

# *Technical Specification*

*for*

## ***ALL ELECTRIC AUTOMATIC TELESCOPIC SPREADER***

*for*

## ***Rail Mounted Gantry Cranes***

***(E-ATS-RMG)***

Tender No. : 24-2021

1. **General**  
The all-electric Automatic Telescopic Spreader (ATS) is intended for use on rail mounted gantry (RMG) cranes, in yard operation. The **ATS-RMG** shall be suitable for handling 20', 40' and also 45'/48' (Via 40' position pockets) ISO standard containers.
- Capacity requirements (SWL):
- 40 metric tons.
  - Eccentric load of 10% in the longitudinal and lateral directions.
- 1.1. **Scope of work**  
The following specifications together with the data sheets, list of mandatory items appendices and forms represent the requirements for the supply of the spreader: design, fabrication, testing, delivery and warranty.
- The contractor shall furnish all appliances and/or accessories that are necessary for the proper performance of the spreader, whether detailed or not in the drawings, called for in the specifications, or shown on the data sheet.
- 1.2. **Location of use**  
The spreaders will be used in container yards at Haifa port
- 1.3. **Climate and meteorology**  
The climate at the places of use is characterized by a typically Mediterranean sub-tropical climate. The mean annual temp. is 22°C, the coldest months are Jan. and Feb. (mean daily temperature of 16°C) and the warmest month is Aug. (mean daily temperature of 27°C).
- Relative humidity values are relatively constant throughout the years with monthly averages ranging from 57% to 69%.
- The structure, mechanical system, electrical equipment, hydraulic system, etc. shall be sized and designed to operate within temperature range of -10°C through +50°C and relative humidity of 85%.

2. **Main Operational and Technical demands**

2.1. **Operational features**

The spreader shall have the following features:

- Extend / retract automatic system to adjust its length to twist locks positions correlating to 20' and 40' ISO containers, for handling 20', 40' and also 45'/48' (Via 40' position pockets) ISO standard containers.
- Automatic twist locks operation for use with ISO standard containers.
- Fixed corner guides or Fixed flat guides (4 or more) .

2.2. **Extension and retraction**

Extending / retracting of the spreader, to 20', 40' positions, shall be controlled from the operator's cabin.

The maximum time to extend or retract shall be:

- 25 seconds for extending to 40' (from 20').
- 30 seconds for retracting from 40' (back to 20').

2.3. **Special features and equipment to be supplied with the spreader**

2.3.1. Shock absorbers for soft landing in order to protect the spreader from landing impacts as well as to minimize landing noise shall be preferred.

2.3.2. Height indication system in order to allow crane system to slowdown when reaching container. The system setting height shall be **around 5.5 m** under the twist locks (container detection height)

2.3.3. Twin 20' detection units to prevent accidents of locking & hoisting two 20' containers together when the spreader is in 40' position.

2.3.4. Working hours counter

2.3.5. Twist-locks movement counter

2.3.6. **Test Bench (TB)**

One unit of Test Bench shall be included in the scope of supply in order to perform workshop maintenance ,testing and checkups.

The TB shall include all necessary peripheral connections to spreader and power , cables, locking devise / possibility for the landing pins, etc...

Electrical cabling to connect the TB to power shall be at least 20m long , the Electrical cabling to connect the TB to the spreader shall be at least 10m long (equipped with adequate socket). Test Bench shall include indications of all the signals send by the spreader and also all the commands given by the crane (see signals table below)

2.4. **Twist Locks (TL)**

The twist locks shall be forged type in accordance with BS 5237 or equivalent.

**The twist locks assembly shall be of floating type .**

2.4.1. The locking and unlocking functions of the twist locks shall be controlled from the operator cabin and integrated with the crane control. In addition, the twist locks assembly shall be provided with the mechanical safety devices:

- preventing twist locks closing/opening unless the spreader is well seated on the container pockets.
- preventing twist locks opening if a container is hanging in the air.

2.4.2. Rotation of the twist locks shall last maximum two (2) seconds.

2.4.3. A solution should be provided for the easy and quick manual release/unlocking of the twist locks in case of electrical failure or when the spreader is stuck in the container

pockets (twisted or ruined pockets). Detailed drawing as well as written explanation of the system should be presented in the tender technical documents.

- 2.4.4. A solution should be provided for the easy manual release of each of the **4 landing pins** for maintenance/testing purpose in the shop. Detailed drawing showing the solution should be presented in the tender technical documents.

- 2.4.5. **Long lifetime of TL is preferred**, thus, the maintenance need to replace TL will be considered when evaluating the proposals. Advantage in score shall be given to manufacturer stating in the spreader periodical inspection that TL replacement is depending on results of inspection (non-destructive/visual) instead of mandatory replacement.

- 2.5. **Lifting lugs**  
4 lifting lug shall be placed, one on each corner of the main frame .additional 4 lifting lug shall be placed, one at each corner of the telescopic beams. The SWL for each lug shall be at least 10 ton. The SWL of each lug shall be permanently marked near each lug.

- 2.6. **Corner guides**  
Four fixed corner guides or fixed flat guides shall be provided on the spreader. The guides will be connected to the spreader by pins for easy replacement. (Equivalent solutions may be presented subject to HPCs approval). securing of the pins/bolts shall be via positive locking device of high reliability against loosening (yet allow easy replacement of guides).

- 2.7. **Wear pads**  
Wear pads made of hard abrasive resistance material shall be used between the sliding telescoping beams. The pads shall act also as shock absorption and noise reduction media. The pads shall be accessible for easy inspection and replacement.

