



Technical specification

Overhead ladle Crane 152, SMS - upgrade from 250 tf to 275 tf

Liberty steel Galati
No. 7100 / 161 / 10.02.2023



TECHNICAL SPECIFICATION

OVERHEAD LADLE CRANE 152, SMS, INCREASING THE LOAD FROM 250 tf TO 275 tf

Rev 00

Contracted work:

SOLUTION STUDY

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FOREWORD

Liberty Steel Galati plant is called hereinafter, the **COMPANY** and the **PROVIDER** of equipment and services is named hereafter **PROVIDER**

In this technical specification, the installations represent the overhead ladle crane 152 from Steel Melting Shop no.1, as well as the complete connected installations and the equipment that represents a part of the installation.

The **COMPANY**, within its project aims to ensure the transfer of the ladle with liquid steel between converters and ladle furnace targeting to:

Increasing the load of the the actual P152 overhead crane, from 250 tf to 275 tf

This project is a part of the sustainability program of the **COMPANY** aiming to achieve the continuation of production under safety working conditions. For these considerations, the performance of the crane must be anticipately adapted accordingly (capacity, reliability, speed, number of manoeuvres)

This technical specification refers only to the first step and that is to draw up the **Solution Study** for upgrading the P152 from 250 tf to 275 tf.

PROVIDER'S compliance with this technical specification represents a commitment for results and performances as requested by the **COMPANY**.

The **PROVIDER**, within his commitment for results and performance, will ensure that the object of his work, all the materials, equipment and documents delivered by him, comply perfectly with enforced Romanian laws, decrees and standards, especially regarding health and safety and environment protection, technical as well as with internal regulations of the **COMPANY**.

Within the contracted work, the **PROVIDER** will strictly comply with IT DP 045 "General rules to be applied by LIBERTY GALATI contractors" as well as with all the policies and objectives of the latter.



1. OBJECT OF CONTRACTED WORK

Within the project for transfer of the ladle with liquid steel between converters and ladle furnace this Technical Specification refers to a Study for transforming the actual P152 crane in order to increase its capacity from 250 tf to 275 tf, with the condition to maintain the same weight of the assembly crane + max. load. This condition is imposed in order to not modify the actual runway girders.

The modifications suppose the followings:

- replacing the actual hoisting mechanism 250 tf with a new one of 275 tf or upgrading the existing one;
- replacing the actual auxiliary mechanism 80 tf with a new one of 65 tf , with the condition to assure the capability to tilt the ladles, full of liquid steel
- giving up to the auxiliary mechanism of 16 tf .

By transforming the actual overhead crane 152 with a bigger capacity the **COMPANY** expects an improvement from the last technologies in terms of health and safety, energy efficiency, productivity increase and maintainability.

The object of work executed by the **PROVIDER** will include in particular:

- Data collection from existing documentation, site surveys and technical discussion
- On-site verification of all drawings & data provided by the **COMPANY**
- On-site verification of all features of the existing installations/equipment that could influence the results & performances to be proposed by the **PROVIDER**
- On-site verification of any pre-conditions needed for the results & performances to be proposed by the **PROVIDER**
- Technical expertise of the crane: metallic construction, mechanisms , electrical installations
- Calculation Breviary for metallic construction, trolleys, mechanisms and electrical installation, in the proposed situation (275 / 65 tf x 15.5 m)
- Job list of the all necessary activities for transforming the crane
- ISCIR approval for transforming the crane
- All drawings & documents containing all required data for upgrading;
- Complete documentation, for obtain the ISCIR authorization

The **PROVIDER** is the sole responsible for the solutions proposed in order to guarantee the proper operation of the installation and to obtain the results, performances and functionalities expected by the **COMPANY**.

The **PROVIDER**, in the scope of his work will have to strictly comply with the following principles:

- Define and conceive the study, to guarantee a perfect restart of the full installation and making sure that there is a full integration with the existing systems, structures and equipment.
- Conceive the study, in order to guarantee the health and safety and environment protection and to minimize the execution difficulties of his work,
- Obtain the results and performances expected and defined by the **COMPANY**
- Improve the reliability, availability, maintainability of equipment which will be proposed to be modified, adapted, replaced and / or related with the execution of proposed work
- Integrate the proposed work in the planning of the **COMPANY**
- Inform and consult with **COMPANY**, on regular basis, about achieved results.



2. CHARACTERISTICS OF THE INSTALLATION INTERFACING WITH THE CONTRACTED WORK AND LOCATIONS FOR THE EXECUTION OF CONTRACTED WORK

2.1 SITE CONSTRAINTS

Within the Study, object of this technical specification, the PROVIDER must propose the solutions to comply perfectly with the constraints and risks present on the site of the COMPANY and as he also identified during the site survey. The PROVIDER must also respect the IT DP 045 "General rules to be applied by LSG PROVIDER'S

2.1.1 Constraints specific to the working environment of the equipment

The PROVIDER, during the execution of work, will also take into consideration the following specific constraints:

General environment data:

- Outdoor temperature *
- Relative humidity *
- Last earthquake observed in the area:: - 30.08.1986 = 7, 1° Richter, 30.05.1990 = 6, 9° Richter, 31.05.1990 = 6, 4 ° Richter, 27.10.2004 = 6 ° Richter
- Galati is in Earthquake Risk Zone Level VII on Mercalli scale.
- Wind and Snow conditions*:
 - Reference wind speed: 32m/s,
 - Reference wind pressure: 0,5 kPa,
 - Snow load: 250 kg/m² at ground level

(*) : values to be confirmed by the PROVIDER based on the meteorological station near the Braila airport, for the execution period of concerned works, see at:

<http://www.weatherbase.com/weather/weather.php3?s=1351&refer=&cityname=Galati-Romania>

Specific site data:

- Installation is located indoors Inside the Bay E-F (the PROVIDER must check the documentation for detail layout)
- The installation is subject to heat radiated by the surface of the liquid steel or by the empty ladle itself. The temperature at the ladle surface can reach 1650°C
- Under the girder temperatures reach 180°C and under the hooks cross beam (lifting beam) up to to 800°C.
- The installation is subject to dust, 10 mg/m³
- High temperature inside the bay with variations between the range of - 20 up to + 60° C (the temperature nearby the entire crane – except below girders- can reach sometimes + 80 C)
- Ambient temperature with moisture variations
- Noise – 88.8 Db
- Behaviour during standard power line disturbances (amplitude – 30% U duration 300 ms)
- Existing means and elements for Lock Out/Tag Out of energies to be explained during site survey
- Under voltage installations nearby



When proposing the solutions, the **PROVIDER** must take into consideration the working environment conditions, available space as stated in this technical specification and also as observed during the site survey.

