

DOCUMENT TYPE: Inquiry

DOCUMENT TITLE:

Inquiry Document For Cranes of Refractory Warehouse & Workshop Buildings

REV.	DATE	PRE.	CHK.	APP.	Client	Description	Purpose of Issue

PROJECT TITLE :

SIRJAN JAHAN STEEL MAKING PROJECT

Client :
SIRJAN JAHAN STEEL
COMPLEX



Consultant :
Canymes



Project Code	P.Code	Unit Code	Area Code	Technological	Sub Technological Code	Progressive No.
	NAME	DATE		Contractor No.	SHEET	REV.
					31	
				Contract No. : -----		

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SIRJAN JAHAN STEEL COMPLEX
Steel Making Plant Project





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1 Foreword



This inquiry document covers the design, fabrication & supply, supply of two years spare parts(as an option) & special tools, transportation, unloading & delivery to the site, erection & commissioning & performance test , training , quality control , inspection & expediting & guarantee of **two 5 ton electric overhead traveling single girder crane, one 8ton electric overhead traveling single girder crane and one 3ton electric overhead traveling single girder crane and** that shall be installed in SIRJAN Steel Plant.

1.2 General description

This inquiry document includes below cranes:

CRANE NO.		DESCRIPTION	QTY	LOCATION	CAPACITY (Ton)	SPAN (m)
Cr22	Refractory storage crane1	EOT single girder / hook (Single Girder overhead crane)	1	Refractory storage building	5	19.9
Cr23	Refractory storage crane2	EOT single girder / hook (Single Girder overhead crane)	1	Refractory storage building	5	19.9
Cr24	Workshop crane	EOT single girder / hook (Single Girder overhead crane)	1	Workshop building	8	17.8
Cr25	Workshop crane	EOT single girder / hook (Single Girder overhead crane)	1	Workshop building	3	17.8

- For cranes rails, clamps and accessories for installation should be included.
- Feeding line including all accessories in travelling length should be considered.
- Cable from center electrical panel to isolator switch will not be in vendor's scope of work.
- Sub-vendors shall be selected from attached list to inquiry.
- Two years spare parts, List of sub-supplier and Schedule time should be submitted.

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2 Codes, standards and classification

2.1 Codes and standards

Design, calculation and manufacturing will be according the latest edition of FEM 1.001 3rd Edition 1998 and CMAA for mechanical and structural part, IEC for electrical part will be followed.

Other standards used as follow:

- DIN for forged hooks and laminated hooks
- ANSI/AGMA n. 2001, 6001 and related standards for gearboxes
- ISO 1328 – UNI 7870 (SYSTEM OF ACCURACY)
- DIN 3972 – REFERENCE PROFILES
- ISO/AWS for welding design and procedures
- EN and ISO for base materials



2.2 Classification

Classification of the cranes and hoists will be based on the operating conditions of the most severely loaded part of the crane. Generally, the classification shall be according to FEM standards for heavy lifting appliances.

2.3 Rope drives

The calculation of rope drives will be in accordance with FEM standards to ensure an adequate degree of safety of operation of the lifting appliance and to achieve an adequate service life for the wire ropes used.

The relation of rope diameter to rope sheave diameter respectively rope drum diameter must be according to the relevant FEM standards.

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2.4 *Steel structure*

Lifting categories and stress groups shall be according to FEM standards, as per consideration in chapter 2.1. Steel structures and mechanisms will be designed according “Fatigue stress verification”.

More in detail provision for access ladders or staircases will be made wherever found necessary. The access to the crane, for maintenance conditions, must be provided at the following location:

- Maintenance walkway along the girder
- Maintenance walkway around the trolley should be consider
- Collector slipper maintenance platform

3 *Drives*

3.1 *General*

All drives must be mounted on base plates and have safe access for maintenance. If necessary, access platforms must be provided.

3.2 *Bridge travel drive*



The bridge travel drive essentially consists of:

- Individual wheel drives
- Driving wheel sets
- Trailing wheel sets

Gearbox and motorized wheels will be connected by means of low speed coupling type transmission.

The wheels shall be of forged steel with flanges and shall be mounted on rotating axles carried on spherical roller bearings.

The number of the driven wheel sets depends on the total number of wheel sets and the acceleration forces to be transmitted.