- 2.8. **Information / Number Plate**  
Information plates showing the SWL of the spreader and other identification data, such as serial number and port number, shall be mounted on both sides of the spreader.

### 3. **Design Criteria**

#### 3.1. **General**

Unless otherwise mentioned the design, construction and equipment shall conform to the following regulations, standards and codes:

- AWS - American Welding Society.
- ASTM - American Society for Testing Materials.
- EN - European Norm.
- FEM - Federation European de la Manutention.
- IEC - International Electrotechnical Committee.
- ISO - International Standards Organization.
- SSPC - Steel Structure Painting Counsel.
- VDE - Verband Deutscher Elektrotechniker.
- ILO - International Labor Organization.

In case of any difference between standard/code demands and this specification, the contents of the specification will prevail.

#### 3.2. **Classification**

The classification of the spreader calculated to the SWL of 40 ton, shall be in accordance with the FEM rules 1.001 3<sup>rd</sup> edition revised 1/10/1998:

	Utilization	Load Spectrum	Classification
Structure	U7	Q2	A7 (DIN 15018-H3/B5)
Mechanism	T8	L3	M8
Components	B8	P3	E8
<b>Wherever the design is not according to FEM , the manufacturer is to supply explanation showing comparison and correlation to FEM requirements.</b>			

3.3.

**Structure and mechanical system.**

The spreader structure, especially the corner assemblies, shall be design to sustain the loads, stresses, high impacts, and vibrations generated during the operation. Stresses inflicted when the spreader is dropped on a container in full speed should be considered as well.

The spreader Twist locks shall protrude at least 100 millimeter below the spreader structure, to enable handling of distorted containers/corner pockets .

The bottom of the spreader shall be specially reinforced and protected against operational damages.

Mechanical and electrical components shall be located in protected areas to minimize damages during operation. Electrical cables will be routed in steel conduits and inside protected areas of the structure to protect them from damage.

Drive units (motor & gear) shall be resilient mounted in order to minimize the shocks and stressed inflicted onto the local structural mounting area/bores (in order to prevent formation of structural cracks).Other method for preventing formation of local structural cracks in the drive mounting area/bores may be suggested (subjected to HPC approval)

A ladder shall be provided at both spreader sides for climbing up to the human cage, which is located on the crane head block and for maintenance.

3.4.

**Materials**

All materials and equipment shall be new, of the highest grade, free from defects and shall conform to the applicable specifications and requirements of this specification. Steel grades will be selected according to FEM paragraph 3.1.

Load bearing structure - Only killed steel will be used for the load bearing structure. Steels will be purchased from manufacturers listed in the "approved manufacturers list" of a Known classification company. The steels will be delivered with certificate 3.2 according EN 10204.

A classification company will act as the purchaser's authorized representative (to be approved by HPC). All associated costs shall be borne by the Bidder.

Other uses - These steels will be delivered with certificate 3.1.

Twist locks shall be forged in accordance with BS 5237 or equivalent.

3.5. **Corrosion protection**

The supplier shall use materials to minimize corrosion and subsequent maintenance as a result of corrosion. It shall be accomplished by the following (besides painting, see para. 3.5):

- Use of stainless steel grade A4, where practical.
- Protection of materials subject to corrosion by coating.
- Hot dip galvanizing in accordance with ASTM-A385.
- Sealing of structural members.

All hardware parts shall be treated against corrosion.

Screws, bolts, and such - 12 mm. diameter and below - pins, studs, pipes and fittings, springs, washers and other miscellaneous fastenings material shall be of stainless steel grade A4 (316).

Bolts and such above 12 mm. diameter shall be hot deep galvanized in a centrifugal method according to ISO 1461.

4. **Electrical system**

4.1. The spreader shall be all-electric type.

All the electrical components shall comply with IP65 degree of protection and be designed for withstanding mechanical shocks and vibration.

special care should be given to electrical connectors & connection terminals able to withstand the high mechanical shocks and vibrations without reducing the Electrical signals connectivity.

Electrical motors shall be 380 VAC, 50 Hz and comply with IP55 degree of protection, or better.

**The control system shall be based on relays logic, suitable for spreader application.**

Visual indication of I/O (signal & commands) for a maintenance and diagnostic purposes to be provided in the main EI cubicle. Auxiliary on board information screen may be suggested (for diagnostics/fault finding etc.).

4.2. The electrical cabinet can be made from stainless steel grade A4 (316), reinforced PVC or marine aluminum, and shall comply with IP55 degree of protection. The cabinet shall be positioned in a way, that a free access for maintenance will be guaranteed in the work-shop and when the spreader is connected to the crane. The cabinet door/s shall have an handle & have a latching safety device for keeping in open position.

The electrical cabinet shall sustain high impacts & vibrations and mechanical stresses inflicted upon it during spreader operation.

The cabinet shall be well protected against operational damages, shielded by a robust protection steel frame-the solution shall be presented in the tender's technical proposal (other method of protection may be suggested for HPC's approval ).

The cabinet & its protection frame will not protrude outside the spreader peripheral lines.

Laminated wiring diagram shall be attached inside the cabinet in a place accessible for the maintenance personal.

4.3. Electrical cables shall be flexible stranded cables, suitable for high mechanical stresses, rubber insulated, with maximum allowed operating temperature of 70°C. High UV, oil and acid resistances & shock resistant are required. Conductor cross section shall be not less than 2.5 mm<sup>2</sup>. Cables shall comply with VDE standard.

