RFP - VOLUME II

TECHNICAL SPECIFICATIONS FOR EQUIPMENT

FOR MOBILE HARBOUR CRANES

(For Shahid Beheshti Port (Chabahar)

NOVEMBER 2016

PART 1 – GENERAL

1.1 Introduction

This Specification is for the design, fabrication, construction, delivery, installation, commissioning and testing of various container handling equipment for Shahid Beheshti Port (Chabahar), Islamic Republic of Iran. The equipment will be used for the loading and unloading of container on vessels of approximately 8,600 TEU capacity and for container handling operations in the yard.

1.2 Environmental Conditions

The port equipment will be exposed to an extremely corrosive marine atmosphere with particularly high salinity, high temperatures and humidity. In addition, these regions of the Persian Gulf and Oman sea are subjected to frequent dust and haze storms and periodic seismic activity.

The Manufacture shall design and construct the cranes to ensure reliable operation under the following site conditions: -

1.3 Temperatures (measured in shade)

Ambient Air Temperatures:	Maximum	50°C
	Minimum	0°C

1.4 Relative Humidity

Maximum relative humidity (RH)	99%

1.5 Rainfall

Mean annual (17 years)	171mm
Max annual (1976)	494mm
Min annual (1962)	1mm
Intensity	20mm/20 min

1.6 Winds

Wind strength and direction variable through the seasons:

Maximum operating wind speed	20m/s
Maximum storm winds	44m/s (gust)

1.7 Seismic

Seismic Design Data (minimum values):

Horizontal acceleration (50 year)	0.34g
Vertical (50% x horizontal)	0.17g

140 TONS MOBILE HARBOUR CRANES

1.0 This specification covers the design, manufacturing, inspection, testing and commissioning at site of 140 Tons Mobile Harbour Cranes.

IPGPL intends to procure 2 (two)Nos. of Mobile Harbour Cranes of each 140 Tons capacity for handling break bulk / dry bulk/ general / container cargo at Chabahar Port Multipurpose terminal. The following specifications are determined for 2 units of mobile harbor cranes of 140 Tons capacity, which are going to be installed in the Multi Purpose Terminal in Chabahar Port with environmental conditions stated below. The design and manufacture of these units should comply with the well known standards such as ISO, FEM, IEEE, ASME, IEC, JIS, EN, ECC, AWS, and SIS as applicable.

2.0 **Environmental conditions**

- Temperature range: 0 to +50°C
- Humidity: relative humidity up to 99%
- Height from sea level: 0 (in one level)
-Environment: Dusty, corroding and salty environment
- Permissible wind speed when the units are working: 72 Km/h (20 m/s)

3.0 Main Conditions

Suggested cranes should be designed for Iranian conditions. The cranes must work in the port conditions for continuous 20 hours per day and 7 days of the week. MHCs shall be of approx. 140 Tons capacity. The maximum permissible distributed load on the surface of the quay is 5 tons/m^2. A separate winch for grabbing is to be provided. The radius of operation should be at least 50m.

4.0 **Spreader & Grab**

The following equipment shall be supplied for common use of 2x140 T and 4x100 T Mobile Harbour cranes:

4.1 Two nos. of main telescopic spreader 40t to handle 20 ft and 40 ft ISO containers.

4.2 Four nos. of Grab of minimum 24 cubic meter capacity

4.3 Two units of special device for handling sheet rolls (C-hook) with 40 ton capacity.

5.0 Auxiliary systems:

The cranes must be equipped with the following systems:

- Fully Localized lubrication system for main parts that need lubrication separately.
- Wind speed alarm system
- All the sub-assemblies should have been manufactured by original and well – known companies.
- Appropriate warning lights (rotary or flashing strobes) , motion alarms (horn, acoustic alarms), luminous air obstruction lights, emergency shutdowns and other necessary warning lights an alarms
- Adequate illumination for the working area, driver&operator cabins, machinery & electrical houses.
- Lightning protection system

