

BID Invitation

For the Procurement of total Four (4) units of 6 plus 1 lane truck/ 1 over 6 of container height of 41ton (under spreader) Electrical Rubber Tyred Gantry (“ERTG”) Cranes.

Issue Date	11 th of February 2022
Closing Date	3 rd of March 2022
Closing Time	17.00 Greek Local Time
Issuer	PCT SEMPO N. Ikonio 18863 Perama

NOTE TO PARTICIPANTS:

By submitting their Proposals the Participants agree to abide by the terms and conditions of the Invitation to Bid



1. PRESENTATION OF PCT

PCT is a Greek société anonyme which pursuant to the concession agreement dated 25/11/2008 (the "**Concession Agreement**"), as currently in force, for the concession of the port installations of Piers II and III of the container terminal of the Port of Piraeus (the "**New Container Terminal**") between the Piraeus Port Authority (PPA), COSCO SHIPPING Ports Limited (formerly named "COSCO Pacific Limited") and PCT, which (Concession Agreement) has been ratified by Law 3755/2009, as amended and in force, has undertaken the management and operation of Piers II and III of the New Container Terminal for the period of time set forth in the Concession Agreement.

2. DEFINITIONS

For the purposes of understanding the terms of this Call, definitions of the following terms are given herein below:

"Assigning Company" or **"the Company"** or **"PCT"** or **"Buyer"**: the Société Anonyme under the corporate name "Piraeus Container Terminal Single Member S.A."

"Authorized Representative": a legal representative of the Candidate (according to the Candidates statutes/bylaws) thereof or a specifically authorized representative (by a decision issued by the Candidate's competent body), as the case may be, who has the power to bind the Candidate and also has the authority to sign and submit the Candidate's Offer;

"Binding Declaration": refers to the Binding Declaration as per Law 1599/1986 or in the case of a foreign Candidate a text of analogous form of evidence, in accordance with the provisions of the country of provenance thereof signed by the Authorized Representative. In all cases where there is a reference to the term "Binding Declaration", it is intended that such is effected by certification of the original signature of the signatory;

"Tender or Call": the said document;

"Candidate" or **"Bidder"**: The Legal Entities, Companies, Joint Ventures or Groupings of Legal Entities/ Companies participating in the Tender by submitting an Offer for the supply of equipment and services that are subject matter of this Call for Tender.

"Interested party" means Legal Entities, Companies, Joint Ventures or Groupings of Legal Entities/ Companies which intend to take part in the tender procedure by submitting an offer.

"Contract" means the Agreement entered into with the Contractor.

"Contractor" or "Supplier" or "Seller": means Legal Entity, Company, Joint Venture or Grouping of Legal Entities/ Companies selected by PCT to carry out the Supply and services, which enters into a contract on the matter with PCT Single Member S.A.

"Tender Evaluation Team" or "Committee" means the PCT Tender Evaluation Committee which consists of senior company executives and will be established by PCT's competent management bodies' decision.

"Third Party Inspection Company" means the certified Third Party Inspection Company who will undertake the task of supervision of the entire project according to Article 13 of this Call.

"Offer": The offer to be submitted by the Candidates in the frame of this Tender and/or the main folder of the offer which includes three (3) sub-folders:

- (i) 1st sub-folder named: **"Participation Supporting Documents"**
- (ii) 2nd sub-folder named: **"Technical Offer"** and
- (iii) 3rd sub-folder named: **"Financial Offer"**.

"LETTER FOR PERFORMANCE FIRST DEMAND GUARANTEE" has the meaning attributed to it in Article 7.2, Article 16 and Annex A hereof.

"FORM FOR ADVANCE PAYMENT BANK GUARANTEE" has the meaning attributed to it in Article 7.3, Article 16 and Annex B hereof.

3.2 Scope of Tender

The scope of the tender shall be the 'Award of Procurement of the Supply, Installation, Commissioning and Testing of four (4) Electric Rubber Tyred Gantry Cranes for Container Terminal use', **CIF** ready to operate at Piraeus Container Terminal Single Member S.A within a delivery time of: Sixty Five (65) calendar weeks from contract date.

Note that for the successful completion of the procurement, the scope of the tender also includes and the selected Supplier shall undertake at no extra cost for PCT SA, the following:

1. The design, fabrication, paint, install, erect, deliver to site and test, Buyer's site commissioning, performance testing through acceptance by the Buyer and provide training, onsite technical service, and after sales maintenance and repairing services.
2. As-built drawings and technical data for maintenance, operation and maintenance manual.
3. Design review, supervision and inspection reports during fabrications, technical training and after-sales service.
4. Each crane shall be supplied with head block and container spreader.
5. Every RTG shall be equipped with GPS device and software, which shall be same or compatible with PCT existing TOS system.
6. Main power cable plugs and outlet shall be provided for each crane.
7. One mobile diesel generator set shall be provided.
8. The insurance during transportation of the said cranes.
9. The technical and operational training at PCT premises for the delivered Cranes and related equipment.
10. The supply of all stated spare parts, vendors' list proposals and special tools requested within this Call.
11. The process of obtaining the relevant certification for the cranes in Greece according to the applicable and latest Greek and EU legislation, as in force, by providing all the necessary documents to PCT and the competent Greek authorities where required and proceeding with any necessary act for this purpose.

3.3 Time limits for receiving Tender documentation – Provision of clarifications

Interested parties may receive additional information or clarifications in relation to the present Tender, by submitting questions up to **five (5)** days (included) prior to the Closing Date in writing via e-mail at: Konstantinos.Ampelidis@pct.com.gr .

After the lapse of the above time limit no other communication or request for clarification as to any terms may be acceptable.

Written responses by PCT S.A. are notified to all interested parties until two (2) working days prior to the expiry of the time limit for the submission of offers.

If it is not possible to provide the aforementioned clarifications in time, PCT SA may but is not obliged to extend the deadline for submitting offers for a reasonable period.

In all events, PCT SA may but is not obliged to extend the deadline for submitting offers where:

- a) a request for clarifications is submitted, which in the Company's view is important for shaping the offer or
- b) it is the reasoned request of one or more Candidates in the Company's view.

If, as a result of the above clarifications, a procedure is considered necessary, the Company shall grant the interested parties a time extension in relation to the deadline for submitting their offers, as stated above.

The time limit for the submission of offers is the 3rd of March 2022 until 16:00 Greek time (GMT +2). Candidates are not allowed to refer to verbal responses or clarifications by PCT S.A.

4. SUBMISSION OF OFFERS -OFFER DOCUMENTATION

4.1 Submission of Offers

PCT is a private-owned company and due to the immense importance of the procurement no objections in relation to the content of this bid invitation (if submitted) will be examined by PCT.

PCT, at its absolute discretion, has the right to cancel or repeat the procedure at any stage, at no cost or expense for PCT.

PCT may also cancel the outcome of the process and resort to the procedure of competitive negotiations, when there is an emergency cause, at no cost or expense for PCT.

In case less than three Candidates' offers fulfil tender criteria in order for their financial proposals to be unsealed, then PCT reserves the right to cancel the procedure by declaring it as non-successful, at no cost or expense for PCT, unless otherwise stated in the tender documents and/or the Regulation.

PCT also reserves the right to enter into competitive negotiations with all successful Participants after the Evaluation process and before concluding the Contract.

The Offers shall be submitted by the Candidate itself or by the Candidate's Authorized Representative electronically by contacting Mr. Konstantinos Ampelidis (Konstantinos.Ampelidis@pct.com.gr) in order to receive thorough guidelines to access the PCT corporate FTP platform.

Each individual sub-folder (Participation Supporting Documents, Technical Offer and Financial Offer) as well as the entire offer folder will be protected with different passwords which will be sent separately at each stage of the tender at the time, the way and to a specific email which will be notified by the PCT to all participants.

The Candidates are responsible for and accept the risk for any event, to include even force majeure, that may have as a result the non-timely or non-duly submission of the folder of offer thereof.

Offers submitted after the above date and time are overdue and shall be returned without being unsealed.

4.2 Language of the procedure

The official languages of the procedure is English and all information and all documents from the Candidate or the Contractor to PCT and its Technical Advisors shall be drawn up in English, or accompanied by a lawful English translation, if in any other language.

Moreover, all written and oral arrangements between the Candidates, Tender Evaluation Team and PCT, shall also be in English.

4.3 Offer Documentation

The Offer will consist of encrypted zip files with different passwords: the subfolder of the "Participation Document", the subfolder of the "Technical Proposal" and the subfolder of the "Financial Proposal". Each of the three subfolders must bear the title respectively: "PARTICIPATION DOCUMENTS", 'TECHNICAL PROPOSAL', 'FINANCIAL PROPOSAL'.

PCT (through Mr. Ampelidis Konstantinos) will initially receive just one (1) password from each of the participants. The password will be **ONLY** for the "Participation Documents" encrypted folder. **No other password will be submitted at this point.** After Participants are qualified from this stage, they will be notified to submit the 2nd password for the "Technical Proposal".

If they qualify this stage they will be notified to submit the 3d and final password for the "Financial Proposal".

1st zip file named: **"Participation Supporting Documents"**

2nd zip file named: **"Technical Offer"** and

3rd zip file named: **"Financial Offer"**.

4.4 Validity of offers

Offers shall bind the Candidates **for four (4) calendar months** commencing from the submission deadline date. Any offer which sets forth a term of validity less than the above mentioned, shall be rejected.

Participants are advised that they may be requested to extend the validity of their proposals by a **further two (2) months**.

It is at PCT's sole discretion to consider all proposals as void and invalid and cancel the whole bidding process. No compensation will be paid to the bidders under this circumstance.

(i) True and Correct statements

Each Candidate understands that the information contained in its offer will be relied upon PCT's decision-making process with respect to the award of the contract and such information is expressly warranted by the Candidate to be true and correct. Furthermore, each Candidate will furnish such supporting and confirming information, prior to the award of the contract, as may be reasonably requested by PCT.

(ii) Reasons for rejecting an offer may include (but are not limited to):

If any information provided by the Candidate/s is found to be incorrect.

If a Candidate fails to verify any information provided in the proposal in response to PCT's request.

If the 'ON / OFF' criteria requirements are not met.

If the Candidate does not comply with the Tender terms.

If the same participant submits more than one (1) offer.

5. PRESUMPTION RESULTING FROM THE PARTICIPATION IN THE PROCEDURE

5.1 Submission of an offer in the tender procedure will constitute a presumption that each Candidate accepts the terms of this Call for Tender, is fully informed as regards the tender documents and is fully aware of the project implementation conditions and requirements. In particular, Candidates are obliged to fully apprise themselves of all project implementation conditions including all those specified in this Call for Tender and, consequently, submission of an offer in the tender procedure shall constitute a presumption that the Candidate/s:

- (i) Has/Have checked, are aware of and accept all technical conditions for the offered cranes.
- (ii) Is/Are be fully responsible for the design, manufacturing and supply of the cranes that will be handed to PCT, according to the provisions and terms of the Standards as described herein.
- (iii) Will fully comply with all written remarks and suggestions from PCT S.A. and the selected Third Party Company,
 - a) during design approval, b) during manufacture, c) during assembly, d) during installation/erection and, e) during final testing and commissioning of the cranes. All costs or corrections to the designs, testing, fabrication of parts or any NDT tests will be carried out at the contractors cost and must be included in the Candidates' financial offer in accordance with the tender Call.
- (iv) In case any assembly/erection works are carried out at PCT SA premises, the full responsibility of the proper assembly/erection preconditions and requirements are at the contractor's sole responsibility, liability, cost and expenses.
- (v) Also, the Contractor will be fully responsible and fully liable for any accident that may occur during the assembly or erection works and testing of the cranes at PCT's premises to any PCT's or other third parties' personnel and/or property.

5.2 Any failure by the Candidate to take into consideration all the above issues and requirements using all information possible, is at its own exclusive responsibility and shall not release the Candidate from any liability neither from its obligation to fully comply with its contractual obligations if selected for the Award of Tender.

5.3 In light of the above, the Candidates fully and unreservedly guarantee the accuracy of the offer and, if chosen, they will unreservedly undertake to carry out all supply and services and, in general, to perform the project in full compliance with all terms, specs, etc. and the project implementation schedule specified herein.

5.4 Candidates are not entitled to any remuneration for expenses incurred relating to the compilation and submission of information mentioned herein, such as tender dossiers, etc.

5.5 The Committee reserves the right to contact any Public Authority or Body in order to request clarifications about information submitted and to supplement it and Candidates are obliged to respond to that request within the deadline specified by the Committee.

6. PREQUALIFICATION CRITERIA

6.1. Prequalification Criteria

Each Candidate is obliged, upon penalty of disqualification, to fulfil the following prequalification criteria.

6.1.1 Professional Prequalification Criteria (ON/ OFF criteria)

Each Candidate that participates in the tender procedure on its own or as a member of a Joint Venture or a Group of companies/entities is obliged, upon penalty of disqualification, to have the following professional qualifications:

1. The Candidate is not bankrupt, in liquidation, is not in compulsory receivership, or bankruptcy compromise, the Contractor's operations have not been suspended or it is not any similar situation under any similar proceedings, is not in proceedings to be declared bankrupt or in proceedings to be placed in compulsory liquidation or compromise with creditors and is not in any similar situation (restructuring, etc.)
2. The managing partners in the case of a limited or general partnership or limited liability Company, and the Chairman, the Managing Director and the members of the Board of Directors in case of a Société Anonyme or the natural persons exercising management functions in all other cases must not have been convicted on the basis of a final judgement for:
 - a. participation in criminal organizations within the meaning of Article 2(1) of Council Framework Decision 2008/841/JHA
 - b. bribery within the meaning of Article 3 of Council Act of 26 May 1997 and Council Framework Decision 2003/568/JHA.
 - c. fraud within the meaning of the Directive (EU) 2017/1371
 - d. money laundering within the meaning of repealed by the Directive (EU) 2015/849
 - e. Embezzlement
 - f. Fraud
 - g. Extortion

h. Forgery

i. Perjury

j. Bribery

According to the Penal Code or crimes similar in their specific aspects to the above, provided for in foreign legal orders.

3. They must have fulfilled obligations relating to the payment of social security contributions in accordance with applicable Greek law (in the case of a Greek or foreigner Candidate engaged in activity in Greece) or in accordance with the law of the country of establishment.

4. They must have fulfilled tax obligations in accordance with applicable Greek law (in the case of a Greek or foreigner Candidate engaged in activity in Greece) or in accordance with the law of the country of establishment.

5. They must not have committed a disciplinary offence the penalty for which was deprivation of the right to participate in tender procedures (tender procedures for public works).

6. The company (or any other legal person or natural person associated directly or indirectly with it in a manner which, at PCT's unfettered discretion, reveals a real connection to it which could negatively affect implementation of the project) must not have been expelled in any manner, or no such similar penalty must have been imposed on it (such as seizure of a bond, declaration of the party as in forfeit of the contract, termination of the contract) from a construction or other type of project, and in particular (but not limited to) a PCT project or one belonging to another company in the same group to which PCT belongs.

6.1.2. Financial and Economic Standing Criteria (ON/OFF)

Each Candidate must have an average annual turnover of 30.000.000 €, over the past three (3) years in container crane sales and provide sales performance i.e. from 2018 –2020.

6.1.3. Quality Related Criteria (ON/OFF)

Each Candidate must hold a valid ISO 9001:2015 certificate. The scope of the certificate must be relevant to the subject of the tender call.

6.1.4 Technical Capacity Criteria (ON/ OFF)

Each Candidate must meet the following technical criteria

1) It has manufactured within the past five (5) years, at least sixty (60) RTG cranes of minimum width 6 +1 and height 5 +1.

2) It has a legally operating sales representative within the European Union and preferably within Greece.

7. GUARANTEES

Bank guarantees shall be required to the winning bidder / Supplier of the procurement. In case of Joint Venture or of Group of companies/entities, the letters of guarantee are common to all members.

7.1 LETTER FOR PERFORMANCE FIRST DEMAND GUARANTEE (Good Performance Guarantee)

A Good Performance Guarantee upon signing the Contract is required.

The "LETTER FOR PERFORMANCE FIRST DEMAND GUARANTEE" must be issued in accordance with the template of Annex A of this Call for Tender by an Eligible Bank in favor of PCT for an amount equal to 10% of the total amount of the contract VAT excluded. The good performance guarantee will be valid until the end of the 'guaranteed good operation' period of the cranes.

No Contract will be signed unless the good performance guarantee is delivered to PCT.

7.2 ADVANCE PAYMENT BANK GUARANTEE (Advance Payment Guarantee)

An Advance Payment Guarantee upon signing of the contract is required and will be valid until the final acceptance.

The Advance Payment Guarantee Letter must be issued in accordance with Annex B of this Call for Tender by an Eligible Bank in favor of PCT for an amount equal to 20% of the total amount of the contract VAT excluded.