4.4. heavy-duty proximity type Limit switches shall be used for providing at least the following indications : twist locks position(open & close) ,landing pins position(released & pressed), telescope end positions (20' & 40')

4.5. **interlocking system shall be integrated :**

- 4.5.1. Preventing of hoisting/lowering unless all four (4) twist locks are in locked or unlocked position (by sending signal to the crane-see appendix )
- 4.5.2. Preventing of locking or unlocking of twist locks unless all four (4) corners are properly seated onto the container.
- 4.5.3. Preventing extending/retracting unless landing pins are released and twist locks are in open position (only when no container under ).
- 4.5.4. Preventing sudden direction change of the telescoping drive in case of sudden retract/extend command change coming from the crane. Only after a complete movement stop followed by a short time delay (1-2 sec), the movement to the other direction can start.
- 4.5.5. In case of two 20' containers detected under the spreader in 40' position the spreader shall send signal " twin 20' containers detected" (Via pin 22) ,which indicating this event to the Crane PLC .The interlocking for this case is done only by the Crane PLC – blocks the locking command to the spreader as long as signal " twin 20' containers detected" is active.  
**remark-** as there is no signal to the spreader intended for bypass " twin 20' containers detected" , this bypass is done internally by the crane PLC . as long as the bypass command is given by the operator ,the crane PLC permits the locks command to be send to the spreader , even if the signal " twin 20' containers detected" (Via pin 22) is send to the crane.
- 4.5.6. As long as the control voltage (230VAC ,Via pins 24-26) is provided to the spreader, the signal of the twist locks position (open/locked) shall remain active, even if the main motor supply (230VAC ,Via pins 31-36) is switched off .
- 4.5.7. All components shall be easily accessible for assembling, dismantling, adjustment, inspection and maintenance. All components shall be protected against mechanical damages.
- 4.5.8. Electrical components, terminals, cables and wires shall be marked in according to the electrical diagram. Double screw connected name-plates will be installed adjacent to each component. Other permanent marking method may be presented to HPC for approval.
- 4.5.9. Indication LED type lights shall be installed on the spreader in a position, visible from the driver cabin (see drawing below).  
The following indications and colors shall be provided:
- Twist locks closed - Green
  - Twist locks open - Red
  - Spreader seated - Blue.
- The corresponding signals shall be transmitted via spreader cable to the crane control system.
- 4.5.10. Electrical supply from the existing cranes to the spreader is:  
400 VAC, 16 A x 3, 50 Hz.

5. **Spreader – Head-block (crane) connections**

The spreader connections shall be fitted for using on the gantry cranes which are in operation in HPC. The supplier is responsible to verify the connection requirements as detailed below.

5.1. **Mechanical connection**

The mechanical connection shall matches the existing head block design (see measurements drawing below).

Two (2) vertical guide pins shall be used on the spreader for aiming of the head block. Due to operational restrictions ,the distance between hanging pin center line to

spreader bottom shall not exceed **1300 mm** (see drawing below).

The spreader shall be provided with four (4) locking pins to match the four (4) locking seats on the head block. The pins shall be provided with handles to enable easy locking and unlocking of the cradle.

Mechanical latches shall be provided for positive securing of the pins in the locked position. The pins shall be connected to spreader Via chain in such away so that in the unlocked position the pins can't be removed from the spreader without using tools.

5.2. **Electrical connection**

Electrical connection shall provide the compatibility with the gantry cranes by using the Parallel Interface.

Spreader shall be equipped with HARTING type connector. Socket housing shall have two stainless steel locking levers, protective cover and comply with harsh environmental conditions. Male insert shall be screw terminal type. wiring details should be kept as defined (see drawings below).

In order to prevent e-cable damage at the connector outlet, a suitable support shall be installed to support the outgoing cable, from the socket, straight and firm.

Wiring diagrams shall be submitted for HPC's approval.

5.3. **Maintenance consideration**

The spreader shall be designed for a maximum interval length of the periodic preventive maintenance. In any case, the spreader shall not require higher inspection frequency than monthly.

Twist Locks shall be designed so as to deduce their planned replacement interval to be the longest possible.

Special attention shall be given to topics such as accessibility for inspection and maintenance and easy procedures for replacements of the various components.

6. **Design review and appraisal**

The supplier shall submit for review by the HPC copies of all arrangement, disposition, and detailed design drawings, calculations (structural, electrical, mechanical and hydraulic) electrical and hydraulic diagrams and catalogs used to design, manufacture and assemble the spreaders.

The HPC review is to verify general conformity of the design with the specification and does not relieve the supplier of any responsibility.

All information shall be submitted **early enough** to enable the HPC to submit rejections, comments and remarks to the design, before any purchase of material, components, manufacturing or another binding activity has been started. Thus, required modifications shall not affect the timetable or ordering of parts.

**The design shall be in metric form.**

For the main selected components, the following data shall be submitted:

- Technical catalog and data sheet with marking of it in the document.
- Calculation and selection procedure.

Computer calculations shall be presented in such a way that the results can be checked by means of non-programmed calculations.



Design review will be conducted in the contractor's premises, unless otherwise decided by the HPC.

7. **Shop work**

7.1. **General**

All structural, mechanical, hydraulic and electrical work shall be performed by, or directly supervised, by qualified and skilled personnel.

7.2. **Structure**

Metal cutting, weld preparation, welders' certification, welding procedures and welding quality assurance shall meet the requirements of the relevant ISO standards, or the requirements of AWS D1.1 and AWS D14.4.

Intermitted welds and overhead welding shall not be used.

Plates thicker than 30 mm shall be ultrasonically tested for lamination and discontinuity.

Structural parts shall be jig welded and jig drilled to assure accurate fit-up.

7.3. **Cleaning and painting.**

The paint system is a re-coatable epoxy paint system based on Ameron B.V. paints.