2.2 INSTALLATION & ACTIVITIES INTERFACING WITH THE CONTRACTED WORK

Equipment present in area	Interfacing [y/n]
Overhead crane	yes
Casual flow of materials and process activities	yes
Other projects in the area	Yes

2.2.1 Process overview

Mainly, the crane 152 insures the transfer of the ladles of liquid steel between BOF converters – ladle furnace (LF) – RH (and their empty return)

Additional operations carried out by the P152 crane:

- Handled steel pots for demolition of masonry.
- Handled steel pots for positioning pots on dryers.
- Manipulated steel transfer for maintenance programs.
- Handled the coils of Ferrous alloys . To supply the cutting machines Al.

2.2.2 Location

The installation is located in the steel shop with the **COMPANY** premises, in Galati, Romania. The actual overhead ladle crane 152 is located in E-F casting bay. The bay E-F has an opening of 18 m and a length of 219 m. The entire height is of 31,80 m and 33.64 at top

This crane has more than 55 years of service. The last expertise performed by BUTAN Group, in Aug 2013, confirmed the load of 250 / 80 / 16 t.

2.2.3 Overhead ladle crane 152 technical data

Item	U.M	Value	
		Min value	Max value
Commissioning year:	Year	1968	
Fabrication number:	No	685815/1968, nr ISCIR G 857	
The average number of cycles per day	cycles/day	45	
Crane capacity main	tf	250	na
Crane capacity auxiliary	tf	80	na
Crane capacity maintenance	tf	16	na
Crane is for maintenance or process?	na	process	
Structural classification	na	A7	
Mechanical classification- hoist main	na	M7	



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Overhead ladle Crane 152, SMS - upgrade from 250 tf to 275 tf

Item	U.M	Min value		Max value	
Mechanical classification- hoist auxiliary	na	M7			
Mechanical classification- hoist maintenance	na	M7			
Mechanical Classification- translation trolley main	na	M7			
Mechanical Classification- translation trolley auxiliary	na	M7			
Mechanical Classification- crane travel	na	M7			
Operation class	na	C			
Lifetime	Years	25	na		
Overhead crane inside or outdoor?	na	inside			
Ambient working temperature-Under the crane girders	C	25	180		
Ambient working temperature-in the bay	C	-20	60 (casual can reach 80 C)		
Ambient working temperature at the ladle surface	C	1550	1650		
Ambient working temperature under lifting girders	C	650	800		
Operator cabin or/and remote control	na	Operator cabin			
Mobile cabin	Y/N	N			
Beam type (single/double/multiple- no.)		4 beams			
Beam with hook	Y/N	Y			
No. of hooks main	no	2			
Lifting capacity per each hook/load	t	125 (2 hooks= 250 t)/80/16			
No. of hook auxiliary	no	2			
Lifting capacity per each hook auxiliary	to/hook	16	80		
Hook maintenance	Y/N	Y			
No. of maintenance hooks	no	1			
Lifting capacity per each maintenance hooks	to/hook	16			
Maxlm load on wheel	to	52			
Lifting height	m	10			
Type of railway	na	KP 120			
Length of the railway	m	225			
Height of the railway	m	16,5			
Type of material of wheels	NA	Casted with forged contact surface			
Wheels hardness	HB	400	420		
Wheels lateral guiding	Y/N	Y			
Crane wheels diameter	mm	800			
Span	m	19,6	na		
Trolley wheels diameter	mm	800			
Railway type for trolley	na	KP100			
Crane gauge	m	15.5			
Crane wheelbase	m	12.1			
Main trolley gauge	m	6.5			
Auxiliary trolley gauge	m	2.25			
Main Trolley wheelbase	m	4.4 (± 4 mm)			
Hook type and material	na	Metallic construction for 80 t/125 t Casted for 16 t			



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Item	U.M	Value	
		Min value	Max value
Main lifting speed	m/min		4.2
Auxiliary lifting speed	m/min		8.3
Maintenance lifting speed	m/min		16.3
Travel speed for crane	m/min		82
Travel speed for main trolley	m/min		24.7
Travel speed for auxiliary trolley	m/min		39,5
Type of gearbox for main lifting	na		?
Type of work brake for main lifting	TYPE		FC 630
Type of service brake for main lifting	TYPE		FC 630
Type of safety brake for main lifting	TYPE		SHC 251
Anti-wire overlapping system (Y/N)	Y/N		N
Gearbox for main lifting load			1 (one) planetary gearbox
Gearbox for auxiliary lifting load			1 (one) horizontal gearbox
Gearbox for maintenance lifting load			1 (one) horizontal gearbox
Gearbox for main trolley travelling			2 (two) vertical gearboxes with central operation
Gearbox for auxiliary trolley travelling			1 (one) gearbox with central operation
Gearbox for crane travelling			2 (two) vertical gearboxes with central operation per each girder
Brake for auxiliary work lifting load	TYPE		FC710
Brake for maintenance lifting load	TYPE		FC400
Brake for crane travelling	TYPE		2XFC400
Brake for main trolley travelling	TYPE		FC320
Brake for auxiliary trolley travelling	TYPE		FC320
Steel lifting cable	TYPE		stratoplast D34
Semi- automation? (Y/N)			N
Full automation? (Y/N)			N
Energy saving converters. (Y/N)			N
PLC included? (Y/N)			N
Electrical Anti-sway incl. (Y/N)			N
Anti-twist cable system	Y/N		Y
Motor classification (for production class F)	Class		F
Electric drive with frequency type?	Hz	50	na
Uninterruptible Power System UPS	Y/N		N
Overload limitation system	TYPE		sensy

In the same bay there are 2 overhead cranes that have the same characteristics and same age. The average number of cycles per day being 45, we have a load of 77.1% for the current level of production 2.4 MTLs

The maximum number of cycles that P152 can do is 58 with a use of 99.4%- BOF- LF-RH- Empty ladle back



2.2.4 Characteristics of transported products

Liquid steel ladles with steel at approximately 1650°C
Handled steel pots for demolition of masonry.
Handled steel pots for positioning pots on dryers.
Manipulated steel transfer for maintenance programs.
Handled the coils of FE alloys. To supply the cutting machines Al.