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In the case of bridges with 4 wheel sets generally 50% (half) of all wheel sets are driven. Bridges with 6 Wheel sets have 2 driven wheel sets; bridges with 8 wheel sets have 4 or 2 driven wheel sets. In any case, it will be verified that the acceleration power with an unloaded bridge can be transmitted with a friction coefficient of $\mu = 0.25$ between track wheel and rail. Wheel loads and numbers should be designed according to FEM booklet 4. In case of bridges with more than 4 wheels each pair of wheels should be mounted in trucks with equalizing design.

3.3 *Trolley travel drive*

The crane trolley shall travel on several wheels according to requirements. The wheels shall be of forged steel with flanges and shall be mounted on rotating axles carried on spherical roller bearings.

Trolley travel drive essentially consists of:

- Central drive or individual wheel drive
- Driving wheel sets
- trailing wheel sets

Gearbox and motorized wheels shall be connected by means of low speed couplings type transmission.



In the case of trolleys with 4 wheel sets generally 50% (half) of all wheel sets are driven. Trolleys with more than 6 wheel sets have 2 driven wheel sets; In any case it will be verified that the acceleration power with an unloaded trolley can be transmitted with a friction coefficient of $\mu = 0.25$ between track wheel and rail.

Wheel loads and numbers should be designed according to FEM booklet 4

3.4 *Hoist drive*

General

The mechanical components of the hoist drive will be rated according to FEM Standards in order to achieve an adequately long service life.

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The hoist drives will be arranged as “open barrel hoist” or “standard hoist” considering the hoist drive operation and duty.

The hoist drive will comprise the following main components:

- squirrel cage motor
- Shaft coupling with brake drum or brake disc
- self-adjusting double shoe brake with thruster or brake disc with thruster (for open barrel hoist)
- Magnetic disc brake (for "standard hoist")
- spur gearbox or standard gearbox with hardened and ground toothing, according to AGMA standards
- Rope drum/gearbox connection
- Rope drum
- drum bearings
- hoist limit switch
- Rope suspension
- Upper block for hoist motion, from 2 x 4 falls of rope
- Ropes
- Bottom block



Drums shall be supported at 2 points. The gearbox drum side shall be fitted on the output gearbox shaft by means of a barrel coupling, which allows for an articulated connection. The opposite side shall rest on one spherical roller bearing.

Over speed protection system with an emergency brakes will be provided and actuate on drum flange with optical relays.

4 Steel works

4.1 Material

The steelwork will consist of structural steels according to FEM

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4.2 Main bridge structure

The bridge structure consists of 1 girder fabricated with welded torsion box type design plates and vertical diaphragms, horizontal inner stiffeners giving great rigidity to the entire assembly. The butt joints of the flange and web plates shall be displaced as far as possible from the center of span avoiding also that their respective joints would coincide.

All welds will be visible and continuous on the finished crane.

The butt weld on the bottom flange and the depth of 150mm on the lower web plates shall be 100% radio graphed and flush grounded; the remaining butt welds shall be 10% radio graphed by samples.

Maximum deflection of bridge due to live load and trolley weight will not exceed 1/800 of span.

The rail section and platforms or walkways shall not be considered in structure calculations.

Minimum metal thickness of box girder shall be 8 mm for heavy-duty cranes or outdoor cranes and 6 mm for service cranes.

The girders are rigidly connected to the end carriages (to make a box type construction) by high resistance joint using bolts no smaller than $\phi 14$ mm.



Safety shall be provided to prevent a drop of more than 25mm in case of broken wheel or axle.

4.3 Trolley frame

The trolley frame will be made of plates and steel sections in welded construction with welded-on and welded-in transoms, bearing brackets and mounts to accommodate the mechanical and electrical equipment.

4.4 Rails

Rails are butt welded by a special procedure to form a complete length run, thus preventing the shock on the trolley, due to the joints.

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4.5 *Buffers*

Bridge and trolley shall be equipped with buffers able to absorb kinetic energy of 0.7 of the nominal speed with the unloaded trolley at the final approach (maximum wheel load). These buffers shall be provided at each of the crane or trolley corners.

4.6 *Ropes*

Hoisting wire ropes shall be of 6 x 36 Warrington Seale wire type constructions, with metal core center.