Alternative paints and / or paint system may be suggested by the supplier, subjects to HPC approval.

Paints manufacturer instructions should be strictly followed.

The cleaning and paintwork shall be executed in the shop, prior to the installation and assembling of the components on the spreader.

7.4. **Surface preparation and cleaning**

All welds spatter, slags etc. shall be thoroughly removed and sharp edges rounded off.

The spreader structure shall be dry-shot or grit blasted to cleanliness grade Sa 2½ according to ISO 8501 and roughness grade Medium S according to ISO 8503.

Dust, oil, grease and dirt shall be cleaned with viscous emulsion cleaner Ameron 57, washed with high-pressure tap water and dried completely prior to the application of the first coat.

7.5. **Painting system**

**Strip coat**

Corners, plates' edges **and all welds**, shall receive one strip-coat of Zinc rich epoxy paint Amercoat 68, by brush (satin). DFT = 50µ.

Strip coat to cover 2-3 cm. on each side of the edge. Repair coat shall be applied to 5-6 cm. on all sides of the welded areas

<b><u>Layer</u></b>	<b><u>Paint</u></b>	<b><u>DFT(µ)</u></b>	<b><u>Shade</u></b>
Repair / Strip	Amercoat 68	50	
First coat	Amercoat 68	70-80	
Second coat	Amerlock 400C	70-80	
Top coat	Amercoat 450SG	70-80	Safety orange (RAL 2007)
Total (min).		<b>230</b>	

Each layer will have a different shade.

8. **Quality assurance and quality control (QA & QC)**

8.1. **Shop inspection**

Inspection of parts and assembly - structural, mechanical, hydraulic and electrical – and of the finished spreader shall be performed, if so decided by the HPC, in the places of

8.2.

**Quality control**

The supplier must include in the supply a proven quality control and quality assurance system that will ensure the quality of the spreader. The supplier shall provide a copy of his quality control manual.

Vendor items shall be checked and tested for compliance with applicable standards and specifications. Inspection and test reports, compliance certificates etc. shall be included in the supply documentation that shall be reviewed by the HPC.

Test reports and certificates shall be furnished as applicable for:

- Twist locks.
- Electrical motors.
- Gear reducers.
- Hydraulic pumps and cylinders.
- Steel Certificates .
- Welders Certifications.
- Welding Procedure & qualification of Structure (WPS & PQR).
- UT and X ray records .
- Paint work records.

8.3.

**Quality plan**

The supplier shall issue the Quality Plan in a comprehensive programmed file. The file will include all the information and data referring to the QA and QC, for material and components purchasing, manufacturing, assembly, inspection, commissioning and testing, including activities, procedures, instructions, etc.

The file shall be reviewed and approved by the HPC prior to start of fabrication.

8.4.

**Painting inspection**

The supplier shall keep painting inspection report. The inspection report shall include the testing according to ISO 12944-7 – “Execution and supervision of paint work” (or equivalent).

Inspection of the paintwork shall be executed in the shop, prior to the installation and assembling of the components on the spreader.

9. **Technical documentation**

9.1. **General**

All documentation and correspondence shall be in English.

The technical documents shall be bounded in a durable loose-leaf binder. Additionally, all documentation will be submitted on magnetic media (CD or memory stick) .

The documentation mentioned below shall be comprehensive to include all the relevant information that may be required in case of maintenance, break down or a failure in the structure / mechanical / electrical part.

Thus, HPC personnel will be able to refer to the documentation, to obtain spare parts data or any technical information required for the repair, maintenance or to order of the required parts from the OEM without being compelled to dismantle the component. The documents may be used also for training of maintenance personnel.

9.2. **Reports**

The supplier shall submit monthly progress reports to the HPC.

9.3. **Parts list**

Not later than two month before shipment of the spreaders, the supplier will submit to the HPC a complete and comprehensive list of components installed on the spreader. The list shall give detailed and complete information on technical data, rating, type, Model, total quantity per spreader, manufacturer and ordering reference of the component.

The list shall be in a "Product Tree" (fathers, sons ...) format with at least 3 levels (e.g. – spreader mechanics, Twist Lock System, Reducer...) and shall be in excel format.

9.4. **Spare parts list**

Not later than two month before shipment of the spreaders, the supplier shall submit his recommendation for spare parts for: the startup, 2 years usage and 5 years usage, to be kept in the HPC stores. The list shall be prepared on the basis of the complete list of parts and on delivery time, quantity installed, etc. at least the next information shall be presented for each part : part umber, related system , unit Price, delivery time ,total quantity per spreader. The list shall include complete units as well as a breakdown to single items and components.

Reference to each component and its parts breakdown as applicable shall appear in the maintenance manual.

9.5. **Electrical system file**

The electrical system file shall consist but shall not be limited to:

- Circuit diagrams of the electrical system.
- Catalogue pages of the main components ( with marking of the relevant P/N)
- PLC software back-up (only if its PLC controlled spreader)
- Components layout.
- Terminal diagram – interconnection wiring diagrams, showing the connections of all components and devices including cables and wire numbering.
- List of El. components including al least the next information for each : reference to the relevant El. Drawing, part number ,OEM part number, quantity per spreader .

