



ArcelorMittal

APPENDIX NO. 5

TO THE REQUEST FOR QUOTATION NO 01/211/2022

## TECHNICAL SPECIFICATION

for design of safety zones and safety system, fabrication of components and electrical infrastructure, connection to local network, commissioning, and validation of the safety zone system. Safety zones should be prepared in accordance with the risk analysis performed by the Crane Contractor for the entire Genesis Ace project. Preparation of safety zones is one of the parallel projects carried out at the Cold Rolling Mill in Krakow.

The subject-matter of the contract indicated in these specifications relates to the project entitled “*Development of an optimum logistic model and cooling model for the storage area upstream the pickling line in the Cold Rolling Mill of ArcelorMittal Poland S.A.*” (project no. POIR.01.02.00-00-0211/17-00), co-funded under Measure POIR.01.02.00 “Sectoral R&D programmes” of the Smart Growth Operational Programme 2014 - 2020 co-financed by the European Regional Development Fund.

*All purchases, services and supplies under DDP INCOTERMS 2010 that are subject to this bid must be included and cooperate with the existing infrastructure and equipment in the Company and must meet the same technological standards. Therefore, the need to preserve the same technological conditions and to maintain unification of devices resulting from the extension of the existing infrastructure determined the records in this specification. The applied records shall be justified by the need to ensure efficient project completion. The above-mentioned regulations shall not require the Bidders to apply the indicated solutions, but only inform them about minimum parameters and standards. Application of some types of solutions shall not be obligatory, but exemplary only. The indications regarding expected technical parameters as well as the indications regarding specified types and manufacturers' names shall be general and refer solely to exemplary designations of equivalent products and shall not be the only acceptable solution. On this basis the Buyer permits equivalent solutions.*

*The bid must be complete in all respects and must contain all components / equipment required for correct construction, operation and maintenance. The Bidder undertakes to familiarise itself with this specification and make sure that the devices are technically feasible, and to accept full responsibility for the guaranteed operation of devices to be delivered in terms of their capabilities, parameters as well as smooth and reliable functioning.*

**ArcelorMittal Poland S.A.**

**KRAKÓW**

January 2022

## TABLE OF CONTENTS

<b>CHAPTER I .....</b>	<b>4</b>
<b>1. FOREWORD .....</b>	<b>4</b>
1.1. INTRODUCTION .....	4
1.2. PURPOSE OF THE PROJECT .....	4
1.3. TARGET .....	4
1.4. CONTENTS OF THE SPECIFICATION .....	5
1.5. GENERAL REQUIREMENTS .....	5
<b>2. ENVIRONMENTAL DATA .....</b>	<b>5</b>
<b>3. MEASUREMENT UNITS, STANDARDS, NORMS AND REGULATIONS .....</b>	<b>5</b>
<b>4. TECHNICAL INFORMATION .....</b>	<b>6</b>
<b>5. SCOPE OF THE BIDDER'S WORKS .....</b>	<b>6</b>
5.1. SUBJECT-MATTER OF THE PROJECT .....	6
5.2. GENERAL SCOPE OF THE PROJECT .....	6
5.2.2. DESIGN OF FENCING SYSTEM FOR SAFETY ZONES AND ELECTRICAL/ELECTRONIC/NETWORK INFRASTRUCTURE .....	7
5.3. DETAILED SCOPE OF THE PROJECT .....	8
<b>6. TECHNICAL CAPABILITIES OF THE BIDDER .....</b>	<b>8</b>
<b>7. WORKS COMPLETION TIME .....</b>	<b>8</b>
7.1. DELIVERY OF THE SCOPE OF WORKS .....	8
7.2. WORK SCHEDULE .....	9
7.3. GENERAL REQUIREMENTS .....	10
<b>8. AVAILABILITY AND INTERCHANGEABILITY .....</b>	<b>10</b>
<b>9. QUALITY, SUPERVISION, TRAININGS, WORKMANSHIP, COMMISSIONING, TESTS AND INSPECTIONS .....</b>	<b>10</b>
9.1. QUALITY .....	10
9.2. SUPERVISION .....	10
9.3. WORKMANSHIP .....	11
9.4. COMMISSIONING .....	11
9.5. HAND-OVER TO OPERATION .....	12
<b>10. PAINTING .....</b>	<b>12</b>
<b>11. PRICE .....</b>	<b>12</b>
<b>12. PERFORMANCE GUARANTEE .....</b>	<b>12</b>
<b>13. GUARANTEE OF SUPPLY AND WORKMANSHIP QUALITY .....</b>	<b>13</b>
<b>14. SAFETY OF PEOPLE, WORKS AND OFFERED SUPPLIES .....</b>	<b>13</b>
14.1. PRE-CONDITIONS .....	13
14.2. TERMS AND CONDITIONS OF THE BID .....	14
14.3. TERMS AND CONDITIONS OF PERFORMANCE .....	14
<b>15. REQUIREMENTS OF THE OWNER FOR THE BID .....</b>	<b>15</b>
15.1. GENERAL REQUIREMENTS .....	15
15.2. REQUIREMENTS FOR TECHNICAL BID .....	15
<b>16. LANGUAGE OF THE CONTRACT .....</b>	<b>16</b>
<b>17. INFORMATION, EXPLANATIONS AND AGREEMENTS .....</b>	<b>16</b>
17.1. PERSONNEL OF THE BIDDER/CONTRACTOR .....	16
17.2. PERSONNEL OF THE OWNER .....	16
17.3. INFORMATION, CORRESPONDENCE, EXPLANATIONS AND AGREEMENTS .....	17
<b>18. OTHER .....</b>	<b>17</b>
18.1. WASTE PRODUCTION AND RECYCLING .....	17
18.2. MEASUREMENTS .....	17
18.3. PROTECTION OF CONTRACTOR'S PROPERTY .....	18
18.4. ENTRY/EXIT OF THE BIDDER'S/CONTRACTOR'S PERSONNEL AND MATERIALS TO/FROM THE SITE .....	18