- Fire detection and fire alarm system especially in electrical house, machinery house an Operator and Driver cabins.
- All maintenance platforms should have enough space for the repair of equipment and strong enough to support the weight of personnel and equipment together, with suitable access means
- The lighting system should be fitted on anti-vibration mounts to prevent failure, and according to existing standards/ dimensions of Iran.
- All stairs, walkways, platforms, bolts and nuts should be hot dip galvanized and stairs should have required safety.
- Vertical ladders should not be used for access.
- One spare tyre with ring for each crane should be supplied.
- The manufacturer is bound to suggest 3 common sizes of tyres for its crane (along with detail spec. of them including dia, width, layers, etc.)
- The machinery house should be equipped with proper filter for particles of the inlet air
- Emergency power supply (UPS) for warning and emergency lights.
- In all necessary locations of E-house, M-house and driver's & operator's cabins fire extinguishers should be installed.
- All of special and standard tools for maintenance & (specially those required for engine and its related components) must be supplied (related tables in questionnaire should be filled).
- Air-conditioning system and electric panel for M.H.Cs should be supplied via AC power supply from the port mains (in parked position). The crane should have provision for shore power supply arrangement and shall be operable in both diesel and electric modes.
- Air compressor for adjusting the tyres pressure and its necessary equipment.
- Fuel tank should be equipped with drain valve and fuel indicator separately.
- Fueling must be done from the most suitable location of the crane with easiest access.

6.0 **Operator's Cabin (Tower & Lower) or (Operator & Driver)**:

Each of two cabins must be equipped with the following:

- Air cooling (split type) in the cabin to adjust the temperature around 22ºc with standard relative humidity.

- Monitor in the cabin to check the following places with camera (LCD is preferable).

  1 - Spreader (for fitting the spreader on the container)
  2 - For travelling

- The cameras should be controllable (with all movements, focus & zoom ability) from the operator's cabin (with a good resolution at night and day).

- Communication system including a public address system consisting a microphone and amplifier together with speakers and 2 walkie-talkie handsets with at least three VHF channels for each crane are needed.

- Maximum acceptable noise level in the cabs: 75 dBA

- Cabin windows should have wipers and fresh water spraying for cleaning the window to clearly see the crane operation. Further, all the windows should be able to be cleaned manually. All windows should be equipped with auto reset curtains. Window glasses should be tinted safety glass with sunblinds.
- All of loading and operation indications should be displayed on the operator's display monitor.
- Tower cabin bottom glasses shall have guards.

7.0 Crane Control System

- Monitoring system besides of common abilities, should include suitable table and electrical drawings for quick fault tracing
- The logic (Ladder) diagram of PLC control system should be submitted.
- Real time monitoring and recording of main movements (hoisting, slewing, luffing) should be done with PLC.
- The electrical house should be equipped with air-conditioning system and filter for inlet air.
- All joysticks must be equipped with dead man protection system.

8.0 Design Rules

Manufacturer should cover below items with FEM for its design:

- Classification and loading on structures and mechanisms.
- Stress calculations in structures.
- Fatigue calculations and selection of mechanisms component.
- Stability and safety factor against movements by the wind.
- The manufacturer should foresee all the necessary conditions in its design and should give the most compatible design for the mentioned ports environments.
- The manufacturer should carry out the final test.

9.0 Materials and structural steels

All materials for load bearing structures should be weldable low carbon steel, and free from defects and also have well-known certificates.

- All materials should conform to the most applicable specifications of DIN and FEM standard.

10.0 Warning / Caution Instructions

In all the necessary positions and locations of the crane that caution instructions, are needed, a note plate should be installed on that place, warning the personnel in Farsi & English languages (corrosion resistant durable permanent plates).

11.0 Packing

- All equipment must be packed in a way that handling with forklift truck or crane is possible.
- If there is a risk of damage to apparatus during transportation, they shall be disconnected and tagged. All the components shall then be securely packed.
- Equipment shall be adequately packed to withstand at least six months storage at construction site prior to installation and the manufacturer shall recommend any necessary procedures to be imposed during storage.

- Spare parts and tools to be packed separately and clearly marked “spare parts” and “tools” respectively.

12.0 **Standard Parts/Equipment Uniformity**

- If possible, all the standard group parts / equipment shall be bought or procured from a same sub-supplier and in one brand. For example all of bearings must be bought from SKF or all of electrical motors shall be bought from (x) company.
- All of the equipment that are going to be bought, must be bought from the manufacturers given in the maker list. (attached)
- Spare parts & tools shall be packed separately and clearly marked as “spare parts” and “tools” respectively.