- 9.6. **Maintenance manuals and parts catalogs (mechanical & electrical)**  
The maintenance manual shall consist of the following chapters (minimum requirements):
- General description of the spreader, its systems and operation.
  - Set of "As made" drawings.
  - Preventive maintenance procedures for periodic inspection and maintenance.
  - Maintenance instructions - Procedures and instructions for troubleshooting, parts or components replacements, adjustments, and disassembly, repair, assembly and testing of components as well as systems.
  - Parts catalog (see 7.7.1.).
  - Lubrication (see 7.7.2).
- 9.7. **Parts catalog**  
This chapter will include (minimum requirements):
- Illustrated parts breakdown, including sub-contractor items such as motors, gear reducers etc., with drawings and a list for each one of the drawings.
  - Index of all part numbers appearing in the catalog in P/N sequence having the following data elements:
    - Designation given by the contractor and OEM detail.
    - Drawing number.
    - Location on the spreader / component.
    - Designation given by the OEM.
- 9.8. **Lubrication**  
This chapter will include (minimum requirements):
- Lubrication chart showing all points to be lubricated, type of lubricant/oil to be used for each point and recommended frequency for re-lubrication / oiling.
  - Lubricants list with equivalent Israeli lubricants. Only lubricants approved by the HPC will be used.
- 9.9. **Timing and quantities.**  
The various documents shall be prepared and submitted for the review and approval by the HPC.  
Documents will be submitted in due time to allow comments, acceptance of the spreaders, training, maintenance and purchase of spare parts.  
Review of maintenance manuals and reports, as well as coordination of shipments shall be carried out in the supplier office, prior to the shipment, unless otherwise decided by the HPC.  
Documents for review and approval shall be submitted in 2 copies.  
"As-made" documents shall be submitted in 3 copies.

10. **Training of maintenance personnel**
- 10.1. **General**  
Maintenance personnel instructions and training will be given to two sectors of technicians – mechanics and electricians. Four training sessions of 3 days, each will be given to each sector (24 training days in total).  
Training hours – Sunday till Thursday , from 06:30 AM till 14:30 PM.  
Each session shall include 7-10 trainees.  
Training will be completed before acceptance of the first shipment of spreaders.  
the trainer should be a qualified and experienced engineer (HPC reserve the right to ask to change the trainer)
- 10.2. **Classroom instruction**
- System overview and theory
  - Maintenance manual, operation manual, drawings familiarization and interpretation.
- 10.3. **On the job training (on a test bench / crane)**
- Equipment familiarization.
  - Electrical cubicle and main components familiarization.
  - Maintenance tasks performance.
  - Inspection procedures
  - Systems adjustment.
  - Troubleshooting and faults diagnostics.
- 10.4. **Training accessories and final knowledge test**
- Training technical booklets shall be given during training to each participant.
  - At the end of each session, a short "knowledge test" will be conducted to the participants.
  - Formal manufacturer training certificate will be issued to each of the participants. Certificate shall include the manufacturer name& logo ,name & ID no. of the participant, training issues covered and total training hours conducted.
11. **handing over**
- It is the responsibility of the manufacturer to deliver the equipment to Israel ready for operation.
- The manufacturer will perform at least the following tasks upon the arrival of the equipment to HPC :
- ▶ Checking and repairing of voyage damages
  - ▶ Remove all voyage protection materials.
  - ▶ Assembly and installation as necessary
  - ▶ Complete equipment checkup before handing over.
  - ▶ Handing over of the equipment to HPC in a fully serviceable and in full operational status.
  - ▶ **in case spreaders shipping is done via containers**  
Unloading process of spreaders from containers shall be by the contactor's and on his responsibility  
Spreaders shipped on a flat rack/platform is preferred for easy unloading.

The spreaders **shall not be shipped** in a closed container box **unless approved by HPC** after the contractor proves to HPC that the extraction procedure of the spreaders out of the closed container box is easy and safe. To get HPC's approval, the supplier shall present in advance detailed unloading instructions of the spreader out of the container, including the tools and equipment to be used.

12. **Final Acceptance Test Procedure (ATP)**

Each spreader shall be tested at the supplier premises and in the port to demonstrate conformance to the specification and proper integration with the crane.

The following tasks shall be performed:

- 12.1. Review of QA & QC documents & Visual test.
- 12.2. Testing for compliance with the specification
- 12.3. Static test with an overload of at least 65 tons (200% preferred) at 40' spreader position. The test will be conducted at the supplier premises. Formal Test certificate copies shall be handed to HPC before shipment of the spreaders.
- 12.4. Dynamic test with an overload of 125%.
- 12.5. Performing a local validation tests by " Governmental authorized lifting appliances inspector" (mandatory inspection required by Israeli regulation ).Any rejects/deficiencies found by the inspector, which prevents the validation of the equipment , shall be corrected by the contractor and on his expense.
- 12.6. Functional test – test of all the functions on a test bench or on the crane.
- 12.7. Operational test – On the job operation for a period of 4 weeks in a “trouble free” manner in actual operation conditions.  
In case the equipment shall become unavailable (i.e. non-operational-due to fault, failed components.. etc.) During the operational test, and its downtime shall be unreasonable , this test shall be considered as failed . The contractor (or its service company) shall examine, repair and declare that the equipment is ready for re-testing once more. The test shall be renewed for a period of twenty one (21) days, and so forth. However, the supplier shall be entitled to attain this test not more than three (3) times. During this Operational test the contractor's service company is to be available in reasonable time for service and repair in case needed.

Acceptance certificate will be issued after successful completion of the a/m tests. Training, complete documentation and the establishment of a service company in Israel are preconditions for the acceptance of the spreaders.

13. **Warranty**

13.1. **Warranty Periods**

The warranty period shall be twenty four months (24) from the issuance date of the acceptance certificate of each spreader.

This warranty shall cover the complete spreader systems including structural defects, fatigue failure and paintwork.

