky lift for the purpose of Street light maintenance as well as other lite duty maintenance work and 1 No. of Rail mounted hydraulically operated sky lift for rail gantry lighting maintenance as well as other maintenance purpose.

4.13.2 Sky Lift shall be Hydraulic operated type.

4.13.3 Shall be capable for working height of 10 Mtr.

4.13.4 Shall be suitable for pay load of 200 Kg.

4.13.5 Shall be Suitable for transportation.

4.13.6 Shall be hydraulic operated from the operator trolley cage with all latest control features with all safety safeguards at operator control.



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4.13.7 Shall be supplied with all required statutory approval and certificates.

4.14 FIRE PROTECTION SYSTEM OF SWITCHGEAR AND CONTROL ROOM BUILDING

4.14.1 Switchgear room and control room to be provided with fire-fighting and protection system as per OISD 173.

4.14.2 The under mentioned are essentially 'First Aid' equipment, meant for controlling small fires in their incipient stages and are not intended to deal with large outbreaks of fires.

4.14.3 First aid fire-fighting equipment shall be provided in electrical sub-station, as indicated below:

- Dry Chemical Powder fire extinguisher (10 Kg. Capacity) to be provided in the control room to be located inside sub-station building. The number should be determined based on a maximum travelling distance of 15 meters. At least 1 fire extinguisher shall be provided for every 250 m2 area.
- Dry Chemical Powder Fire Extinguisher (5/10 Kg. Capacity) to be provided in the control room and switchgear room & the number should be determined based on a maximum travelling distance of 50 meters. At least 1 fire extinguisher shall be provided for every 750 m2 Area.
- CO2 Extinguisher (1.5/6.8 Kg. Capacity) on wheels - To be located in sub-stations and around outdoor transformer. The number should be determined based on a maximum travelling distance of 15 meters. At least 1 fire extinguisher shall be provided for every 250 m2 area.

4.14.4 Control room to be provided with fire alarm and detection system.

4.15 INSPECTION & TESTING

4.15.1 Requirement herewith indicated is indicative only. LSTK contractor to submit Quality assurance plan (QAP) to be followed during execution of work for ONGC / ONGC appointed agency's approval.

4.15.2 The contractor shall ensure that the manufacturer carries out adequate tests for each equipment for compliance with the specifications as well as overall operational accuracy. Vendor should forward the certified copies of works test reports for the same to the ONGC.



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- 4.15.3 Notwithstanding any inspection carried out by ONGC or its representative, the Vendor / manufacturer shall carry out its own tests to ensure consistent performance.
- 4.15.4 All the tests either on the field or at outside laboratories concerning the execution of the work and supply of materials by the Contractor shall be carried out by Contractor at his own cost.
- 4.15.5 The work is subject to inspection at all times by the Site Engineer / Engineer-in-Charge / representatives nominated by ONGC. The Contractor shall carry out all instructions given during inspection and shall ensure that the work is being carried out according to the technical documents and the relevant codes of practice furnished to him during the performance of the work.
- 4.15.6 Any work not conforming to the execution drawings, specifications or codes shall be rejected forthwith and the contractor shall carry out the rectifications at his own cost.
- 4.15.7 All results of inspection & tests will be recorded in the inspection reports, proforma, which will be approved by the Site Engineer / Engineer-in-Charge. These reports shall form part of the completion documents.
- 4.15.8 Inspection & acceptance of works shall not absolve the Contractor from any of his responsibilities under this Contract.
- 4.15.9 Equipment shall be subjected to stage wise expediting, inspecting and testing at vendor's / sub vendor's works by ONGC / its authorized Inspection Agency. Vendor shall submit Quality Assurance (QAP) procedures before commencement of fabrication. Approved QAP procedures shall form the basis for equipment inspection.
- 4.15.10 Inspection and Testing at Vendor's / Sub Vendor's works shall include but not be limited to the following:
- Dimensional checkup.
 - Checking of all material test certificates.
 - 100% Hydrostatic test of complete loading arm assembly at 1.5 times of operating pressure for minimum 30 minutes with full assembly.
 - 10% Radiography of butt-welded joints (Pressure containing welds) of loading arm.
 - Swivel test: Rotational test at Design Pressure.
 - Spring life Cycle test: Vendor to furnish 2 lac cycle tests on one number per batch dully certified from reputed inspection agency for verification.
 - Operability test for each bottom loading arm to check complete working envelope.
 - Witness of 10 % Hydro test of all valves at vendors work and review of inspection reports.
 - Review of Inspection report of Pump



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- Witness of decanting tank pressure test and review of material test certificates, stage inspection reports and final inspection reports.
- Review of all piping and fittings inspection reports and test certificates (as applicable).

4.15.11 Any or all the tests, at Company option may be witnessed by Company / its authorized TPIA. Acceptance of shop tests shall not constitute a waiver of requirements to meet the field performance under the specified operating conditions. Inspection by Company / TPIA shall be regarded as checkup and in no way absolve the vendor of his responsibility.


4.15.12 Swivel Tests :

If proof test certificates (for swivel of the types and size proposed and having at least the same loading) are unavailable or unacceptable, the swivel shall be proof tested at vendor's works.