8. SUB-FOLDER OF PARTICIPATION SUPPORTING DOCUMENTS

8.1 Professional prequalification documentation in order for the criteria set in 6.1.1. to be fulfilled.

Each Candidate, in order to participate in this tender procedure on its own or as a member of a Joint Venture or Consortium and to prove the fulfilment of the above mentioned prequalification criteria, shall submit, at the risk of rejection of its Offer, the following participation supporting documents as originals, legally certified copies or valid, simple, clear and easy-to-read information where applicable:

- i. A brief description of the Candidate/s legal entity and business.
- ii. The Candidate/s registration certificate (or equivalent) in force issued by the Candidate/s business registry.

iii. The Candidate/s competent management body's decision to participate in the Tender, submit the offer and appointing its authorized representative to specifically sign and submit the offer; the authorized representative shall be delegated by the Candidate/s to answer on behalf of the Candidate/s any questions PCT may have, and sign the agreement (In cases of Individual Enterprises).

iv. A binding declaration of the Candidate/s:

a. stating that it is fully aware of the contents of this call and unconditionally and unreservedly accepts its terms;

b. acknowledging that its participation in the process takes place at its sole risk and expense and that the participation as such does not establish any right to compensation from PCT or PCT's personnel;

c. acknowledging that disqualification from the Tender or failure to succeed in the Tender does not create any right to compensation for the Candidates;

v. full contact details for the Candidate/s' authorized representative (including full name, address, phone and fax numbers and email address);

vi. A binding declaration according to the law of the country of establishment of the Candidate/s, confirming that the Candidate/s fulfil/s the criteria of Article 6.1.1.

vii. A binding declaration, affirming:

a. That, in case of award of contract to the specific Candidate/s, the Candidate/s accepts and commits to the execution of the procurement, will undertake the procedures for issuing the relevant Certificates of Conformity, CE documentation and any other legal requirement according to Greek Law on behalf of PCT SA in order for the equipment to be fully operative at PCT SA.

b. The legal entity possesses the know-how of the design studies/ manufacturing method/ assembly method / testing method and commissioning method of the crane until certified according to EU and Greek legislation.

c. The country and location of manufacture, construction and assembly of the Crane.

d. That the offered vendors' list equipment will be readily available for production for at least the next ten (10) years from the date of submission of the statement and that if

the equipment is deemed obsolete within this time period the supplier shall propose a relevant replacement part and/or equipment which will be directly interchangeable.

e. That the Candidate commits to be providing technical support to PCT for the next five (5) years if the Candidate is selected with the award of the Call.

f. That all submitted documents are originals or legally certified copies or valid, simple, clear and easy-to-read true copies from the originals.

In case of a Joint Venture of contracting enterprises or Group of companies/entities, the abovementioned documents must be submitted by all members.

In case of a Group of companies/entities or a Joint Venture, a private agreement establishing the Joint Venture must also be submitted which appoints the leader of the Joint Venture of contracting enterprises or Group of companies/entities, which must declare the following as a minimum:

i) The contracting enterprises' agreement to jointly submit the offer.

ii) The participation percentage of each member in the agreement.

iii) The joint representative and process agent for the members of the grouping or Joint Venture, in dealings with PCT S.A. and

iv) That the members of the Joint Venture shall be jointly and severally liable to PCT S.A. for implementing the project and in case of special or quasi general succession, the successors must be bound to continue to participate in the Joint Venture under the same terms.

Furthermore, the grouping of contracting enterprises / joint venture should also submit:

a) An official copy from the register of minutes of the Company's Board of Directors or the competent body which approved participation in this tender procedure, appointing one or more representatives to submit the tender, and to sign any document relevant to the tender procedure, and appointing a process agent.

b) A solemn declaration from the legal representative and process agent appointed by decision of the Candidate's competent body, in which he unconditionally and unreservedly accepts his appointment as representative.

c) Evidence confirming that the Candidate's legal representative has not been convicted for an offence related to his professional activity and conduct, based on a decision applicable *res judicata* (a certified copy of an extract from the criminal record or other equivalent document shall be sufficient).

Note that the corresponding certificates (that the Candidate/s is/are not bankrupt, not in liquidation, etc.), issued by the competent authorities of the country in which the company is established, shall be submitted along with other supporting documents requested to the Candidate/s and shall be in effect on the date of the signing of the contract. If the aforementioned certificates are not issued by the respective and competent country, they may be replaced by a sworn statement or, if there is not such provision in the laws of the country of establishment, by a solemn declaration before a judicial or administrative authority, notary public or competent professional body of the country of origin or provenance.

8.2. Financial and economic prequalification documentation in order for the criteria set in 6.1.2. to be fulfilled

Copies of the financial statements of the Candidate of the last three (3) audited years, proving compliance with the economic and financial standing criterion of article 6.1.2. hereof.

8.3. Quality prequalification documentation in order for the criteria set in 6.1.3. to be fulfilled

A valid ISO 9001:2015 certificate whose scope is relevant to the subject of the tender call.

8.4. Technical prequalification documentation in order for the criteria set in 6.1.4. to be fulfilled

Adequate proof (i.e. certificates of acceptance from the buyer of the cranes, contracts, agreements etc.) that the Candidate:

1. Has manufactured within the past five (5) years, at least sixty (60) RTG cranes of minimum width 6 +1 and height 5 +1.
2. Has a legally operating sales representative within the European Union and preferably within Greece.

8.5. All supporting documents required by this Tender and its Annexes and, especially these documents referred in Annex C, must be provided depending on the country where each candidate is running its business and has its registered office.

8.6. The abovementioned participation supporting documents must be valid at the time of contract signing and should be resubmitted by the participants at their own expenses upon request of PCT.

The Evaluation Committee will initially (a) identify the Offers which were duly submitted pursuant to this Tender (at the correct time, place and process) and (b) will immediately proceed with the review and evaluation of the fulfilment of the ON/OFF criteria set above in Article 8 (SUB-FOLDER OF PARTICIPATION SUPPORTING DOCUMENTS). The Offers that were duly submitted and satisfy the ON/OFF criteria, will be defined by the Committee as acceptable Offers and the Committee will proceed to the next stage of evaluation of the Sub-Folder of the Technical Offer.

9. SUB-FOLDER OF TECHNICAL OFFER.

The sub-folder of the Technical Offer shall include a description of the proposed Cranes in order to sufficiently demonstrate the Candidates' understanding of PCT's specific requirements pursuant to this Tender Call for the following:

The supply, erection or installation, commissioning and testing for the Cranes requested within this Tender Call,

An analytical technical description and specification of the proposed Crane according to the technical requirements of PCT S.A. as stated in **ANNEX D**,

The ability to provide the relevant certification for the crane in Greece pursuant to the applicable Greek and EU legislation in force, by providing all necessary documents to PCT and the competent Greek authorities where required and proceeding with any necessary acts for this purpose,

The technical and operational training at PCT premises for the delivered equipment. The Supplier shall disclose to PCT's technicians all necessary knowledge in order to keep the e-RTGs in top condition and the training course will be a mix of theory and hands-on experience. Moreover, PCT's operators shall be taught how to optimize their day-to-day operational performance and anything that needs to be checked on a day-to-day basis, before operations begin. The supplier shall submit a training agenda and, at the end of each training session, a respective

training form will be signed by both the trainer and the trainees for the actual evidence of the training performed.

The supply of spare parts and special tools requested within this Call,

Any other documentation requested in this Call.

Within the sub-folder of the Technical Offer, the Candidate is required to provide a table or an equivalent list with comments on each item within **Annex C**, with reference to all technical documentation.

Participants are obliged to provide, amongst others, the following documents **as part of their Technical Offer**:

1. The Candidate's proposed warranty period (In effect as of delivery and final acceptance of equipment).
2. The Candidate's proposed delivery time schedule (Stated in calendar weeks by submitting an indicative Gantt chart of the entire process).
3. Lists including technical descriptions of spare parts and special tools offered.
4. An analytical list of the documents and manuals for the proposed cranes.
5. An analytical description of the proposed training for the offered cranes.

10. SUB-FOLDER OF FINANCIAL OFFER.

Participants are requested to submit a financial proposal.

The below mentioned costs and expenses shall be fully born by the Candidate:

- a) The full cost of the Equipment and spare parts and special tools.
- b) All testing and certification costs including the cost of the Third Party Company.
- c) All documentation and manuals as stated in the Tender Call.
- d) All training costs and expenses at PCT S.A. premises.
- e) Costs and expenses related to transportation and insurance of the machinery.
- f) Visa application, travelling and lodging cost in Greece for the Supplier's personnel.

g) The cost and expenses in relation to travels, accommodation, meals etc. for up to two (2) employees of PCT S.A. throughout the duration of the construction of the crane. (Six round trip tickets to be provided from the Suppliers location to and from Greece).

h) In general, any other cost that may occur for the delivery, assembly and commissioning of the Equipment in a fully functional and tested operation mode.

Terms and conditions

All prices should be stated in Euro, CIF at Container Terminal facilities located in Pier II –NEO IKONIO, KERATSINI, GREECE, excluding VAT.

No invoices should be issued without a prior written consent from PCT SA.

All costs regarding supply of equipment, delivery, shipping, insurance, erection in their final positions, inspections, certifications, training and any others mentioned in the Call for Tender should be fully borne by the Candidate.

11. WARRANTY

Within the offer, the Candidate shall clearly identify the proposed terms of warranty for the crane. The warranty period of the cranes shall be of at least ten (10) years for the metallic structure, ten (10) years for coat and paint, three (3) years for Festoon cable and at least one (1) year for the effective trouble free working condition of the crane without failure.

Within the warranty period, the Candidate shall be fully and solely responsible to repair and/or rectify any technical problems or issues that may arise at their own cost, provided that these technical problems or issues are due to the Candidate's or the manufacturer's of the crane acts and/or omissions. (Damages and wear and tear parts shall not be subject to the stated warranty period).

The warranty period for the Equipment Spare Parts shall be valid for at least one (1) year after hand-over and final acceptance from PCT.

Any additional free warranty provided will be taken into account for the vendor's selection. Components repaired or replaced during the warranty period shall be subject to the remaining original warranty period plus one (1) year.

The provided warranty period shall take effect from the date of final acceptance and the signing of the Acceptance Report.

During the warranty period, in case PCT cannot solve a problem and/or issue occurred, the Supplier shall provide to PCT an expert engineer who shall move to PCT's premises to solve it within ten (10) working days upon a written request from PCT, unless otherwise reasonably agreed by both parties in writing.

After the warranty period, in case PCT cannot solve a problem and/or issue occurred, the Supplier shall provide to PCT an expert engineer who shall move to PCT's premises to solve it within fifteen (15) working days upon a written request from PCT, unless otherwise reasonably agreed by both parties in writing.

The delivery time of Spare Parts shall not exceed ten (10) working days during the warranty period and fifteen (15) working days after the warranty period from the written request of PCT, unless otherwise reasonably agreed by both parties in writing.

12. TESTING, COMMISSIONING AND ACCEPTANCE

Various tests (including but no limited to, especially the insulation test for each electric motor and transformer, appearance inspection, high-tension insulation tests and crane performance Tests) of the crane specified in the tender documents shall be conducted at the contractor's terminal under the supervision of the PCT's representatives before shipping. The crane shall be delivered to the PCT's terminal fully erected, provided that PCT's representatives are satisfied with the tests performed in the Seller's premises. In 3 months before shipping, the Seller shall:

1. Notify predicted ship schedule and relevant matters;
2. Provide details on the shipping and erection procedure of the crane and request PCT's co-operation;
3. Provide Test program and detailed field test and test record forms.

The following data will be submitted before field testing and commissioning:

- 1) Test reports and qualification certificates of various materials used for the crane;
- 2) Test reports and qualification certificates of purchased mechanical and electrical equipment;
- 3) Test reports and qualification certificates of main load bearing elements such as twistlocks, high-strength bolts, wire rope fittings etc.;
- 4) Qualification certificates of welds;
- 5) Qualification reports of assembly quality;

6) Painting qualification certificates.

Appearance inspection.

Visual inspection includes, but is not limited to, conformity of the following items with the technical specifications and provisions. These items are: every main crane movement mechanism, electrical equipment safety devices, brakes, control valves, lighting and inter-communication system;

Structural members and connections, stairs and ladders, walkways, operator's cab and platforms;

All protection devices;

Container spreader, fittings and connections;

Wire rope and its fittings for secure;

Sheave block shafts and fasteners, connection plate system and rail;

Visual inspection also includes all necessary certificates that have been submitted and reviewed;

Crane visual inspection may be accepted if the following are achieved:

- 1) Correct installation position and complete with all necessary parts;
- 2) Structure without any deflection and/or damage;
- 3) Painting meets specifications requirement with uniform colour and acceptable durability;
- 4) Secure installation of all devices and standardization;
- 5) Piping arranged neatly;
- 6) Without any external oil leakage;
- 7) All identification marks are clearly visible.

High-tension insulation test

The buyer's electrical Power Administration Department will perform high-tension insulation tests. This should be arranged by the buyer before the cranes arrive at the buyer's premises. And it should be executed by the buyer immediately after the cranes arrive at the buyer's premises.

Crane performance Tests

Static load test and dynamic load test (In accordance with FEM 1.001 standard)

The purpose of the static load test is to examine the load bearing capability of the crane and its structural members and components.

The test is considered successful if the respective result provides that there is not any crack, permanent deformation, painting peeling off and/or any damage that affects the crane performance and safety, neither any loosening and/or damage at joints and connection which may be found after test.

- a. **Static load Test:** The trolley is positioned in the middle of the trolley girder and the crane is tested with 140% static load. Firstly, 120% load is dynamically lifted and, then, the load is gradually added up to 140% without any shock. During testing, observe deflection of the girder. There should not be residual deformation. Before static load test, deflection of the girder is verified to be within $L/800$ under 100% dynamic load.
- b. **Dynamic load test:** The crane is tested with 120% dynamic load (the overload limit switch is by-passed). The hoisting and trolley motions should be normal under this test. With the overload limit switch connected, the crane is to be tested with dynamic load of 100%, 105% and greater than 110% rated load to verify the activation, reliability and effectiveness of the overload limit switch.

Crane durable operation test (acceptance test)

Eight (8) hour durable test

Set up a test yard 30m from the transverse travel of crane. Set a semi-trailer carrying a fully loaded container (L=40' H=8'6"); set 2 containers (L=40' H=9'6") each in Row 1, Row 2, Row 3 and Row 4. Lift the container from the trailer and pass it over Rows 1 - 3 and pile it onto the containers in Row 4; followed by lifting the same container back to the trailer, aligning it with the trailer and settling it, disengaging the lock and lifting the Spreader, passing the Spreader over Row 1 and aligning it onto the container in Row 3; immediately after this, lift the Spreader and move it back onto the container on the trailer and lock it up. This completes an operation cycle. Repeat 10 operation cycles and move the gantry once, i.e., travel it a 30M length and move it back to the original location. Every 2 hours or so, combining with the movement after 10 operation cycles, steering of the running wheels is performed by

moving the gantry to the transfer drive and turning the wheels 90 ; then move the gantry 6M in the new direction and move it back to the containers, and then carry on with the operation cycles again. When performing the cycles, all movements shall be performed at maximum speed. During the 8-hour continuous cycling, failures caused by defects in the crane as well as in the Spreader shall be accounted. The test is deemed to have failed if the down time exceeds 30 minutes or the failure count exceeds 3 times; the Contractor shall then re-arrange an operation test.

Prior to the operation test, the Contractor shall return all movement mechanisms to their normal conditions; during the operation test, no temporary program override or bypass is allowed for resetting the equipment. In case of any such incidents, the Buyer is entitled to request a re-arranged operation test.

Acceptance report

After the above stated tests have all been successfully completed, an acceptance report will be prepared and the test results and conclusion will be listed.

The report will provide the tested crane performance, test date, test place and the witness (es)' name.

The report will be prepared jointly by the Seller and the Buyer's representatives.

Before the acceptances report is prepared, it is the Seller's responsibility for safe-keeping the cranes.

Any defect occur during the testing in buyer's premises shall be repaired by the Sellers at its own cost, unless it is found to be the fault of buyer.

Acceptance

The acceptance is divided into two stages: Ex-works Acceptance (carried out in Seller's facilities before loading the cranes onto the ship), and Site Acceptance (carried out at the Buyer's terminal).

1. The acceptance of the cranes is performed under the quality standards and technical specifications stipulated in this document. Site acceptance will be carried out pursuant to the Test Program agreed by both parties and as stipulated in this document.
2. The entire process of acceptance shall be closely related to the contract signing, and

design reviewing, etc. The Buyer's representative(s) shall participate to the entire process, especially the Ex-works Acceptance carried out on the Seller's premises before the loading of the cranes for transport.