The breaking strength of wires shall be 1960 N/mm².

Rope diameter shall be determined according to FEM standards.

4.7 *Safety aspects*

All equipment will be easily accessible for maintenance.

Ladders arranged at both end carriages shall provide access to the platforms. Crane bridge to be equipped with the necessary railings and safety ladders.

Safety guards will be supplied for all rotating equipment.

Hand railing will be of tubular section around all access and walkways. Walkways will be minimum 600 mm wide with open grating or non-skid plate.

Nameplate will be attached to the crane in a clearly visible position and indicating the safe working load and the year of manufacture.



Electric limit switches limit all the horizontal movements of the crane. For limiting overload, safety device must be considered.

5 *Lubrication*

It should be done base on manufacturer standard.

6 *Gear Boxes*

Reduction Gears shall be completely enclosed in gear cases. Oil tight and sealed. Opening will be provided for the inspection of gearing. Covers of inspection holes will be suitable sealed.

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Gear boxes will be fabricated from steel plates or cast steel. Fabricated gearbox will be stress relieved. Inside surface of gear cases will be properly cleaned and provided with oil resistance painting. Gear cases will be also with lifting lugs.

Breather, level indicator, dip stick, and drain plug will be provided for each gearbox.

7 *Test overloads*

The cranes shall be designed for a static test load of 140% of the nominal, and 125% dynamic test load for 1 time at commissioning phase. The tests will be done according to FEM standards.

8 *Electrical equipment*

8-1 Standards

The electrical equipment and installation will be in accordance with the following technical standards:

IEC / VDE / FEM

8-2 Power supply



8-2-1 The main supply voltage is 400V – 50HZ , 3phase+PEN . all feeding line will be in vendor scope of supply.

8-3 Motors

Squirrel cage motors shall be used. All the cranes motors shall be equipped with thermistors.. The starting no. of motors are 300/hour, so the motors and relevant feeding system (cables , contactors , bus bars , ...) engineering should be according this item .

All motors shall be chosen on the basis of IEC rules. And shall have cylindrical shaft ends, in B3 form, and casing and covers in spheroid cast iron or welded steel.

Unless otherwise specified by the purchase specification, they shall be of the totally enclosed type, having an IP 55 protection degree. Class F insulation as per CEI-IEC standards is imposed. For horizontal movements that require sizes less than 132 and that have speeds less than or equal to 50 m/min the use of short circuited progressive starting motors is permitted.

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All motors shall be equipped with thermal sensors with trip contacts to the automatic circuit breaker.

8-4 Brakes

The brakes must be of the electro-hydraulic block type according to DIN 15435 . The brakes and entire associated system shall be arranged in accessible points for ease of maintenance. Each brake must be able to stop the respective movements without generating harmful oscillations to the load in normal operating conditions. The brakes shall be arranged to operate in the following way:

- Emergency braking as a result of operator intervention
- braking as a result of mains supply loss
- braking due to limit switch
- Position brake when the overhead travelling crane is not in operation

8-5 Cables

The calculation of the cable current carrying capacity shall be done in accordance with the maximum temperature, in function of the insulation chosen, allowed by the IEC standards.



a) Power circuits

The three core and/or single core cables must be of the flexible type, with copper conductors, rubber insulation and a polychloroprene sheath, and shall have a 500 V rated operating voltage or U_0/U equal to 450/750 V according to IEC standards. The minimum conductor cross section must be 2,5 mm² (taking into account .

b) Auxiliary circuits

The multi core cables shall be of the flexible type with copper conductors, rubber insulation and a polychloroprene sheath, and shall have a 500 V rate operating voltage or U_0/U equal to 450/750 V according to IEC. The minimum cross-section allowed is 1.5 mm².

c) In the case where the ambient temperature is higher than 60° C consideration must be given to the use of silicon rubber insulated cables,

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d) The power connections inside the panel boards must be carried out with copper bars, appropriately fixed, or rather with single core cable as mentioned in point a) with minimum conductor cross-section equal to 2.5 mm'.

The internal auxiliary connections must be executed with single core wiring having PVC insulated copper conductors of 1.5 mm, minimum cross-section, and rated voltage U_0/U equal to 450/750 V. If the ambient temperature should be greater than 60°C single cored silicon insulated cables served with a fiber glass sheath should be employed in both types of connection (main and auxiliary circuits).