2.3 TOPOGRAPHY – SITUATION OF LOCATIONS – VERIFICATION OF GENERAL LAYOUTS OF THE COMPANY

The **PROVIDER**, prior to sending the final offer will conduct one or several surveys of concerned locations in order to specifically verify, measure the accuracy of layouts of existing installation as well as all existing interferences and risks.

The **PROVIDER** is allowed to bring on site for this survey any specialists that are required for a better understanding of the existing situation.

The **PROVIDER** must taking in consideration available space and any other site constrains.

All visits of locations will take place in the presence of a member of the **COMPANY**.

The solutions proposed by the **PROVIDER** within the Study must be, in any case, compatible with existing structures, working conditions and process constrains rather than with the layouts of the **COMPANY**, if due to any reasons the latter will prove to be inaccurate.

3. DESCRIPTION OF CONTRACTED WORK

3.1 DESCRIPTION OF GENERAL FUNCTIONS IN SCOPE OF CONTRACTED WORK

The object of the contracted works refers to a Study for transforming the actual P152 crane in order to increase its capacity from 250 tf to 275 tf, with the condition to **maintain the same weight of the assembly crane + max. load. This condition is imposed in order to not modify the actual runway girders.**

The modifications suppose the followings:

- replacing the actual hoisting mechanism 250 tf with a new one of 275 tf or upgrading the existing one;
- replacing the actual auxiliary mechanism 80 tf with a new one of 65 tf , with the condition to assure the capability to tilt the ladles, full of liquid steel
- giving up to the auxiliary mechanism of 16 tf .
- repairs of the existing components in accordance with the Technical Expertise conclusions

3.2 SPLITTING OF CONTRACTED WORK INTO FUNCTIONAL POSTS

In order to have clarity in the functional description of the contracted work, the **COMPANY** has hereinafter divided the contracted work into functional posts.

In the same idea, in order to clarify the global comprehension of the contracted work, the **PROVIDER** will comply with this splitting into posts, unless this splitting does not allow him to comply with his commitment for results.

1. Post 1 Technical expertise of the crane
2. Post 2 Breviary calculations for the proposed solution
3. Post 3 Job list for all the works
4. Post 4 ISCIR approval for transforming the crane



3.3 FUNCTIONAL DESCRIPTION OF POSTS

3.3.1 Post 1 Technical expertise

The technical expertise will establish all the necessary works for eliminate all the existing non conformities of the actual crane.

It will be expertised the following :

- Metallic construction of the crane
- Crane travelling mechanism;
- Lifting mechanism 250 tf;
- Trolley travelling mechanism 250 tf
- Electrical installation of the crane

All the auxiliary tools, equipments and activities needed for preparing the expertise are in the PROVIDER's scope (e.g. topo measurements, scaffolds, articulated boom lift, NDT of the metallic construction etc.)

3.3.2 Post 2 Calculations breviary

It will draw up calculations breviary for the followings:

- Metallic construction (275 + 65) t – 15.5 m
- Trolley 275 tf (hoisting mechansim, travelling mechanism and metallic construction);
- Trolley 65 t new (hoisting mechanism, travelling mechanism and metallic construction) It will guarantee the capability to tilt the ladles full of liquid steel.
- Elecirical installation of the crane (275 + 65) tf – 15.5 m

When proposing the solutions, the PROVIDER will aim to keep in mind a standardization of all the foreseen equipment that made up the proposed solution.

The PROVIDER must conceive its solution so that all equipment and components are available on the market from alternative PROVIDERs (at least 2) for the COMPANY to purchase at least for the next 15 years.

The PROVIDER will propse only equipment resistant to the heat and soundly positioned (specific attention to instrumentation devices)

Calculations and dimensioning of all components will be performed based on transitory (starting off, breaking) and extreme (trials, degraded operation, cable or drive chain breakage, disequilibrium, impacts etc.) operational conditions.

The components must be able to bear the corresponding torque and power and withstand the shocks and impacts that might occur.

Drums / pulleys / cables must be designed and dimensioned in order to obtain and guarantee a minimum lifetime for cables of 5 years.

The PROVIDER will follow the below stated design inputs:

	Utilization class	Load-spectrum class	Machine group
Whole of the structures	U8	Q4	A8
Framework	B8	P4	E8
Main hoisting mechanisms	T8	L4	M8
Auxillary hoisting mechanisms	T8	L4	M8
Travelling mechanisms	T8	L4	M8
Steering mechanisms	T7	L4	M8
Auxillary steering mechanisms	T7	L4	M8



3.3.3 Post 3 Job List

It will draw up a Job List with all the necessary activities to transform the existing crane P152 (250+80/16) t – 15.5 m in a crane (275 + 65) t – 15.5 m, **with restriction to maintain the same weight of the assembly crane + max. load**

It will indicate a estimation regarding the value of the necessary works in order to transform the crane, and the necessary time, including the repairs of the existing components.

3.3.4 Post 4 ISCIR approving for transforming the crane

After the study will be agreed by the COMPANY, the PROVIDER will do all the necessary actions for approving the study by the ISCIR authority, and will provide all documents needed to obtaining the ISCIR authorization or any document required by the Romanian legislation for operating the crane.

3.4 STUDIES

3.4.1 Mechanical/Hydraulic/Pneumatic Studies

The PROVIDER has to take in account and study the existing mechanical/hydraulic/pneumatic solutions applied on the existing crane, so that the proposal solutions for upgrading the crane has to be suitable with the components that will be kept

3.4.2 Civil Works Study – n/a

3.4.3 Functional studies

3.4.3.1 General and /or Detailed Functional Analysis

The Provider:

- Provides the operational instructions
- Elaborates the functional analysis jointly with the COMPANY
- Elaborates the form for the functional requirement
- Verifies the correlation of this functional requirement with the requirements of the COMPANY
- Specifies the interfaces

3.4.4 Electrical and automation studies

In order to structure the conception and the execution of sub-assemblies for automations, the PROVIDER has to use a library of standard programming modules, unless there is a properly justified exception.