18.5.	ADDITIONAL CONDITIONS OF PROJECT EXECUTION .....	18
<b>CHAPTER II</b>	.....	<b>19</b>
<b>1.</b>	<b>ENVIRONMENTAL DATA .....</b>	<b>19</b>
1.1.	LOCATION .....	19
1.2.	ENVIRONMENTAL DATA .....	19
<b>2.</b>	<b>STANDARDS, NORMS AND REGULATIONS .....</b>	<b>20</b>
2.1.	Formats of documentation files - standards applicable in ArcelorMittal Poland S.A. ....	20
<b>3.</b>	<b>BASIC DOCUMENTATION .....</b>	<b>20</b>
<b>CHAPTER III - SCOPE OF THE BIDDER/CONTRACTOR'S WORKS</b>	.....	<b>21</b>
<b>1.</b>	<b>ELEMENTS OF SAFETY ZONE FENCING TOGETHER WITH ELECTRICAL AND NETWORK INFRASTRUCTURE .....</b>	<b>21</b>
	SAFETY SYSTEM.....	21
	S1 safety zone. ....	21
	S2 safety zone. ....	22
	Zone S3 .....	26
	Zone S4 .....	30
	Zone S5 .....	34
	Zone S6 - crane tracks.....	34
	Control panel in the ACE system supervision room .....	36
	PLC & software.....	37
	General electrical and network requirements.....	39
	Network connections.....	39
	ACE system supervision room.....	41
<b>2.</b>	<b>INSTALLATION OF FENCING AROUND SAFETY ZONES .....</b>	<b>43</b>
<b>3.</b>	<b>Integration of delivered and installed safety zones with overhead cranes #1020 and #1025 as well as other machinery within the zones. ....</b>	<b>43</b>
<b>4.</b>	<b>DOCUMENTATION REQUIRED DURING PROJECT EXECUTION .....</b>	<b>44</b>
<b>5.</b>	<b>GUARANTEED PARAMETERS .....</b>	<b>44</b>

# CHAPTER I

## 1. FOREWORD

### 1.1. INTRODUCTION

"ArcelorMittal Poland" S.A. (hereinafter referred to as **the Owner**) implements a full steel making cycle, starting from raw material facilities (coke plant, BF, BOF Plant) to production of finished rolled products.

The **Owner** is interested in the increase in production and safety level of Cold Rolling Mill; for that purpose, it is required to increase storage capacity for coils upstream the pickling line and ensure required flow capacity.

### 1.2. PURPOSE OF THE PROJECT

The main task is to design, prepare, install, start up and validate:

- 6 safety zones, entry points to restricted areas (platforms) and electrical infrastructure for the Genesis ACE system.
- Connection of the system electrical infrastructure and safety zones to the currently existing electrical infrastructure and Mill.
- Safety system responsible for control of safety zones - preparation of start-up program.
- Integration of safety zone system with overhead cranes and Genesis ACE system.
- Supplying power and providing network for safety zone system equipment.