13.0 **Documentation**

The manufacturer should submit the below items in addition to the other stated documents:

1. General view of crane (2 Dimensional and 3 Dimensional with related dimensions)
2. Electrical house equipment arrangement.
3. Machinery house equipment arrangement.
4. Catalogue with these information:

   4-1) Loading diagram (lifting capacity chart)

   4-2) Technical data (working speed: hoisting, slewing, luffing and travelling,…)

5. Operating user’s manual and maintenance manual clearly giving details of preventive/ breakdown maintenance, procedures for removing / reassembling of various sub-assemblies for the main equipment as well as bought out items also indicating spare parts numbers and ordering information should be written in English Languages in soft (CD) & hard (paper) version.
6. All equipment should have nameplates.
7. All of the Technical specification pages should be signed and stamped.
8. The attached L.O.M are indicative.

14.0 ***Principal Duty***

The Harbour Mobile crane shall have not less than 140 Tons lifting capacity under hook at minimum radius, able to handle break bulk/ general cargo as well as fully loaded containers from 62000 DWT size ships, along the berth and yards at the Multipurpose Terminal of Port of Chabahar, Iran. The cranes’ outreach shall be not less than 50m.

15.0 Power pack:

Dual system. (i) Diesel-electric with diesel engine with a main three-phase generator. (ii) Medium voltage Shore power supply arrangement. The crane to be equipped with ‘Automatic Phase Changer’.

16.0 <u>Group Classification of Crane and Components</u>

Authorities, Regulations EN, FEM, DIN, VDE, VDI, IEC, ISO

The following parameters shall be adhered to:

CRANE CAPACITY		*Not less than 140 tons under hook*
General	*MAX. Outreach*	*Not less than 50 m*
Hoisting	***CAPACITY***	
	Heavy Lift	*Minimum of 140t up to about 22 m radius*
	General Cargo Handling	*Approx. 92t up to about 31 m radius*
		Approx. 56t up to about 45 m radius
	Four Rope Grab Operation	*Approx. 72t up to about 27 m radius*
	Maximum hoisting height on hook above ground	*At minimum radius = minimum 51 m and above* *At maximum radius =* *minimum 30m and above*
	Minimum hoisting height on hook below ground	*15m and above*
	OPERATING SPEED	
	empty hook	*120 m/min approx..*
	40 t, Grab mode	*approx.50 m/min and above*
	60 ton hook	*approx.33 m/min and above*
	144 ton hook	*Approx..14 m/min and above*
Slewing	*Minimum slewing speed (without load)*	*Approx.1.6 rpm*
	Minimum slewing speed (to 63 ton hook)	*Approx. 1.3 rpm*
	Minimum tangential speed at boom head (without load)	*Approx. 280m/min*
	Minimum tangential speed at boom head (with load)	*Approx. 186m/min*
	Slewing Range	*360 deg*
Luffing	*Maximum luffing speed*	*approx. 90 m/min*

	Average luffing speed (to 63 ton hook)	*55m/min approx.*
Travelling	*Long Travel*	*5 Km/h approx..*

The crane and its machinery shall be designed according to the FEM 1.001 (Rules for the Design of Hoisting Appliances) and shall have the following minimum classifications:

Crane Classification

Heavy lift operation 140t on hook	*A3*
General cargo 65 t to 77t on hook	*A6*
Four Rope operation, 63 t	*A8*

Hoist

Heavy lift operation 140 ton hook	*M6*
General cargo 90t on hook	*M8*
Four rope operation, 75 t	*M8*

Slewing Gear

All operation modes	*M7*

Luffing Gear

All operation modes	*M7*

Travelling gear	*M4*

Main Dimensions:

Outreach of the boom from crane centerline *minimum 50 m or above*

Height of boom pivot point above ground *minimum 17 m*

Height of eye level in tower cab *minimum 24 m*

The crane shall be designed to work safely and reliably under the following conditions:

Maximum gradient for travelling

- in direction of travel *6%*

- perpendicular to direction of travel *2.5%*

17.0 ***ENGINE:***

Appropriately sized direct injection, diesel engine. The Tenderer shall provide proof that the engine shall provide adequate power and torque to the crane while maintaining maximum fuel efficiency, preferably engines from the list indicated in Annex, single heavy duty tropical fin & tube type radiator, engine coolant radiator and transmission oil cooler. To have Automatic Engine shutdown at conditions that might be deemed harmful to the engine e.g. high temperature and low engine oil pressure. Air intake Pre-cleaner be designed to minimize dust intake. To have an on board & External fault diagnostic facility.

All air intake filters to be fitted with sensors to feed PLC system with warning fault messages when clogged. Machine house designed to be able to minimize dust intake.

18.0 ***Drive System:*** *Prime Mover - Diesel Engine, 4 stroke direct injection.*

19.0 Undercarriage:

Adequate Number of axles suitable for the design uniform distributed load of the quay shall be deployed.