All the connections at the terminal board located in the lower section shall be complete of compression lug terminals marked with letters and numbers as shown in the electrical drawings, all the conductors relative to the internal connections must in the same way be numbered according to the drawing.

e) All cables for the mobile installation must be of the type suitable for severe duty end according to Electrical General Specification.

9 Site condition

9.1 Plant Location

The Site is located at Sirjan Steel Complex, situated in Sirjan northwest part of Iran, at East Kerman province, with approximate co-ordinates of:

Longitude 55°, 44' East

Latitude 29°, 32' North

9.2 meteorological condition

The meteorological information of the site is based on the data obtained from Sirjan meteorological station, since 1965.

Elevation from sea level

1700 m



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Max. ambient air temperature	Recorded	40 °C
	Design	50 °C
Min. ambient air temperature	Recorded	-12 °C
	Design	-10 °C
Average. ambient air temperature		15.9 °C
Wet bulb design temperature		18°C
Dew point		0 °C
Prevailing wind direction	SE to NW(135°clockwise from north)	
Prevailing wind speed	4.8 m/s	
Fastest wind direction	NE to SW (20°clockwise from north)	
Fastest wind speed	25 m/s	
Civil department design wind speed consideration	36.1m/s	
Yearly rainfall	Average 120 mm	
Max relative humidity	%70	
Atmospheric pressure	820 mbar	

10 TEST & INSPECTIONS:



Inspection and tests will be performed according to FEM Rules chapter 8 requirements; The purpose of the tests and inspections outlined in this inquiry is to verify manufacturing process as well as the accordance with the related purchaser's specifications, supplier's specifications and drawings and the fulfillment of the designated function.

Test & inspections shall be witnessed and certified by purchaser's representative and client.

Dimensional inspection should be done after complete assembly in suppliers factory.

The following tests shall be performed by supplier as per Q.C.T.M.

- Material inspection, report of chemical composition & mechanical properties of each heat.
- Dimensional inspection
- N.D.T of all weld joints and machined surfaces.

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- Rust prevention and painting inspection.
- Final inspection prior to packing.
- Packing inspection.
- Marking inspection for packing.
- Visual inspection

MANUFACTURING SPECIFICATIONS:

All materials used shall be new and conform to the respective specifications given on drawings. Any deviation is subject to the purchaser's approval.

All parts shall be manufactured/ procured according to the drawings attached to this enquiry. Any deviation is subject to the purchaser's approval.

Welding is a major procedure in the manufacturing; the approved W.P.S. (welding procedures specifications) shall be according to FEM and internationally recognize codes strictly followed by supplier.

Static and dynamic load test shall be done based of FEM

11 DOCUMENTATION:

Supplier' shall provide as a minimum the following documents:

A list of spare parts for commissioning & 2 years operation

A summary of test/inspection items, procedures and judgment criteria.



Supplier is also required to submit a separate quotation for the recommended two years operating spares (excluding the above items). This supplementary proposal shall include recommended spare parts, materials prices and delivery schedule.

Supplier shall provide the following documents after signing the purchase contract in English language.

Equipment and accessory list.

Arrangement drawings.

Sectional assembly drawings with B/M.

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Assembly drawing

Welding Procedure Specification

Quality control and testing manual (QCTM), including procedure and acceptance criteria for all tests and inspections.

Timetable for design, manufacturing, inspection and delivery.

Operating and, maintenance manual

Pre-commissioning and commissioning manual.

Provision of drawing and information to allow purchaser to design and procure the incoming electrical power system.

Finalized single line and circuit diagrams for power and control

Outline drawings of electrical equipment

Terminal arrangement of the terminal box.

Erection manual

Relevant catalogues for all sub-assemblies & sub-systems & Equipment..

Final Book include(all datasheets & catalogue of instruments and PLC system , drawing (panel layout , circuit diagram, MTO,...) shall be considered



12 PACKING, MARKING & DELIVERY

GENERAL

The package equipment shall be adequately protected to prevent damage during transportation to the site.

In general, instruments should remain as part of the packaged equipment during shipping and shall be removed only if they are outside the confines of the packaged equipment skid, or when the manufacturer requests special packing and shipping facilities.