4.15.13 Loading Arm unit shall be tested at site after commissioning. Vendor shall establish the following parameters as a minimum:

- A) After assembly at least one arm of each type shall be erected at the supplier premises. This will allow all the inspection agencies to check dimensions, balancing, operation and functions of the complete assembly.
- B) Complete working envelope
- C) Movement / operation of complete loading arm by a single person
- D) Leakage test for swivel joints, vacuum breaker and other flange joints.

4.15.14 Non Sparking Tools and tackles shall be ONGC approved Brand made. List of Non Sparking tools and tackles shall be as below.

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LIST OF NON-SPARKING TOOLS - PER SET

S I. No.	DESCRIPTION	SIZE	No's/Qty
1	OPEN END SPANNERS	6 X 7	1
2	OPEN END SPANNERS	8 X 9	1
3	OPEN END SPANNERS	10 X 11	1
4	OPEN END SPANNERS	12 X 13	1
5	OPEN END SPANNERS	14 X 15	1
6	OPEN END SPANNERS	16 X 17	1
7	OPEN END SPANNERS	18 X 19	1
8	OPEN END SPANNERS	20 X 22	1
9	OPEN END SPANNERS	21 X 23	1
10	OPEN END SPANNERS	24 X 27	1
11	OPEN END SPANNERS	24 X 26	8
12	OPEN END SPANNERS	25 X 26	1
13	OPEN END SPANNERS	30 X 32	1
14	OPEN END SPANNERS	32 X 36	1
15	RING END SPANNERS	6 X 7	1
16	RING END SPANNERS	8 X 9	1
17	RING END SPANNERS	10 X 11	1
18	RING END SPANNERS	12 X 13	1
19	RING END SPANNERS	14 X 15	1
20	RING END SPANNERS	16 X 17	1
21	RING END SPANNERS	18 X 19	1
22	RING END SPANNERS	20 X 22	1
23	RING END SPANNERS	21 X 23	1
24	RING END SPANNERS	24 X 27	1
25	RING END SPANNERS	24 X 26	8
26	RING END SPANNERS	25 X 28	1
27	RING END SPANNERS	30 X 32	1
28	RING END SPANNERS	32 X 36	1
29	HAMMER RING SPANNER	41	1
30	HAMMER RING SPANNER	46	1
31	HAMMER RING SPANNER	52	1
32	HAMMER RING SPANNER	66	1
33	ADJUSTABLE WRENCH	6"	8
34	ADJUSTABLE WRENCH	12"	4
35	PIPE WRENCH	12"	1
36	PIPE WRENCH	24"	4
37	BRASS HAMMER	2 lbs	2
38	BRASS HAMMER	5 lbs	1
39	BRASS HAMMER	10 lbs	4



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40	CIRCLIP PLIER		1
41	LONG NOSE PLIER	6"	1
42	ROUND NOSE PLIER	6"	1
43	SCREW DRIVER	10"	2
44	SCREW DRIVER	12"	2



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5.0 TECHNICAL DATASHEETS

5.1 BOTTOM LOADING ARM FOR LIQUID LPG ROAD LOADING FACILITY

Sr. No.	Description	Requirement
1.	Type	Swivel, Unsupported boom Type Bottom loading arm suitable for Hydrocarbon Application Liquefied LPG) Self-supporting, high profile, overhead (top to bottom)
2.	Balancing	Spring Type (Torsion / Compression) / Gas Strut
3.	Model	Vendor to specify
4.	Design Pressure	21 Kg / Sq. cm.
5.	Operating Pressure	7 to 12.5 Kg / Sq. cm.
6.	Operating Temperature	0 – 65° C
7	Size	80 NB
	Liquid Loading Arm	80 NB
	Vapor Return Arm	50 NB
8	Connection	
8a	Inlet connection	80 NB ANSI B 16.5 x 300 #
8b	End connections for TT	As per API Coupler(1004)
9.	Body	1st Arm Carbon Steel; 2nd Arm Carbon Steel. To act as electrically continuous.
10.	Seals	VITON / PTFE with Viton insert
11.	Flow Rate Normal	40 M3/Hr
12.	Length of Inboard Arm / Arm Dia.	As per OEM & Site Condition / 80 NB
13.	Length of outboard Arm / Arm Dia.	As per OEM & Site Condition / 80 NB
14.	Interchangeability of swivel	YES
15.	Arm Connection Detail: Connection to Header.	FLANGE 3" ASA 300 # Flange Connection
16.	Arm Connection Detail: Connection to Tanker.	FLANGE 3" ASA 300 # Flange Connection
17.	Overspill service.	REQUIRED
18.	Pipe material	Seamless Carbon Steel ASTM A 106 Gr. B
20.	Intermediate Swivel Joints (1 CS and 2 Aluminum)	Flanged End (30 0# / TTMA). Dual ball races



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21.	Swivel Type	Ball and Needle Bearing type
22.	Spring Material	EN47 / SAE# 5160H(UNS 51600)/Equivalent
23.	Working envelope (Site specific to cover full range)	Reach 2 – 3 meter (Typical). 2 meter X 1 meter x 1 meter (Vertical). Contractor to Physically check.
24.	Accessories	Dummy adaptor with Parking post for loading arm Safety API coupler with position sensor. Over fill protection device.
25.	Cross over function	To be provided



