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CONSTRUCTION OF
ÇERKEZKÖY INTERMODAL TERMINAL (IMT)

SECTION 4 - EMPLOYER'S REQUIREMENTS

GANTRY CRANE

1. Scope of supply

1.1. Detailed design, design calculations, drawing and manufacture of gantry crane as per employer's requirements (ER).

1.2. Supply, assembly including erection, installation, wiring and cabling at IMT site, commissioning and testing.

1.3. Provision of trainings.

1.4. Spare parts including;

1.4.1. Spare part package for commissioning and start-up - necessary emergency spare part package with enough spares at site for commissioning and start-up;

1.4.2. Spare part package of consumables during the first two (2) years of gantry crane operation;

1.4.3. Spare part package of capital spares – the contractor shall propose "capital spares" for assuring height reliability of gantry crane function.

2. General Requirements

2.1. Offered supplies must be provided complete with necessary accessories and parts to ensure that gantry crane is capable of operating to required ER, quality and performance.

2.2. The contractor is fully responsible for proper connections of supplied items to existing infrastructure for smooth installation and operation.

2.3. The type of voltage in Turkey is 220 V (mono phase) and 380 V (tri phase + neutral). All hardware must be suitable for direct connection to the standard power outlets in Turkey. The type of electrical outlets generally installed in Turkey is the type with 2 side mounted earthing poles (EUROPLUG). All plugs of all items will have to fit exactly. The contractor shall evaluate the supplied current, the quality of the current and the fluctuations and take necessary precautions to avoid damages to the equipment.

2.4. The supplies must be compliant with Turkish and EU regulations and international standards. Wherever reference is made in ER to specific standards and codes to be met, provisions of the latest edition or revision of the relevant standards in effect, shall apply, unless otherwise stated in ER.

2.5. The supplies should comply with the regulations concerning safe operation, energy saving and environmental safety, in line with the policies or practical measures in use within the EU and Turkey.

2.6. During the installation of supplied items, the contractor will be responsible for providing measures for any Health & Safety risks associated with supplies provided.

2.7. System components and whole system must be compatible with each other "as a whole". Any interoperability problems between software and hardware must be resolved by the contractor at no additional cost to DGII and the Contracting Authority.

2.8. All offered goods must be suitable for operation in the climatic conditions in a place of delivery.

2.9. For warranty, the contractor shall comply with the special and general conditions Article 32 and 33, Regulation of Turkish Law as published on Official Gazette no.29029 dated 13.06.2014.

3. Technical documentation to be provided by the contractor

3.1. Following documentation shall be provided by the tenderer together with their tenders:

3.1.1. The contractor shall provide **the concept designs** of the items in DWG and PDF format. As a minimum, the concept design shall include:

- General layout plan;
- Mechanical layouts;
- Electricity layouts;
- Process and instrumentation diagrams;
- Other documentation as deemed needed.

1.1. Following documentation shall be provided by the contractor:

1.1.1. **The detailed designs** in DWG and PDF format shall be provided by the contractor within 30 days after the commencement and submitted to the Contracting Authority for an approval.

1.1.2. **As-built designs** in PDF format shall be provided by the contractor after issuance of the Provisional Acceptance.

1.1.3. Other documentation to be provided by the contractor:

- Original certificate of origin documents;
- Operation and maintenance manuals - all supplies must be offered with original set of operation and maintenance manuals in English and in Turkish language;
- Warranty document of the manufacturer and/or authorized dealer/distributor of the manufacturer.

1. Installation and commissioning requirements

1.1. Full installation and commissioning shall be borne by the contractor.

1.2. Consumptions on site during the installation and commissioning shall be borne by the contractor.

1.3. The contractor shall make available to himself all tools, materials and equipment required for transport, assembling, installation and commissioning.

1.4. The contractor shall provide all tools and equipment needed for testing.

1.5. The contractor shall perform onsite installation and commissioning by trained and authorized personnel including unloading, furnishing to designated location, unpacking, assembling and connection to main supply and removal of packing materials from site in accordance with Article 29 of Special Conditions.

1.6. Connection to main electrical, mechanical, water, air and/or gas supplies from the existing infrastructure shall be done by the contractor according to the rules and regulations of Turkey. Recovering of any damage to building structure that may occur during the installation and commissioning is under the responsibility of the contractor.