### 1.3. TARGET

Hot-rolled sheet coils - being processed by the Pickling Plant - shall be delivered to **S4** safety zone area by railway transportation directly from the Hot Rolling Mill. Unloading coils at the coil storage area (**S2**) and delivery of coils at the production line entrance (**S1**) shall be performed with the use of two Q40t overhead travelling cranes. All transport operations shall be ultimately carried out in automatic mode with the possibility of manual control from the cabin or radio terminal. While the cranes are in automatic mode, access to safety zones where the cranes are operating will be forbidden. The indicated safety zones will be secured against access of workers by means of permanent barriers and other technical protection measures.

Basic data of transported coils:

- Coil diameter  
Min.: 1000 (610 - rejects) mm  
Max.: 2300 mm
- Coil width  
Min.: 680 mm  
Max.: 2100 mm
- Coil max. weight: 35.0 t
- Temperature of transported coil: max. 600°C

## 1.4. CONTENTS OF THE SPECIFICATION

This Specification contains environmental data of the Owner's location in Krakow, required technical standards, necessary technical data, the Bidder's scope of works, the Buyer's/Owner's rights, requirements for technical capabilities of the Bidder, required availability, interchangeability, quality and safety, and other information, which are required for the Technical Bid (e.g. performance guarantee).

## 1.5. GENERAL REQUIREMENTS

- The Bid submitted by the Bidder shall comply with the requirements of this Specification and price quoted in a separate, sealed envelope addressed as indicated in the Request for Quotation.
- The Bid shall be complete, and all activities and equipment required for proper Project execution shall be specified by the Bidder in its Bid.
- The Bidder shall familiarise itself with this Specification and attached documents and, upon making sure that design, delivery, erection, commissioning and validation of the system and safety zones are feasible for them, it shall assume full responsibility for guaranteed level of functionality of the system and safety zones, parameters and availability as well as undisturbed operation of process facilities of Cold Rolling Mill in AMP in Kraków.
- The Bidder shall submit the bid in accordance with the tender documentation. **The Bidder should also foresee all additional works not particularly listed in this Specification.**

## 2. ENVIRONMENTAL DATA

Local environmental data for the design purposes are provided in CHAPTER II ITEM 1 of this specification.

## 3. MEASUREMENT UNITS, STANDARDS, NORMS AND REGULATIONS

The Bidder shall observe standards, regulations and other provisions of the law, referred to in this Specification with respect to completion of delivery and services in accordance with quality assurance rules and meeting delivery and performance deadlines. All other technical requirements shall comply with standards of environment pollution control. List of applicable measurement units, norms, standards and regulations as well as the rules of their application by the Buyer are given in CHAPTER II ITEM 2 of this specification.

## 4. TECHNICAL INFORMATION

List of basic documentation is described in CHAPTER II ITEM 3. Detailed technical and technological requirements are described in CHAPTER III of this specification.

## 5. SCOPE OF THE BIDDER'S WORKS

### 5.1. SUBJECT-MATTER OF THE PROJECT

The subject-matter of the project is:

- 5.1.1 Design of security zones system in a way allowing its integration with the Genesis ACE system.
- 5.1.2 Design of fencing system for safety zones and electrical, electronic infrastructure, and other technical protection measures according to the ACE system risk analysis.
- 5.1.3 Preparation of electrical/electronic/network infrastructure and installation of safety zone fencing and other technical protection measures.
- 5.1.4 Integration of the system and safety zones with Genesis ACE and with overhead cranes operating in automatic mode.
- 5.1.5 Validation of technical solutions and safety zone system.
- 5.1.6 Supplying power and providing network for safety zone system equipment

**3 operation modes for cranes are foreseen:** manual control from the cabin, radio control with a portable control panel and auto operation.

### 5.2. GENERAL SCOPE OF THE PROJECT

The investment project has been generally split into four parts:

#### 5.2.1. DESIGN OF SAFETY SYSTEM

Includes design of a safety system based on Siemens S7-400 central safety controller and ET200S remote safety I/O module. The Contractor shall prepare basic software needed for validation and commissioning of the zone system, which will then be modified as needed by AMP. The use of safety relays is not permitted. The controller, distributed modules and necessary I/O cards shall be supplied by AMP and are not part of the tender procedure. Electrical, automation- and network-related scope of supply must be agreed with AMP.

NOTE! The entire logic of safety zones must be handled by the safety controller program. All software must be fully accessible and editable by AMP professionals.

NOTE! Revamping of the area of walking beam and robot that removes narrow strip from supplied coils is subject of another project. However, as part of this project it is required to interface the ACE safety zone controller with S1 safety zone controller - probably via secure digital signals.

#### **5.2.2. DESIGN OF FENCING SYSTEM FOR SAFETY ZONES AND ELECTRICAL/ELECTRONIC/NETWORK INFRASTRUCTURE**

Includes design of fencing system for designated safety zones, other technical protection measures, and electrical/electronic/network infrastructure in accordance with the recommendations described in the ACE system risk analysis.