Test Program for Acceptance

The Seller shall furnish a Test Program for Acceptance to the Buyer eight weeks prior to the Site Acceptance. The first draft of the test program shall include the documents used in former similar projects, which are proven to be practical, scientific and feasible. The Buyer shall request the amendment of the Test Procedure for Acceptance. In this case, Buyer and the Seller shall negotiate and form the final Test Procedure for Acceptance. The following points shall be agreed by both the Buyer and the Seller:

Time spent on continuous operation on crane without failures will be between eight (8) hours.

1. As regards any kind of reliability test, failures which can be resolved within five minutes should not be added into break down time.
2. As regards over load testing, static load should be 140% of rated load, and dynamic load should be 120% of rated load.
3. Full-load free drop emergency stops test cannot be carried out for main hoist high speed brake. It may reduce the service life. The buyer can witness the test on testing desk of Seller if it is required by the Buyer.

As regards any new requirements exceeding above basic principle, the Buyer should discuss with Seller to resolve. Otherwise it is considered as accepted by the Buyer.

a. Ex-works Acceptance

The Ex-works Acceptance shall be carried out on the Seller's premises after the crane erection and commissioning. Seller will give notice eight weeks in advance for such acceptance. The Buyer or the representative(s) shall be invited to participate in the Ex-works Acceptance.

The Buyer's representative(s) shall participate at the Ex-works Acceptance. The Ex-works Acceptance will focus on:

1. Geometric parameters, static and empty load operation parameters, crane empty load

test (or full load test according to the possibility),

2. Technical performance parameters,
3. Appearance quality,
4. Noises, vibration and stability of light load operation,
5. Special requirements raised by the Buyer.

The Seller shall provide the Buyer's representative(s) with the acceptance program and all facilities (including the supervision tools, etc.) required by the Ex-works Acceptance and the Site Acceptance.

A week before shipping departure date, the Buyer shall present a Punch-List according to the specifications stipulated in this document at the time of Ex-works Acceptance to facilitate the Seller solve the Punch-List items. After any modification on the Punch-List items under a parties' agreement before the loading of the cranes onto the ship, the Buyer shall not ask for a new modification after the cranes arriving at the Buyer's terminal.

b. Site Acceptance

The Supplier shall be fully and solely responsible and liable for the erection and/or the commissioning and any test run carried out on the equipment. The official test consists of a function test, a durability test and a load test. The test runs program shall be in accordance with the Acceptance Test program. The Supplier shall be responsible to provide all testing and make any arrangement as regards the performance of the test runs.

Upon arrival of the cranes or their components at PCT's terminal, Supplier will restore any areas/parts affected by and during sea transportation. Site acceptance will be done after the cranes are powered on, under the acceptance program described in this Tender. Apart from the inspection of the dynamic data and the parameters when fully loaded, other static specifications which have been inspected in Ex-works Acceptance will not be re-inspected. If needed, the inspection will be carried out after Site Acceptance (not affecting the Site Acceptance).

Site Acceptance should be performed pursuant to the Test Program as agreed by both parties (as described in this Tender). The site acceptance shall focus on the conformity of the cranes in technical performance parameters with the specifications required. After succeeding in the

tests listed in Test Program, the Acceptance Certificate should be provided by the Buyer and the liquidated damages of the late delivery should be stopped (if any).

During the acceptance, minor Punch-List items which will not affect the operation of the cranes are accepted. The Supplier is responsible to solve any remaining items/issues/problems within the guarantee period (further details may be arranged and agreed by the parties).

Once the equipment has met all the requirements stipulated in this Tender and is suitable for operation, the Seller shall issue a respective Certificate of Fitness to the Buyer. Upon receipt of the Certificate of Fitness, the Buyer shall appoint Buyer's representative(s), and the representative(s) shall join the acceptance tests, which the Seller shall be further responsible to perform. The acceptance test shall be carried out no later than seven (7) days after the date the Certificate of Fitness is received by the Buyer. The Acceptance report has to be signed by the Buyer and the Seller jointly. In case the Buyer's representative(s) unreasonably withhold his attendance and witness at the Acceptance Test (test runs), the Acceptance Test shall be performed by the Seller itself, and the test results and records shall be accepted by the Buyer as if the Buyer had attended the testing procedure. The Buyer reserves the right to reject the Acceptance Test if the test result does not meet the agreed standards and standard requirements as set out in this Tender. Once the Acceptance report is accepted and signed by both parties, the Equipment is considered to be accepted ("Acceptance").

The Supplier shall provide all necessary instruments, which should be mutually agreed upon by all parties, and all supplies like lubricants oils, etc. for tests.

During the test, if one or several items fail to meet the requirements stipulated in this Tender, the Supplier shall take any necessary measure for the new testing and bears any relevant cost. The Supplier shall submit to PCT three (3) copies of all testing reports, technical documents together with complete sets of testing items, results and condition of the equipment in line with the requirements stipulated in the Technical Specification.

It is agreed that, if a sudden unfavorable change in the weather occurs during the Acceptance Test, the Acceptance Test shall be discontinued and the performance of the test shall be postponed until the next favorable day. Any delay in the Acceptance Test caused by unfavorable weather conditions shall be understood to be a permissible delay.

13. AFTER SALES SERVICES

For the regular maintenance, the Seller is obliged to provide hard copies and CDs of the regular maintenance plan as well as a list of all required spare parts distributed in a time base according to working hours.

The Seller is required to perform (free of charge for all equipment and services) the first (1st) initial maintenance and the next two (2) regular maintenance procedures the official maintenance plan indicates. The lubricants will be provided by the Buyer.

The following after sale services shall be provided to the Buyer by the Seller:

1. Technical training

Technical training shall be performed at the Buyer's premises. The Seller will provide, at its own cost, an experienced electrical engineer and an experienced mechanical engineer as the trainers. The Seller is required to train the maintenance team of the Buyer on the repairing and maintenance procedure.

The trainees will be members of the Buyer's operation and maintenance staffs.

The Seller shall furnish 2 copies of comprehensive teaching material for each crane one month prior to the training takes place.

The technical training shall be performed after delivery.

2. During first stage of crane normal operation (6 months), the Seller shall provide at least two relevant technicians or engineers who shall move to the Buyer's premises for a 24 hour service and provide assistance to the Buyer's personnel as regards the crane operation and trouble-shooting (mainly electrical).

3. Provide the update drawings and any relevant maintenance information.

4. Spares parts required for changing and repairing shall be furnished to the Buyer's premises within ten (10) days.

5. Within guarantee period, the Seller shall assign its personnel to regularly inspect the operation of the crane to eliminate any potential problem.

6. During crane operation, the Seller's representatives shall frequently visit the Buyer's premises to discuss any possible improvement on the functioning of the crane.

14. PAYMENT TERMS

14.1 Payment Terms

The proposed payment terms are the following:

- 20% of the contract amount as advanced payment payable within 15 days after the signing of the contract and receiving :
 - A Good Performance Guarantee of 10% of the amount of the contract upon signing of the contract, valid until the end of the warranty period.
 - An advanced payment guarantee of 20% of the amount of the contract upon signing of the contract, valid until the final payment.
 - Invoice covering the 20% of the total contract value.
- 35% after delivery of the crane at PCT's premises. Invoice covering 35% of total contract value / Proforma Invoice is required.
- 35% after final acceptance from PCT as set forth in Article 13 and after completion of on-site training against an invoice covering the remaining 45% of the total contract value.
- 10% will be paid one (1) year after the final acceptance by PCT.

15. GENERAL TERMS

1. The validity of the offer should be for at least four (4) months from the offer submission deadline set for this Tender.
2. This Tender is expressly not a Contract between PCT and the Participant, or an offer to a Contract.
3. PCT is not bound to accept the lowest or any offers.
4. Nothing in this Invitation, any offer, or any conduct or statement made before or after the issuance of this Invitation, is to be construed so as to create legitimate expectations or give rise to any contractual obligations, expressed or implied, or any obligations in equity. PCT makes no binding representations or undertakings as to how the Proposal process will be conducted.
5. PCT reserves the right to postpone, adjourn or cancel the Tender, as well as to amend the time table of the Tender and of the Tender in general, at any time, or to repeat the Tender, at its sole discretion, without bearing any liability towards the Participants in the Tender or/ and

any third parties. Participation in the Tender remains at the Participant's sole responsibility and expense. The Participant does not derive any compensation rights out of this participation other than those set out in the present document. Participation itself in the Tender Procedure equals to Participant's full and unconditional acceptance of the Tender terms and conditions.

6. In case less than three Candidate's offers fulfil tender criteria in order for their financial proposals to be unsealed, then, PCT reserves the right to cancel the procedure by declaring it as non-successful, unless otherwise stated in the tender documents and/or the Regulation.

7. PCT reserves the right to enter into competitive negotiations with all successful Participants after the Evaluation process and before concluding the Contract.

The present Call for Tender as well as the Contract is governed by and construed in accordance with the Laws of Greece. The courts of Piraeus shall have exclusive jurisdiction to resolve any disputes associated with the Tender or the Contract.

8. The Contract will be drafted in the English Language and all written communication between the parties will be in the English or Greek language.

9. All Candidates shall comply with all applicable regulations and standards.

10. Confidentiality: The parties shall keep the terms of the Tender or/and the Contract strictly confidential and shall not disclose such terms to third parties, except as may be required by Law.

11. If a Candidate has made false or misleading claims or statements, PCT reserves the right to reject any time any offer submitted by or on behalf of that Candidate. Candidates should be aware that, giving false or misleading information is a serious offence under the Hellenic Criminal Code.

12. The Candidates are prohibited to form alliance or exchange information in the tender process, so as to damage PCT and/or exclude or weaken the participation of other bidders.

15.1 Penalties imposed upon delay of the Supplier in completing the project.

i. For any delay of up to 30 days from the end of the contractual deadline for completing the project, PCT reserves the right to impose a penalty of the sum of one thousand euro (€ 1.000,00) which shall be seized per calendar day as a penalty to the Supplier.

ii. For each day of delay after the period stated in the previous subparagraph, the penalty shall rise to two thousand euro (€ 2.000,00) per calendar day to the Supplier.

iii. Where the penalties amount to the performance guarantee figure stated in Article 7.2, provided that there is grounds for imposing a penalty, PCT S.A. shall be entitled to terminate this Contract due to the Supplier's fault, in which case, the aforementioned good performance guarantee shall be seized.

iv. PCT S.A. reserves the right to demand that the Supplier pays any other penalty imposed on it by the Hellenic Republic in accordance with the provisions of the Concession Agreement, which is associated directly or indirectly with failure to meet the deadlines in the contract schedule or with any other related event due to the Contractor's fault.

ANNEX A: LETTER FOR PERFORMANCE FIRST DEMAND GUARANTEE

(TENDER BANK GUARANTEE)

Piraeus Container Terminal Single Member S.A. (PCT S.A.)

10, Akti Miaouli

185 38, Piraeus Greece

Date:

Reference: Guarantee No [...]

Issuance Date: [.....]

1. We, the undersigned [name and address of the financial institution or bank] (hereinafter referred to as the "**Guarantor**"), hereby confirm that we give the company under the corporate name Piraeus Container Terminal Single Member S.A. Akti Miaouli 10, 18538 Piraeus, Greece (hereinafter referred to as "**PCT**"), an unconditional, irrevocable and independent first-demand guarantee consisting in the undertaking to pay to PCT a sum equivalent to the amount of:

EUR [in figures: ...] (in words: ... EUR)

upon simple demand, for the good performance of the contract concluded between PCT and [company name and address], (hereinafter referred to as the "**Contractor**"), as given in the contract between PCT and the Contractor (hereinafter referred to as the "**Contract**") in relation to the tender procedure initiated on [...date..], as subsequently amended accordingly, with the subject: [....tender subject....] (hereinafter referred to as the "**Tender**").

2. If PCT gives notice that the Contractor has for any reason failed to fulfil his obligations under the Contract by the due date, we, acting by order and for account of the Contractor, shall undertake to immediately pay up to the above amount, in EUR, without exception or objection, into a bank account designated by PCT, on receipt of the first written request from PCT sent by registered letter or by courier with acknowledgement of receipt. We shall inform PCT in writing as soon as the payment has been made.

3. We hereby expressly and irrevocably waive the right to require exhaustion of remedies against the Contractor, any right to withhold performance, any right of retention, any right of

avoidance, any right to offset, the right to assert any other claims which the Contractor may have against PCT under the contract or in connection with it or on any other grounds and, in particular, any objection stipulated under Articles 852-855, 862-863, 866, 867 and 869 of the Greek Civil Code and waiving also any and all of our rights under the said Articles.

4. Our obligations under this guarantee shall not be affected by any arrangements or agreements made by PCT with the Contractor which may concern his obligations under the contract.

5. We shall undertake to immediately inform PCT in writing, by registered letter or by courier with acknowledgement of receipt, in the event of a change of our legal status, ownership or address.

6. This guarantee shall come into force upon its signature.

7. This guarantee is and will be valid until [.....] (the Expiry Date), and any written demand for payment in original paper form under this guarantee must be received by us on or before the close of our business hours of the Expiry Date through your bank.

8. The rights arising from this guarantee may not be assigned without our written consent.

9. This guarantee shall be governed by and construed in accordance with the laws of Greece and any dispute arising under this guarantee shall be subject to the exclusive jurisdiction of the Courts of Athens, Greece, to the exclusion of any other jurisdiction.

Done at [insert place], on [insert date]

[Signature]

ANNEX B: FORM FOR ADVANCE PAYMENT BANK GUARANTEE

(TENDER BANK GUARANTEE)

Piraeus Container Terminal Single Member S.A. (PCT S.A.)

10, Akti Miaouli

185 38, Piraeus Greece

Date:

Reference: Guarantee No [...]

Issuance Date: [.....]

1. We have been informed that:

Within the framework of the tender procedure initiated on [...date..] with the subject: [...tender subject....] (hereinafter referred to as the "**Tender**"), You have concluded a sale and purchase agreement dated on .../.../..... (hereinafter referred to as the "**Contract**") with the company under the name [...] (hereinafter the "**Contractor**") with its head offices located at [...] for the supply of and agreed spare parts for use in the container terminal of PCT SA at a total price of euro [...]

2. Furthermore, we understand that, according to the conditions of the Contract, an advance payment in the sum of [amount in words] ([amount in figures]) is to be made against an advance payment guarantee, the Contractor is required to provide you with an advance payment bond in the amount of euro [.....].

3. At the request of the Contractor, we [name of Bank] hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of [amount in words] ([amount in figures]) upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation under the Contract because the Contractor has used the advance payment for purposes other than toward providing the works under the Contract.

4. The maximum amount of this guarantee shall be progressively reduced by the amount of the advance payment repaid by the Contractor.



5. This guarantee shall expire on at the latest. Consequently, any demand for payment under it must be received by us at this office, i.e. in [.....] bank of [.....], [.....bank address.....] on or before that date.

6. We hereby expressly and irrevocably waive the right to require exhaustion of remedies against the Contractor, any right to withhold performance, any right of retention, any right of avoidance, any right to offset, the right to assert any other claims which the Contractor may have against PCT under the contract or in connection with it or on any other grounds and, in particular, any objection stipulated under Articles 852-855, 862-863, 866, 867 and 869 of the Greek Civil Code and waiving also any and all of our rights under the said Articles.

7. This guarantee shall be governed by and construed in accordance with the laws of Greece and any dispute arising under this guarantee shall be subject to the exclusive jurisdiction of the Courts of Athens, Greece, to the exclusion of any other jurisdiction.