1.7. All software must be delivered and installed in electronic version. All software must be licensed to DGII.

1.8. Acceptance requirements shall minimally include successful passing of following test procedures:

1. **General**	
1.1 **General note**	
The gantry crane shall be tested before being taken into service to ensure that it is able to fulfil its specific functions safely.	
All test results shall be recorded.	
At the conclusion of testing, all limiters that may have been either disengaged or adjusted to facilitate such testing shall be reactivated and returned to their prescribed operational settings.	
The crane must be operated by authorized personnel. Only authorized personnel during crane test in the working area.	
Working area should be kept clear during load test.	
The tolerance for the test results shall be for: • Test weights: - 1 % to + 3 % • Crane dimensions: + / - 0,1 m	
1.2 General checks	
All motions of the crane shall be operated throughout their range of movements, without load, up to their maximum operating speeds. Motion limiters and buffer positions shall initially be approached and contact made at slow speed prior to contact being made at maximum operational speed.	
If buffers are tested the following procedure should be used: • Test buffers at 20 % vmax - trolley 100 % • Test buffers at 50 % vmax (if designed for) - crane end 50 %	

• Test buffers at 70 % vmax (if designed for) - crane – crane 70 % / 0 • Test buffers at 100 % vmax (if designed for) - crane – crane 50 % / 50 %	
Where buffer stops are used without other motion limiters, they shall only be contacted once at 100 % speed.	
All functions of the crane equipment shall be tested, particularly those related to safety, including back-up brake sequencing, for correct operation.	
When installed, a second (back up) upper limiter for hoist range shall be tested by disconnecting the first limiter and then the motion driven through at both low and high speed.	

1. **Test of crane**	
2.1 Crane over load test	
According to FEM 1001-part 8/9	
2.1.1 Dynamic test	
Dynamic tests shall be performed with a test load that is at least 110 % of the rated capacity.	
Tests are considered successful if no fractures, permanent deformations or damages affecting the function or safety of the crane are visible and if no connections have loosened or show signs of damage.	
The test shall be carried out in the critical trolley positions, such as the in the middle of the crane gauge, extreme positions of traverse including any cantilever outreaches, so as to qualify overload and stability requirements.	
Before performing this test, the overload protection has to be by-passed.	
Test weight: according to document QCIP II.	
Moving hoist from ground to top and back.	
Trolley from hinged post to fixed post outreach.	
Crane travel from one side to the other. (Trolley one-way hinged post side, back fixed post side)	
All movements with full speed.	
All movements should be stopped once with operational brake (frequency inverter) and once with emergency brake.	

All movements shall be tested separately. A new movement shall not be initiated until vibrations caused by the preceding movement have dampened out. Max. wind speed 40 km / h.	
2.1.1 Static test (twist locks)	
Test weight: according to document QCIP II Static overload tests shall be performed with a test load that is at least 125 % of the rated capacity.	
Before performing this test, the overload protection has to be by-passed. All movement has to be carefully with minimum speed. No emergency stop test allowed.	
Move trolley to hinged post outreach. Lift test load for 0,1 m. Move trolley to fixed post outreach.	
2.2 Hoist test	
Hoist speed according to specified SWL.	
Hoist speed empty spreader.	
Hoist speed according to specifications / ER.	
Upper limit switch (operational)	
Upper emergency limit switch (operational by- passed)	
All movements should be stopped once with: All movements should be stopped once with operational brake (frequency inverter) and once with emergency brake.	
Deflection tests: Span middle – trolley without load in middle Span middle – trolley with nominal load in middle Difference observed: Deflection from static calculation:	
Hinged post – trolley without load in outreach Hinged post – trolley with nominal load in outreach Difference observed: Deflection from static calculation:	
Fixed post - trolley without load in outreach Fixed post - trolley with nominal load in middle Difference observed:	