All axles to be steerable.

All axles must have level compensation and fitted with differential equalizers.

A pair of twin pneumatic preferably tubeless tyres per axle.

Pneumatic impact wrench for use on nuts (with fast speed nut removal action if possible) completed with hose attachments, accessories, box spanner fitted to a suitable portable compressor.

Wide spacing of wheel axles for optimum stability during traveling

Automatic central greasing systems as standard Outriggers to be preferably fitted with rollers

20.0 ***Steering:*** *Should be capable of performing several steering modes i.e. driving in longitudinal, diagonaldirection and also conventional steering or as standard.*

21.0 ***Brakes:*** *Luffing brake, Hoist brake, slew brake, parking / holding brake; Must be able to stop automatically in case of power failure.*

22.0 ***Tower:*** *Welded pipe construction /box and beam construction of torsionally rigid design with staircase leading to the tower cabin for access to the upper tower and jib – heel. The tower should be well lit.*

23.0 ***Boom:*** *Fixed torsion resistant lattice construction with three main chords and consisting of sections (fulcrum section and boom head.) Boom sections connected with flanges. Boom luffing cylinders shall be protected from effects of climatic conditions.*

24.0 ***Ropes and sheaves:*** *Self-lubricating, low twisting galvanized greased steel ropes for hoisting, Large diameter rope sheaves with anti-friction bearings. Sheaves made from special steel and the groove surface hardened to increase lifetime of sheave. Hardness Number (Rockwell) to be mentioned by the manufacturer.*

25.0 ***Electrics:*** *The electric equipment to comply with the relevant IEC and EN standards. All wiring and cabling according to relevant DIN/VDE and IEC standards. Load sensing and fault detection central computer*

26.0 ***Propping system:*** *Two integrated boxes housing four hydraulically operated outrigger beams Manual and automatic operation. Even load distribution in rugged terrain: pot holed yards, climb over rails and raised ground.*

27.0 ***Testing:*** *Crane to be fully erected rigged and load tested prior to handover.*

28.0 ***Spares/tools etc.:***

12000 running hours Spare parts shall be quoted according to the *contractual bidding* forms and the buyer has the right to exclude/ reduce it , however a comprehensive list of spares parts complete with prices shall be submitted with the tender.

PREFERRED / INDICATIVE MANUFACTURERS FOR MAJOR COMPONENTS FOR THE EQUIPMENTS

Manufacturers List/ List of Material (L.O.M.)

DESCRIPTION	MANUFACTURER	COUNTRY
HOIST, TRAVEL LUFFING AND SLEWING AC ELECTRIC MOTORS	NORD LEROY SOMER ABB SIEMENS	GERMANY FRANCE SWEDEN GERMANY
COUPLINGS	SIEGERLAND FLENDER NORD PIV	GERMANY GERMANY GERMANY GERMANY
SLEWING, HOIST AND LUFFING GEARBOX	SEW NORD FLENDER P.I.V	GERMANY GERMANY GERMANY GERMANY
SLEWING, HOIST AND LUFFING BRAKES	BUBENZER SIEGERLAND SIBRE	GERMANY GERMANY GERMANY
ELECTRICAL PACKAGE	SIEMENS ABB TELEMECANIQUE	GERMANY GERMANY FRANCE
ALL HYDRAULIC PACKAGE AND EQUIPMENT	PARKER REXROTH VICKERS	ENGLAND GERMANY ENGLAND
ALL WIRE ROPES	CASAR CERTEX	GERMANY FINLAND
SPREADER CABLE	LABBKABEL (OLFLEX) SIEMENS AEG	GERMANY GERMANY GERMANY
BEARINGS	FAG SKF TNT	GERMANY SWEDEN JAPAN
LIMIT AND PROXIMITY SWITCHES	SIEMENS IFM TELEMECANIQUE	GERMANY GERMANY FRANCE
TRANSFORMER	SIEMENS ABB FRANCE TRANSFO	GERMANY GERMANY FRANCE
FREQUENCY INVERTER	ABB SIEMENS LENZE	GERMANY GERMANY GERMANY
MAIN FEEDING CABLE	AEG SIEMENS (PIRELLI) F + G	GERMANY GERMANY GERMANY
DIESEL ENGINE	VOLVO BENZ MWM	SWEDEN GERMANY GERMANY
TIRES	MICHLEAN BRIDGESTONE DAUNLOOP	FRANCE JAPAN GERMANY
SPREADER	BROMMA SMITS RAM	SWEDEN/ MALASYSIA NETHERLAND UK
COMPRESSORS	ATLAS COPO KAESER	GERMANY GERMANY
OPERATOR'S CABIN	SCANCAB BRIEDA MATEC	DENMARK ITALY GERMANY
OPERATOR'S CAB AIR CONDITIONING	SAMSUNG LINDE O-GENERAL	JAPAN GERMANY JAPAN
Generator	Siemens AVK Stamford	Germany Germany UK

The other brands maybe indicated by the tenderers. However, the acceptance of the same will be confirmed by the tender holder prior to the end of technical evaluation.