Done at [insert place], on [insert date]

[Signature]



ANNEX C: General Criteria Required For All New Suppliers

ANNEX D: Technical Specifications

ANNEX C : General Criteria Required For All New Suppliers

<u>INFORMATION REQUESTED</u>	<u>ΑΠΑΙΤΟΥΜΕΝΑ ΣΤΟΙΧΕΙΑ</u>	GREECE	EU Supplier (Excluding Greek Suppliers)	Non EU Supplier
Company Full Details	Πλήρη Στοιχεία Επιχείρησης	Απαιτούμενο Στοιχείο	Απαιτούμενο Στοιχείο	Απαιτούμενο Στοιχείο
Bank Details · Bank Name · Beneficiary Name · Bank account number · SWIFT code · IBAN	Τραπεζικά Στοιχεία · Όνομα Τράπεζας · Δικαιούχος Τραπ.Λογ/σμού · Αριθμός Λογ/σμού · SWIFT code · IBAN	Απαιτούμενο Στοιχείο Απαιτούμενο Στοιχείο Απαιτούμενο Στοιχείο Απαιτούμενο Στοιχείο Απαιτούμενο Στοιχείο	Required Information Required Information Required Information Required Information Required Information	Required Information Required Information Required Information Required Information Required Information
TAX Certification	Φορολογική Ενημερότητα	Απαιτούμενο Στοιχείο	NO	NO
Social Security Certification	Ασφαλιστική Ενημερότητα	Απαιτούμενο Στοιχείο	NO	NO
G.E.M.I. (General Electronical Commercial Registry) Up-to-date authorization letter	Γ.Ε.Μ.Η. (Επικαιροποιημένο "ΓΕΝΙΚΟ ΠΙΣΤΟΠΟΙΗΤΙΚΟ") *	Απαιτούμενο Στοιχείο	NO	NO
TAXISNET -personalized information (from Taxisnet) Up To Date Registry Verification	TAXISNET- Σελίδες "Προσωποποιημένης Πληροφόρησης" στοιχεία μητρώου νομικού προσώπου	Απαιτούμενο Στοιχείο	NO	NO
TAXISNET -personalized information (from Taxisnet) Up To Date Registry Verification	TAXISNET- Σελίδες "Προσωποποιημένης Πληροφόρησης" στοιχεία μητρώου επιχείρησης*	Απαιτούμενο Στοιχείο	NO	NO
«Good standing certificate from Tax Authority» (Official English Translation)		NO	Required Information	Required Information
VAT Registry (with English Translation)		NO	Required Information	NO
Business License (with English Translation)		NO	Required Information	Required Information



PIRAEUS CONTAINER TERMINAL SINGLE MEMBER SA

ANNEX D (Technical Specifications)

**Technical Specification
Of
Electrical Rubber Tired Gantry Crane**



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Technical Specification of ERTG

S1. Scope of Work

In accordance with the Buyer's bidding documents for total Four (4) units of 6 plus 1 lane truck/ 1 over 6 of container height_of 41ton (under spreader) electrical rubber tyred gantry cranes (shortly named as ERTG) with telescopic single electrical container spreader, the Seller should include design, fabrication, painting, assembly, Contractor's facility commissioning, fully-erected, transportation, Buyer's site commissioning, performance testing through acceptance by the Buyer. Besides all the above said it also includes the following:

1. As-built drawings and technical data for maintenance, operation and maintenance manual.
2. Design review, supervision and inspection reports during fabrications, technical training and after-sales service.
3. Each crane shall be supplied with a headblock and container spreader
4. One spare of spreader shall be provided.
5. Main power cable plugs and outlet shall be provided for each crane.
6. Every RTG shall be equipped with GPS device and software, which shall be same or compatible with PCT existing TOS system.
7. One mobile diesel generator set shall be provided.

S2. Location for operation of the crane

The Crane will be operated at Piraeus Container Terminal Single Member S.A. GREECE.

S3. Crane Features

1. The seller is a specialized container crane manufacturer and experienced in RTG. The RTGs supplied by seller are provided with up-to-date technology with available parts for next ten years at least. The seller ensures that the mechanical and electrical



PIRAEUS CONTAINER TERMINAL SINGLE MEMBER SA

components to be used in construction of the crane will be of high quality. The diesel generator set, drive control, hydraulic system components, painting system will be supplied with brands well known in the world.

2. The mobile diesel-generator set used for the crane shall be supplied from well-known manufacturer in Europe.
3. With high shock-resistance capability and is suitable for frequent starting operation with minimized harmonic variation and voltage surge.
 - The diesel engine to be used is provided with electronic speed adjustment device and protection devices against high temperature, low lube oil pressure and over speed.
 - Long service life. Under proper and regular maintenance, the interval between overhauls can be above 15,000 hours.
 - The diesel engine has ample back-up horse power so that it is able to operating under without load work at sufficient horsepower after a certain wear to ensure stable rpm.
4. The Crane shall provide with tubeless tyre wheels and enables the wheels to support the crane weight and the eccentric load when the trolley is traversed to one end limit. It should be noted that high inflation pressure is necessary for reduction of the crane travelling resistance, prolong the tyre service life and easier steering.
5. The Crane design shall allow the machine to be turned by carousel drive around RTG's center. The wheels shall also be able to be turned to parking position.
6. The Crane shall provide with automatic gantry guidance and auto steering system.
7. The Crane shall provide with proper safety protection, one LCMS system located in electrical room, a fault display and alarm system install in operator cabin. In case when faults occur, it can be quickly found out and corrected in accordance with its location display.
8. The Crane shall provide with sway-damping system to ensure perfect anti-sway capability on trolley direction.
9. Fine cast steel sheaves, linear-contacting type wire ropes and hot dip galvanized stair steps are used on the crane to achieve perfect performance and desirable reliability.
10. The spreader all function (extend, retract and twistlocks) by electric motor control. It can be extended and retracted to ISO 20ft, 40ft and 45ft positions. The spreader



consists of the head block and spreader itself with quick change connections.

11. The crane has super-workmanship and is provided with special anti-corrosion means. All those fasteners exposed to weather are of dacro or stainless steel.
12. The Seller shall provide after-sale services to the satisfaction of the Buyer:
 - 1) One year guarantee.
 - 2) Provide training for the maintenance staff, and particularly the electricians.
 - 3) Seller has stock of electrical and mechanical components to provide easier services and may supply appropriate components soon on request.
 - 4) Seller will, upon completion of the crane, send competent personnel to site for service and further training for a period of 24 weeks until the Customer has been familiar with the Crane.

S4. Standards and codes

Standards and codes for design and manufacture, unless it is clearly specified in the Technical Specifications, the following internationally accepted standards and codes for crane design and manufacture are to be used:

For structure:	FEM
For material:	GB700-88/ GB1591-88/ GB699-88
For electrical:	IEC
For welding:	AWS
For gearing:	AGMA
For Quality Control:	ISO
For painting:	SIS
GB3811-2008:	Crane Design Rules, Chinese National Standard
GB6067-2010:	Safety Regulations for Lifting Appliance
GB/T15362-94:	Rubber Tyred Container Crane Testing Method
GB/T14783-93:	Rubber Tyred Container Crane Technical Condition
JT/T90-94:	Port Machinery Wind Load Standard
JTJ244-95:	Port Machinery Assembling Inspection Criteria



All measurement units for the Crane are of international standard unit system (metric) (except some import components such as engine and some electrical parts).

S5. Design Criteria and Operation Conditions

S5.1 Design Criteria

- 1. Design wind speed
Operation condition: 20m/s
Non operation condition: 55m/s
- 2. Temperature: -10°C ~ +40°C
- 3. Humidity max. relative 100%

S5.2 Design operating conditions, classification and rating:

According to FEM and GB3811-2008 standards, the classification of the Crane structural and mechanical parts is as follows:

1. Crane working classification:

Class of Utilization	U8
State of Loading	Q3
Working classification	A8

2. Mechanism working clarification:

<i>Mechanism</i>	<i>Class of utilization</i>	<i>State of loading</i>	<i>Group classification</i>
Main hoisting	T7	L3	M8
Trolley traversing	T7	L3	M8
Gantry travelling	T6	L2	M8

S5.3 Type of load to be handled

The Crane is suitable for handling the following goods:



1. 20ft, 40ft and 45ft ISO standard containers.
2. All spreaders should have lugs at each corner for over height spreader engage.
3. Other containers and cargos by using four temporarily suspended lifting slings.

S5.4 Theoretical duty cycle operation of the crane is assumed to load and unload 24 units of 41T containers to and from the chassis in the order specified, based on this, the calculated cycle time is about 24 containers per hour. The calculation is based on that the starting and braking time of hoisting and lowering with and without load are 2s and 4s respectively; starting and braking time of trolley is 4s, starting and dwell time for twistlocks is $\leq 3s$.

S5.5 Design service life of the bearings (minimum)

1. 25,000 hours for main hoisting system
2. 25,000 hours for the trolley traversing system
3. 12,500 hours for the gantry travelling system

S6. Design parameters

Main dimensions, tolerances and operation requirement:

- | | |
|------------------------------------|----------------------------------|
| 1. Rated capacity (SWL): | 41ton (under spreader) |
| 2. Dynamic load test: | 49.2 ton |
| 3. Static proof test load: | 57.4 ton |
| 4. Containers to be handled: | ISO 20', 40', 45' container |
| 5. Electrical spreader | 20ft /40ft /45ft telescopic type |
| 6. Tyre | 16.00-25/ 28PR |
| 7. Span (Wheel Centre to Centre) | 23470mm |
| 8. Span (inside) | not less than 21810 mm |
| 9. Overall width | not exceed 26500 mm |
| 10 Lifting height (under spreader) | 21200 mm |
| 11. Overall length of crane | not exceed 13490 mm |
| 12. Speed: | |
| a) Main hoisting | Without load: 52m/min |

	26m/min with 41 ton load under spreader The max. acceleration and deceleration time (with load): 2 s The max. acceleration and deceleration time (without load): 4s
b) Trolley traverse	70m/min The maximum acceleration and deceleration time: 4s
c) Gantry traveling	30/ 130m/ min (full load and spin turn / without load)
13. Spreader skewing	$\pm 5^\circ$
14. Spreader side shift	± 150 mm
15. Anti-sway / displacement	Trolley direction ± 100 mm within 2.5 cycles when the trolley runs under full speed condition (spreader with rated load at 4.0m above ground level from the lowest side of the spreader)
16. Number of gantry wheels	16 (no. of four tyres per each corner of Gantry equalizer)
17. Gantry Wheel Turning	$0^\circ/ 90^\circ$ / spin and parking

S7. Stability of the crane

1. The crane can be held and not be overturned under 1.1 times of the maximum wind load (FEM Standard requirement).
2. When the hoist with rated load is lifted to the up stop position, the trolley collides with the mechanical buffer at full speed and under the extreme wind load at the same direction (the slowdown and over travel limit switches fail to be activated), the crane remains stable under this condition.
3. The Crane is still stable when the trolley with rated load is traversed to the worst position and one of the tyre is flat.
4. Emergency stop when the gantry at rated speed, with lifting load at highest position, slope no more than 2%, the crane is still stable.

S8. Material

Materials used for the crane are of high quality and in compliance with standard requirement.

Materials used for main structure and important structural members are provided with quality assurance certificates. Steel surfaces are free from rust spots and inclusions. Non-ferrous alloy will not be used for the main load-bearing structural members.

For main members: Q355B.

Steel, flat steel thickness not less than 8mm.

Minor components thickness not less than 6mm.

Steel pipe thickness not less than 4.5mm.

Electrical room and operator cabin wall thickness not less than 3mm.

Hydraulic oil tank, control panel and junction box should be used 2mm thickness stainless steel.

Other materials will be in compliance with requirement under Tender Documents.

The welding consumables are in compliance with requirement of appropriate standards and specifications. The selected electrodes, welding wire, fillers etc. have the same strength as that of the base metal. Bolts and nuts for connections subject to high load and high-strength connections are made of medium carbon steel or steel alloy and heat treated.

Linear contacting type wire ropes will be used for main hoist. The tensile strength of the wire is 1960 N/mm².

S9. Workmanship

The manufacturing and fabrication process of the Crane comply with the international standards. The steel plates are blasted to remove mill scales to Sa 2^{1/2}, SIS Standard. The materials are cut through digital controlled cutting machine and manually operated cutting is prohibited. Special plates which need to be cut by hand will be machined or ground at the edges to smooth.

Cleanliness in the hydraulic system is ensured. All pipe connections are designed as shock-damped. Threaded connections are provided with anti-loosening means. Cylinder piston rods are chrome-plated and ground. All the oil filling ports and return line ports of the oil reservoirs are fitted with oil filters.

Bores for bolts are drilled or reamed and all burrs are removed after machining.

Straightening and bending of all plates and section steel will be accomplished by press and

hammering is prohibited. Drums, gears, travelling wheels, sheaves and their shafts are made of plate steel or forged steel and fine machined and ground to smooth. Reentrant angles at diameter changes are rounded.

Welding procedure and consumables and appropriate tests are in compliance with recommendation of the manufacturer and relevant standards and codes. Welds are ultrasonic and X-ray tested by certain percentage. Welding of the main structural members is to be performed by qualified welders.

Test procedure, welding procedure, test method and test results of main components and main structural members are to be approved by the customer (the Buyer) and test reports and relevant information to be submitted to the Customer.

1. All butt welds of main structural members subject to tension; 100%UT + 10% RT
2. General welds (complete penetrated butt welds) on trolley, girder, gantry frame, mast frame; 30%UT + 5% RT
3. Butt-welds on headblock (complete penetration welds); 100%UT + 5% RT
4. Butt welds of main hoist rope sheaves bracket; 100% UT
5. Main shaft and gear after heat treatment; 30%UT + 10% RT

S10. Steel structure

Gantry frame is the main structure of the Crane. It consists of two (2) U-type members connected with two girders, Cross-sections of these members are of box type. The girder is of rectangular box-section with sufficient strength and stiffness to suit the effect of deformation of the tyres and uneven ground surface and to prevent the structure from vibration.

S11. Mechanical parts

1. Mechanical parts and components are designed for specified load combinations and in accordance with class of utilization and group classification and have sufficient strength, stiffness, stability and interchangeability.
2. Main hoist sheaves are of fine casting type to obtain light weight and sound roundness. Manufacturing tolerance meets the standard for sheaves.
3. All wire rope sheaves will be machined from fine cast steel with rope groove contour. Grooved surface is of hardness HRc45~50, with effective deepness is more than 5mm. The sheaves are standard products of Seller. They are produced by the special subsidiary of Seller. Safeguards are provided on some of the sheaves on the crane to prevent the wire rope from jumping off the groove. Full attention is paid to inspection, lubrication, installation and replacement in the sheave design. The nominal diameter

of the rope sheave should be not less than 28 times of wire rope diameter.

4. The main hoist drum is made of steel plate and of welded construction. The diameter of drum is above 30 times of the nominal diameter of wire rope. Fleet angles of the rope leading from the drum and the sheave are all less than 2.5° .
5. Trolley wheels are made of forged steel 42CrMo. Tread surface is heat treated to hardness HB320~380 that provides perfect wear-resistance and the design service life is not less than 25,000 hours. Horizontal roller wheels are mounted for guidance. This type of design can minimize the wheel binding on the rail.
6. Flexible coupling is used for the motor and its type and connection configuration with the shaft will be approved by the Buyer during drawings' review. All the couplings are provided with safety guards with lubrication points without removal of these guards. The motor for main hoist is connected with gear reducer through elastomeric coupling. Safety guard is fitted outside of the coupling. Safety factor of the high speed coupling is determined in accordance with FEM and is ≥ 2 for main hoist and is ≥ 1.5 for other traveling mechanism.
7. Gears and reducers
 - 1) Gears and reducers are designed in accordance with AGMA standard. All main gears have teeth hardened to HRC58~62. Reducers of main hoist and trolley have the same service life as that of the crane.
 - 2) Double oil seals are used on the main reducers instead of rubber oil seals to provide wear free operation and thus maintenance work is minimized.
 - 3) Main hoist gear reducers are of split type. Oil filling bore and drainage as well as air breather and oil level indicator are provided on the reducer case. When the hatch cover on the upper case is opened, the gear meshing can be checked.
8. Wire rope
 - 1) Wire rope used is linear contacting type, regular lay, right hand with tensile strength of not less than 1960 N/mm^2 .
 - 2) Safety factor is greater than 6.
 - 3) Another the end of wire rope is usage wedge connection sockets.
9. Festoon cable system

The festoon cable is fixed at the side of girder. The festoon cable is arranged in the direction, and the festoon travel with the trolley.
10. Fasteners
 - 1) All fasteners are in metric units complying with ISO Standard.

- 2) Exposed fasteners are all provided with reliable anti-corrosion means (stainless steel, galvanized or painted).
- 3) Widely used nylon lock nuts or DTF are used at essential locations to withstand vibration and alternate load. High-tension bolt connections coated are used for main structure.

All fasteners are provided with reliable loosening measures. (Except some import components such as engine and some electrical parts).

11. Brakes used on the crane are of widely used disc type brakes. The brakes are normally applied by dish spring or spiral spring and released through hydraulic thruster. The brakes gap is automatically compensated. The gap due to wear of the brake lining may also be manually adjusted in case of automatic compensator failure. The brake shoe lining is made asbestos-free material. The brake disc are all machined and balanced.

S12. Electrical room

The electric room shall be made of steel plate that provides insulation and tightness.

Inside the E-house can be open construction type with safety plastic insulated handrail. In the middle is a pass way. Two sides all arrange with devices.

The electric room shall provide with two units of air conditioners and door frames to ensure a desirable operation environment. The roof of the machinery house and the electric room is sloped to drain water.

S13. Gantry travelling

1. Gantry travelling consists of equalizer beams, bogies, drive system, travelling wheels and safety guards.
2. The bogie is connected with the equalizer beam through slewing bearing. Solid steel safety guards are provided at both ends of the tyres wheels.
3. Four sets driven wheels of the Crane are arranged on four corners of the crane. The wheels are driven through four (4) sets of motors and reducers without chain.
4. The gantry motors have sufficient horsepower to ensure the crane to travel on a slope of 2% and against wind of 25m/s at low speed to the stowage position.
5. The motors equipped with built-in electro-magnetic disc brakes. In case the power cut off, the brakes set and can be released by loosening the bolts for being drawn.
6. The tyres are of tubeless and heavy duty especially for engineering application.