Deflection from static calculation:	
2.3 Crane drive test	
Crane speed according to specifications / ER	
Limit switch east (operational) Limit switch west (operational) Emergency limit switch east (operational by-passed) Emergency limit switch west (operational by passed)	
Hydraulic buffer test (Nominal load in upper position, trolley in middle)	
All movements should be stopped once with operational brake (frequency inverter) and once with emergency brake.	
2.4 Trolley drive test	
Trolley speed	
Outreach hinged post side	
Outreach fixed post side	
Span	
Limit switch hinged post (operational) Limit switch fixed post (operational) Emergency limit switch hinged post (operational by-passed) Emergency limit switch fixed post (operational by -passed)	
Hydraulic buffer test	
All movements should be stopped once with operational brake (frequency inverter) and once with emergency brake.	
2.5 Auxiliary hoist	
Hoist speed according to specifications / ER	
Hoist speed empty	
Hoist speed to ground	
Trolley drive 5/20 m/min	
Upper limit switch (operational)	
SWL 2000 kg = 2500 kg overload (yes / no)	
More than 2500 kg (max 3200 kg) overload (yes / no)	
2.6 Test of safety device	

2.6.1 Emergency stop	
Emergency stop: • Cabin • Electric room • Winch house • Stair tower platform to cabin / platform cabin • Stair tower platform to winch house / platform winch house • Drives 4x • Trolley upper part 2x • Cable drum platform • Spreader	
2.6.2 Test of the load limiting device	
Overload is adjusted to 105 % of SWL Overload (yes / no) More than 105 % of SWL over load (yes / no)	
2.6.3 Warning signals	
Test of warning signals: • Crane drive signals (horn and flash) • Horn	
2.7 Final inspection	
Visual inspection – After finishing of the crane test a final visual inspection of the steel structure and the mechanical items must be done.	

1. Health & safety

1.1. The contractor shall be fully responsible for applying the Health and safety procedures in accordance with the legislation published by the Republic of Turkey Ministry of Family, Labour and Social Services during the manufacturing, delivering, assembling, installation, commissioning and testing. Moreover, the contractor will be responsible for advising DGII and the Contracting Authority of any Health & safety risks associated with supplies provided and of suitable protective measures.

1.2. Gantry crane shall be designed to operate safely taking into account the characteristics of the terrain and its surroundings, atmospheric and meteorological

conditions, any possible structures and obstacles located in the vicinity either on the ground or in the air in such a way as to cause no nuisance or pose no danger under any operational or servicing conditions or in the event of an operation to rescue persons.

2. Trainings

2.1. Following installation and commissioning of supplies, the contractor shall provide trainings for DGII staff.

2.2. The contractor shall include in their offer a training plan according to requirements in this ER including offer for extended trainings (duration, topics provided in tables hereunder are requested as minimum). The contractor (if required) may extend training durations and topics covered.

2.3. Trainings shall be realized in Turkish language.

2.4. Trainings shall be provided by qualified instructors.

2.5. All necessary accessories, materials and documentation for the trainings shall be provided by the contractor.

2.6. Unless otherwise required, trainings shall be realized in DGII facilities in Turkey.

2.7. The trainings shall be recorded by the contractor and provided as a separate media to DGII for future use.

Item No.	Content of the Trainings	Min number of training days	Min number of participants
Gantry crane	Trainings shall include theoretical training and applied trainings covering following topics as a minimum: • Overview and terminology; • Usage and operation of gantry crane; • Consumables; • Maintenance and troubleshooting; • User interface and software; • Usage of PLC and automation; • Emergency measures; • Health and safety; • Other tests as deemed necessary.	**2**	**8**

1. Warranty requirements

1.1. The contractor shall provide minimum 2 years warranty for all items.

1.2. The contractor shall provide minimum 5-year warranty for paint according to DIN EN ISO 4628.

1.3. Only original or approved by the manufacturer(s) spare parts should be used in any repair service.

1.4. The contractor shall provide available software updates during the warranty period.

2. Visibility

2.1. Proper material and size compatible with specifications and dimensions of supplies shall be offered by the contractor and approved the Contracting Authority after the commencement of the contract.

2.2. Label shall be designed in accordance with the enclosed sign without any distortion.

2.3. Label shall be coloured, readable, visible and durable.

2.4. EU Turkey visibility logo of visible size should be placed at the top part of the gantry crane including led lights to make it visible at night.

2.5. The contractor shall erect project sign boards at the main entrance to the sites on which the names of the Contract, the Contracting Authority, DGII, the contractor and the information required by the Contracting Authority will be stated. The design of the sign board shall comply with EU Visibility Rules and require the approval of the Contracting Authority.