The conception of automation sub-assemblies has to ensure the safety and the rapidity in installing, diagnosing and troubleshooting them.

3.4.5 Reliability study

The solution that will be proposed will take in account the reliability of the new components, and has to assess the probability of occurrence.

3.4.6 Study for safety during design/conception

The PROVIDER has to:



- Identify the risks linked to his supply during design, implementation, operation and maintenances phases
- Identify and implement actions to eliminate/reduce/replace identified risks
- List these risks and measures in a synthesis document (as table)

3.4.7 Studies for the execution and implementation of contracted work within existing installation

The PROVIDER has to:

- Verify the existing installations (existing piping, anchorage, cabling...)
- Study the interfaces with existing installations
- Make the studies for the integration of the system

3.4.8 Special studies for erection and dismantling during the execution of contracted work

The proposed solutions for upgrading the crane has to take in account the operations to be performed on site in order to minimize the erection time and stoppages time of the crane.

3.5 WCM

The PROVIDER will comply with IT DP 045 "General rules to be applied by LIBERTY GALATI contractors" and the IT DP 046 «WCM Job List for Suppliers».

3.6 FIRST PRIORITY PARTS – SPARE PARTS – UPGRADEABILITY

The PROVIDER will comply with IT DP 045 "General rules to be applied by LIBERTY GALATI contractors"

4. RESULTS, PERFORMANCES & MEASUREMENTS TO BE ACHIEVED

4.1 RESULTS AND PERFORMANCES TO BE ACHIEVED

The PROVIDER studies, defines and executes the contracted work as well as the equipment object of the contracted work to achieve the results and performances defined below, as well as in IT DP 045 "General rules to be applied by LG PROVIDER'S"

The PROVIDER must take in consideration the working environment (i.e. temperature, corrosion, steam etc) when designing and executes the contracted work and equipment.

The PROVIDER must also check the site status and existing design for proper adaptation to observed situation.

4.1.1 Production & exploitation

The work executed by the PROVIDER, as well as the Equipment object of contracted work, must achieve the following results and performances in terms of exploitation:

Number lifts per day = 276

Number translation per day = 276

Distance per day = 12 km

Number of cycles per day = 58

Lifetime = 25 years



4.1.2 Product quality – n/a

4.1.3 Yield – n/a

4.1.4 Impaired or reversed operation, specific conditions – n/a

4.1.5 Consumptions – no special requirements

4.1.6 Reliability, maintenance, availability

The work executed by the **PROVIDER**, as well as the equipment object of contracted work, has to comply strictly with the recommendations regarding maintenance and reliability of installations, detailed in the document « Annex no 05 -IT DP 046 WCM Specification for **PROVIDERs** Rev.0 » and «Annex no 19 – TPM development & specification for **PROVIDERs** » attached to the RFQ.

4.1.6.1 Tolerances for non-availability of the Equipment object of work executed by the Provider

The non-availability of the overall equipment object of the work executed by the PROVIDER must not exceed the limits indicated in the following matrix of criticality.

The cases considered as acceptable are marked by "A"

The cases considered as unacceptable are marked by "I"

Breakdown = non-availability or faulty operation of the function

BREAKDOWN	VERY FREQUENT 1 breakdown per month Fmax = 12 / year	FREQUENT 1 breakdown per semester Fmax = 2 / year	LESS FREQUENT 1 breakdown per year Fmax = 1 / year	IMPROBABLE 1 breakdown every 5 years Fmax = 0.2 / year
CATASTROPHIC Stoppage > 8 h	I	I	I	I
CRITICAL 2h < Stoppage <= 8 h average = 5 h	I	I	I	A
MAJOR 1h < Stoppage <= 2 h average = 1.5 h	I	I	A	A
MINOR Stoppage < 1 h Average = 0.5 h	I	A	A	A

4.1.6.2 Operational Rate – Availability Rate

The definition of the calculation of the operational rate and the availability rate of the **WORK EQUIPMENT** made by the **PROVIDER** can be done as follows:

The above matrix allows the determination of the accepted stand-by time:

- Catastrophic stationary: 0 h / year
- Critical stoppage: 0,2 x 5 = 1 h / year
- Major stoppage: 1 x 1,5 = 1,5 h / year



Minor stoppage: $2 \times 0,5 = 1 \text{ h / year}$
Thus:
Accidental stationary time is:
T Accidental stationary = 3,5 h / year

The plant operates 365 days a year in 3x8 h or 8760 h / year.
Planned maintenance stops are rated at: T = 300 h / year

The operational rate is calculated by integrating the stops planned:
Operational rate = $(8760 - T \text{ planned stops} - T \text{ accidental stationary}) / (8760)$

The availability rate is calculated excluding plant maintenance stops, or as:
Availability rate = $(8760 - T \text{ planned stops} - T \text{ accidental stationary}) / (8760 - T \text{ planned stops})$

The Equipment object of the work executed by the **PROVIDER** must achieve the following results and performances:

Operating rate = 96,53%
Availability rate = 99,96%

The assembly of the installation must be conceived in order to achieve the above defined operational rate and availability rate, especially with the possibility to diagnose and replace immediately a faulty mechanism and the availability of necessary spare parts.

Generally, to be maximized the uniformity for mechanical and electrical parts, frequency converters, etc....to reduce the diversity of spare parts and optimize the related stock ;

4.1.6.3 Other results and performances to be obtained in terms of Maintenance and Reliability

The COMPANY is aiming to maintain the existing level of stock diversity and prefers to future use of grease mobile LBZ low viscosity

The PROVIDER should aim to design all systems taking in consideration COMPANY'S recommendation without generating additional scope.

4.1.7 Other results & performances to be obtained

4.1.7.1 Safety

Ensure fire detectors in the operator cabin. Provide fire extinguisher (manual) in the operator cabin.