#### **5.2.3. MANUFACTURING AND INSTALLATION OF FENCING FOR DESIGNATED SAFETY ZONES**

Includes manufacturing of safety zone elements in accordance with the strength requirements described in the technical specification for each zone, supplying them to a designated area of the Cold Rolling Mill, and then installation in specified locations.

#### **5.2.4 MANUFACTURING AND INSTALLATION OF ELECTRICAL/ELECTRONIC INFRASTRUCTURE**

Includes manufacturing and installation of required electrical and electronic infrastructure required to connect safety zones with their controls, interlocking guards, interlocking guards with locking mechanism, emergency stop devices, light barriers.

#### **5.2.5 INTEGRATION AND COMMISSIONING OF THE SAFETY-ZONE SYSTEM WITH GENESIS ACE.**

Development of the required software and start-up of the system.

#### **5.2.6 VALIDATION OF TECHNICAL SOLUTIONS AND SAFETY ZONE SYSTEM**

Conducting tests and making corrections to the system or software if necessary.

#### **5.2.7 COOPERATION WITH CONTRACTORS OF EQUIPMENT WORKING IN SAFETY ZONES**

According to arrangements with UDT (Office of Technical Inspection) the entire project related to automatic storage yard shall be accepted as one project. Therefore, the Crane Contractor shall perform a risk analysis for the entire ACE system (i.e. for new cranes and safety zones). All proposed design solutions provided by the Bidder, which will be implemented within the designated zones and safety system in a way that enables integration of the system as a single functional whole, must be agreed with the Crane Contractor.

The Zone Contractor is obliged to cooperate with the Contractor of cranes as regards safety in the bay. In particular, this applies to making arrangements with the Office of Technical Inspection and submitting all documents or inquires of the crane contractor in an immediate manner in order to make arrangements with this Office. The Crane Contractor shall provide the safety zone contractor with a risk analysis in the scope pertaining to safety zones or to the overall project. The Crane Contractor shall promptly provide the necessary documents and information from and to the Office of Technical Inspection and the Contractor, as required for the project.

#### **5.2.8 PROVISION OF INSTRUCTIONS AND TRAININGS**

Includes provision of safety zone operating instructions, instructions for removal and re-installation of safety zone guards and components.

The Contractor of safety zones shall also conduct training for operators of zones and service departments such as Maintenance and Automation Departments on how to operate and perform servicing of the system.

#### **5.3. DETAILED SCOPE OF THE PROJECT**

The detailed scope of works and requirements are described in CHAPTER III of this Technical Specification.

### **6. TECHNICAL CAPABILITIES OF THE BIDDER**

- The requirements are specified in item IV.1. of the Request for Quotation.

### **7. WORKS COMPLETION TIME**

#### **7.1. DELIVERY OF THE SCOPE OF WORKS**

The full scope of work and delivery, installation and validation as defined in item 5 of Technical Specification, shall be divided into 2 stages:

- STAGE I covering items 5.2.1, 5.2.2, 5.2.3, 5.2.4, 5.2.7 for the system and safety zones shall be completed within a maximum period of 7 months from the date of confirmation of order from the bidder
- STAGE II covering items 5.2.5, 5.2.6 and 5.2.8 for the integration of the safety system and validation of applied solutions after receiving information from the Owner - not longer than 2 months due to the necessity of implementing projects that are at the border of competences.

A preliminary work schedule comprising periods of time assumed for the completion of stages of the Project shall be attached to the Bid.

## 7.2. WORK SCHEDULE

### 7.2.1. PRELIMINARY WORK SCHEDULE

- Submission of the technical documentation for Owner's approval. The submitted technical documentation must also be fully approved by the branch of Office of Technical Inspection in the Lesser Poland Voivodeship (arrangements with the Office are within the Crane Contractor's scope of responsibilities).
- Completion of individual supplies that are of key importance to meet the installation and project completion deadlines,
- Take-over of the work site in coordination with the head of the organisational unit (Cold Rolling Mill) and commencement of the installation,
- Installation of safety zone fencing system, interlocking guards, interlocking guards with locking mechanism, emergency stop devices, light barriers and other elements of zones.
- Installation of electrical and electronic infrastructure for safety zones, interlocking guards, interlocking guards with locking mechanism, emergency stop devices, light barriers, control boxes and other elements of technical infrastructure.
- Integration and start-up of the designed system of safety zones with Genesis ACE system responsible for control of cranes operation in automatic mode.
- Validation of safety system and its functionality.
- Submission of a complete as-built documentation along with the required operating documentation and operating instructions to the Owner.
- Providing the User with complete software - editable source codes.
- Conducting trainings.