The signboard shall comply with "Communication and Visibility in EU-financed external actions guide" and shall be not less than 2 x 2 meters with the EU-Turkey partnership logo in Turkish and English language.



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SECTORAL OPERATIONAL PROGRAMME FOR TRANSPORT

TCDD

1. Item No	2. Employers Requirements (ER)	3. Min. performance values
1.	**Gantry Crane**	
	Manufacturer's name; product model/type:	
	Country of origin:	
	Quantity: 1	
1.1	Rail mounted gantry crane used for loading and unloading containers.	n/a
1.2	Gantry crane shall be mounted on rails moving parallel to the train's side, with a boom / cantilever spanning the distance between the train's cargo hold and the quay.	n/a
1.3	Gantry crane shall operate with both 20" and 40" containers.	n/a
1.4	Gantry crane shall have anti-collision sensor for emergency stop.	n/a
1.5	Gantry crane shall be able to work with a generator after a power outage.	n/a
1.6	**Gantry crane design requirements**	
1.6.1	Rail type	According to ER design requirements A100, PRI 85 or equivalent
1.6.2	Rail slope	According to ER design requirements 0,5%
1.6.3	The crane rails must be aligned within the permissible tolerances of class 1 according to ISO 12488-1:2012	Class 1 according to ISO 12488-1:2012
1.6.4	The rail strength shall not exceed 690 N/mm²	> 690 N/mm²
1.6.5	Magnetic switches for the positioning should be mounted in average every 20 m along the crane rail.	n/a

1. Item No	2. Employers Requirements (ER)	3. Min. performance values
1.6.6	For synchronizing the gantry travelling, gear unit's magnets have to be installed every 20m along the rail.	n/a
1.7	**Gantry crane foundations -** The foundations shall be made of concrete, designed and constructed according to Turkish regulation under Official Gazette 30364.	Official Gazette 30364
1.8	**Structural characteristics**	
1.8.1	Steel structure including stairways and service point.	n/a
1.8.2	All metal materials to be used in open-air space shall be designed and produced for corrosion resistance according to regulation under European Standard EN 1993 Eurocode 3.	European Standard EN 1993 Eurocode 3
1.8.3	Pedestals, stairs, platforms and ladder structure used for the construction of the gantry crane shall be galvanized.	galvanized
1.8.4	Fatigue-resistant design with double girder.	n/a
1.8.5	Access to service points for operation and maintenance.	n/a
1.9	**Paint**	
1.9.1	Paint standard	EN ISO 12944 - Paints and varnishes
1.9.2	Sandblasting standard	Sa 2 ½
1.9.3	Epoxy resin zinc phosphate (Intercure 200 HS)	Min.140 µm – Max. 160 µm
1.9.4	Polyurethan, Polysiloxan hybrid or Polysiloxan (Interfine 979)	Min.80 µm – Max. 100 µm
1.9.5	Standard coating shall be at least corrosiveness category.	Min. C4
1.9.6	Colour shall be according to RAL standard.	RAL 5002
1.9.7	Total dry coat thickness	Min. 240 micron

1. Item No	2. Employers Requirements (ER)	3. Min. performance values
	Gantry crane description / elements The crane shall consist of following elements:	
1.10	**Gantry crane structure** - Gantry crane for transferring containers from train or track onto either trucks or rail wagons.	n/a
1.10.1	Design classifications	FEM
1.10.2	Crane classification	min. U7/Q2/A7
1.10.3	Hoist mechanism	min. T7/L2/M7
1.10.4	Trolley traversing mechanism	min. T7/L2/M7
1.10.5	Gantry travelling mechanism	min. T7/L2/M7
1.10.6	Trolley rotation mechanism	min. T5/L2/M5
1.10.7	Working speed	min. 16 m / min
1.10.8	Safe working load (SWL)	min. 40 tons
1.10.9	Gantry rail span	between 20 to 48 m
1.10.10	Cantilever outreach	max. 18 m
1.10.11	Hoisting height	min 10 m / max 20 m
1.10.12	Rope reeving	min 6 / max 8
1.10.13	Clearance between legs	min 15 m / max 18 m
1.10.14	Overall length (buffer to buffer)	min 23 m / max 29 m
1.10.15	Power supply method	Cable reel