All equipment must be design for a temperature 60 (casual can reach 80 C)

Ensure fire detection and extinguishing (automated) in all electrical rooms.

PROVIDER must provide anchorage points on the crane to ensure the maintenance and operation activities.

4.1.7.2 Extra works

The **PROVIDER**, within his commitment for results and performance, will ensure that the supplied solution is adapted to the existing situation and **not generate extra works** (i.e. consolidation of the existing foundation or of the metallic structure, runway girders etc)

4.1.7.3 Performances related to planning

The **PROVIDER** must respect of planning with 0% deviation from initial agreed planning



4.2 POSSIBLE EVOLUTION OF THE INSTALLATION IN THE FUTURE – N/A

4.3 LIFETIME

The PROVIDER must design the supplied solution and equipment so that the lifetime is of 25 years. The PROVIDER must deliver the reference list with the observed lifetime all supply.

4.4 METHODS TO VERIFY THE RESULTS & PERFORMANCES TO BE ACHIEVED – n/a

5. SAFETY & ENVIRONMENT

THE COMPANY UNDERSTANDS THAT THE SAFETY OF EQUIPMENTS AND WORKS EXECUTED ON-SITE IS OPTIMUM AND WORKS ARE EXECUTED IN PERFECT SAFETY CONDITIONS.

The PROVIDER will comply strictly with IT DP 045 "General rules to be applied by LG PROVIDERS" and IT DP 044 General safety instructions for External Companies that work on the beneficiary's sites.

The PROVIDER will inform the COMPANY about all the specificities of the equipment in terms of environment and safety.

Considering the environment in which the Equipment will be installed, since the conception phase of the respective equipment, the PROVIDER will comply with the following prescriptions, regarding the safety of the equipment and that of the worksite

The PROVIDER must attach to the Technical Offer, the filled-in template F.DP.087 H&S Management Questionnaire V0, (annex to this Technical Specification).

5.1 PARTICULAR SAFETY SPECIFICATIONS TO BE CONSIDERED

All actions to eliminate / reduce / replace identified risks resulting from HIRA, described in chapter 3.4.6 – Study for safety during design/conception, of this document are considered as part of the PROVIDER supply – design, manufacturing, delivery, erection, notably all the energy Lock out elements.

General health & safety instructions for all external companies working on sites belonging to COMPANY (annexes no.3 and 4) are not exhaustive and are general. Services PROVIDERS and their subPROVIDERS are bound to observe and apply entirely all national laws regarding Health & Safety, even if they are not stipulated in annexes.

5.2 PARTICULAR SPECIFICATIONS REGARDING THE SAFETY OF THE WORKSITE

Special attention has to be provided for the safety of the worksite, especially regarding:

- Superposed works
- Interfaces between worksites – PROVIDERS

5.3 PARTICULAR SPECIFICATIONS REGARDING THE ENVIRONMENT

The PROVIDER will comply with all laws, norms, rules, and regulations applicable in Romania.

All the management related to waste are in the scope of the PROVIDER.

The PROVIDER based on site survey as well as existing laws, standards and norms must assess the corrosive of the environment to which the structure, parts and equipment will be exposed and in implement appropriate coating and surface protection. The specifications will be submitted to COMPANY for review from early design phase.



6. TECHNICAL RULES, NORMS, PRESCRIPTIONS AND LAWS FOR DESIGN, ERECTION, MOUNTING, COMMISSIONING

The **PROVIDER** will comply strictly with IT DP 045 "General rules to be applied by LG **PROVIDERS**" along with all the laws, regulations, norms and standards of required in Romania.

According to the evolution of standards and norms, if there are any contradictions between the recommendations and prescriptions of the **COMPANY** and enforced regulations, the **PROVIDER** has the obligation to inform the **COMPANY** with minimum 30 days in advance. The final solution will be chosen by mutual agreement of the two parties.

6.1 SPECIFIC RULES

Additionally to enforced Norms and Regulations, as well as to construction standards, instructions and rules of the **COMPANY**, the **PROVIDER** will comply with the below mentioned specific rules:

ISO 9001

ISO 14001

ISO 18001

Law 316/2006

IEC 81346

SR EN 22768-1,2 mK

FEM 1. 001 3rd Edition revision 1998/10/01;

FEM 9.901 Calculation base for overhead crane equipment's;

Machining-ISO 2768/UNI EN 22768;

CEN-European Committee for Standardization;

CENELEC-European Committee for Electro technical Standardization;

ETSI-European Telecommunication Standard Institute;

ANSI/AGMA n. 2001, 6001 and related standards for gearboxes;

ISO/AWS for welding design and procedures;

IEC for electrical part;

DIN for forged hooks; forging according to EN 10254: 2001: steel closed die forgings;

SR 1944-1; SR 1944-2; SR 1944-3; SR 1944-4; - "Simple forged hooks with rod"

DIN 15018;

DIN 15020;

EN 349 : 1 994 + A1:2008 Safety of machinery-Minimum gaps to avoid crushing of parts of the humane body;

EN-ISO 5817:2007: Welding-Fusion welded joints in steel, nickel, titanium and their alloys (bean welding excluded)-Guidance on quality levels for imperfections-> Level B = Quality level : Stringent;

EN 13135-1 : 2003 + A1 : 2010 : Cranes-Equipment-Part 1 : Electro technical equipment;

EN 13135-2 : 2004 + A1 : 2010 : Cranes-Equipment-Part 2 : Non-electro technical equipment;

EN 13155;2003 + A2:2009: Cranes-Safety-Non-fixed load lifting attachments;

EN-ISO 13857 : 2008 : Safety of machinery -Safety distances to prevent hazard zones being reached by upper and lower limbs;

EN 15011 : 2011 : Cranes-Bridge and gantry cranes;

EN 1090-1 +2 : Execution of steel constructions & aluminium structures-Class to be determined during basic engineering.