13.2. **Warranty claims**

In case of a failure during the warranty periods, the HPC shall issue a corresponding detailed Warranty Claim stating the nature of the failure, the demands for repair etc. The obligation of the contractor with regard to the Warranty jobs and claims shall include **parts and labor**. The notice about the claims shall be sent to the contractor as well as to his authorized service company in Israel.

In order to minimize the downtime of the faulty crane, the contractor may use spare parts from the store in the port, provided that he shall supply it back in the quickest

manner.

If emergency work is needed, or if the contractor fails to perform satisfactory, the port shall have the right to carry out the repair work and the contractor shall reimburse all corresponding costs to the HPC.

The contractor shall notify the HPC about the execution of the repair work associated with the warranty claim and on the supply of the replacement parts.

14. **Service Company**

The supplier undertakes to establish in Israel an appropriate Service Company to be active during the warranty period. The Service Company is subject to HPC approval. The Service Company will be responsible for the repair of faults and defects discovered during the warranty period, which are beyond the normal routine maintenance, including the structure, electrical and mechanical systems and inclusive of replacement of faulty components.

Skilled, proficient and experienced personnel will be employed.

The response time shall not exceed 6 hours.

15. **Project Timetable**

General Timetable for the complete supply shall be submitted within 15 days of the purchase order.

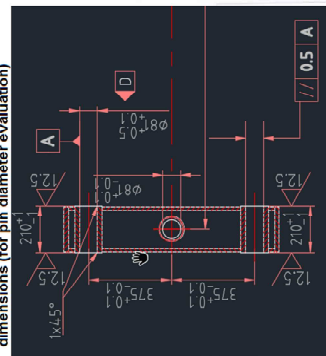
The following activities shall be addressed in the timetable for each supply stage:

- Engineering and design review (one month to be considered for the review)
- Purchasing and supply of components;
- Manufacturing & Assembly;
- Commissioning;
- Testing in the manufacturer shop.
- Transportation.
- Testing in the destination port.
- Training

## 4900 ±1



matched head block handing bores  
dimensions (for pin diameter evaluation)



for sizing the diameter of the spreader Bores & pins see head block drawing on the right/bottom side

Max 260

106  
+0.5/+1

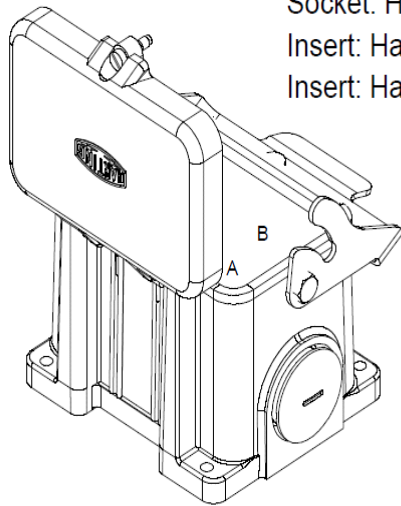
**VIEW A**

from support

guide pin

SECTION B-B





Socket: Harting 48 pin  
Insert: Harting 1-24 pin (M)  
Insert: Harting 25-48 pin (M)

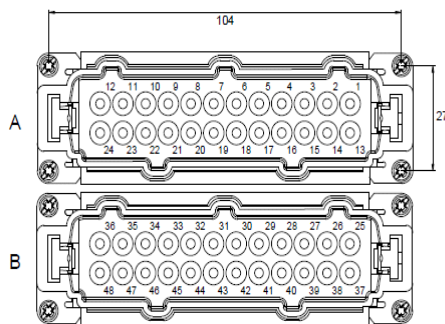
## SPREADER CONNECTOR

### SLOT A

1	40FT FEEDBACK AVAILABLE SIGNAL	
2	SPREADER AT 40FT	Sig
3	PROTECTIVE EARTH PE	
4	LANDED LEFT	Sig
5	LANDING SENSOR BYPASS	
6	SPARE	
7	LANDED LAMP SIGNAL (OLD SPREADER)	
8	240V L FOR SPREADER WEIGHT INDICATION	
9	240V N FOR SPREADER WEIGHT INDICATION	
10	240V N FOR SPREADER WEIGHT INDICATION	
11	SPARE	
12	SPARE	
13	SPREADER AT 20FT	Sig
14	LANDED RIGHT	Sig
15	SPARE	
16	RESERVE (Use In Old Cranes)	
17	SPARE	
18	RESERVE (Use In Old Cranes)	
19	TWISLOCK UNLOCKED CMD	Cmd
20	TELESCOPIC RETRACT CMD	Cmd
21	TELESCOPIC EXPAND	Cmd
22	TTDS PERMIT	Sig
23	REDUCE HOIST	Sig
24	CONTROL VOLTAGE 230 VN	
PE	PROTECTIVE EARTH PE	

### SLOT B

25	CONTROL VOLTAGE 230 VAC	
26	CONTROL VOLTAGE 230 VAC	
27	TWISTLOCK LOCKED	Sig
28	TWISTLOCK UNLOCKED	Sig
29	SPERADER CONNECTED	
30	TWISLOCK LOCKED	Cmd
31	MOTOR SUPPLY L2	
32	MOTOR SUPPLY L2	
33	MOTOR SUPPLY L1	
34	MOTOR SUPPLY L1	
35	MOTOR SUPPLY L3	
36	MOTOR SUPPLY L3	
37	SPARE	
38	NOT CONNECTED	
39	NOT CONNECTED	
40	NOT CONNECTED	
41	NOT CONNECTED	
42	NOT CONNECTED	
43	NOT CONNECTED	
44	NOT CONNECTED	
45	NOT CONNECTED	
46	NOT CONNECTED	
47	NOT CONNECTED	
48	NOT CONNECTED	