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5.2 TOP LOADING ARM FOR LIQUID LPG RAIL LOADING FACILITY

1.	Description	Gas Strut / Spring Loaded Swivel Type, Top loading suitable for left hand and right hand service
2.	Balancing	Spring Type (Torsion / Compression) / Gas Strut
3.	Model	Top / side Supported
4.	Vacuum breaker	To be provided – Aluminum / Brass
5.	Design Pressure	21 Kg / Sq.cm.
6.	Operating Pressure	7 to 12.5 Kg / Sq.cm.
7.	Operating Temperature	0 – 65° C
8.	Size	Liquid Loading Arm - 80 mm Vapor Return Arm – 50 NB
9.	End connections	ALU pipe open end and other side flanged
10.	Body	1 st Arm Carbon Steel; 2nd Arm Aluminum To act as electrically continuous.
11.	Seals	VITON / PTFE with Viton insert
12.	Length of Inboard Arm (Site specific)	As per OEM and Site Condition
13.	Length of outboard Arm (Site specific)	As per OEM and Site Condition
14.	Interchangeability of swivel	Yes
15.	Arm Connection to Header	FLANGE 80 NB, ANSI 300 #
16.	Arm Connection to Wagon	Hammer Union Joints (API APPROVED)
17.	Pipe material	Seamless Carbon Steel SA 106 Gr. B
18.	Swivel Type	Split Flange, Double Ball race type
19.	Swivel Joints	Carbon steel, Flanged End. Aluminum for Drop tube swivel
20.	No. of Swivels	Four
21.	Spring Material	EN47 / 45 / SAE # 5160H / Equivalent
22.	Drop tube	Aluminum - Collar along with handle shall be provided on drop to identify the extent of drop tube to be inserted into wagon.



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23.	Working envelope	Reach 3 – 4 meter (Typical). 4 meter X 6 meter x 1 meter (Vertical)
24.	Accessories	Dummy adaptor with Parking post for loading arm Safety API coupler with position sensor. Over fill protection device.
Other Specific Requirement for LPG Loading Arms (Top and Bottom Loading)		
	Codes and Standards	The material of construction of the pipes, flanges, valves, joints etc. shall be in accordance with relevant ASTM standards. The specification of the pipes and flanges shall be in accordance with relevant ASME, ANSI, API standards. Wherever international standards and codes are not available, vendor may follow his own proven standards and practices.
	Technical requirements	Loading Arm shall generally consist of base riser, outboard arm, inboard arm, connecting pipe or drop pipe, swivel joints, vacuum breaker, balancing arrangement, supporting arrangement and locking arrangement for filling position.
	Outboard Arm	The arms shall be of seamless pipes suitable for the hydrocarbon service. It shall be of seamless Aluminum pipe material to avoid sparking The arm pipe thickness shall be selected for the specified design pressure, and the bending and torsional stresses encountered in the loading operations.



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	Swivel Joints	<p>The swivel joints shall be designed to make the arm maneuverable with the effort of a single person.</p> <p>The swivel joints bearing surface material and ball bearings material shall be suitable for fluid handled. Bearing surfaces and ball bearings shall be suitably hardened to ensure long life. The swivel joints shall be lubricated type.</p> <p>The arrangement of swivel joint shall preferably allow changing of seal without complete dismantling bearings.</p> <p>The swivel joints shall have corrosion-proof sealing surfaces of stainless steel or vendor's proven standard material.</p> <p>Swivel joint shall be of following constructional features.</p> <p>Swivel joint in base riser shall be of split flange construction, so as to allow replacement of main seals without removal of bearing balls and dismantling of swivel joint.</p>
	Balancing Arrangement	<p>The arms shall be counter balanced by compression spring assembly, torsion spring box, pneumatic cylinder or hydraulic cylinder.</p> <p>The balancing arrangement shall be such that the outboard arm remains horizontal in filled condition for pressure loading arm and in empty condition for atmospheric loading arm.</p>
	Supporting Arrangement	<p>The arm shall be supported by column or stand post with anti-friction bearing.</p> <p>The supporting arrangement shall be such that there is complete flexibility in operation.</p> <p>The supporting arrangement shall be such that no load or force due to loading arm is transferred to ONGC's piping.</p>
	Locking Arrangement	<p>Suitable locking arrangement shall be provided for locking the arm in parked position. The locking arrangement can be manual operated type.</p> <p>Suitable locking arrangement shall be provided for locking the arm in filling position for top-atmospheric loading arm.</p> <p>Additional chains shall be provided for parking and filling position-locking arrangement which may be used at later date.</p>



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	Vacuum Breaker	Top-atmospheric loading arm shall be provided with vacuum breaker. Vacuum breaker shall be either diaphragm type or spring type. Vacuum breaker shall be located at highest point of the loading arm for faster draining. Minimum 1/2" opening for airflow in the vacuum breaker shall be provided for achieving fast draining. Vacuum breaker shall be constructed from material suitable for fluid handled. However, in no case HDPE or similar material shall be used for vacuum breaker.
	Grounding Arrangement	Each loading arm shall be electrically continuous, otherwise earthing conductors shall be provided across the non-insulating joints to make it electrically continuous.
	Loading / Unloading envelope	The length of inboard arm, outboard arms, and connecting pipe shall be such as to give adequate flexibility in loading operations. The following range of flexibility shall be provided, as a minimum.
		Loading arms for road tankers (When road tanker is parked at the Centre line of clear space in the loading bay and with loading arm base riser Centre line and tanker nozzle(s) center Lines (s) are on same axis, in plan view) : Top Loading
		a) Longitudinal direction (Along the road tankers axis)
		Atmospheric loading : ±3 m
		Pressure Loading : ±1 m
		b) Transverse direction (Perpendicular to wagon axis)
		Atmospheric and pressure loading : ±0.5 m
		c) Vertical direction (From tanker flange center line / top elevation)
		Atmospheric and pressure loading - ±0.5 m