Safety guards are fitted outside of the tyres. To replace the tyres easily, there is jacking pedestal. When any one of the tyres jacked up, the other one is also lifted up.

7. Each wheel of the crane can be turned through 90° by the motor so that the crane can travel on perpendicular way.
8. Each gantry sides should has indicator rods to indicated straight line running when gantry manual operation by driver
9. The wheel turning indicator is provided in the operator's cab. Interlock is provided to ensure that wheels could not be locked until they are fully turned to right position and travelling could not be operated until the wheels are locked.
10. The wheel turning operation is performed under non-operation of the gantry travelling and without load. In addition to push-button for wheel turning 90°, there is a selector switch on the control panel in the electric room and when it is selected to the manual position, each wheel can be operated on the ground level.
11. Each corner should have an anti-collision system shall prevent collision between RTG's working on the same track.
12. The system shall be designed to automatically prevent damage in the event that RTG is travelling into possible collision situation. The sensors should not be energized by rain.
13. Each leg of the crane is fitted with cat-whisker type anti-collision limit switch to stop the crane urgently in case it hits any obstruction. Both ground sides and operated should has by pass switches in case the limit switch is activated, it can be by pass the circuit and move the crane in corrected position.
14. Gantry control station shall provide and located at under sill beam (E-room side), it can be control a "Left and Right" direction of gantry travel under 20 % speed.
15. When parked, the gantry allows any one single side to turn 90°, while another side is maintained at 0°.

S14. Trolley and trolley traversing

S14.1 Trolley

1. The trolley frame is made of rolled sections and plate steel and has sufficient rigidity, strength and stability. In addition, protection device is provided for preventing the trolley from derailing.
2. A safe and reliable access shall provide between the trolley and the operator's cab.
3. Trolley platform are covered with checkered plates.

4. The tolerance of trolley and trolley wheels meets ISO and FEM standards.
5. The trolley rails are welded on the top of each of main girders. The stoppers are fixed on both ends of the rail to prevent over travel.
6. The trolley frame is provided with jacking pads for wheel replacement.
7. The trolley guide wheels shall be provided.
8. The trolley is equipped with safety device to avoid wheels coming out of rail.
9. The trolley buffers with enough energy-absorbing ability is capable to stop a full-speed moving trolley.
10. One service crane (1000kg) shall be provided and located on trolley platform.
11. Both bottom side of anti-sway system should have maintenance platform, it can be easy and safe to disconnect the pins of wedge connector socket when wire ropes replacement.

S14.2 Trolley traversing

1. The trolley traveling wheels are machined from forged steel with double flanges, minimum 500mm diameter.
2. The trolley is driven by single electric AC-motor connected to a gear reducer. The gear reducer splits the driven to both sides of trolley through propeller shafts. The final drive is with sprockets on fixed chains laid on the main girders.
3. The trolley can traverse with rated load up to a slope of 2% against wind (wind velocity 25m/s) and can be smoothly and reliably brake when traversing down a slope of 2% with wind.
4. The trolley is provided with slow down, end stop and over travel limit switches at both traverse ends and in addition to those the rubber bumpers and stoppers are also provided.
5. Trolley anchor pin shall be vertical type and located at trolley both side, each anchor pin should have circuit interlock protection to stop trolley motion when the pin was connected condition. The stoppers with pins should have ± 50 mm tolerance, a straight line should paint on left hand inside main girder for operator to stop the trolley at right position.
6. One convex mirror (at least 500mm) located at under trolley platform, in order to ensure the operator able easy to see at rear side situation

S15. Main hoisting

1. Main hoisting is four (4) wire ropes and single drum type and it is driven by AC

motor via gear reducer which in turn drives the wire rope drum. The gear reducer is horizontally split type with spiral bevel gear and helical cylindrical gear. The motor have sufficient horsepower to ensure perfect acceleration performance.

2. Flexible coupling with braking disc is fitted between the motor and the reducer. The Seller shall provide two independent brakes, each brake with braking torque of 125% of the rated torque. Brake is of hydraulic thruster operated disc type.
3. A tachometer is fitted at the rear of the motor for cutting off the motor power in case the motor speed exceeds 110% of the rated speed.
4. An absolute encoder and cam switch are fitted at the end of wire rope drum side.
5. When the container is over loaded, it should via loadcell pins to detecting. The indicator light in the operator's cab is on, the actual weight show on screen, the acoustic alarm is activated and the main hoist power for lifting circuit should cut off but can be allowed to lower down slowly.

S16. Headblock

The spreader is attached to the head block by twistlock pins. Cable basket for cable storage and junction box should be fitted on the headblock. Also, the headblock must be equipped by high quality and stable hand rails.

S17. Sway-damping

The RTG shall provide with an anti-sway device. The Seller shall provide an effective mechanical sway-damping device. Sway of the container with rated load can be controlled within ± 100 mm (trolley direction) in 2.5 cycles under the condition that the trolley runs at the full speed when the spreader bottom is 4m above ground.

S18. Lubrication

1. The reducer is oil-bath lubrication.
2. All rolling bearings are lubricated through manual greasing.

Those lubrication points where they are not accessible are concentrated to several accessible places and the grease nozzles are arranged together and led by seamless copper tubes. All the grease nozzles are of button type and special grease guns matched these nozzles are provided.

S19. Stairs, walkways and platforms

Straight ladders are used for access from ground level to the electric room. The girder with



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power chain has platform and its walkway are covered with expanded metal and toe boards with 100mm height. Handrails are 1.1m high and the intermediate railing is 0.55m high.

The stairs are hot dip galvanized and without building-up snow and water and have property due to hot dip galvanizing.

Platforms, handrails, walkways, straight and tilted ladders are all designed and fabricated in accordance with the customer's requirement and in compliance with crane safety Rules. At any place where personnel may climb for maintenance, a platform with safety guard is provided.

Main girders walkways of both sides should have sufficient space and are cover steel grating plate.

S20. Mains powered RTG

The main power drives, hoist, trolley and gantry travel shall be powered by electrical supply through a cable reel assembly. Power for the auxiliary drives, control and supplies for all lighting circuits on the RTG, shall be provided by electrical supply through a cable reel assembly.

Scope of supply includes cable reel assembly complete with the cable and cable plug and socket outlet.

Maximum allowed voltage fluctuation of the power supply shall be 1000V +/-5%. The RTG shall have re-generation when lowering the load, supplying power back to the network.

The cable reel shall be located high enough to prevent ground level collisions. There shall be no safety compromises. In case of over-tension and slack of the supply cable an automatic shutdown shall be activated. A flexible power supply cable shall be used. Motor cable reel shall be horizontal retrieval type with mono spiral winding drum and torque controlled. Gear box components shall be totally immersed in oil. Slip ring and motors shall be provided with space heaters. For selection of manual/ auto mode and for manual winding on shall be placed in control box. Diverting unit shall be double sided, symmetric, mounted on crane structure. Cable reel shall be fitted with cam switches to limit the length of the gantry travel. The main cable distance between cable guide frame with gantry wheel centre to centre not less than 1600 mm.

The main power cable length is 400 meters, can ensure the crane can move leftward and rightward respectively.

The main disconnecting (isolating) device must have control from ground level and possibility to lock the disconnecting device to off – position.

Main transformer shall be 400 kVA, primary voltage being 1000V/ 3 phase, 50Hz and secondary voltage 400V at 50Hz frequency. Insulation class shall be according to IEC 34-1 and windings rated 155° (F).



The supplier of electric powered RTG shall act as the electrical system integrator.

S21. Auxiliary power supply

3-phase 400V, 50Hz power supply is transferred into 3-phase, 400V/ 230V, 50Hz through auxiliary transformer and can fulfil is fed to lighting, air conditioning, communication and the other auxiliary services.

IEC color code applied.

S22. Small diesel generator

A mobile diesel generator set shall be provided for cross travelling as well as stack change when disconnected from mains supply. Mobile diesel generator shall have sufficient supply power for wheel turning, gantry travelling (speed limited to 40m/min), trolley travelling and spreader hoisting on with full load (speed limited to 26m/min), working lights, power sockets and air conditioning units.

When the power cable go through the guided frame, it can be led correctly to the cable trench or cable groove on the ground, through speediness plug, the end of power cable can connected with junction box on the ground to get the city power, The safety switch in the junction box will ensure all cable plugs to be switched on/off under none electricity conditions.

The mobile diesel generator set can be random installed bottom of sill beam at non cable reel side on each ERTG.

When the RTG travels to another working place on the container yard, the ground junction box of city electric power will be switched off, the connection to city electric supply will be cut down accordingly, pull out the cable plug. The pulling on/out of cable plug will be done under none electricity conditions. The mobile diesel generator cable plug to plug in the socket and supply power for the crane, through the jogging function, the reel cable can be withdrawn by manual, and then the RTG can travel to another working place, same as normal RTG.

When the RTG is traveled to another container stacking yard, it can be reconnected to another junction box to realize the city electric power supply and handle the container.

S23. Main disconnect

The diesel-alternator set shall provide with circuit breaker adjacent to the set. In addition to this, a disconnected is provided in the main panel board in the electric room for power



on/off during maintenance and repairing in the electric room.

S24. Balance of the crane

Both the power unit and the electrical house shall be located in the opposite of the loading/ unloading side of the RTG providing optimal weight distribution.

Balance and duty-cycle calculations showing the weight distribution during normal crane operation shall be submitted with the seller.

S25. Festoon system and Power supply to the operator's cabin.

The festoon cable system is mounted on one side of the main girder, the control cable shall provide at least 20% spare cores. The warranty period of Festoon cable is 3 years.

Power to the trolley and the cab is fed through flexible cables from the festoon cable system.

S26. Power supply on the Spreader Headblock

A heavy duty flexible boloney cable with oil-resistant rubber jacket is used for power supply and control power between the headblock and the trolley. The cable is of multi-core type, not less than 2.5mm². The headblock is fitted with a cable tub that receives and pays out the cable with the headblock lifting up or lowering down. To change the spreader quickly, the water proof plug and receptacle outlet are provided between headblock and the spreader. Interlock switch is also provided to prevent the headblock from hoisting without spreader but the plug is still inserted in the receptacle. The spreader cable has at least 20% of spare cores.

S27. Main electrical equipment, circuit design and PLC application

S27.1 Circuit design of main electrical equipment

1. Main electrical equipment, circuit design:

Drive control system is of digital programmer controlled drive, and it is digital regulation control by using microprocessor to regulate speed in step less manner with fast response, high control accuracy, high speed regulation ratio and stable and reliable in operation. There are several drives control hoist/ gantry/ trolley respectively. In addition, the hoisting mechanism has constant horsepower control characteristic.

2. To ensure the gantry travelling is operated along a straight line, the crane is provided with manual steering device that changes the gantry wheel rpm by using the handle to control speed difference between gantry motors.

3. Trolley, gantry and hoisting drive shall be operated individually.
4. Acceleration and deceleration is controlled by the operator. However, the drive has the given integration function, i.e. acceleration and deceleration time is set by personnel and remains unchanged if the operator moves the handle too fast. The drive is also provided with speed detection function. When the master controller is returned to neutral position, the speed of appropriate motion is slowed down electrically and the brake is smoothly applied only at the motion speed reduced to below 10% of the rated value.
5. Insulation of the motors is Class F and protection of them is IP23 for inside room and more than IP55 for outside door, which meets requirement of IEC34-5. Motors externally fan cooled have interlock between ventilator and the motor and also signal of ventilator running.
6. Electrical system includes main power circuit, drive circuit, lighting circuit, PLC communication circuit and telephone signal circuit.

S27.2 Application of PLC

The PLC system on the Crane can process all system control signals including driven system. All interlock and logic control functions, except a few hardware interlocks, are performed by PLC.

PLC unit is specially designed for a rough industrial environment application and can be suitable for the environment with high temperature, dust, vibration, humidity and electrical noise. PLC system has reliable power failure protection.

It receives data from input device (switch, heat transducer, limit switch etc.), executes logic judgment determined by the program stored in memory and gives control output signal to the electrical equipment and electrical components.

PLC is provided with sufficient redundancy to ensure reliable running of the system.

The PLC's power is supplied from the control transformer that is independent of drive and lighting systems.

The PLC is rack-mounted type and every function module is made as inserted card for easier expanding, replacement and maintenance.

The PLC is provided with program and data memory and failure recording device. Memory has larger capacity than the system needs for further expanding. For hoisting, load measuring device is provided and displayed in the operator's cab.

PLC system is able to be linked into remote communication network and is provided with interface for future communication with the port computer network.



Guaranteed to provide spare parts of PLC and drives can supply for ten years or more.

S28. Electrical Fault Display, LCMS and RCMS

The cranes shall provide with complete fault display and diagnostic system. Display includes hoist faults, gantry faults, trolley faults, alternator faults, diesel engine faults and spreader faults etc.

Local Crane Management System (LCMS) shall be installed in electric control room. This shall provide continuous monitoring, diagnostics and data collection on the crane. The PLC program also can be via LCMS to open. The UPS power back up the CMS. One fault display shall be provided in operator's cabin. The Seller shall provide full description of the proposed CMS, which shall be subject to Buyer's approval.

The LCMS should fulfill the following functions:

- Display the status of RTG
- Running hours and Counters (MH/ TT/ GT/ Operation time/ Control On time/ Twistlock counter)
- Diagnostic the crane fault
- Event log
- Showing the production data on each crane
- Maintenance schedule assistant

Each crane should be provided the RCMS (Remote Crane Management System), it is via RF communication, the main PC system will be located at Engineering Department Building or other location. The Seller must provide all software and hardware and coordinate the local frequencies of antenna device, the local effective frequencies channel will be provided to Seller by Buyer. Moreover, the function of RCMS with LCMS must be same.

S29. Operator's cab.

The operator's cab shall designed based on ergonomics to give a comfortable environment for the operator. The operator's cab is secured under the trolley and mounted with vibration damping pad. The walls and ceiling are laminated with heat insulation. The cab is enclosed and sealed properly. Material for decoration in the cab is flame-resistant. Glazed windows are provided in the fore half of the cab in front, side and bottom of the cab. Back view mirror is provided on the both sides. The bottom glass is provided with steel grid for operator's safety but does not obstruct the operator's

viewing. The side windows are adjustable to fully-closed, half-opened and fully-opened positions. Front and Bottom windows are assembled with safety glass.

A protection railing shall provide in the front of the cab to increase safety for the operator. All the window glass can be replaced easily from inside the cab. Windshield wiper is provided for the front lower window, and rain shade and sun shield are also provided at the window. All the windows glass can easily be cleaned from the platform. At rear of the cab an access door is fitted. The door is equipped with lock and door closure. The operator's cab should have adequate lighting and intercommunication means.

Safety access is provided between the operator's cab and the trolley to ensure that in any case the operator is able to escape from the cab through the crane girder.

The operator's cab shall also provide with the following equipment:

1. Master controller

The following control components are fitted on the left and right control consoles:

- 1) Hoist/gantry master controller
- 2) Trolley master controller
- 3) Manual / Auto selector for gantry steering
- 4) Controller for gantry steering (travelling along straight line)
- 5) Selector for spreader twistlocks (lock / unlock)
- 6) Spreader position selector switch and position indicator light
- 7) Tyre wheel turning control switch and position indicator light
- 8) Wheel parking selector switch (normal/ parking)
- 9) Emergency stop button
- 10) Spreader skewing control button
- 11) Spreader side shift control button
- 11) Spreader "home" position control button
- 12) Working floodlight switch
- 13) Wind shield wiper operation switch
- 14) Buzzer alarm and weight screen for main hoist overload



- 15) Washer control switch
- 16) General by-pass button
- 17) Spreader by pass push button
- 18) Landing by pass push button

The wheel turning operation also can be controlled manually through the Gantry operation station (including in/ out the pin and turning movement).

Auxiliary controls and indication:

In addition, switches for floodlight under the cab, walkway lighting, air conditioner and controls of intercommunication equipment are all easily operated in the cab.

2. Auxiliary equipment:

- 1) Ample spaces are provided in the front of and rear portion in the cab for future installation of display.
- 2) Fire extinguisher
- 3) Load indicator
- 4) At front and lower part in the cab, the indicator lights are arranged for spreader unlock, lock and landed which are green/red/yellow indicator lights respectively. Wind velocity indication and alarm are also provided in the cab.
- 5) Loud speaker
- 6) Air-conditioner
- 7) Heater

S30. Electrical protection of the electrical equipment.