Steel constructions

FEM 1. 001, edition 1998-Booklet 1 to 9;

Eurocode 0(EN 1990) : basis of design;

Eurocode 1 (EN1991) ; actions;

Eurocode 3 (EN 1993) : steel;

EN ISO 13849-1 Safety of machinery-Safety-related parts of control systems-

Part 1 : General principals for design-performance levels;

EN 13850 Safety of machinery-Emergency stop-Principles for design;



EN 62061 Functional safety of safety-related electrical, electronic and programmable electronic control systems-Safety Integrity Levels;
EN 954-1 Safety categories (replaced by EN ISO 13849-1 and EN 62061);
EN 60204-1 Safety of Machinery Electrical Equipment of Machines
Part 1 : General requirements (replaced by EN ISO 13849-1 and EN 62061);
EN 60204-32 Safety of machinery-Electrical equipment of machines-
Part 32 : Requirements for hoisting machines (replaced by EN ISO 13849-1 and EN 62061);
EN-ISO 14121-1 Safety of machinery-Risk Assessment Safety of machinery-Risk assessment examples of methods;
EN-ISO 14121-2 Safety of machinery-Risk assessment-Part 2 : Practical guidance and examples of methods;
EN 14122-1 to 4 Access to work stations;
EN ISO 12100-1 Safety of machinery-Basic concepts, general principles for design
Part 1 : Basic terminology, methodology;
EN ISO 12100-2 Safety of machinery-Basic concepts, general principles for design
Part 2 : Technical principles;
EN ISO 13857 Safety distances, dimensioning and screening;
EN 953 Physical guards;
EN 563 Safety of Machinery-Temperatures of touchable surfaces;
EN ISO 13732-1 Ergonomics of the thermal environment-Methods for the assessment of human responses to contact with surfaces-Part 1 : Hot surfaces;
IEC 61131 Programmable logic controllers (PLCs);
EN 13135-1 Crane safety electromechanical equipment;
EN 13135-2 Crane safety non-electromechanical equipment;
EN 13557 Cranes. Controls and control stations;
EN 13586 Cranes. Access;
EN 12077-2 Cranes safety-Requirements-Part 2 : Limiting and indicating devices;
EN 12644 Cranes -Information for use and testing-
Part 1 : instructions;
Part 2 : Marking;
EN 60034 Rotating electrical machines;
EN 60947 Low-voltage switchgear and control gear, General rule's;
SR EN 12644-1+A1:2008 Lifting equipment. Information for use and testing. Part 1: Instructions
SR EN 12644-2+A1:2008 Lifting equipment. Information for use and testing. Part 2: Marking
SR EN 12385-1+A1; SR EN 12385-2+A1; SR EN 12385-3+A1; SR EN 12385-4+A1; - "Steel cables";
Fire retardant or fire-resistant standards
IEC 60332 Tests on electric and optical fiber cables under fire conditions;

6.1.1 Legal standards and norms for manufacturing, erection and tests

HG 51/1996 – decision regarding the regulation of reception for machine montage, equipments, technological installations and their commissioning.
OG No. 95 from 30 August 1999
Law NO. 440 from 27 June 2002
EN 10204
EN 10204 - *Inspection Certificate according to EN 10204, type 3.1*
ISO 286-1:2010
EN 22768/1,2

6.1.2 Specific rules and request for mechanical, hydraulic and HTV

Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC (recast) (Text with EEA relevance)
HG nr. 1029/2008,



DIRECTIVE 2004/108/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility

PROVIDER will assure the protection against corrosion using anti corrosive paintings on all parts that are subject to this risk.

The layout of the installation will be conceived to prevent accumulation of dust and drainage, spills of any kind.

6.1.3 Specific rules for electrical and instrumentation

73/23/EEC	Low Voltage Directive
EN 60 204	Safety of machine, electrical equipment of machines
EN 50 178	Electrical equipment in electrical installation
EN 61 800-3	Variable-speed electric drive EMC product standard
EN 55 011	EMC Emission
EN 61 000-4-3	EMC Interference - Immunity
IEC 60 801-3	EMC Interference

IEC 62337 Commissioning of Electrical, Instrumentation and Control Systems in the Process Industry

IEC 62381 Activities during Factory Acceptance Test (FAT), Site Acceptance Test (SAT) and Site Integration (SIT) for Automation

IEC 62382 Electrical and Instrumentation Loop Check

DIRECTIVE 2006/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 12 December 2006 on the harmonisation of the laws of Member States relating to electrical equipment designed for use within certain voltage limits

HG nr. 457/18.04.2003

HG nr. 982 from 22 august 2007

The list is not exhaustive. All EU electrical standards must be accomplished.

Romanian Norms

- NP I7-02 – norm for electric installations engineering and execution
- PE 107/98 – Norm for electric cable networks engineering and execution
- PE 102/86 – Norm for the engineering and execution of connecting and distribution installations with power up to 1000 V a.c.

6.1.4 Other Specific Rules

All European standards must be respected.

The European and Romanian legislation in force, and with (list not exhaustive):

- national standards in force regarding pollution control, health and safety, calculations.
- HG 1029/2008 : "Lifting machines other than lifts and service lifts",
- SR EN 12644 – 1+A1:2008 Lifting machines other than elevators and service elevators
- SR EN 12644 – 1+A2:2008 Lifting machines other than elevators and service elevators
- PT R1 2003 Lifting machines other than elevators and service elevators
- General safety instructions for External Companies that work on the beneficiary's sites
- to law n° 91-1414 of 31.12.91 Heading II, provision ensuring the transposition of E.E.C. directives regarding the design of machines, appliances, tools, heavy plant, equipment and installations.
- decree 88-1056 of 14.11.88, and its appendices regarding the protection of workers against the dangers of electric current.
- decree 98-1084 of 02.12.98 regarding organization measures, conditions of setting in operation and the technical stipulations that govern use of equipment in the workplace.



- order of 18.12.92 regarding coefficients of utilization of lifting accessories.