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5.3 TOP LOADING ARM FOR SKO TOP LOADING FACILITY

Sr. No.	Description	Requirement
1.	Type	Torsion Spring Balanced top loading arm, suitable for Hydrocarbon Application (SKO) Self-supporting, high profile, overhead (top to bottom) bottom loading arm
2.	Balancing	Spring Type (Torsion / Compression) / Gas Strut
3.	Model	Vendor to specify
4.	Design Pressure	15 Kg / Sq. cm.
5.	Operating Pressure	2 to 6 Kg / Sq. cm.
6.	Operating Temperature	0 – 65° C
7	Size	50 NB
8a	Inlet connection	50 ANSI B 16.5 x 150 # RF
8b	End connections for TT	As per API Coupler(1004)
9.	Body	Arm Carbon Steel;
10.	Seals	PTFE with Buna-N Nitrile Rubber Insert
11.	Flow Rate Normal, LPM	750 LPM
12.	Length of Inboard Arm / Arm Dia.(Site specific)	Contractor to check physically / 50 NB
13.	Length of outboard Arm / Arm Dia. (Site specific)	Contractor to check physically / 50 NB
14.	Interchangeability of swivel	YES
15.	Arm Connection Detail: Connection to Header.	FLANGE 2" ASA 150
16.	Arm Connection Detail: Connection to Tanker.	Aluminum pipe open end (API APPROVED). Drop tube
17.	Overspill service	REQUIRED
18.	Base Swivel (CS material)	Flanged
19.	Intermediate Swivel Joints (1 CS and 2 Aluminum)	Flanged End (150#/TTMA). Dual ball races
20.	Swivel Type	Ball and Needle Bearing type
21.	Spring Material	EN47 / SAE# 5160H (UNS 51600) / Equivalent
22.	Working envelope (Site specific to cover full	Reach 2 – 3 meter (Typical). 2 meter X 1 meter x 1 meter (Vertical). Contractor to Physically check.



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23.	Accessories	Dummy adaptor with Parking post for loading arm. Breakaway coupler of material Aluminum.
24.	Cross over function	To be provided



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5.4 NON RETURN VALVE

Sr.	Description	Requirement
1.	Standard, Rating & Service	a. ASME B 16.34, API 6D, 300 # for LPG loading / unloading application for valves 50 NB and above b. ASME B 16.34, API 6D, 150 # for SKO/HSD/ATF loading / unloading application for valves 50 NB and above c. ASME B 16.34, API 6D, 800# for all application for valves below 50 NB size
2.	Type	Non Sparking Type
3.	Size	As per system size (80 NB and 50 NB)
4.	Ends	Flanged conforming to ANSI B16.5 with raised face
5.	Body	Cast Steel conforming to ASTM A 216 Gr WCB / Forged conforming to ASTM A 105
6.	Cover	Bolted with material conforming to ASTM A 216 Gr WCB / ASTM A 105
7.	Disc	Material conforming to ASTM A 216 Gr WCB/ ASTM A 105 with 13% Cr. Steel Facing
8.	Body Seat Ring	Renewable with Material conforming to ASTM A 216 Gr WCB / ASTM A 105 with facing of suitable non-sparking material
9.	Disc Hinge	Material conforming to ASTM A 216 Gr WCB/ ASTM A 105 with facing of suitable non-sparking material
10.	Hinge stud Bolt	ASTM A 193 Gr B7
11.	Cover Nuts	ASTM A 194 Gr 2H
12.	Bonnet Gasket	Spiral wound SS 316 with soft iron filler
13.	Seats	Shall be non-renewable integral type or Non-Integral seat ring seal welded type
14.	PAINTING	Manufacturing Standard
15.	Installation Position	Suitable for horizontal / vertical installation
16.	Testing	As per API 6D with zero leak



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5.5 BALL VALVE:

1.	Type	Fire safe, Anti-static
2.	Size	As per System
3.	Design Code	BS 5351 & API 608
4.	Test Code	BS-5146 / API -598 B.S. 617 SS Part-I
5.	Fire Safe	API-607 / APIRPGF 1993
6.	Valve Type	Full Ball
7.	Type	2 Piece
8.	End Connection	ANSI 300 # Flanged type, SORF, for LPG Loading / Unloading Application
		ANSI 150 # Flanged type, SORF, for SKO/HSD/STF loading Application
		ANSI 800 # Socket weld end for all application valves below 50 NB size
9.	Body	ASTM A 216 Gr. WCB
10.	Ball	CF8M
11.	Trim	Blow-off proof design, UNS S31600, "Type 316"
12.	Seat	PTFE
13.	Stem seal	PTFE / GRAF OIL
14.	Gland Packing	GRAF OIL
15.	Studs	A 193 Gr.B7
16.	Nuts	A 194 Gr.2H
17.	Handle	Carbon Steel