100 TONS MOBILE HARBOUR CRANES

1.0 This specification covers the design, manufacturing, inspection, testing and commissioning at site of 100 Tons Mobile Harbour Cranes.

IPGPL intends to procure 4 (four) nos. of Mobile Harbour Cranes of 100 Tons capacity for handling break bulk / dry bulk/ general / container cargo at Chabahar Port Multipurpose terminal. The following specifications are determined for 4 units of mobile harbor cranes of 100 Tons capacity, which are going to be installed in the Multi Purpose Terminal in Chabahar Port with environmental conditions stated below. The design and manufacture of these units should comply with the well known standards such as ISO, FEM, IEEE, ASME, IEC, JIS, EN, ECC, AWS, and SIS as applicable.

2.0 **Environmental conditions**

- Temperature range: 0 to +50°C
- Humidity: relative humidity up to 99%
- Height from sea level: 0
-Environment: Dusty, corroding and salty environment
- Permissible wind speed when the units are working: 72 km/h

3.0 Main Conditions

Suggested cranes should be designed for Iranian conditions. The cranes must work in the port conditions for continuous 20 hours per day and 7 days of the week. MHCs shall be of approx. 100 Tons capacity. The maximum permissible distributed load on the surface of the quay is 5 tons/m^2. A separate winch for grabbing is to be provided. The radius of operation should be at least 50m.

Each crane must be equipped with the following:

3.1 Main telescopic spreader 40t to handle 20 ft and 40 ft ISO containers.
3.2 A Hook and Grab of minimum 24 cu.m capacity
3.3 Two units of special device for handling sheet rolls (coil hook) with 40 Tons capacity.

4.0 **Spreader& Grab**

The following equipment shall be supplied for common use of 2x140 T and 4x100 T Mobile Harbour cranes:

4.1 Two nos. of main telescopic spreader 40t to handle 20 ft and 40 ft ISO containers.
4.2 Four nos. of Grab of minimum 24 cubic meter capacity
4.3 Two units of special device for handling sheet rolls (C-hook) with 40 ton capacity.

5.0 **Auxiliary systems**:

The cranes must be equipped with the following systems:

- Fully Localized lubrication system for main parts that need lubrication separately.
- Wind speed alarm system
- All the sub-assemblies should have been manufactured by original and well – known companies.

- Appropriate warning lights (rotary or flashing strobes) , motion alarms (horn, acoustic alarms), luminous air obstruction lights, emergency shutdowns and other necessary warning lights an alarms
- Adequate illumination for the working area, driver&operator cabins, machinery & electrical houses.
- Lightning protection system
- Fire detection and fire alarm system especially in electrical house, machinery house an Operator & Driver cabins.
- All maintenance platforms should have enough space for the repair of equipment and strong enough to support the weight of personnel and equipment together, with suitable access means
- The lighting system should be fitted on anti-vibration mounts to prevent failure, and according to existing standards/ dimensions of Iran.
- All stairs, walkways, platforms, bolts and nuts should be hot dip galvanized and stairs should have required safety.
- Vertical ladders should not be used for Access.
- One spare tyre with ring for each crane should be supplied.
- The manufacturer is bound to suggest 3 common sizes of tires for its crane (along with detail spec. of them including dia, width, layers, etc.)
- The machinery house should be equipped with proper filter for particles of the inlet air
- Emergency power supply (UPS) for warning and emergency lights.
- In all necessary locations of E-house, M-house and driver's & operator's cabins fire extinguishers should be installed.
- All of special and standard tools for maintenance & (specially those required for engine and its related components) must be supplied (related tables in questionnaire should be filled).
- Air-conditioning system and electric panel for M.H.Cs should be supplied via AC power supply from the port mains (in parked position). The crane should have provision for shore power supply arrangement and shall be operable in both diesel and electric modes.
- Air compressor for adjusting the tyres pressure and its necessary equipment.
- Fuel tank should be equipped with drain valve and fuel indicator separately.
- Fueling must be done from the most suitable location of the crane with easiest access.