The Crane shall provide with the following protections:

- 1) Overload
- 2) Short-circuit
- 3) Over current
- 4) Over voltage
- 5) Under voltage

- 6) Phase loss
- 7) Overheating
- 8) Frequency protection (AC)
- 9) "Neutral" position interlock of controller
- 10) Electricity leakage
- 11) Others

S31. Limit switches, interlock switches and emergency stop buttons

1. Limit switches and their functions of each motion are listed below:
 - a. Limit switches of hoisting
 1. Slow down limit switch at upper end
 2. Stop limit switch at upper end limit
 3. Stop limit switch at extreme end limit
 4. Slow down limit switch at lower end
 5. Stop limit switch at lower end limit
 6. Over speed limit switch activated at 115% of the max. Operation speed.
 7. Rope anti-slack device for lowering
 - b. Limit switches of trolley
 1. Slow down limit switches before trolley runs at the end stop forward and backward.
 2. End stop limit switches at both forward and backward directions
 3. Over travel limit switches at both forward and backward directions
 4. Limit switches for trolley stowage device
 5. Limit switches for the door of platform outside the operator's cabin
 - c. Limit switches of gantry :
 1. Wheel 0° / 90° and spin turn limit switches
 2. Wheel lock pin in/out limit switches (if necessary)
 3. Interlock of gantry running and wheel turning:

- i) Wheels could not be turned until the lock pins are fully out.
 - ii) The lock pins could not be inserted in or pulled out until the wheels reach their due position
 - iii) Gantry could not be operated until all the lock pins are inserted fully.
 - iv) The lock pins could not be pulled out during travelling.
4. Limit switch for gantry anti-collision with container
2. Emergency stop
- Emergency stop buttons are provided at the following locations:
- a. One on control console
 - b. One for each corner at gantry
 - c. One in the electric room
 - d. One near the hoisting motor
 - e. One on the diesel engine (for engine E-stop only)

S32. Indicator lamps

The following indicator lamps are provided on the control consoles:

- 1) Main power on and control on
- 2) Wheels are in the "0°" position
- 3) Wheels are in the "90°" position
- 4) Wheels are in the spin turn position
- 5) Wheels are parking condition
- 6) Spreader positioning

S33. Alarm signals

The crane is provided with the following alarm systems for the personnel safety:

- 1. Water-proof type red rotating warning lights and electronic audio alarms are fitted near the four legs respectively at ground level and they are activated during travelling.

2. An electric bell is provided to warn the relative persons nearby during operation.

S34. Intercommunication system

Telephones are installed in the operator's cab, electric room, trolley frame, below of electric room and below of cable reel. Intercommunication on board can be performed by these telephone sets. Cables for telephones are screened cables.

S35 Cabling

All cabling between various equipment on the cranes runs in galvanized cable trays, cable ladder, galvanized conduits and plastic coated metal flexible tubes. The cables which run at the external positions like beams must be fastened with metallic tie wraps. The power, control and communication cables are separated by baffles in the cable trays to make the various circuits in order.

Multi-core long distance control cable has spare cores of 10% and the cable with amply length. Junction boxes are outdoor watertight construction.

All the cabling on the crane complies with IEC standard. Bending radius of multi-conductor cable is not less than 6 times of the outside diameter of the cable and the bending radius of the conduit shall not be less than 8 times of the external diameter of the conduit. The conduit shall be bent without cross-section deformation.

The wires, conductors in the cable are marked with the sleeves printed numbers. Rated voltage of the wires, cables meet requirement of 500V for AC and 1000V for DC. Conductors are copper stranded wires.

S36. Terminals

Terminals of the in and out wires to and from the control panel will be , as far as possible, arranged at the front bottom of the panel for easier maintenance. Both ends of the cable conductor are identified with permanent labels that are identical as shown on the drawings.

10% terminals at the control panel and junction boxes are provided as spares.

S37. Lighting and Heaters

Circuit for lighting is divided into several independent circuits and each of them has a number of separate sub-circuits and overload and short-circuit protections.

Lighting ballasts and internal leads for lighting junction boxes are connected through terminal strips.

Lighting fixtures are weather-proof, anti-corrosion and shock-resistant type and are such mounted that they are easily to be repaired.

1. Walkway lighting:

Lights for stairs, ladders, platforms and walkways can be controlled at ground level and/or from the cab. Illumination is average 20Lux.

2. Lighting in Machinery house and electric room:

Lights specially used in the engine room on a ship are mounted in the machinery house and electric room, their illumination is 100 lux. Lighting is also provided in the control panel for maintenance.

3. Anti-condensation heaters:

Anti-condensation heaters are provided in the generator and main motor control panels and are fed from shore power under non-operation condition.

4. Lighting in the operator's cab and LED floodlight:

Illumination in the operator's cabin 100 Lux. Outdoor and fully enclosed LED floodlights are provided outside the cab and both side girders. The LED floodlight must provide satisfactory illumination greater than 60 Lux in fogged weather. The LED floodlight can illuminate the crane projection plane and ensure illumination of not less than 250Lux at the area under the trolley.

5. Gantry access walkway lighting:

Four outdoor fully enclosed LED floodlights are installed at the four gantry legs, to provide illumination on the gantry walkway not less than 50 Lux.

S38. Power outlet sockets

The following power outlet receptacles are provided. The power on/ off switches are provided with overload and short-circuit protections.

1. Watertight sockets AC230V, 16A are provided in the following locations:
 - a. One set on the trolley frame.
 - b. Each of under sill beam has one socket.
2. Power sockets including one AC230V, 16A are provided at the following locations:
 - a. Two sets in the electric room.
 - b. Two sockets of 230V and 16A in the operator's cab
 - c. One socket of 12V / 5A in the operator's cab.
 - d. Two socket of 24V / 5A in the operator's cab.
3. One outdoor watertight socket 400V, 32A, 3-phase/ 4-wire with earth located at sill beam of electric room underneath side.

S39. Painting Specification

Specification for Coating Procedure and Painting and Çot-Dip Galvanization

The seller would follow the specification seriously and accept the inspection from the purchaser as well as supervision of painting supplier at the same time. The buyer agrees to the specification and should not raise any new requirements. If the buyer raises any new requirements, the buyer should absorb the additional cost and also extend the delivery accordingly. Seller should use paint agreed by Buyer.

39.1. General

39.1.1 The specification is edited for painting protection of container crane steel structure by with the following features:

39.1.1.1 The container crane at port of sea or rivers, under salt and moist environment, the coat protection guarantee is 10 years. The paint guarantee is 10 years means that the rust rate would not exceed Re3 of European Rust Grade within this period (except for mechanical damaged or others by external cause).

39.1.1.2 In painting construction, the pretreatment (for steel material) and re-treatment (for shaped structure) will be carried out strictly. In consideration of environmental protection and worker's health, manual polishing instead of blasting will

be assumed to the welding burning loss or mechanical scratch for re-treatment in three situations below.

1. Affined parts such as interior surface of structure box.
2. The stressed supporting member that welded to the main structure, such as brackets for ladder platforms.
3. Two components welded together that have been retreatment.

39.1.1.3 Assure the primer is rich zinc primer with high volume zinc (organic style and inorganic style, not recommended the latter), and the primer must have excellent adhesion to steel surface and anti-rust performance. If apply inorganic rich zinc primer, the dry film thickness can only be 25~30 microns after heating and drying in pretreatment (otherwise, it will adhere to the supporters), only after steel structure completed, the surface will be touch-up organic rich zinc with 40~50 microns (inorganic zinc cannot cover itself again). We should appoint out that only use organic rich zinc to touch-up when inorganic rich zinc coat is damaged by welding and fire or mechanical scraped.

39.1.1.4 As inorganic rich zinc primer construction is more complex, (it is strict with temperature, humidity, thickness), if not specially need, the seller will apply organic rich zinc primer (epoxy rich zinc primer), if the purchaser requires to use inorganic rich zinc primer in design verifying or other later periods, then the cost should rise.

39.1.1.5 Assure there is excellent adhesion between primer and mid-coat, the mid-coat film is compact and good protection to primer coat.

39.1.1.6 The finish coat uses aliphatic polyurethane, which has the performance of good adhesion, hard and flexible film, good gloss, excellent durability to exterior exposure, long term resistance to severe variations of marine climate and corrosion of salt mist in the atmosphere. It has excellent anti-corrosion capability to bad condition such as, acid, alkali, and salt etc. The finish coat has good multiple physical performances in both protection and decoration.

39.1.1.7 Assure the total dry film thickness of outer surface is not less than 210 microns in international normal 10 years coat protection (average 230 microns).

39.1.2 The scope of this specification covers surface preparation, painting system and paint application (including touch-up) as well as inspection of every steps etc.



39.1.3 All of exposed steel surfaces shall be painted. Air-tight interior surface may not be painted. Exposed interior surface may apply organic rich zinc primer with 45-60 microns (or apply inorganic rich zinc primer with 25~30 microns and then apply epoxy rich zinc primer with 30 microns), in special situation, apply mid-coat not less than 80 microns on the primer coat.

39.1.4 Painting of standard mechanical and electronic components (reduce box, brake, electrical box, lift, spreader and etc.)

39.1.4.1 Otherwise specified, color of the mechanical and electrical components improved from the sub-contractor specified by the buyer will be the traditional color. The painting of imported components should have excellent pre-treatment (manual or mechanical or chemical method) and high-zinc primer and polyurethane finish paint (this clause should also be included in the imported components contract, otherwise supplier should explain).

39.1.4.2 Standard mechanical and electronic components (except for the following area accepted by the buyer: stainless-steel components or other corrosion-resistance standard parts which needs grease on surface) should be painted according to the specification. The color of finish coat should match the color of the crane. If the end user has any comments, then it should be discussed with the Seller. The minimum painting thickness of the components installed inside the machinery house and driver's cab should be 150 microns.

39.1.5 The color of primer and mid-coat shall comply with paint supplier, the finish coat shall comply with the owner's demands.

39.2. Steel Pre-Treatment (Sand Blasting)

The pretreatment refers to steel including steel plate and steel section.

39.2.1 Both sides of steel plate with thickness about 4mm shall be prepared by mechanical method, such as sand blasting and grinding (except for galvanized steel plate, mesh plate and pattern plate, which have been retreatment). The cleanness of mechanical preparation shall be according to Sweden industry standard Sa 2 1/2 grade (or the same grade of SSPC-SPIO) the roughness profile equal to 1-3 mils.

39.2.2 It is no needs pretreatment that which has been prepared and painted as commercial products of mesh plate and pattern plate. If it is necessary that can be repainted on the surface.

39.2.3 Only dry abrasive material will be allowed. Mechanical preparation grit shall be steel shot, steel grit, Gradee Flint, Crystal Sillica, Green Diamond or a synthetic media equal to the preceding. The compressed air supply used for mechanical preparation shall be free of detrimental amounts of water and oil. The compressor manufacturer shall install the separators and traps.

39.2.4 After mechanical disposal, rich zinc primer (organic or inorganic, the latter one is not recommended) should be painted on the surface to protect the substrate. Any rust or other dirtied should be got rid of in prior

39.2.5 No acid washes or other cleaning solutions or solvents shall be used on the surfaces after mechanical preparation (blasting). This includes any inhibitive washes intended to prevent rusting.

39.2.6 The Seller will put shop primer and protect primer in one, it means after surface pretreatment, apply rich zinc primer. If use organic zinc primer (normal is two components epoxy rich zinc), the dry film thickness is not less than 45~50 microns; the dry film thickness of inorganic rich zinc primer is not less than 25~30 microns (this is determined by curing characteristic of inorganic rich primer and special drying technology must be used during pretreatment.).

39.2.7 Without any technical methods, pretreatment will not be permitted when steel surfaces are less than 3°C above the dew point.

39.3. The second treatment steel structure (for welded steel structure)

The attention of second preparation is that remove the damaged areas caused by welding and mechanical scraped. The second preparation can carry out with sand blasting method in blasting room, or in manual method and power tools in manufacture shop with satisfied environmental protection.

For the outer surface of general crane box-shape structure, the second treatment may be carried out by sand blasting in special sand blasting shop; while, for the inner surface of box shape structure, it could be carried out by manual tool instead of sand blasting because of its condition.

39.3.1. Treatment structure - All welding spatters must be removed. All sharp edges must be removed or rounded off by machine tools, so that the painting adherent is

guaranteed. For large structure, outer surface may be cleaned in mechanical method (re-blasting) for damaged areas primer coat or rust areas caused by welding, cutting, fire or mechanical scraping, and be ground to St3 grade. For areas with good primer, oil and grease will be cleaned, while grinding is not necessary. Clean existing zinc salt. For inner surface, it will be treated manually and paint will be touched up.

39.3.2. After the damaged primer coat mechanical grinding, touch up primer according to 39.4.1.1 item.

39.3.3. For the assembled structure of large components, before assembling, every component (the attachment welding on it as soon as possible) will be re-blasting. But after welding, course of the size is too large, so the damaged areas only be prepared by hand tools (for example wind power tools), it cannot be re-blasting all over.

39.4. Paint Application and Coat System

39.4.1. Structure external surface

39.4.1.1 Primer application

39.4.1.1.1 After steel plate mechanical treatment (sand blasting), should apply rich zinc primer immediately, the primer dry film thickness is determined by paint characteristics. If the primer is inorganic zinc primer, the dry film thickness is 25~30 microns; if the primer is organic zinc primer, the dry film thickness is 45~50microns.

39.4.1.1.2 After second treating with steel structure, touch up organic zinc primer in time, and assure primer coat thickness is not less than 45-50 microns. It must be pointed out that if the thickness of inorganic zinc primer is not enough, then only recoat with organic rich zinc (epoxy zinc) primer to according to specified thickness.

39.4.1.1.3 At first well stir the primer base uniformly, the pour the base and curing agent into clean container according designed weight ratio and well stir, then adjust the working viscosity with compounding thinner, of which the percentage shall be 0-5% normally, and remove the foreign matter with filter. It can be used after maturing for 20-30 minutes. The mixture shall be used up after curing.

39.4.1.1.4 The primer touch dry time normal is 2 hours/ 20°C (according to paint style), and completely dry during 7 days/20°C. Only the surface is dry can apply next coat, that means mid-coat can apply minimum time is 2 hours, this view should pay more attention to touch up coat.

39.4.1.2 Mid-Coat and Top-Coat Application

39.4.1.2.1 Before apply mid-coat and top-coat, should check if there are damaged areas, holidays, sags, peel etc. on the last coat, and take measures accordingly.

39.4.1.2.2 All of the surface shall be airless spray or rolling except cannot access surface can be brushed.

39.4.1.2.3 All painting facilities and tools must be good working conditions, begin with application, the tubes and pots should be clean.

39.4.1.2.4 The compressed air apply to painting facilities must filtered by separator, the separator can successively separate the water and oil in the air.

39.4.1.2.5 The surface must be clean with no stains before airless spray, when the last coat is thoroughly curing, the next coat can apply, and the interval is same as primer coat.

39.4.1.2.6 The nozzle of the painting gun should vertical to the surface, keep span of 150mm~300mm. The tracks of nozzle are very parallel; arch tracks are not permitted. The process of painting is successive.

39.4.1.2.7 The paint mist from the nozzle is adjusted to proper state. The next step should cover 10%-20% of the last step.

39.4.1.2.8 Thickness of Coat Dry Film

Inorganic zinc primer coat system is used for external surface of exposed structures

Coat	Product	Dry Film Thickness (microns)
<i>Primer</i>	<i>Inorganic rich zinc primer</i>	<i>25 – 30µm</i>
<i>Primer</i>	<i>Organic rich zinc primer</i>	<i>40µm</i>
<i>Mid-coat</i>	<i>High build epoxy</i>	<i>90 – 120µm</i>
<i>Top-coat</i>	<i>Aliphatic polyurethane</i>	<i>60µm</i>
Total		More than 210µm

Organic zinc primer coat system is used for external surface of exposed structures



Coat	Product	Dry Film Thickness (microns)
Primer	Organic rich zinc primer	45 ~ 50µm
Mid-coat	High build epoxy	90 ~ 120µm
Top-coat	Aliphatic polyurethane	60µm
Total		More than 210µm

Note:

1. Because inorganic rich zinc primer coat dft for one application cannot more than 30µm and cannot recoat with inorganic zinc primer, there are two steps to apply primer during preparation and the second treatment step.
2. If add the external surface inorganic rich zinc film thickness, the original film will be removed completely, and then apply inorganic rich zinc primer one time with 60-70 microns.

39.4.2 Internal Surface of Box Structures

In general, there are two coats (primer and mid-coat). The sand blast cannot be performed during second treatment when the structures are formed. Only partial treatment manually or with mechanical tools is permitted. As for the long round tube structures with diameters less than 1.5m, the sand blasting and painting cannot be performed owing to the limited conditions. Therefore, Overall seal is applied.