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5.6 GATE VALVE

1.	Type	Fire safe, Anti-static
2.	Application	Liquid LPG & ATF/SKO/HSD
3.	Size	Above 50 NB
4.	Design Code	BS 5352 / ASME B31.3
5.	Valve Test Code	API 598
6.	Valve Standard	ASME B 16.34, API 6D
7.	BW ENDS	ASME B16.25
8.	Flange End	ASME B 16.5
9.	SW End	Manufacturing Standard
10.	End to End Dimension	ASME B 16.10
11.	TYPE OF WEDGE	Solid
12.	Type of Bonnet	Welded
13.	Type of Bore	Full
14.	Body Material	Cast Steel conforming to ASTM A 216 Gr WCB / Forged conforming to ASTM A 105
15.	Stem Material	STAINLESS STEEL 316L, HALF STELLITED
16.	Fire Safe	API-607 / APIRPGF 1993
17.	End Connection	ANSI 300 # Flanged type, for LPG Application for valves 50 NB and above ANSI 150 # Flanged type, for SKO/HSD/STF loading Application for valves 50 NB and above ANSI 800 # Socket weld end for all application for valves below 50 NB size
18.	Bolt	ASTM A193-B7
19.	Nut	ASTM A194-2H
20.	Gland Packing	GRAF OIL
21.	Handle	Carbon Steel



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5.7 PLUG VALVE

1.	Type	Fire safe, Anti-static
2.	Application	Liquid LPG & ATF/SKO/HSD
3.	Size	Above 50 NB
4.	Design Code	BS 5352 / ASME B31.3 / API 599
5.	Valve Standard	ASME B 16.34, API 6D
6.	BW END	ASME B16.25
7.	Flange End	ASME B 16.5
8.	SW End	Manufacturing Standard
9.	End to end Dimension	ASME B 16.10
10.	Pressure Class	ANSI 300 # Flanged type, for LPG Application for valves 50 NB and above ANSI 150 # Flanged type, for SKO/HSD/STF loading Application for valves 50 NB and above ANSI 800 # Socket weld end for all application valves below 50 NB size
11.	Port Size	Regular, Multi-ports are all the same size as inlet
12.	Body and Bonnet Type	Bolted Bonnet to Base Connection
13.	Body and Bonnet Material	Cast Steel conforming to ASTM A 216 Gr WCB / Forged conforming to ASTM A 105
14.	Plug Material	ASTM A182 Gr. 1141F
15.	Stem Material	Integral with plug
16.	Seat Material	Integral with Body
17.	Bolt	ASTM A193-B7
18.	Nut	ASTM A194-2H
19.	Handle	Carbon Steel



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5.8 REFURBISHMENT OF EXISTING STRAINER AT LPG RAIL GANTRY: NORTH GANTRY AND SOUTH GANTRY

1.	Fluid	Liquid LPG
2.	No. of Strainer	8 Nos. of 12" size in LPG Rail Gantry
3.	End connection	300 # Flanged End
4.	Flange material	Carbon Steel ASTM A 216 WCB / A 105 Gr. B
5.	Type	Wire mesh basket type
6.	Mesh	Min. 40 Mesh of SS 316
7.	Body	Carbon steel as per ASTM A 216 Gr. WCB / ASTM A 105
8.	Design Pressure	21 kg / Sq. cm
9.	Working Pressure	2 – 6 kg / cm ²
10.	Allowable ΔP at designed Flow rate	0.25 Kg/Cm ² (g)
11.	Temperature	0 – 55°C
12.	Seals	Vendor to specify based on product characteristics
13.	Drain Connection	½" SW End 800# with isolation valve with blind flange with wire seal



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5.9 NAPHTHA DECANTING SUMP ALONG WITH SUMP PUMP

5.9.1 Existing Sump Details

1.	Application	Naphtha Decanting Sump
2.	Liquid	Naphtha
3.	Design Code	ASME Section VIII, Div-1986
4.	Design capacity	33.7 M ³
5.	Design Pressure	0.1 Kg/CM ² (g)
6.	Test Pressure	0.15 Kg/CM ² (g)
7.	Design Temperature	65 Deg C
8.	Corrosion Allowance	3 mm
9.	Radiography	Spot
10	Sump Inlet Line Size	80 NB
11	Sump Pump	
	Manufacture Name	Kishor Pumps
	Pump Model Number	KVS-40-160
	Capacity	20 M ³ / Hr
	Head	32 Mtr
	Type	Vertical Centrifugal Pump
	Discharge Line size	80 NB
	Motor rating	3.7 KW

5.9.2 New Sump with Sump Pump Details

1.	Application	Naphtha Decanting Sump
2.	Liquid	Naphtha
3.	Reference	To be Supplied as per P & ID 9242-M-GAN-PRO-005-00007 with all associated piping, fittings, valves, instrumentation and drain and vent system
4.	Position	Underground
5.	Protection	Shall be provided with Cathodic Protection
6.	Material of Construction	Carbon Steel
7.	Thickness of Tank	LSTK contractor to Specify
8.	Stamping Requirement	Yes
9.	Manufacturer name	LSTK contractor to Specify
10.	Design Code	ASME Section VIII, Div-1986
11.	Design capacity	33.7 M ³
12.	Design Pressure	0.1 Kg/CM ² (g)