1. Item No	2. Employers Requirements (ER)	3. Min. performance values
1.10.16	Main power supply	min. 50Hz max.60 Hz Medium voltage as required, e.g. Min. 6kV max. 15kV
1.10.17	In case of any damage or malfunction in the main power supply, the crane should be equipped with an emergency power supply / generator.	n
/1.10.18	**Generator set with isolation cabinet:** Used in a case when crane cannot be operated due to shutdown of main power supply. Generator set cannot be used for normal operation / container handling. Possibility that the generator set may be carried by a fork lift to provide the crane with electric power allowing dislocation of the crane to the safe position. Gantry crane shall be provided with a spring-loaded storm break automatically activated in case of a shutdown. The storm brake shall also act as a holding brake when the crane stops. The gantry crane should be parked safely at any place along the rail track.	min 115kVA
1.10.19	The Crane Management System (CMS) shall provide an easy-to-use visualization for crane operators.	n/a
1.10.20	The system shall consist of two CMS workplaces. Accessible via a laterally mounted monitor in the cabin with touchscreen function. The second workplace is in the electrical house, where the system can be accessed by the PC. Both workplaces shall allow full access to all CMS features.	n/a
1.10.21	Suitable for service technicians and terminal operators for diagnosis and maintenance purposes.	n/a
1.10.22	Gantry crane must be equipped with LED lights to ensure optimum illumination of the working area under	n/a

1. Item No	2. Employers Requirements (ER)	3. Min. performance values
	the crane, even in dark or poor light conditions.	
1.10.23	All walkways on the crane should be illuminated with LED lights.	n/a
1.11	**Trolley** - for movements of the hoist along the bridge girder of a crane. The hoist is moved horizontally along the top or underside of the bridge for positioning above a load.	n/a
1.11.1	The trolley shall be built as a twin-rail slewing trolley with non-slewing bridge.	n/a
1.11.2	An electrically operated chain hoist shall be installed on the trolley bridge for hoisting and slewing operation	hoisting capacity 2000 kg
1.11.3	Easy accessibility for operation and maintenance.	n/a
1.11.4	Hoisting with Safe Working Load (SWL) under spreader	min. 20 m / max. 35 m
1.11.5	Hoisting with empty spreader	min. 40 m / max. 80 m
1.11.6	Trolley travel speed	min. 60 m / max. 120 m
1.11.7	Gantry travel speed	min. 100 m/min / max. 140 m/min
1.11.8	Trolley rotation	min. 1 / max. 2 rpm
1.11.9	Robust and low-maintenance festoon wiring should be used for power supply.	n/a
1.12	**Spreader** – spreader beam moves in several directions allowing accurate positioning of the cargo.	n/a
1.12.1	Fully electric	n/a
1.12.2	The spreader shall be designed to pick up ISO standard containers with twist lock beams at the 20-40 ft position.	n/a
1.12.3	The spreader shall be provided with hydraulically driven European type piggyback to handle semi-trailers.	n/a
1.12.4	Power supply	400/230 V AC 50 Hz or different

1. Item No	2. Employers Requirements (ER)	3. Min. performance values
1.12.5	Control voltage	24V DC
1.12.6	Hoisting speed	Max 1 m/s
1.12.7	Special container sizes	20" / 40"
1.12.8	Capacities	min. 40t
1.12.10	Hydraulic electromotive telescopic	n/a
1.12.11	Electromotive rotation unit	n/a
1.12.12	Compact digital full HD cameras, with High Dynamic Range (HDR)	n/a
1.12.13	Design standard	EN13001; DIN 15018 H2B4; FEM 1.001; British standard BS 2573
1.12.14	Electrical design standard	EN15056
1.13	**Wire ropes** - used dynamically for lifting and hoisting in cranes and for transmission of mechanical power.	n/a
1.13.1	Wire Surface	Galvanized
1.13.2	Grade	1960 Newton / mm^2
1.13.3	Core	IWRC Plastic coated
1.13.4	Type	Compacted (hammering)
1.13.5	Tolerance	min +2 % / max +4 %
1.13.6	Classification	8 strand x K26 wires WS
1.13.7	Rope Direction	Right hand Regular Lay (RHRL)