39.4.2.1 Primer application for secondary treatment of internal surfaces.

39.4.2.1.1 Painting in exposed interior, cause of space, only rolling and brushing.

39.4.2.1.2 The primer and mid-coat application according to item 39.4.1.1 and 39.4.2.2.1.

39.4.2.2 Coat system for internal surfaces of box structures.

Coat	Product	Dry Film Thickness (microns)
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<i>Primer</i>	<i>Rich zinc primer</i>	<i>50µm (organic) or 25 ~30µm (inorganic) + 30µm (organic)</i>
<i>Mid-coat</i>	<i>High build epoxy</i>	<i>Not less than 80µm</i>
Total		130µm

39.4.2.2.1 Mid-coat application

39.4.2.2.1.1 Before application mid-coat, check out if there are damages, holidays, sags etc., and then handle it.

39.4.2.2.1.2 Take some stripe to not easily access areas.

39.4.2.2.1.3 At some narrow place brush and rolling application can be used.

39.4.2.2.1.4 The surface must be clean without stains before applying paint, when the last coat is thoroughly cured, the next coat can be applied. (comply with painting interval)

39.4.2.2.1.5 Assure mid-coat dry film thickness is 80 microns. (Refer to following coat system)

39.4.3 Air-tight sealed structure internal surface

It is permitted that no primer on internal surfaces of airtight sealed structures. If needed, one primer with dry film of 30 microns (inorganic zinc) - 50 microns (organic) can be applied.

39.5. Hot Dipped zinc coat Surface

39.5.1. Scope of hot dipped zinc. Only light and easy disassembled exposed components (e.g. ladders, handrails, lattice plates) can be hot dipped zinc, since they are easily worn by footsteps, the normal paint can't provide the protection. All of the load bearing components (e.g. horn lugs), over-sized components which cannot be put in the hot dipped zinc pool and components which can be anti-rusted by painting (e.g. manhole covers and pattern plates on the walkway, etc.) should not be hot dipped zinc. If some components are required to be hot dipped zinc by the Buyer, which is not

included in this Painting Specifications, it should be discussed between both parties.

39.5.2. Quality Standard of hot dipped zinc components should be as per ASTM A-123-89a and ASTM A 153-82. If partial damages occur on the surfaces of the hot dipped zinc components, hot spray zinc must be used for mending.

39.5.3. Surface treatment after hot dipped zinc.

39.5.3.1 Usually, the surface hot dipped zinc steps, lattice plates etc. which will be worn are not retreated (e.g. painting). For the sake of color and luster, the handrails can be painted per following painting process after mutual agreement of both parties.

39.5.3.2 Detergent is used to remove the oil and grease on the galvanized components. Then fresh water is used to remove detergent, salt or other dirt. Sand paper should be used if rust appears.

39.5.3.3 Hot dipped zinc surface coating system (the point is firstly apply one phosphoric primer)

Coat	Product	Dry Film Thickness (microns)
<i>Primer</i>	<i>Phosphoric primer</i>	<i>5 ~10 μm</i>
<i>Mid-coat</i>	<i>High build epoxy</i>	<i>30 ~ 40 μm</i>
<i>Top-coat</i>	<i>Aliphatic polyurethane</i>	<i>30 μm</i>
Total		Not less than 65μm

39.6. Touching up surface

39.6.1 Surface Preparation

Remove surface oil and loose coat. The damaged areas by machinery, welding or fire shall be ground with mechanical tools cleaning to minimum St3, and keep some slope, then touch up step by step according to coat system.

39.6.2 Coat system

Comply with specifications (refer to section 39.4.1 and 39. 4.2)

39.7. Environment condition of paint application



39.7.1. Air humidity

Temperature of substrate must be at least 3°C above the dew point and relative humidity less than 85%. (Relative humidity is 95% to some particular paint style).

39.7.2. Environment temperature

Normally application temperature is between 5°C ~ 35°C (some particular paint is 0°C ~ 45°C), steel surface temperature is controlled between -10°C ~ 50°C.

39.7.3. Ventilation and lighting

Assure good ventilation and lighting at application space. In particular at box interior, to ventilate so as to prevent flammable gas meeting flash from explosion.

39.7.4. Dust

Avoid application in dust environment. Before apply any coat, should check if there is dust in the surface, dust can remove by vacuum or compressed air, only free no dust surface can be coated.

39.7.5. Strong Wind

Avoid airless spray in strong wind (it is easy to waste or spray other component).

39.8. Application safety

39.8.1 Paint worker should take some precautions according to labor protection rules while applying paint, particularly at box interior must force to ventilate preventing poison and explosion.

39.8.2 No permitting spray gun place at person or body while application.

39.8.3 Read safety caution on the label before applying any coat. Otherwise should refer to "materials safety data sheet" and obey national or local government safety legal.

39.8.4 Avoid absorbing solvent gas or paint mist, skin or eyes cannot touch paint, apply paint under good ventilation condition.

39.8.5 Tie up safety rope at the high attitude.

39.8.6 Paint container should tie up at proper place at high attitude, so as to avoid container down or dropping.

39.8.7 Obey law of environment protection of local government while painting (recoating and touch-up) at the dock of buyer, avoid paint drop into water area and land area so as to protect environment.

39.9. Quality inspection

As follows requirement should record and submit reports:

39.9.1 Paint quality check

39.9.1.1 Checks that if supplied paint quality comply with contract.

39.9.1.2 Suspected paint checked by eyes, should notify the supplier to take back or submit the third to check. Inhibit use before conclusion given.

39.9.1.3 Record every group of paint standard sample.

39.9.2 Appearance check (Coat surface)

Should be free of holiday, sagging, brush print, pinhole, orange or cracking and dry spray etc. Topcoat finish should comply with the required color.

39.9.3 Film thickness control

39.9.3.1 Wet film thickness control: Wet film thickness should be controlled while application is in progress so as to obtain a correct dry film thickness.

39.9.3.2 Dry film thickness control: Measurement should be according to SSPC- PA 2.90% of the measurements should reach the specified DFT.

39.9.4 Environment check

39.9.4.1 Tests environment temperature and humidity (normally one time per 2 hours) with instrument, application only carry out under specified condition.

39.9.4.2 Paint application circumstance must be clean, free no dust and oil, the coated surface is clean.

39.9.4.3 Timely check application place particularly box interior ventilation and lighting.

39.9.5 Coat adhesion test

39.9.5.1 After primer and mid-coat and finish coat has finished and thoroughly cured, tests coat system adhesion so as to test adhesion force between coats and steel substrate.

39.9.5.2 Use Elcometer 106 style Punch to test adhesion, all of the test data should more than 300psi. The Punch should pull of coats, if no coat pull off, the test fails, should try once again.

39.9.5.3 Selects Max. 5 representative points to test adhesion on crane, and



records data on report.

39.9.5.4 The damaged area caused by testing adhesion shall ground to St 3 grade, and then touch up step by step by coat system, the repaired surface should have same appearance as other undamaged surface.

39.10. The painting and hot dip galvanize procedure and specification is standard while conflicting with other documents. Acceptable painting expert and authority organization of both sides should arbitrate any interpretations between both sides.

S40. Auto Steering and Position Detecting Systems

Automatic gantry guidance system shall be provided. The system shall eliminate the need for the operator to steer the machine: however the system shall allow the operator to "take over" the controls as he may require. The system shall require no ground civil works and shall guarantee a maximum ± 100 mm deviation from the runway axis with automatic shutdown occurring at predetermined distance from the runway axis.

The position detecting system shall be provided. The system shall be capable of detecting gantry, trolley and spreader positions (Block, Bay, Row and Tier) through encoders and GPS accurately in order to support the container location information delivered to the buyer's yard management system (CATOS). The Seller shall provide all hardware and software of detecting system to ensure all data can be delivered to Buyer's VMT device and all data able communication effectively. It shall also be able to interface the yard management system.

Integration with Terminal Operation System shall be provided including re-programming and testing in the event that Buyer's TOS is changed/remains to any of the systems (Catos or Navis), within a period of 2 years after Equipment's hand over

The Seller must secure that each ETRG is able to detect sufficient number of satellites at all times in order to secure the smooth operation of the Automatic gantry guidance system. In case not enough satellites are visible from the ETRGs, then the Seller must provide an adequate solution so that sufficient numbers of satellites are available.

Proposed auto steering and position detecting systems must have been in commercial use for at least ten (10) years and the contractor shall name minimum twenty (20)



different RTG-operated container terminals where the system is working in similar use with RTGs.

S41. Spreader

Spreader general

The telescopic spreader shall be designed to meet the heavy demands of the container handling industry. All motions of the spreader including telescopic movement and twistlocks movement shall be fully electrical, and controlled from the operator's cabin.

The spreader shall be designed to handle the rated load for ISO 20ft, 40ft and 45ft containers.

All motions of the spreader shall be electrically actuated. Hydraulic spreaders shall not be accepted.

Spreader frame

The structural frame shall be designed and constructed to have adequate safety factors to prevent premature fatigue failure within 1 million load cycles.

Spreader Twist Lock

1. The twist lock shape shall fit ISO corner fittings.
2. The spreader is provided with limit switches for detection of unlocking, locking and landing as well as 20'/40'/45ft position detection.
3. Twist locks shall be floating type and fitted with sleeve type twist lock guides. A grease nipple shall be fitted at a suitable position on the sleeve and the twist lock shank. Spherical washer shall be provided to support twist lock loads.
4. Twist lock movement from 'unlock' position to 'lock' position shall be prohibited by mechanical and electrical interlock unless four twist locks are confirmed to be fully inserted into corner fittings and the spreader is fully landed on to a container.
5. Main hoist motion is to be prohibited unless physical positions of all of the twist locks match the 'lock' or 'unlock' command switch position on the control console. A method of direct twist lock sensing is preferred.

Spreader flipper

1. The flippers shall be provided at four corners of spreader.



2. The flippers of the RTG spreader are fixed type

Spreader telescoping

1. Telescoping guide shoes shall be designed to allow easy and quick access and simple adjustment.
2. The guide shoes must be able to be replaced without dismantling telescopic beams from the main frame.
3. The operating time for extension or retraction shall be less than 32 sec. for 20' - 45ft.

Spreader plunger

1. The plunger shall positively detect the landing of the spreader on a container or on a hatch cover which are handled by twist locks.
2. The hole for the plunger on the bottom plate of twist lock box and the tip of the plunger shall be chamfered to a minimum of 4mm in radius. To prevent jamming of the probe due to mushrooming of hole edge and the top of the pin.
3. Limit switch shall sense the plunger position, which shall be located to accurately indicate spreader landed and container lifted conditions.

Spreader lifting lugs

1. Lifting lugs for handling a damaged container or an odd shaped cargo with slings and shackles shall be fitted at four corners near each twist lock (each lugs with not less than 10 tones on a spreader).
2. The rated load of the spreader is 40t. The capacity shall be clearly indicated by painting near each lug.

Spreader protection

1. All mechanical and electrical components fitted on the spreader shall be protected from frequent impact and vibration of operation.
2. All the electrical cables connected to the moving parts of the spreader shall be properly protected from damage due to interference.
3. All the electrical parts shall be protected from the weather.

S42. Fire Extinguisher

At least 5 fire extinguishers shall be provided in the following locations:

- One set in operator's cabin
- One set on trolley platform
- One set on in electrical room
- Two sets at ground level (under both sill beam)

S43. Load sign and Nameplates

Nameplate of the crane manufacturer and the Customer's logo are provided on both outsides of the crane trolley girder. The crane nameplate bearing principal parameters of the crane is mounted in a prominent place in the operator's cab. All these signs, plates, logos are subject to the customer's approval.

Identification labels showing operation directions and functions are provided at each operation handle and push button.

Signal lamps, indicators and instruments are provided with signs showing their indication. The form and material of the sign of SWL (Safety Working Load) and the Logo of the Port are subject to approval of the Customer. All the signs, nameplates and logo are written in English.

S44 Hydraulic system (if necessary)

1. The hydraulic components such as pumps, various control valves, filters, etc. will be imported from Vickers, Parker or Atos. They have excellent performance and high reliability.
2. Hydraulic seamless steel tubes are used for rigid structure. Hydraulic hoses are used for those places where flexible connection is required and on the spreader. Cleanliness of the hydraulic piping system is ensured by using up-to-date cleaning procedure and the hydraulic detector supplied by Parker Company.
3. The oil reservoir will be of high quality and is possible to be cleaned and inspected to ensure cleanliness of the oil during operation. Oil filter is used on the return line with the element easily replaceable.
4. All the hydraulic pipes and hoses are supported at certain intervals through clamps

attached to the crane structure for minimizing vibration and noise level. Hydraulic valves and pipes are rust-protected and provided with anti-loosening measures.

5. A clear oil level sight glass is provided at a suitable place on the reservoir that in turn has drainage for water condensation (drained periodically by maintenance staff), reliable strainer, oil temperature indicator etc.
6. Interchange of the hydraulic valves is ensured since all hydraulic valves adopted by world famous hydraulic companies are made in accordance with ISO standard no matter which company is selected.
7. Pressure inspection points are provided in the piping which can automatically be closed. Threaded fittings are sealed by thread sealing glue and are provided with sufficient space for tightening the fittings and unscrewing them.

S45. Testing, Commissioning and Acceptance

45.1 Various tests (including specifically the insulation test for each electric motor and transformer, appearance inspection, high-tension insulation tests and crane performance Tests) of the crane specified in the tender documents will be conducted at the contractor's terminal under the supervision of buyer's representatives before shipment. The crane will be delivered to the buyer's terminal as fully erected, after buyer's representatives were satisfied with the test performed in Seller's site. In 3 months before shipment Seller will:

1. Notify predicted ship schedule and relevant matters;
2. Provide shipment and erection procedure of the crane and request buyer's cooperation;
3. Provide Test program and detailed field test and test record forms.

45.2 The following data will be submitted before field testing and commissioning:

1. Test reports and qualification certificates of various materials used for the crane;
2. Test reports and qualification certificates of purchased mechanical and electrical equipment;
3. Test reports and qualification certificates of main load bearing elements such as twistlocks, high-strength bolts, wire rope fittings etc.;
4. Qualification certificates of welds;
5. Qualification reports of assembly quality;



6. Painting qualification certificates.

45.3 Appearance inspection

Visual inspection includes conformity of the following items with the technical specifications and provisions. These items are: every main crane movement mechanism electrical equipment safety devices, brakes, control valves, lighting and inter-communication system;

Structural members and connections, stairs and ladders, walkways, operator's cab and platforms;

All the protection devices;

Container spreader, fittings and connections;

Wire rope and its fittings for secure;

Sheave block shafts and fasteners, connection plate system and rail;

Visual inspection also includes if all necessary certificates have been submitted and reviewed;

Crane visual inspection may be accepted if the following attached:

1. Correct installation position and complete with all necessary parts;
2. Structure without any deflection and/or damage;
3. Painting meets specifications requirement with uniform color and acceptable durability;
4. Secure installation of all devices and standardization;
5. Piping arranged neatly;
6. Without any external oil leakage;
7. All identification marks are clearly visible.

45.4 High-tension insulation test

The buyer's electrical Power Administration Department will perform high-tension insulation tests. This should be arranged by the buyer before the cranes arrive at buyer's site. And it should be executed by the buyer immediately after the cranes arrive at buyer's site.

45.5 Crane performance Tests

45.5.1 Static load test and dynamic load test

The purpose of static load test is to examine the load bearing capability of the crane and its structural members and components.

The test is considered successful if the test result shows that there is not any crack, permanent deformation, painting peeling off and/or any damage that affect the crane performance and safety, not any loosening or damage at joints and connection is found after test.

- a. Static load Test: The trolley is positioned in the middle of the trolley girder and the crane is tested with 140% static load. Firstly, 120% load is dynamically lifted and, then, the load is gradually added up to 140% without any shock. During testing, observe deflection of the girder. There should not be residual deformation. Before static load test, deflection of the girder is verified to be within $L/800$ under 100% dynamic load.
- b. Dynamic load test: The crane is tested with 120% dynamic load (the overload limit switch is by-passed). The hoisting and trolley motions should be normal under this test. With the overload limit switch connected, the crane is to be tested with dynamic load of 100%, 105% and greater than 110% rated load to verify the activation, reliability and effectiveness of the overload limit switch.

45.6 Crane durable operation test (acceptance test)

8 hour durable test:

Set up a test yard 30m from the transverse travel of crane. Set a semi-trailer carrying a fully loaded container (L=40' H=8'6"); set 2 containers (L=40' H=9'6") each in Row 1, Row 2, Row 3 and Row 4. Lift the container from the trailer and pass it over Rows 1 - 3 and pile it onto the containers in Row 4; followed by lifting the same container back to the trailer, aligning it with the trailer and settling it, disengaging the lock and lifting the Spreader, passing the Spreader over Row 1 and aligning it onto the container in Row 3; immediately after this, lift the Spreader and move it back onto the container on the trailer and lock it up. This completes an operation cycle. Repeat 10 operation cycles and move the gantry once, i.e., travel it a 30M length and move it back to the original location. Every 2 hours or so, combining with the movement after 10 operation cycles, steering of the running wheels is performed by moving the gantry to the transfer drive and turning the wheels 90 ; then move the gantry 6M in the new direction and move it back to the containers, and then carry on with the operation cycles again. When performing the cycles, all movements shall



be performed at maximum speed. During the 8-hour continuous cycling, failures caused by defects in the crane as well as in the Spreader shall be accounted. The test is deemed a failure if the down time exceeds 30 minutes or the failure count exceeds 3 times; the Contractor shall then re-arrange an operation test.