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13.	Test Pressure	0.15 Kg/CM ² (g)
14.	Design Temperature	65 Deg C
15.	Corrosion Allowance	3 mm
16.	Radiography	Spot
17.	Sump Inlet Line Size	80 NB
18.	Sump Pump	
	Manufacture Name	LSTK contractor to specify
	Pump Model Number	LSTK contractor to specify
	Capacity	20 M ³ / Hr
	Head	32 Mtr
	Standard	API 610
	Type	Vertical Centrifugal Pump
	Discharge Line size	80 NB
	Motor Rating	LSTK Contractor to Specify



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5.10 ATF/SKO/HSD DECANTING SUMP ALONG WITH SUMP PUMP

5.10.1 Existing Sump Details

1.	Application	ATF/SKO/HSD Decanting Sump
2.	Liquid	ATF/SKO/HSD
3.	Design Code	ASME Section VIII, Div-1986
4.	Design capacity	16.5 M ³
5.	Design Pressure	3.5 Kg/CM ² (g)
6.	Test Pressure	5.25 Kg/CM ² (g)
7.	Design Temperature	65 Deg C
8.	Corrosion Allowance	3 mm
9.	Radiography	
	Shell	Spot
	Head	Full
10.	Heat Treatment	Normalize
11.	Sump Inlet Line Size	80 NB
12.	Sump Pump	
12.1	Manufacture Name	Kishor Pumps
12.2	Pump Model Number	KVS-R40-20
12.3	Capacity	10 M ³ / Hr
12.4	Head	56.7 Mtr
12.5	Type	Vertical Centrifugal Pump
12.6	Discharge Line size	80 NB
12.7	Motor rating	7.5 Hp

5.10.2 New Sump with Sump Pump Details

1.	Application	ATF/SKO/HSD Decanting Sump
2.	Liquid	ATF/SKO/HSD
3.	Reference	To be Supplied as per P & ID 9242-M-GAN-PRO-005-00006 with all associated piping, fittings, instrumentation and drain and vent system
4.	Position	Underground
5.	Protection	Shall be provided with Cathodic Protection
6.	Material of Construction	Carbon Steel
7.	Stamping Requirement	Yes
8.	Thickness of Tank	LSTK contractor to Specify
9.	Manufacturer name	LSTK contractor to Specify



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10.	Design Code	ASME Section VIII, Div-1986
11.	Design capacity	16.5 M ³
12.	Design Pressure	3.5 Kg/CM ² (g)
13.	Test Pressure	5.25 Kg/CM ² (g)
14.	Design Temperature	65 Deg C
15.	Corrosion Allowance	3 mm
16.	Radiography	
	Shell	Spot
	Head	Full
17.	Sump Inlet Line Size	80 NB
18.	Sump Pump	
12.1	Manufacture Name	LSTK contractor to specify
12.2	Pump Model Number	LSTK contractor to specify
12.3	Capacity	10 M ³ / Hr
12.4	Head	56.7 Mtr
12.5	Standard	API 610
12.6	Type	Vertical Centrifugal Pump
12.7	Discharge Line size	80 NB
12.8	Motor rating	LSTK contractor to specify



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5.11 SAFETY RELIEF VALVE

Sr. No	Description	POL Gantry	LPG Road Gantry
1	Liquid to be Handled	SKO/ATF/HSD	Liquid LPG and Vapor LPG
2	Location (outdoor / indoor)	Outdoor	Outdoor
3	Type	Spring Loaded	Spring loaded
4	Quantity, Nos.	1 no. for each application (Total 3 nos.)	2 nos.
5	Nominal Size of Run Pipe DN(mm)/ Schedule	By Bidder	By Bidder
6	Design pressure of header Kg/CM2	15.00	21.00
7	Flow through Run Pipe under Maximum operating condition, kg/hr	DDE	DDE
8	Relieving capacity, kg/hr	By Bidder	By Bidder
9	Max. Operating pressure, bar(g)	6	12.5
10	Max. Operating temperature, °C	65	65
11	Set pressure, bar(g)	By Bidder	By Bidder
12	Relieving temperature, °C	By Bidder	By Bidder
13	Back pressure, bar(g)	Atmospheric	Atmospheric
14	Valve Pressure Class	150#	300#
15	Over pressure / Accumulation	10 %	10 %
17	Governing Code	API 520 / ASME Sec. VIII Div-1	API 520 / ASME Sec. VIII Div-1
18	Inlet and Outlet End Connections 1.Type 2. Rating 3.Details / standard	Flanged, 150#, ASME B 16.5	Flanged, 300#, ASME B 16.5
19	Valve Construction	Full Nozzle Full Lift Pressure Relief Valve	
MATERIAL OF CONSTRUCTION			
20	Body	ASTM A 105 / ASTM A 216 Gr. WCB	
21	Disc	SS316 + STELLITE	



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22	Seat	SS316 + STELLITE
23	Bonnet	ASTM A 105 / ASTM A 216 Gr. WCB
24	Nozzle	SA 182 F316
25	Spindle	ASTM A 479 type 410
26	Spindle Guide Material	ASTM A 479 type 410
27	Spring	17 - 7PH SS
28	Bolts	ASTM A 193 Gr. B7
29	Nuts	ASTM A 194 Gr. 2H
30	Cap / Cover	Forged carbon steel
31	Gaskets	Asbestos Free
32	Counter Flanges	ASTM A 105
33	ASME Code Stamp Requirement	Yes
Accessory Required		
34	Test Gag	Yes
35	Lifting Lever	Yes
36	Back Pressure Bellows	Not required
37	Drain / Vent Plug	Yes
38	Silencer	If required
Test Data		
39	Hydrostatic test pressure, kg/cm ² (g)	1.5 Times Design Pressure
40	Blow down pressure, bar(a)	By Bidder
41	Tolerance on set pressure	By Bidder as per design standards
42	Seat Tightness	As per standard API- 527
43	Noise level at outlet (at 1.0 mt distance) of relief valve, dBA (max)	85 dB(A)



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6.0 TECHNICAL SCHEDULE SUBMITTAL

This data sheet shall be filled up completely, Stamped & Signed by the Vendor and a copy shall be enclosed with each copy of the offer.