6.0 Operator's Cabin (Tower & Lower):

Each of two cabins must be equipped with the following:

- Air cooling (split type) in the cabin to adjust the temperature around 22ºc with standard relative humidity.

- Monitor in the cabin to check the following places with camera (LCD is preferable).

  2 - Spreader (for fitting the spreader on the container)
  2 - For travelling

- The cameras should be controllable (with all movements, focus & zoom ability) from the operator's cabin (with a good resolution at night and day).

- Communication system including a public address system consisting a microphone and amplifier together with speakers and 2 walkie-talkie handsets with at least three VHF channels for each crane are needed.

- Maximum acceptable noise level in the cabs: 75 dBA
- Cabin windows should have wipers and fresh water spraying for cleaning the window to clearly see the crane operation. Further, all the windows should be able to be cleaned manually. All windows should be equipped with auto reset curtains. Window glasses should be tinted safety glass with sunblinds.
- All of loading and operation indications should be displayed on the operator's display monitor.
- Tower cabin bottom glasses shall have guards.

7.0 Crane Control System

- Monitoring system besides of common abilities, should include suitable table and electrical drawings for quick fault tracing
- The logic (Ladder) diagram of PLC control system should be submitted.
- Real time monitoring and recording of main movements (hoisting, slewing, luffing) should be done with PLC.
- The electrical house should be equipped with air-conditioning system and filter for inlet air.
- All joysticks must be equipped with dead man protection system.

8.0 Design Rules

Manufacturer should cover below items with FEM for its design:

- Classification and loading on structures and mechanisms.
- Stress calculations in structures.
- Fatigue calculations and selection of mechanisms component.
- Stability and safety factor against movements by the wind.
- The vendor should foresee all the necessary conditions in its design and should give the most compatible design for the mentioned ports environments.
- The vendor should carry out the final test.

9.0 Materials and structural steels

- All materials for load bearing structures should be weldable low carbon steel, and free from defects and also have well-known certificates.

- All materials should conform to the most applicable specifications of DIN and FEM standard.

10.0 Warning / Caution Instructions

In all the necessary positions and locations of the crane that caution instructions, are needed, a note plate should be installed on that place, warning the personnel in Farsi & English languages (corrosion resistant durable permanent plates).

11.0 Packing

- All equipment must be packed in a way that handling with forklift truck or crane is possible.

- If there is a risk of damage to apparatus during transportation, they shall be disconnected and tagged. All the components shall then be securely packed.
- Equipment shall be adequately packed to withstand at least six months storage at construction site prior to installation and the vendor shall recommend any necessary procedures to be imposed during storage.
- Spare parts and tools to be packed separately and clearly marked “spare parts” and “tools” respectively.

12.0 **Standard Parts/Equipment Uniformity**

- If possible, all the standard group parts / equipment shall be bought or procured from a same sub-supplier and in one brand. For example all of bearings must be bought from SKF or all of electrical motors shall be bought from (x) company.
- All of the equipment that are going to be bought, must be bought from the manufacturers given in the maker list. (attached)
- Spare parts & tools shall be packed separately and clearly marked as “spare parts” and “tools” respectively.

13.0 **Documentation**

The vendor should submit the below items in addition to the other stated documents:

1. General view of crane (2 Dimensional and 3 Dimensional with related dimensions)
2. Electrical house equipment arrangement.
3. Machinery house equipment arrangement.
4. Catalogue with these information:

   4-1) Loading diagram (lifting capacity chart)

   4-2) Technical data (working speed: hoisting, slewing, luffing and travelling,…)

5. Operating user’s manual and maintenance manual clearly giving details of preventive / breakdown maintenance, procedures for removing / reassembling of various sub-assemblies for the main equipment as well as bought out items also indicating spare parts numbers and ordering information should be written in Farsi or English Languages in soft (CD) & hard (paper) version.
6. All equipment should have nameplates.
7. All of the Technical specification pages should be signed and stamped.
8. This technical specification (including 13 items) and its attached L.O.M are fixed conditions and the manufacturer is bond to follow them exactly unless the buyer otherwise requires.

14.0 ***Principal Duty***

The Harbour Mobile crane shall have not less than 100 Tons lifting capacity under hook at minimum radius, able to handle break bulk/ general cargo as well as fully loaded containers from 62000 DWT size ships, along the berth and yards at the Multipurpose Terminal of Port of Chabahar, Iran. The cranes’ outreach shall be not less than 50m.