Prior to the operation test, the Contractor shall return all movement mechanisms to their normal conditions; during the operation test, no temporary program override or bypass is allowed for resetting the equipment. In case of any such incidents, the Employer is entitled to request a re-arranged operation test.

45.7 Acceptance report

After the above stated tests have all been successfully completed an acceptance report will be prepared and the tests results and conclusion will be listed.

The report will show the tested crane performance, test date, test place and the witness (es)' name.

The report will be prepared by Seller and the buyer's representatives.

Before the acceptances report is prepared, it is the Seller's responsibility for safe-keeping the cranes.

Any defect occur during the testing in buyer's site should be repaired by the Sellers at its own cost, unless it is found to be the fault of buyer.

Acceptance

The acceptance is divided into two stages: Ex-works Acceptance (carried out in Seller's facilities before loading the cranes onto the ship), and Site Acceptance (carried out at the Buyer's terminal).

1. The acceptance of the cranes is performed per the quality standards and technical specifications stipulated in this document. Site acceptance will be carried out per the Test Program agreed by both parties and as stipulated in this document.
2. The entire process of acceptance shall be closely related to the contract signing, and design reviewing, etc. The Buyer shall send his representative(s) to participate in the entire process, especially the Ex-works Acceptance carried out on Seller's factory before loading the cranes onto the ship.

Test Program for Acceptance



The Seller will furnish Test Program for Acceptance to the Buyer eight weeks prior to Site Acceptance. The first draft of test program will be the documents used in former similar projects, which are proven to be practical, scientific and feasible. The Buyer can raise comments for amending, and after negotiation between both parties, the final Test Procedure for Acceptance will be formed. Following points are agreed by both parties:

Time spent on continuous operation on crane without failures will be between eight (8) hours.

1. In regard to any kind of reliability test, failures which can be resolved within five minutes should not be added into break down time.
2. In regard to over load test, static load should be 140% of rated load, and dynamic load should be 120% of rated load.
3. Full-load free drop emergency stops test cannot be carried for main hoist high speed brake. It may reduce the service life. The buyer can witness the test on testing desk of Seller if it is required by the Buyer.

In regard to new requirements exceeding above basic principle, the Buyer should discuss with Seller to resolve. Otherwise it is regarded as accepted by the Buyer.

Ex-works Acceptance

The Ex-works Acceptance will be carried out on Seller's factory after crane erection and commissioning. Seller will give notice eight weeks in advance for such acceptance. The Buyer or the representative(s) will be invited to participate in the Ex-works Acceptance.

The Buyer shall send his representative(s) to participate in the Ex-works Acceptance. The Ex-works Acceptance will focus on:

1. Geometric parameters, static and empty load operation parameters, crane empty load test (or full load test according to the possibility),
2. Technical performance parameters,
3. Appearance quality,
4. Noises, vibration and stability of light load operation,
5. Special requirements raised by the Buyer.

Seller will provide the representative(s) of the Buyer with the acceptance program and all facilities (including the supervision tools, etc.) required by the Ex-works Acceptance and the



Site Acceptance.

The Buyer shall present a Punch-List according to the specifications stipulated in this document at the time of Ex-works Acceptance to allow Seller to solve the Punch-List items one week before shipment departure date. For any Punch-List items which has been modifies per the Buyer's comments and accepted by the Buyer's representative(s) before loading the cranes onto the ship, the Buyer shall not ask for new modification after the cranes arriving at the Buyer's terminal.

Site Acceptance

The Seller shall be responsible for the commissioning and test runs carried out on the equipment. The official test consists of function test, durability test and load test. The test runs program shall be in accordance with the Acceptance Test program. The Seller shall be responsible to provide all testing and make the arrangements for carrying out the test runs.

Upon arrival of the cranes at the Buyer's terminal, Seller will restore the areas affected by sea transportation. Site acceptance will be done per the acceptance program stipulated in this document after the cranes are powered. Apart from the dynamic data and the parameters when fully loaded to be inspected, other static specifications which have been inspected in Ex-works Acceptance will not be re-inspected. If need be, the inspection will be carried out after Site Acceptance (not influencing the Site Acceptance).

Site Acceptance should be carried out per the Test Program as agreed by both parties (defined in this document). The site acceptance will focus on the conformity of the cranes in technical performance parameters to the specifications. After succeeding in the tests listed in Test Program, the Acceptance Certificate should be provided by the Buyer and the liquidated damages of the late delivery should be stopped (if it exists).

During the acceptance, minor Punch-List items which will not influence the operation of the cranes are allowed. Seller is responsible to solve the remained items as soon as possible during the stipulated period (the period shall be discussed and agreed by two parties).

When the equipment has met all the requirements stipulated in this specification and is fit for operation, the Seller shall issue a Certificate of Fitness to the Buyer. Upon receipt of the Certificate of Fitness, the Buyer shall appoint Buyer's representative(s), and the representative(s) shall join the acceptance tests, for which the Seller shall be further responsible to carry out. The acceptance test shall be carried out not later than seven (7) days after the date the Certificate of Fitness is received by the Buyer. The Acceptance report has to be signed by Buyer and Seller together. In case that the Buyer's



representative(s) should unreasonably withhold his attendance and witness at the Acceptance Test (test runs), the Acceptance Test shall be carried out by the Seller himself, and the test results and records shall be accepted by the Buyer as if the Buyer had attended. Buyer reserve the right to reject the Acceptance if the test result is not up to the agreed standard and standard requirement as stated in this document. Once the Acceptance report is accepted and signed by both parties, the Equipment is deemed to be accepted (“Acceptance”).

The Seller shall provide all necessary instruments, which should be mutually agreed upon by both parties, and all supplies like lubricants oils, etc. for tests.

During the test, should one or several items fail in meeting the stipulated requirements, the Seller shall take necessary measures for the second time tests and bear the costs incurred therefrom.

The Seller shall submit to Buyer three (3) copies of all testing reports, technical documents together with complete sets of testing items, results and condition of the equipment in line with the requirements stipulated in this Technical Documentation.

It is agreed that, if a sudden unfavorable change in the weather should occur during the Acceptance Test, the Acceptance Test shall be discontinued and the date shall be postponed until the first favorable day next following. Any delay in the Acceptance Test caused by unfavorable weather conditions shall be understood to be a permissible delay.

S46. Supervision

The buyer's representatives or assigned special company's staffs are going to Seller's site for supervise the construction process. The seller shall provide (at Seller's own cost):

- Design drawings, working schedule, material technical description, test report, inspection certificates, inspection records, and quality control report;
- Installation process and drawings, inspection and test steps to be taken, documents related to tests;
- Installation and test records.
- The tools, facilities, working space and equipment for the buyer's representatives to perform the supervision.
- The travelling, meal and accommodations arrangement.



S47. After Sale Service

For the regular maintenance, the Vendor is obliged to provide in hard copy and CD the regular maintenance plan and a list of all required spare parts distributed in a time base according to working hours.

The Vendor is required to perform (free of charge for all equipment and services) the first (1st) initial maintenance and the next two (2) periodic maintenances that the official maintenance plan indicates. The lubricants will be provided by Buyer.

The following after sale service will be provided to the buyer by Seller:

1. Technical training

Technical training will be performed at the buyer's premises. Seller will at its own cost send an experienced electrical engineer, an experienced mechanical engineer as the trainers. The Seller is required to teach the maintenance team from the Buyer for the repairing and maintenance procedure.

The trainees will be the buyer's operation and maintenance staffs.

The Seller shall furnish 2 copies of comprehensive teaching material for each crane one month prior to training.

The technical training will be performed after delivery.

2. During first stage of crane normal operation (6 months) Seller will send at least two relevant technicians or engineers to the buyer's site for 24 hour service and to provide assistance to the buyer in crane operation and trouble-shooting (mainly electrical).
3. Provide the update drawings and relevant information for maintenance.
4. Spares parts required for changing and repairing will be furnished to the buyer site within ten (10) days.
5. Within guarantee period personnel will be assigned regularly to inspect the operation of the crane to eliminate potential problem.
6. During crane operation Seller will frequently send representatives to visit the buyers for comments to improve continuously the products.

S48. Stack Profiling System

1. The crane shall have a stack profile system with **two laser scanners** (preferable brand SICK) mounted on the trolley which continually measure and update the profile of the containers on the stack while tracking the position of the spreader (hoist and trolley) as it moves across the stack.
2. The system shall measure the container stack profile in real-time without shadow zone caused by laser beam block from spreader and its load, especially at the start when RTG enters a new container bay, a stack profiling at the maximum spreader height prior to the operation shall be avoided with respect to efficiency.
3. The system shall continuously compare the position of the spreader and its load against the stack. If necessary, the system shall introduce full-speed, slowdown and stop areas around the container stack to avoid collisions during operations. If the crane operator moves the spreader towards an obstacle in the trolley direction, the spreader shall stop and an alarm message shall be shown to the operator.
4. These slowdown areas shall only limit the hoist and trolley speeds only when a collision is expected therefore not affecting the productivity of the crane.
5. Aside from collision prevention in container stack, the system shall also measure the profile of chassis and realize container soft landing in hoist direction in truck lane.
6. The system shall provide a soft landing of the container at the maximum possible speed.
7. It shall be possible for authorized personnel to switch the system on and off through a toggle key switched located in the crane cabin.
8. System software shall be without any recurrent licensing fee. Maintenance software shall be provided without additional costs.
9. Alarm and stop messages shall be incorporated in the CMS and the display in the Operator's Cabin.

S49. Chassis Lift Prevention System

1. The crane shall be fitted with a system that can effectively prevent the accidental hoisting of a truck/chassis still connected to the lifted load.
2. The system shall be equipped with two cameras, which adopts image target detection to the chassis, and shall effectively detect all types of chassis/ trailer independently from the chassis/ truck height without the false alarm and perform an immediate fast stop to prevent lifting the chassis/ truck off the ground.



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3. The system shall be able to detect and prevent chassis/truck lifting not more than 40cm from the ground (measured by the distance from the highest point of truck tire to the ground).
4. The system shall be able to work with any possible combination of containers on a truck/chassis.
5. Alarm and stop messages shall be incorporated in the CMS and the display in the Operator's Cabin.
6. System software shall be without any recurrent licensing fee. Maintenance software shall be provided without additional costs.
7. The operator console shall have an ON/OFF switch and bypass switch.

S50. Equipment Main Configuration

Mechanical

No.	Item	Manufacture	Country of Origin	Remarks
1	Spreader	Bromma	Malaysia	
2	Gear reducers for main drive	SEW/ Flender	Germany	
3	High speed brakes for main drive	Pintsch Bubenzer	Germany	
4	Wire rope drums for main drive	Recommend by Seller		
5	Gantry brake	Pintsch Bubenzer		
6	Wire ropes	Vornbaumen/ Teufelberger	Germany/ Austria	
7	Coupling for wire drum and motor	Pintsch Bubenzer/ Malmedie	Germany/ Germany	Or Internationally famous brands
8	Bearings	FAG / SKF	Import product	
9	Tyre	Advance/ Yokohama	China/ Japan	
10	Operator cabin	Recommend by Seller		
11	Operator seat	Gamma	Germany	

12	Cable reel system	Weilong / Cavotec	China / Switzerland	
13	Festoon system	Weilong / Conductix wampfler	China / Germany	
14	Service crane	Demag	Germany	
15	Buffers	OLEM	United Kingdom	Or Internationally famous brands
16	Paints	KANSAI COSCO	China	

Electrical

No.	Item	Manufacture	Country of Origin	Remarks
1	Diesel engine	Volvo		
2	Generator	Stamford		
3	Electrical control and PLC system	Yaskawa/ Siemens	Japan/ Germany	
4	Main motors (MH,TT, GT)	Yaskawa/ Siemens	Japan/ Germany	
5	AC Drive system (Main Hoist, Trolley, Gantry, Gantry Cable reel)	Yaskawa/ Siemens	Japan/ Germany	
6	Control panel / console	Recommend by Seller		
7	Proximity Switch/ Limit Switch	IFM/ TURCK/ SCHMERSAL	Global	
8	Power cable	PRYSMAIN / TRATOS/ ARISTONCAVI	Germany / Italy/ Italy	
9	Anti-collision System	Banner	Germany	Model: Q120RA-EU-AF2WQ
10	Spreader cable	PRYSMAIN / TRATOS/ ARISTONCAVI	Germany / Italy/ Italy	
11	Cam switch	Stromag		



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12	Over-speed switch	Hubner Berlin	Germany	
13	Festoon cable	PRYSMAIN / TRATOS/ ARISTONCAVI	Germany / Italy/ Italy	
14	Main Joystick (MH/GT & Trolley)	Spohn + Burkhardt	Germany	
16	LED Floodlights	Jari / CLC/ Fuhung	China	
17	LED walkway / Machine room/ Electrical room/ operation cabin light	Jari / CLC/ Fuhung	China	
18	Telecom system	Nanhua	China	Or Internationally famous brands
19	LCMS / RCMS	Kawatoyo	China	
20	Air conditioner (operator cabin and Electrical room)	Toshiba/ Dakin	Japan/ Japan	Inverter type
21	Load cell	Brosa / Tesis/ Sensy	Germany/ Germany/ Belgium	
22	Stack Profiling System	Cathay Nebula	China	
23	Chassis Lift Prevention System	Cathay Nebula	China	

- ***The above table that the manufacture of each item is the first priority. All other items or configuration which are not in list above, shall maintain the same brand and specification with which installed on the user's existing crane, otherwise need approval from the user.***

S51. Spare Parts
Mechanical

No.	Items	Qty	Remarks
1	Spreader	1 unit	
2	Wire rope for Main Hoist	16 reels	Total For 4 unit cranes
3	Main Hoist gearbox	1 unit	
4	Main Hoist high speed coupling	1 set	
5	Main Hoist low speed coupling	1 set	
6	Main hoist rope sheave	4 pieces	
7	Trolley gearbox	1 unit	
8	Trolley high speed coupling	1 set	
9	Trolley low speed coupling	2 sets	
10	Trolley driver chain	4 pieces	
11	Trolley wheel with shaft	4 sets	
12	Gantry tire with rim	4 sets	
13	Gantry differential gearbox	2 sets	
14	Main Hoist high speed brake thruster	2 sets	
15	Main Hoist high speed brake pad	4 pieces	
16	Gantry brake	4 sets	
17	Gantry brake pad	4 pieces	

Electrical

No.	Items	Qty	Remarks
1	H.V. power cable	1 reel	Length: Gantry maximum travel plus cable reel connection
2	Spreader cable	2 reels	
3	Spreader power cable plug and socket	2 sets	
4	Main Hoist / Gantry joystick for crane operator cabin	2 sets	With encoder
5	Trolley joystick for crane operator cabin	2 sets	With encoder
6	Main Hoist motor	1 unit	With encoder
7	Trolley motor	1 unit	With brake and encoder
8	Gantry motor	2 units	With encoder
9	Motor with brake for Gantry cable reel	1 set	
10	Motor for slew system	1 set	With brake
11	Gantry wheel turning motor with brake	4 sets	
12	Main PLC	1 set	With memory card
13	I/O module	2 pieces	Each model
14	PLC digital input and output module	2 pieces	Each model
15	PLC analog input and output module	2 pieces	Each model
16	PLC expansion bus module	2 pieces	
17	Safe PLC module	2 pieces	
18	Inverter PG card	2 pieces	
19	Inverter communication card	2 pieces	
20	Inverter control card	2 pieces	
21	Inverter IGBT drive card	2 pieces	
22	Main Hoist Inverter	1 unit	Full set
23	Trolley Inverter	1 unit	Full set
24	Gantry Inverter	1 unit	If necessary
25	Fuse for converter and inverter	6 pieces	For each type
26	Gantry Cable Reel Inverter	1 unit	



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27	Motor power contactor	2 pieces	For each type
28	Anti- collision sensor	2 sets	
29	Overspeed switch	2 sets	
30	Loadcell	4 sets	
31	Operation seat	2 sets	
32	Control card for service crane	1 set	If necessary
33	Touch panel	1 set	For each model
34	Laser scanner for Stack Profiling System	2 sets	
35	Galaxy IPC-SP controller with software for SPS system	2 unit	
36	Camera for Chassis Lift Prevention System	4 pcs	
37	CLPS controller with software	2 unit	
38	Cooling Fan for inverter	2 pcs	For each model