Technical Documents & specifications :

- a) ASME NOG 1 - 2004 – Rules for manufacturing of cranes, overhead cranes, gantry cranes (overhead multi-girder crane), valid edition *;
- b) AWS D1.1M - Welding code for structures – Steel, valid edition *;
- c) AWS D14.1M –Welding specifications for industrial cranes and other lifting equipment, valid edition *;
- d) ASTM A 36/A 36M, Specification for carbon steel for structures, valid edition*;
- e) ASTM A 48/A 48M, Specification for Gray Cast Iron, valid edition*;
- f) ASTM A 275/A 275M, Norm of testing methods for Magnetic particles examination of forged steel, valid edition*;
- g) ASTM E 709, Standard Ghid pentru examinarea cu Particule Magnetice, editie aplicabila / Guide norm for examination with magnetic particles, valid edition*;
- h) ASTM E 165, Norm of testing methods by penetrant liquids, valid edition*;
- i) EPRI NP-5380, Visual control of welds acceptance criteria, valid edition*;
- j) Recommended practice Nr. SNT-TC-1A, valid edition*;
- k) SR EN ISO 12100-1:2004 –Equipment safety. Basic concepts, general design principles. 1st part : Basic terminology, methodology ;
- l) SR EN ISO 12100-2:2004 - Equipment safety. Basic concepts, general design principles. 2nd part : Technical principles;
- m) SR EN ISO 13857:2008 –Equipment safety. Safety distances to prevent the contact of risk areas with upper and lower parts ;
- n) SR EN 349:1996 –Equipment safety. Minimum distances to prevent the crash of human body parts;
- o) SR EN ISO 13850:2007 - Equipment safety. Emergency stop. Design criteria ;
- p) SR EN 614-1:2006 - Equipment safety. Design criteria for ergonomcy. 1st part : Terminology and general principles ;
- q) SR EN ISO 14731:2007 – Welding process coordination. Duties and responsibilities ;
- r) SR EN 954-1:2000 - Equipment safety. Parts regarding the safety of the control systems. Part 1 : General design criteria ;
- s) SR EN 982:2001 - Equipment safety. Safety requirements related to hydraulic and compressed air commnad systems and their related parts. Hydraulics ;
- t) SR EN ISO 14121-1:2008 - Equipment safety. Risk assessment. Part 1 : Principles ;
- u) SR EN 12644-1:2003 – Lifting equipment. Information for use and test. Part 1 : Instructions ;
- v) SR EN 60204-1:2000 - Equipment safety. Electrical equipment. Part 1 : General requirements;
- w) SR EN 60529:1995 și A1:2003 – Protection level provided by covers (Code IP) ;
- x) SR EN 60947-5-1:2005 –Low voltage equipment. Part 5-1 : Equipment anc commuting elements for control circuits. Electromagnetic devices for control circuits ;
- y) SR EN 61000-6-4:2003 –Electromagnetic compatibility (CEM). Part 6-4 : Generic norms. Norm for emissions in industrial environment ;
- z) SR ISO 4301-1:1994 –Lifting equipment. Classification. Part 1 : Generalities ;
- aa) SR ISO 4301-5:1994 –Lifting equipment. Classification. Part 5 : Overhead and gantry cranes ;
- bb) SR ISO 4310:1996 – Lifting equipment. Rules and test methods ;
- cc) SR ISO 7296-1:1994 – Cranes and overhead cranes. Graphic symbols. Part 1 : Generalities ;
- dd) SR ISO 7363:1998 – Lifting equipment. Technical characteristics and acceptance documents ;
- ee) SR ISO 7752-1:1996 – Lifting equipment. Control devices. Location and characteristics. Part 1 : General principles ;
- ff) SR ISO 7752-5:1996 –Lifting equipment. Control devices. Location and characteristics. Part 5 : Overhead and gantry cranes ;
- hh) SR ISO 8566-1:1996 – Lifting equipment. Cabins. Part 1 : Generalities ;
- ii) SR ISO 8566-5:1996 – Lifting equipment. Cabins. Part 5 : Overhead and gantry cranes ;



- jj) SR ISO 8686-5:2000 – Lifting equipment. Calculation criteria of the loads and of test groups. Part 5 : Overhead and gantry cranes ;
- kk) SR ISO 9373:1997 – Lifting equipment and associated equipment. Precision of measurement of parameters during tests ;
- ll) SR ISO 10245-1:1999 - Lifting equipment. Limit devices and indicators.

6.1.5 Specific laws, rules, norms and prescriptions concerning the safety and safety for fire prevention and suppression

These prescriptions, rules and regulations are non-limiting ones, the beneficiary can take other actions to prevent or remove any event (accident).

- Law 307/2006-fire-fighting;
- Safety and hygiene regulation 9/N/1993;
- GD 355/2007 – monitoring the workers health
- Order 508/933 – MMSS and MSF – Population safety and health;
- P 118-99-fire safety;
- Law 307/2006 – fire-fighting
- Law 319/2006 – H&S Law
- H&S Law no. 319/2006.
- GD 300/2006 – Minimum H&S requirements on temporary or mobile sites
- GD 971/2006 – Minimum H&S requirements at the workplace
- GD 1028/2006 – Minimum H&S requirements for the equipments with screens
- GD 1048/2006 – Minimum H&S requirements for the workers use of the PPE
- GD 1091/2006 – Minimum H&S requirements at the workplace
- GD 1146/2006 – Minimum H&S requirements for the workers use of the working equipments
- Department norms MIM – vol. I and V (not cancelled)

6.1.6 Specific rules for civil works

- Law 10/1995 – building quality, published in the OG MO 12/24.01.1995

7. RANGE AND INTERFACES WITH THE CONTRACTED WORK

7.1 INTERFACES

The contracted work of the PROVIDER will be executed within the following physical limits: E-F casting bay , SMS

7.2 ELEMENTS DELIVERED BY ANOTHER PROVIDER OF THE COMPANY – n/a

7.3 WORKSITE

The PROVIDER will comply with IT DP 045 "General rules to be applied by LIBERTY GALATI and IT DP 044 General safety instructions for External Companies that work on the beneficiary's sites.

8. TESTS - COMMISSIONING – RECEPTION – N/A

9. WARRANTY PERIOD

The minim warranted for supply and all the scope of contracted work must be 24 months or as per GCCP (General Conditions for Purchasing) accepted form.



All the supply and equipment must be available for purchase for minim period of 10 years after the commissioning.

All breakdown must be approached and solved within the acceptable breakdown time. Afterword the warranty time for the specific item/equipment will be restarted.

10. DOCUMENTS TO BE SUPPLIED

All the documents to be supplied from the **PROVIDER** will be in Romanian and English language. The documents issued in a foreign language must be supplied in the "original language" version and the translation in Romanian language.