15.0 Power pack:

Dual system. (i) Diesel-electric with diesel engine with a main three-phase generator. (ii) Medium Voltage Shore power supply arrangement. The crane to be equipped with 'Automatic Phase Changer'.

16.0 Group Classification of Crane and Components

Authorities, Regulations EN, FEM, DIN, VDE, VDI, IEC, ISO

The following parameters shall be adhered to:

CRANE CAPACITY		*Not less than 100 TONS (under hook)*
General	*MAX. Outreach*	*Not less than 50 m*
Hoisting	***CAPACITY***	
	Heavy Lift	*Minimum of 100t at 20 m radius (approx..)*
	General Cargo Handling	*63t up to 31 m radius (approx..)*
		39t up to 45 m radius (approx..)
	Four Rope Grab Operation	*70t up to 20 m radius (approx..)*
	Maximum hoisting height on hook above ground	*At minimum raidus = minimum 40 m and above* *At maximum radius = minimum 28m and above*
	Minimum hoisting height on hook below ground	*10m and above*
	OPERATING SPEED	
	empty hook	*120 m/min (approx..)*
	40 t, Grab mode	*50 m/min and above*
	60 t on hook	*33 m/min and above*
	100 t on hook	*16 m/min and above*
Slewing	*Minimum slewing speed (without load)*	*1.6 rpm (approx..)*
	Minimum slewing speed (to 63 t on hook)	*1.3 rpm (approx..)*

	Minimum tangential speed at boom head (without load)	*280m/min (approx..)*
	Minimum tangential speed at boom head (with load)	*186m/min (approx..)*
	Slewing Range	*360 deg (approx..)*
Luffing	*Maximum luffing speed*	*approx. 90 m/min*
	Average luffing speed (to 63 t on hook)	*55m/min (approx..)*
Travelling	*Long Travel*	*5 Km/h (approx..)*

The crane and its machinery shall be designed according to the FEM 1.001 (Rules for the Design of Hoisting Appliances) and shall have the following minimum classifications:

Crane Classification

Heavy lift operation 140t on hook	*A3*
General cargo 65 t to 77t on hook	*A6*
Four Rope operation, 63 t	*A8*

Hoist

Heavy lift operation 140 ton hook	*M6*
General cargo 90t on hook	*M8*
Four rope operation, 75 t	*M8*

Slewing Gear

All operation modes	*M7*

Luffing Gear

All operation modes	*M7*

Travelling gear	*M4*

Main Dimensions:

Outreach of the boom from crane centerline *minimum 50 m*

Height of boom pivot point above ground *minimum 16.5 m*

Height of eye level in tower cab *minimum 24.0 m*

The crane shall be designed to work safely and reliably under the following conditions:

Maximum gradient for travelling

- in direction of travel	*6%*
- perpendicular to direction of travel	*2.5%*

The crane shall be designed to work safely and reliably under the following conditions:

Maximum gradient for travelling

- in direction of travel	*6%*
- perpendicular to direction of travel	*2.5%*

17.0 ***ENGINE:***

Appropriately sized direct injection, (Normal engine instead of turbocharged to be asked) diesel engine. The Tenderer shall provide proof that the engine shall provide adequate power and torque to the crane while maintaining maximum fuel efficiency, preferably engines from the list indicated in Annex…, single heavy duty tropical fin & tube type radiator, engine coolant radiator and transmission oil cooler. To have Automatic Engine shutdown at conditions that might be deemed harmful to the engine e.g. high temperature and low engine oil pressure. Air intake Pre-cleaner be designed to minimize dust intake. To have an on board & External fault diagnostic facility.

All air intake filters to be fitted with sensors to feed PLC system with warning fault messages when clogged. Machine house designed to be able to minimize dust intake.

18.0 ***Drive System:*** *Prime Mover - Diesel Engine, 4 stroke direct injection preferably turbocharged.*

19.0 Undercarriage:

Adequate Number of axles suitable for the design uniform distributed load of the quay shall be deployed.

All axles to be steerable.

All axles must have level compensation and fitted with differential equalizers.

A pair of twin pneumatic preferably tubeless tyres per axle.

Pneumatic impact wrench for use on nuts (with fast speed nut removal action if possible) completed with hose attachments, accessories, box spanner fitted to a suitable portable compressor.