Spreader EI socket Pins 8,9,10 signal bits (based on spreader dead weight)

### Spreader Weight Bits Table

Spreader Weight Bits			Weight, t
Pin 10	Pin 9	Pin 8	
2	1	0	
0	0	0	5
0	0	1	6
0	1	0	7
0	1	1	8
1	0	0	9
1	0	1	10
1	1	0	11
1	1	1	12

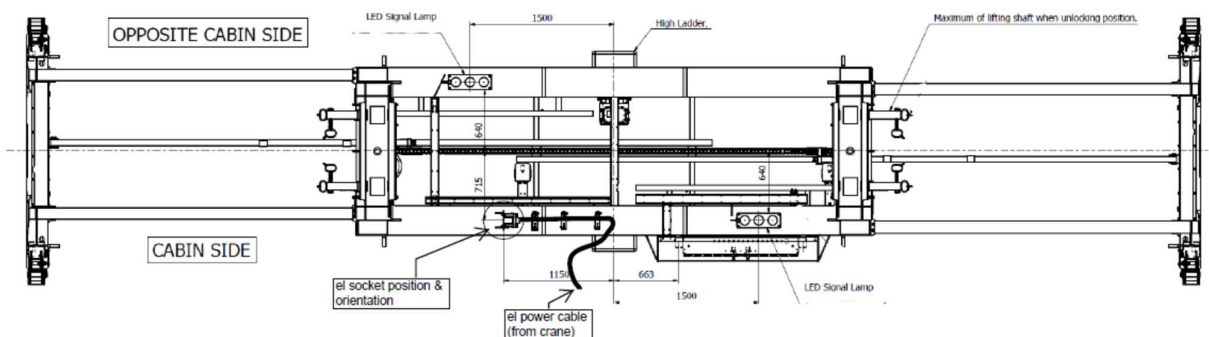
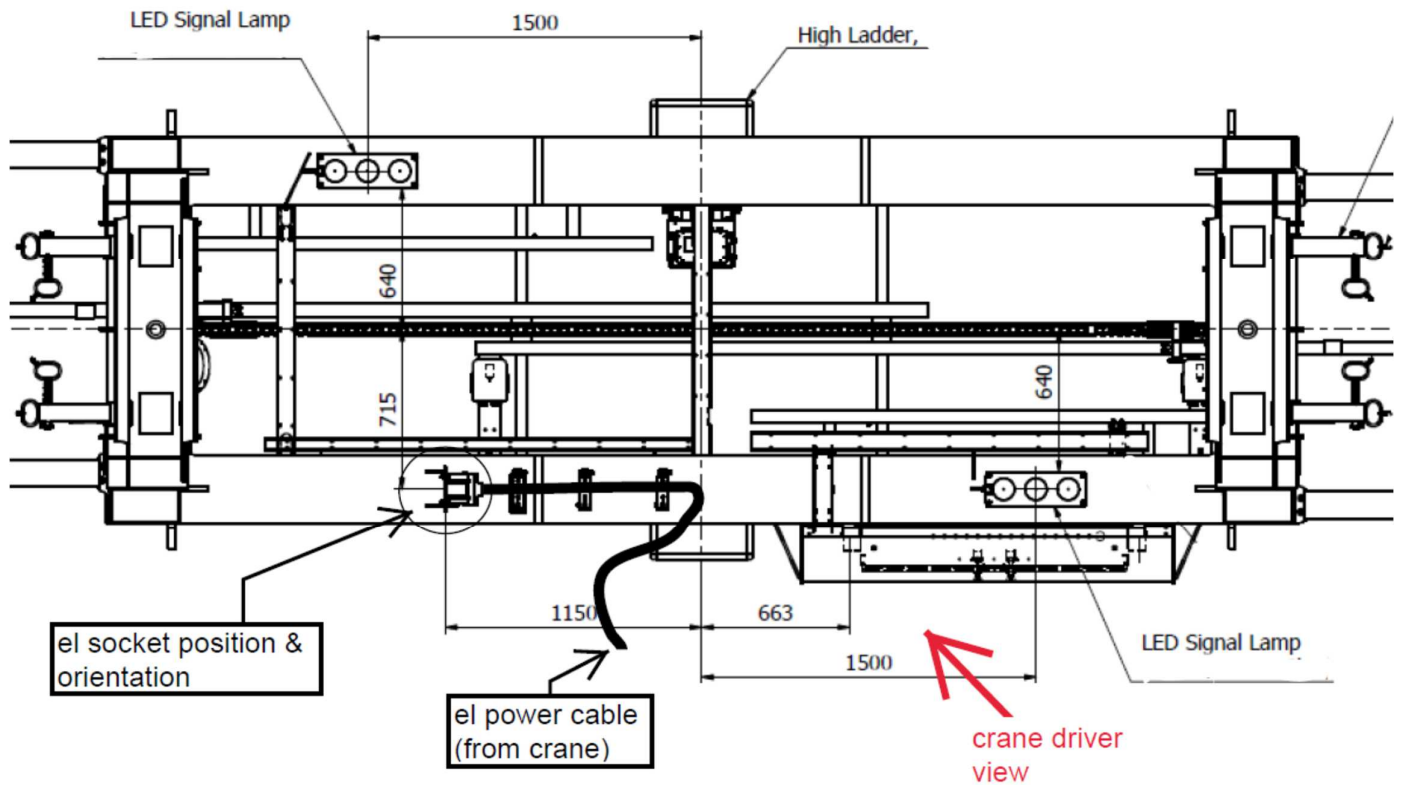
Description of crane feedback & signals for each pin no.