1. Item No	2. Employers Requirements (ER)	3. Min. performance values
1.13.8	Diameter	min. 22 mm / max. 28 mm
1.13.9	Rope ends	Fused and tapered
1.14	**Electric motors**	
1.14.1	Main power supply	n/a
1.14.2	The motor cable reel should be accessed easily and safely by a ladder attached to the platform for maintenance.	n/a
1.14.3	Robust drum body is hot-dip galvanized and all covers must be manufactured from high quality steel.	min. S42 steel
1.14.4	Main hoist power	min. 240 / max. 275 kW
1.14.5	Gantry drive power	min. 20 x 19 / max. 24 x 19 kW
1.14.6	Trolley drive power	min. 4 x 5.5 kw / min. 4 x 32 kw
1.14.7	Slewing mechanism	min. 2 x 5.5 kw / min. 2 x 7 kw
1.15	**Control cabin** - to protect persons, mechanical and electrical items from weather conditions and enable gantry crane operation.	n/a
1.15.1	Visibility from control cabin or from Remote Operating Station (ROS).	n/a
1.15.2	Equipped with graphical user interface in cabin or in remote operation.	n/a
1.15.3	All control cabinets on the crane which are exposed to the weather should be made of stainless steel and additionally powder-coated.	n/a
1.16	**Software**	n/a
1.16.1	Remote Operating Station (ROS)	n/a
1.16.2	Programmable Logic Controller (PLC)	n/a

1. Item No	2. Employers Requirements (ER)	3. Min. performance values
1.16.3	PLC interface / control panel shall be provided for automated operation, control, detection of malfunction and alert.	n/a
1.17	**General applicable codes, standards and documentation**	
1.17.1	Quality Management System	ISO 9001
1.17.2	CE-Label	Compliance to the safety requirements is guaranteed by the fulfilling Machinery Directive 2006/42/EC requirements
1.17.3	EC- Machinery Directive	The Machinery Directive 2006/42/EC
1.17.4	EMC Directive	Electromagnetic Compatibility 2014/30/EU
1.17.5	Welding standard	EN ISO 15614-1
1.17.6	The crane system shall be designed and manufactured according to the latest technology It should minimally include the following codes and standards:	EN 15011 (Cranes - Bridge and gantry cranes) EN 13001 (Cranes – General Design and Crane Safety) EN 1991 (Eurocode – Actions on structures) EN 1993 (Eurocode – Design of steel structures) EN 12644 (Crane – Information for use and testing) EN 1090 (Execution of steel structures and aluminium structures) EN 60204 (Electrical equipment of machines)

1. Item No	2. Employers Requirements (ER)	3. Min. performance values
		EN 13849 (Safety-related parts of control systems)
1.17.7	The metric system shall apply to all drawings	n/a
1.17.8	Following minimum documentation shall be furnished by the contractor: • Operation manual of the crane system; • Maintenance manual of the crane system and all components; • Assembly drawings of the main structural components in original size,; • Wiring diagrams including: - Device lists - Terminal schemes - Layout plans - Active flow diagrams and circuit diagrams • Crane inspection and test log book.	According to EN 1090 and the Machinery Directives

1. Gantry crane manufacturer evaluation criteria to be fulfilled shall include as a minimum:

- Mechanical anti-sway device - electronically controlled anti sway mechanism not allowed / crane should be equipped with powerful, oversized mechanism;
- The manufacturer must provide references of at least 3 projects, of successfully delivered gantry crane during the last 3 years of approx. same size;
- Materials and components shall originate from IPA eligible countries;

- Gantry crane shall have semi-automatic operation in x / y direction in the container storage area, manually controlled lowering and supervised lifting as well as locking / unlocking;
- Interface of Crane Management System and Terminal Operation System (CMS/TOS) shall be a standard commercial software with SQL Server database;
- "Soft landing", for active noise reduction in the neighbourhood / residential areas;
- "Energy recovery" use of return energy for other movements of other mechanisms at the crane, or on an another / adjacent crane;
- "Return energy" to be supplied into the terminal network for other purposes (e.g., lighting, etc.) needs to be agreed and approved by the electric utility provider.