Wide spacing of wheel axles for optimum stability during traveling

Automatic central greasing systems as standard Outriggers to be preferably fitted with rollers

20.0 ***Steering:*** *Should be capable of performing several steering modes i.e. driving in longitudinal, diagonal direction and also conventional steering or as standard.*

21.0 ***Brakes:*** *Luffing brake, Hoist brake, slew brake, parking / holding brake; Must be able to stop automatically in case of power failure.*

22.0 ***Tower:*** *Welded pipe construction /box and beam construction of torsionally rigid design with staircase leading to the tower cabin for access to the upper tower and jib – heel. Should be well lit.*

23.0 ***Boom:*** *Fixed torsion resistant lattice construction with three main chords and consisting of sections (fulcrum section and boom head.) Boom sections connected with flanges. Boom luffing cylinders shall be protected from effects of climatic conditions.*

24.0 ***Ropes and sheaves:*** *Self-lubricating, low twisting galvanized greased steel ropes for hoisting, Large diameter rope sheaves with anti-friction bearings. Sheaves made from special steel and the groove surface hardened to increase lifetime of sheave.. Hardness Number (Rockwell) to be mentioned by the manufacturer*

25.0 ***Electrics:*** *The electric equipment to comply with the relevant IEC and EN standards. All wiring and cabling according to relevant DIN/VDE and IEC standards. Load sensing and fault detection central computer*

26.0 ***Propping system:*** *Two integrated boxes housing four hydraulically operated outrigger beams Manual and automatic operation. Even load distribution in rugged terrain: pot holed yards, climb over rails and raised ground.*

27.0 ***Testing:*** *Crane to be fully erected rigged and load tested prior to handover.*

PREFERRED / INDICATIVE MANUFACTURERS FOR MAJOR COMPONENTS FOR THE EQUIPMENTS

Manufacturers List/ List of Material (L.O.M.)

DESCRIPTION	MANUFACTURER	COUNTRY
HOIST, TRAVEL LUFFING AND SLEWING AC ELECTRIC MOTORS	NORD LEROY SOMER ABB SIEMENS	GERMANY FRANCE SWEDEN GERMANY
COUPLINGS	SIEGERLAND FLENDER NORD PIV	GERMANY GERMANY GERMANY GERMANY
SLEWING, HOIST AND LUFFING GEARBOX	SEW NORD FLENDER P.I.V	GERMANY GERMANY GERMANY GERMANY
SLEWING, HOIST AND LUFFING BRAKES	BUBENZER SIEGERLAND SIBRE	GERMANY GERMANY GERMANY
ELECTRICAL PACKAGE	SIEMENS ABB TELEMECANIQUE	GERMANY GERMANY FRANCE
ALL HYDRAULIC PACKAGE AND EQUIPMENT	PARKER REXROTH VICKERS	ENGLAND GERMANY ENGLAND
ALL WIRE ROPES	CASAR CERTEX	GERMANY FINLAND
SPREADER CABLE	LABBKABEL (OLFLEX) SIEMENS AEG	GERMANY GERMANY GERMANY
BEARINGS	FAG SKF TNT	GERMANY SWEDEN JAPAN
LIMIT AND PROXIMITY SWITCHES	SIEMENS IFM TELEMECANIQUE	GERMANY GERMANY FRANCE
TRANSFORMER	SIEMENS ABB FRANCE TRANSFO	GERMANY GERMANY FRANCE
FREQUENCY INVERTER	ABB SIEMENS LENZE	GERMANY GERMANY GERMANY
MAIN FEEDING CABLE	AEG SIEMENS (PIRELLI) F + G	GERMANY GERMANY GERMANY
DIESEL ENGINE	VOLVO BENZ MWM	SWEDEN GERMANY GERMANY
TIRES	MICHLEAN BRIDGESTONE DAUNLOOP	FRANCE JAPAN GERMANY
SPREADER	BROMMA SMITS RAM	SWEDEN/ MALASYSIA NETHERLAND UK
COMPRESSORS	ATLAS COPO KAESER	GERMANY GERMANY
OPERATOR'S CABIN	SCANCAB BRIEDA MATEC	DENMARK ITALY GERMANY
OPERATOR'S CAB AIR CONDITIONING	SAMSUNG LINDE O-GENERAL	JAPAN GERMANY JAPAN
Generator	Siemens AVK Stamford	Germany Germany UK

The other brands maybe indicated by the tenderers. However, the acceptance of the same will be confirmed by the tender holder prior to the end of technical evaluation.