HPC RMG Spreader Interface For Old/New Single Spreaders				
Signal Name	Signal type	Signal Description	Harting Conn.	Remarks
	Crane PLC		Pin No.	
40' feedback available	signal	1' if pin 2- 40' feedback is used, otherwise '0'	1	
40' feedback	signal	Steady "1" as long as condition exists	2	New signal on pin 2, "40 ft feedback" will be used for new spreaders only (From 2010) that are able to supply this feedback
PE	PE		3	
Left Side Landed	signal	Both left telescopic beam landing pins activated => left side Landed = "1 "	4	
Landing sensors bypass	command	Continuous	5	"Landing sensors bypass" signal is added on pin 5. bypass spreader TWL interlocking , activates landing lamp, activates landed signals to crane-pins 4,14
Not Used			6	"Reduce Hoist Speed" signal is added - pin 23. Positive logic
Switch on Landing Lamp (Blue)	command	Continuous. To be used in old spreaders only	7	Pin 7 - "Switch on Landing Lamp" - Crane has to supply this signal to old spreaders. New spreaders don't use this signal and switch on the landing lamp by spreader PLC.
Spreader Weight 0	signal	Continuous.	8	"Spreader Weight bits 0-2 signals are added on pins 8-10. Spreader "informs" its dead Weight to the crane. See "Spreader Weight Coding" worksheet.
Spreader Weight 1	signal	Continuous.	9	Same as for pin 8
Spreader Weight 2	signal	Continuous.	10	Same as for pin 8
Not Used			11	
Not Used			12	
Spreader at 20 ft Position	signal	20ft pos = "1", if not at 20' pos = "0"	13	
Right Side Landed	signal	Both right telescopic beam landing pins activated => right side Landed = "1 "	14	
Not Used			15	
Reserved		In use in old cranes	16	
Not Used			17	
Reserved		In use in old cranes	18	
Unlock Twistlocks	command	Open twistlocks command "1", pulse	19	
Retract Spreader	command	Retract the spreader command "1", pulse	20	
Extend Spreader	command	Extend the spreader command "1", pulse	21	
Twin 20' Container Detection	signal	Twin 20' detected = "1", continous	22	"Twin 20' container detection" signal is added for spreaders from 2010.
1=Reduce Hoist Speed	signal	Container detected = "1", continous	23	
Neutral	Control Voltage		24	
230 VAC	Control Voltage		25	
230 VAC	Control Voltage		26	
Twistlocks Locked	Input	All four twistlocks are closed = "1", continuous	27	
Twistlocks Unlocked	Input	All four twistlocks are opened = "1", continuous	28	
Spreader Cable Connected	Input	Spreader plug connected = "1", continuous	29	
Lock Twislocks	Output	Close twistlocks command "1", pulse	30	
Spreader Motor L2 380 VAC	Power Voltage		31	Motor supply will be connected by double core (pins 31-36). Motor phase sequence is shown in the table (L1,L2,L3).
Spreader Motor L2 380 VAC	Power Voltage		32	Same as for pin 31
Spreader Motor L1 380 VAC	Power Voltage		33	Same as for pin 31
Spreader Motor L1 380 VAC	Power Voltage		34	Same as for pin 31
Spreader Motor L3 380 VAC	Power Voltage		35	Same as for pin 31
Spreader Motor L3 380 VAC	Power Voltage		36	Same as for pin 31
Not Connected			37	
Not Connected			38	

Not Connected			39	
Not Connected			40	
Not Connected			41	
Not Connected			42	
Not Connected			43	New signal on pin 43, "Test bench connected" is intended to signal the Elme RMG spreader that its test bench (control box) is connected to it (and thus can perform special functions as jogging telescope for wire replacing). This signal is not connected on the crane.
Not Connected			44	
Not Connected			45	
Not Connected			46	
Not Connected			47	
Not Connected			48	
	PE		Shield	

<b>Pulse</b> - Signal is kept "ON" as long as needed for movement	
N/A - Not Available	
<b>Not Used</b> - Spare, connected through spreader cable	
<b>Not Connected</b> - Spare, not connected through spreader cable	
<b>Reserved</b> - Not to be used. Connected through spreader cable	
<b>New RMG cranes pin diagram</b> - is the same as new spreader pin diagram (Harting connector)	
'0' = 0V ; '1' = 230VAC in connector pins:	
<b>COMMENTS</b>	
Spreader identification signals will not be used according to port decision.	
Since 2010 all spreaders should use 40' feedback, i.e. pin 1 = '1'.	
New RMG cranes pin diagram - is the same as new spreader pin diagram (Harting connector)	
In case of two 20' containers detected under the spreader in 40' position the spreader shall send signal "twin 20' containers detected" (Via pin 22) ,which indicating this event to the Crane PLC .The interlocking for this case is done only by the Crane PLC – blocks the locking command to the spreader as long as signal "twin 20' containers detected" is active.	
<b>remark</b> - as there is no signal to the spreader intended for bypass "twin 20' containers detected" , this bypass is done internally by the crane PLC . as long as the bypass command is given by the operator ,the crane PLC permits the locks command to be send to the spreader , even if the signal "twin 20' containers detected" (Via pin 22) is send to the crane.	
As long as the control voltage (230VAC ,Via pins 24-26) is provided to the spreader, the signal of the twist locks position (open/locked) shall remain active, even if the main motor supply (230VAC ,Via pins 31-36) is switched off	

Led signaling lamp position on the spreader main frame & El socket position and orientation on the spreader main frame



Led signal Lamps pannel –color order (one on each side)

**On Spreader**



Red  
unlocked

Green  
locked

Blue  
landed

Driver Side