However fragile instruments or parts of instrument system, such as; analyzers, computer logic cabinets and control panels shall be packed and shipped as separate items. Equipment such as chart recorders, pens and supplies shall also be packed separately and clearly identified.

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If necessary, shipping stops and additional supporting arrangements shall be provided and checked prior to packing. When shipping stops are fitted, they shall be indicated by a label or marking on the package.

Note:

Before packing, the instruments inspector shall check that all instruments and instrument systems have been drained and dried (if required).

Supplier shall submit “packing procedure and specifications” and “timetable for packing and delivery” for purchaser’s approval.

A copy of packing list and supply list will accompany each package.

MARKING

Each part of the package equipment instrument shall be marked in accordance with the requirements of the Purchase Order, including when applicable, additional marking for customs purposes.

13 GUARANTEE

All supplied equipment and material shall be guaranteed to conform to technical specification and perform under site designated working conditions.

Supplier shall guarantee satisfactory and trouble - free operation of the equipment for a period of two years after commissioning.



Guarantee bonds and other conditions will be set separately.

14 SPARE PARTS

GENERAL

The Manufacturer / Supplier shall propose spare parts for packaged equipment instrumentation for:

- Commissioning operation (necessary)
- Two-year operation (as an option)

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And for the later requisitioning of such spare parts including those required for construction period. General requirements set forth in the scope of supply of packaged Unit shall be followed.

15 SPECIAL TOOLS AND CALIBRATION EQUIPMENT

During the engineering phase, Manufacturer / Supplier shall advise the purchaser of any special tools and calibration equipment that may be necessary for commissioning and maintenance purposes.

The Manufacturer / Supplier of the packaged equipment shall quote separately, in the packaged equipment proposal, the tools and / or calibration equipment required for the system.

16 PAINTING & RUST PREVENTION

Supplier shall submit detailed rust prevention and painting procedure and application list for the equipment package, to be approved by purchaser.

Supplier shall propose procedures to prevent rusting of warehouse stored equipment, during long term storage after installation, and during long term suspension of operation.



Reference drawing: SRSM 19 01 P 01 TS 002 - General Information for Erection (G.I.E.) Painting Work (it can be seen in attachments)

17 CRANE DESIGN AND SUPPLY TIME SCHEDULE

The overall time schedule and respective duration of the engineering and supply of hoist crane should be given by contractor (from coming into force of the contract). This time schedule mainly includes the implantation periods of the various phases.

18 REFERENCE LIST



The contractor shall submit the list of reference and related experience in engineering and supply of cranes used in similar plants.

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The scope of work covers the all calculations, basic design, detail design, other engineering works, fabrication, testing, painting, protection, packing, marking, and delivering of the complete plant, machinery, equipment, material and spare parts of the equipment and materials, erection & commissioning, performance and guarantee figure of two 5 Ton single girder EOT cranes and one 8ton electric overhead traveling single girder crane and one 3ton electric overhead traveling single girder crane and well as provision of training to construct and operate the works properly and efficiently at highest western world standards.

The scope of supply includes complete set of E.O.T. Crane equipped with all attachments and warning siren and requirements as following:

- Design of cranes hoists and attachments
- Supply of the fully fabricated equipment
- Material supply regarding the following requirements:
 - All the materials used shall be new and conform to the respective specifications given on drawings.
 - Major materials shall have prior approval of the Buyer or it's Representative (or based on approved QC plan).
- Any deviation is subject to the Buyer or its representative approval. Deviation list shall be submitted in technical proposal.
- Construction and manufacturing of cranes and attachments,
- Shop rails should be included, Supply and erection of rails included in vendor's scope. Specifications,length and plan of erection shall be submitted in technical proposal.
- Design, construction and manufacturing and installation of cranes' stoppers
- Electric motors and brakes,
- Complete motor starters including protection equipment,
- Limit switches for all movements,
- Interconnecting cables
- All installation accessories such as lighting, earthing, socket box, cable tray,...
- Complete motor starters including protection equipment, Limit switches for all movements, Incoming power isolating switch, Interconnecting piping and

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wiring between equipment and accessories, Bonding and earthing (It shall be connected to central system.)