SR	DESCRIPTION	LSTK CONTRACTOR TO FURNISHED / CONFIRMED
1.	LPG Road Gantry Bottom Loading Arm	
	Type	
	Make	
	Model	
	Balancing	
	Size	
	Liquid Loading Arm	
	Vapor Return Arm	
	Body	
	Seals	
	Primary Seal	
	Dust Seal	
	Arm Connection details	
	Swivel Type	
	Spring Material	
	Arm Material	
2.	LPG Road Gantry Bottom Loading Arm	
	Type	
	Make	
	Model	
	Balancing	
	Size	
	Liquid Loading Arm	
	Vapor Return Arm	
	Body	
	Seals	
	Primary Seal	
	Dust Seal	
	Arm Connection details	
	Swivel Type	
	Spring Material	
	Arm Material	



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SR	DESCRIPTION	LSTK CONTRACTOR TO FURNISHED / CONFIRMED
3.	SKO Road gantry Top Loading Arm	
	Type	
	Make	
	Model	
	Balancing	
	Size	
	Body	
	Seals	
	Primary Seal	
	Dust Seal	
	Arm Connection details	
	Swivel Type	
	Spring Material	
	Arm Material	
4.	SKO/HSD/ATF POL Road Gantry area Decanting Sump with Pump	
	Design Standard of Tank	
	Make of Tank	
	Capacity of Tank	
	Material of Construction of Tank	
	Pump	
	Make	
	Type	
	Capacity in M3/Hr	
	Head	
	Motor Rating	
	Material of Impeller	
5.	Naphtha Rail Gantry area Decanting Sump with Pump	
	Design Standard of Tank	
	Make of Tank	
	Capacity of Tank	
	Material of construction of Tank	
	Pump	
	Make	
	Type	
	Capacity in M ³ /Hr	
	Head	
	Motor Rating	



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SR	DESCRIPTION	LSTK CONTRACTOR TO FURNISHED / CONFIRMED
	Material of Impeller	
6.	Sewage Sump with Sump Pump	
	Capacity of Sump	
	Size of Sump with sock pit and septic tank	
	Pump	
	Make	
	Head	
	Flow	
	Motor rating	
7.	AIR CONDITIONING SYSTEM	
7.1	AIR COOLED PACKAGED AIR CONDITIONER	
	Type	
	Make	
	Model No.	
	Capacity (TR)	
	Water entering and leaving temperature	
	for Condenser	
	Power Consumption (KW)	
	Overall Dimension (L x B x D)	
	Gross Weight (Kg)	
	Nos. Quoted	
	Catalogue enclosed	
	Accessories provided	
	Mounting Frame	
	Switch fuse unit (L&T)	
	Drain pipe (6m. long)	
7.2	Refrigerant Compressor	
	Manufacturer	
	No of Units	
	Type	
	Refrigerant	
	Performance	
	Condensing Temp (°C)	
	Evaporating Temp (°C)	
	Capacity in Kcal/hr.	



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SR	DESCRIPTION	LSTK CONTRACTOR TO FURNISHED / CONFIRMED
	B.H.P. required	
	Lubrication type	
	H.P. recommended	
	All operating / safety controls and interlocks as specified provided. (Use separate sheets and furnish details)	
7.3	Condenser (air Cooled Type)	
	Manufacturer	
	Model No.	
	Type	
	Performance Data	
	Fluid temperature	
	Tube side	
	Shell side	
	Deg. C inlet	
	Deg. C outlet	
	Velocity, M/Sec.	
	No. of passes	
	Heat exchange, Kcal/Hr.	
	L.M.T.D. Deg. C (Including correction factor)	
	Overall heat transfer co-efficient	
	Kcal/hr. m ² - Deg. C	
	Fouling factor in hr-m ² - Deg. C / Kcal	
	Surface area m ²	
	Pressure drop meter of water head	
	Design Pressure in Kg/Sq.cm	
	Test Pressure in Kg/Sq.cm	
	Construction	
	Items	
	Tube material	
	Tube sheet material	
	Thermo-wells	
	Pressure gauges/connection	



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SR	DESCRIPTION	LSTK CONTRACTOR TO FURNISHED / CONFIRMED
	Vent. Connection with valves Drain connection with valves Relief valve	
	Fusible plug	
	Antifreeze thermostat	Yes / No
	Remarks	
7.4	Evaporator	
	Fan	
	Type	
	Performance	
	Capacity	
	Total Pressure	
	Outlet velocity	
	Rated speed (V-Belts)	
	B.H.P	
	Motor rating	
	Construction	
	Impeller material	
	Casing material	
	Shaft material	
	Drive	
	Coupling	
	Overall dimensions	
	Overall operating weight	
	No. of outlets	
	Overall dimensions	
	Gross weight	
	No. of quoted	
	Catalogue enclosed	
7.5	Cooling Coil	
	Manufacturer	
	No quoted	
	Performance	
	Cooling capacity Kcal/Hr	
	Coil pipe size	
	Air quantity M ³ /Hr	