10.1 LIST OF DOCUMENTS TO BE SUPPLIED (NON-EXHAUSTIVE LIST)

- Technical expertise of the existing crane: metallic construction, crane travelling mechanism, hoisting mechanism 250 tf, trolley travel mechanism, electrical installation
- Calculation breviary for the metallic construction, trolleys and electrical installation in accordance with the proposal solution
- Job List with the all the necessary activities for transforming the crane
- All the necessary drawings and details for define the proposed solution
- General layout for implementation
- Eletrical and automation layouts
- List of components to be purchased
- All documents needed to obtaining the ISCIR authorization
- All the test documents issued during the expertise phase (NDT test documents, measurement sheets, etc)
- Detailed planning for solution implementation.

Specific documentation – non exhaustive list

10.2 DIFFUSION METHODS OF DRAWINGS/DOCUMENTS

The **PROVIDER** will comply strictly with IT DP 045 "General rules to be applied by LG **PROVIDERS**".

The **PROVIDER** is requested to propose to **COMPANY** the easy of structuring the documentation before starting any process. The final documentation structure as well as the naming of each file must be agreed by the **COMPANY**.

All drawings will be submitted in *.dwg format as well as *.pdf format.

All the drawings and documentation to be received will be defined into an excel list (centralizer of all documents/drawings) as per annexed model file. This list will act as a monitoring file (live document) for all send, updated review documents and drawings.

Any document or drawing is sent with the updated excel list (summary of all documents/drawings).

The **COMPANY** does not accept partial transmittals or any other type of list fragmented list.

The documentation, included will be provide on paper (4 files) and CD (3 pcs)



11. PLANNINGS

The necessary time for drawing up the Study is **60 calendaristic days**.

The **PROVIDER** defined and deliver his planning by specifying the all the phases, including the preparation studies and works.

The planning document will be defined in Microsoft project 2007 and will be submitted in the original format that is the *.mpp extension.

The planning will be made respecting the succession of the tasks rather the task type (electric, mechanical, etc..).

The **PROVIDER** will send a weekly update of the planning in Microsoft project 2007 (*.mpp format) for all the phases.

Project management

The **PROVIDER** must comply and respect with the governance model of the **COMPANY** and assure full availability and collaboration on the following:

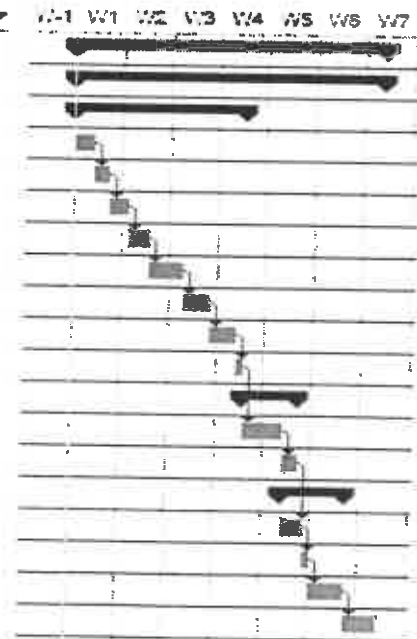
1. Kick off meeting
2. Project monitoring meetings
3. Safety meetings
4. On spot analysis (RCA, etc) related to the project
5. Clarifications and technical discussions

Any change considered in the initial organization of the **PROVIDER** must be announced with at least 3 days in advance by submitting a new organization sheet.

All roles and responsibilities inside the **PROVIDER's** organization must be clearly detailed and explained to **COMPANY** representatives.

Pre-project planning

Task	Duration	Start day	Final day	
Project name	45 days	Day 0	Day45	
Pre-project	45 days	Day 0	Day45	
RFQ& Technical agreement	25 days	Day 0	Day25	
Technical spech definition	3 days	Day 0	Day3	
RFQ definition (full package)	2 days	Day 3	Day5	
RFQ release	3 days	Day 5	Day8	
Bidder confirmation	3 days	Day 8	Day11	
Bidder site visit	5 days	Day 11	Day16	
Technical clarifications	4 days	Day 16	Day20	
Technical agreement	4 days	Day 20	Day24	
File release to commercial	1 day	Day 24	Day25	
Commercial	8 days	Day 25	Day33	
Commercial negotiations	6 days	Day 25	Day31	
Receive negotiated values	2 days	Day 31	Day33	
Approval file	9 days	Day 31	Day40	
Approval file writing	3 days	Day 31	Day34	
Approval file release for signature	1 day	Day 34	Day35	
Receive File approved	5 days	Day 35	Day40	
Contract signing	5 days	Day 40	Day45	





12. PROCEDURE FOR QUALITY CONTROL

The PROVIDER will comply strictly with IT DP 045 "General rules to be applied by LG PROVIDERS"

The PROVIDER will transmit to the COMPANY, his Quality Insurance Manual as well as the Quality Insurance Plan, specific to the respective contracted work which he will apply during the entire period for Study.

13. PRESENTATION OF THE OFFER

13.1 PRESENTATION OF THE TECHNICAL OFFER

In his offer, the PROVIDER must strictly comply with the splitting into posts as described in the above chapters.

The PROVIDER will define it's technical offer considering the instructions provide in the Annex 00 - Instruction for bidders on quotation

The PROVIDER will use to clarify it own supply the Annex 04 Scope of works template

13.2 PRICE BREAKDOWN

In his offer, the PROVIDER will split the prices in according with the posts as described at chapter 3.2

14. ANNEXES

- Annex 00 Instruction for bidders
- Annex 01 Technical specification
- Annex 02 04 F.DP.054 Technology of works_V2_EN
- Annex 03 F.DP.087 Questionnaire for Contractor H&S V1_EN
- Annex 04 Scope of works template
- Annex 05 GENERAL IT REQUIREMENTS for new Automation Systems DAD 2019 Aug
- Annex 06 IT DP 044 General safety instructions for External Companies that work on the beneficiary sites_rev1.DOC
- Annex 07 IT DP 046 WCM Specification for suppliers Rev.0.
- Annex 08 IT DP 045 General rules to be applied by Liberty contractors- engl – rom
- Annex 09 GCIP-00-Liberty