- Electrical TOP will be started from incoming disconnect switches. Isolator switch and all necessary equipment after that is in the scope of supply. This TOP shall be confirmed in technical proposal.
- Feeding line should be considered in supplier's scope of supply.
- Complete motor starters including protection equipment,
- Limit switches for all movements,
- PLC & HMI source program shall be submitted by vendor
- Factory Acceptance Test (F.A.T.) must be considered for Control System
- Interconnecting cables
- All installation accessories such as lighting, earthing, socket box, cable tray,...
- Complete motor starters including protection equipment, Limit switches for all movements, Incoming power isolating switch, Interconnecting piping and wiring between equipment and accessories, Bonding and earthing (It shall be connected to central system.),
- Subcontracting of any part of the order shall be subjected to the written approval of the Buyer or its representative.
- Documentation as requested.
- First filling, grease and lubrication
- Performing of tests and inspections
- Application of surface protection
- Supply of recommended 2 years spare parts as an option
- Coordinating and resolving all engineering information related to the equipment during erection and commissioning.
- Packing and delivery
- erection and commissioning, Plan for erection, commissioning and testing shall be submitted in technical proposal.
- Training program for Mechanical and Electrical items.
- Guarantee



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	SIRJAN JAHAN STEEL COMPLEX Steel Making Plant Project		
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20 Letter of conformity



Here with we confirm that our quotation in response to your Inquiry Document for maintenance Hoists & cranes Rev.....dated is fully in accordance with the conditions as stated therein and we confirm that all technical requirements as stipulated in the above mentioned inquiry documents have been adhered to, except deviations listed as follows:

- 1.
- 2.
- 3.
- 4.
- 5.

Date, Signature (Vendor)


Notes:



- 1) Deviation shall be listed here complete explanation shall be written in separate sheets.
- 2) If no deviation exists, vendor shall specify by writing "NO DEVIATION".
- 3) Please be informed that all Inquiry document and attachments should be signed and stamped by vendor.

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21 Technical data

Data sheet for 5 ton cranes

Canymes Co.			Refractory storage crane CR 22/23	
Description		DATA	REV.	REMARK
MAIN DATA:				
QUANTITY		2		
TYPE OF BRIDGE		EOT single girder / hook		
BAY		Refractory storage building		
MAIN CAPACITY	ton	5		
SPAN (APPROX)	m	19.9		
Travelling length	m	72		
SPEED:				
MAIN HOIST :	m/1'	0.8-8		
LONG TRAVEL	m/1'	5-30		
CROSS TRAVEL	m/1'	2-20		
RULES:		FEM 1001/87 3° ED.		
STRUCTURE:CLASS		A5		
MECHANISM : CLASS		M5		
LIFT AND APPROACH:				
BRIDGE RAILWAY : HEIGHT	m	6.15		
MAIN HOOK LIFT : HEIGHT	m	7		
HOOK APPROACH : ABOUT	m	SHALL BE Maximum : 1m		
Radio Remote		3 sets for each crane		
Push Button station		yes		
Duty		60%		
Ambient temperature		-10°C to +50°C		
Hook accessories:				
Main hoist hook type		DIN 15401		
Speed regulation/electric braking:				
Main hoist		two speeds		
Trolley & bridge	-	two speeds		
Starting method	-	By vendor		
Special features :				

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Limit switch for all movements		yes		
Central lubrication system		no		
Heating & cooling for panels		yes		
Service Brake Type	Electro Magnetic disc brake for all drives			
Overweight Monitor		yes		
Wheel material	GGG70 (vendor to confirm)			
Power supply:				
Main power supply	V - HZ	400 AC - 50		
Fluctuation	-	AS PER IEC		
Control power supply	V - HZ	220 AC - 50/110/24dc		
Crane control	-	Push button		
IP protection	-	55		
Legend: S.C.= squirrel cage motor S.R.= slip ring motor D.P. = double polarity motor A.R.C = accelerating rotor contactor C.C.B = counter current electric braking T.S.R. = thyristor speed regulation (statovar) F.S.R. = frequency speed regulation (inverter) S.P.D = single phase dynamic braking (d.c.) Remark : the a.m. value for power are indicative				

Data sheets of 8 & 3 Ton Cranes are on attachments.

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Appendix: Drawings

Vendor List

Painting specification



SIRJAN JAHAN STEEL COMPLEX
Steel Making Plant Project



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