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SR	DESCRIPTION	LSTK CONTRACTOR TO FURNISHED / CONFIRMED
	Fin. Material	
	Coil entering Air temp.	
	No of fins	
	Coil leaving Air temp Deg. C	
	Size of coil (Face area)	
	Pr. drop airside: MMW.G.	
	Face velocity	
	No of circuits	
	No of rows:	
	Fouling factor:	
	Overall heat Transfer Coefficient	
7.6	Filter	
	Type	
	Module Size & No. of Modules	
	Efficiency	
	Material of Filter Media	
	Weight of Each Module	
7.7	Humidifier	
	Type	
	Capacity	
	Material of Construction	
7.8	AIR DISTRIBUTION SYSTEM	
	Ducting	
	Type	Rectangular
	Material	GSS/AL/SS304
	Type	Round
	Material	GSS/AL/SS304
	Seam	Spiral / Longitudinal
	Diffusers	
	Diffuser with Volume control dampers	Yes / No
	Type	Round / Square / Linear /Slot
	Pattern	Flush / Stepped
	Material	CS with Rust resistant primer / AL with powder coated / SS304
	Diffuser without volume control damper	Yes / No



**PART II - TECHNICAL BID DOCUMENT
ANNEXURE II - MECHANICAL**

**ESSAR PROJECTS (INDIA) LIMITED
ENGINEERING & PROJECT MANAGEMENT**

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SR	DESCRIPTION	LSTK CONTRACTOR TO FURNISHED / CONFIRMED
	Type	Round / Square / Linear /Slot
	Pattern	Flush / Stepped
	Material	CS with Rust resistant primer / AL with powder coated / SS304
	Grills	
	Grilles with volume control damper	Yes / No
	Type	Single acting / Double acting
	Material	CS with Rust resistant primer / AL with powder coated / SS304
	Grilles without volume control damper	Yes / No
	Type	Fixed blade / Adjustable blade
	Material	CS with rust resistant primer / AL with powder coated / SS304
	Dampers	
	Opposed blade type volume control damper for rectangular duct with Brass/Teflon bushing	Yes / No
	Single blade type volume control damper for round duct with Brass/Teflon bushing	Yes / No
	Motorized damper	Yes / No
	Shaft blade provided with	Brass bushing / Teflon bushing / Sealed ball bearing
	Fire damper	Yes / No
	Type of damper	
	Insulation	
	Acoustic insulation	Yes / No
	Material	
	Density	
	Thickness	
	Thermal insulation	Yes / No
	Material	
	Density	
	Thickness	
	Thermal conductivity	



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SR	DESCRIPTION	LSTK CONTRACTOR TO FURNISHED / CONFIRMED
	Miscellaneous	
	Plenum	Yes / No
	Kitchen hood	Yes / No
	Material	GSS / AL / SS304
	Metallic grease filters provided	Yes / No
	Hood light provided	Yes / No
	Access door	Yes / No
	Flexible connection other than at equipment inlet & outlet	Yes / No
	Frame work for Diffusers and grilles and wall mounted VCD and Fire damper made out of	Teak wood / CS / AL / SS Yes / No
	Sealant for duct longitudinal and spiral seams	Yes / No
	Duct support qualified for seismic forces	Yes / No
	Return air boxing	Yes / No
	Material	Gypsum Board / Pop
	Painting	
	Ducts	Unpainted / Epoxy / Synthetic Enamel
	Duct reinforcement angles	Red oxide primer / Epoxy / Synthetic Enamel
	Duct supports	Red oxide primer / Epoxy / Synthetic Enamel
	Diffuser in case of CS	Unpainted / Epoxy
	Grilles in case of CS	Unpainted / Epoxy
7.9	LOUVERS	
	General	
	Designation	
	Type	Fixed / Adjustable
	Air flow rate	
	Quantity	
	Size (Each) and number	mm X mm X No
	Design face velocity	
	Design wind pressure	
	Pressure drop across the louvers	
	Angle of blades	



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SR	DESCRIPTION	LSTK CONTRACTOR TO FURNISHED / CONFIRMED
	Percentage of free area	
	Material of construction	
	Frame	
	Blade	
	Bearing	
	Blade linkage rod	
	Bird screen	
	FIRE DAMPER	
	Make & Model	
	Type	
	Reference	
	Fire rating	
	Details of solenoid	
	Mounting	
	Construction	
	Weight of fire damper without sleeve per SQMT	
	FRAME	
	Material	
	Thickness	
	BLADES	
	Construction	
	Thickness	
	Material	
	Bearing	
	Shaft	
	Shaft material	
	LINKAGE	
	Drive end	
	Material	
	MOTORISED ACTUATOR	
	Make	
	Model	
	Torque range	
	Power consumption	
	Control	
8.	SKY LIFT	



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SR	DESCRIPTION	LSTK CONTRACTOR TO FURNISHED / CONFIRMED
	Type	
	Make	
	Model	
	Operating Weight Lifting Capacity	
	Lift height	
	Size of the operating cage	
	Provided with Hydraulic Operation control panel	



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