### 7.2.2. DETAILED SCHEDULE

Detailed work schedule shall be submitted to the Owner for approval in the framework of performance of the Bidder's/Contractor's scope of work, with consideration of the stages of erection site organisation and securing, performance of all activities related to admission of the Bidder/Contractor by the Health and Safety services to work at the Owner's site, completion of purchases, prefabrication, dismantling and installation, tests and commissioning, acceptance by UDT (Office of Technical Inspection), hand-over for operation and preparation of as-built documentation. This schedule should also include a description (specification) of tasks forming-called critical path of the Project and its milestones.

### 7.3. GENERAL REQUIREMENTS

The Bidder/Contractor agrees to create work schedules in compliance with the Owner's requirements and standards (MS Project).

## 8. AVAILABILITY AND INTERCHANGEABILITY

All working parts shall be able to be prepared for operation, inspection, lubrication and replacement/maintenance during a minimum downtime. All similar parts of the equipment shall be interchangeable.

## 9. QUALITY, SUPERVISION, TRAININGS, WORKMANSHIP, COMMISSIONING, TESTS AND INSPECTIONS

### 9.1. QUALITY

- Apart from safety, quality issues will be of the highest priority to the Owner at all stages of Project execution.
- Materials and workmanship shall be of high quality, suitable for the intended purpose of application and compliant with practices and standards set forth in this Specification. All components shall undergo inspection according to Quality Assurance Program, which shall be submitted by the Bidder, unless the Buyer has waived it by submission of a written statement.
- The Bidder/Contractor shall submit to the Owner all required quality certificates (including mandatory quality certificate 3.1 according to PN-EN 10205:2006, or equivalent, for materials used and welding works completed).

### 9.2. SUPERVISION

The Bidder/Contractor shall appoint a coordinator (Site/Project/Work Manager) responsible for supervision of proper course of works in all its aspects and at all stages of execution (quality, progress, on-time performance, etc.) and for cooperation and contacts with the Owner on an ongoing basis.

### 9.3. WORKMANSHIP

- The Contractor shall perform the works in accordance with technical conditions of performance and acceptance of works, applicable technical regulations, norms and standards, safety at work and fire prevention regulations and agreed Detailed Work Schedule.
- The offered materials and workmanship shall be of high quality, suitable for the intended purpose of application and compliant with practices and standards set forth in this Technical Specification and in the Detailed Engineering documentation. All components shall undergo inspection (according to Quality Assurance Program which shall be submitted by the Bidder) unless the Owner has waived it by submission of a written statement.
- The Contractor shall provide all basic and auxiliary materials required to perform the works along with necessary tools and special equipment.
- Upon completion of the works, the Contractor shall submit to the Owner the set of operating and maintenance manuals along with functionality test and measurement reports and complete as-built documentation for installed equipment.

### 9.4. COMMISSIONING

#### 9.4.1. Cold commissioning

The so called "cold" (partial) commissioning of the equipment shall be carried out upon completion of works at a given part of the project, removal of possible defects and irregularities, performance of additional works (if any), which resulted to be necessary during the execution of project-related works, fulfilment of the Owner's health and safety requirements, notification by the Contractor of the readiness to cold commissioning, and after agreeing the terms and conditions of cold commissioning with the Owner. All functional tests shall be carried out during cold commissioning. Any possible defect or irregularity shall be removed during cold commissioning.

The cold commissioning shall be performed with the use of software developed by the Zone Contractor. The software must enable:

- testing input and output signals,
- communication with peripheral devices,
- testing signals/safety equipment.

#### 9.4.2. Hot commissioning

The so-called "hot" commissioning of the equipment shall be carried out upon successful completion of all works, completion of cold (partial) commissioning, removal of possible defects and irregularities, execution of additional works (if applicable), which resulted to be necessary during the execution of project-related works, execution of functional tests, fulfilment of the Owner's health and safety requirements, notification by the Contractor of the readiness to hot commissioning, and after agreeing the terms and conditions of hot commissioning with the Owner.

Hot commissioning shall be carried out for 10 working days using AMP software. The software shall be prepared by AMP and remain the sole property of AMP. During hot commissioning the Contractor shall make necessary adjustments as requested by AMP.

## 9.5. HAND-OVER TO OPERATION

- Hand-over to operation shall be effected after successful completion of availability tests, approval of the entire ACE system by the Office of Technical Inspection, and after signing the Final Acceptance Certificate (FAC).
- FAC for the whole Project shall be signed only upon reaching all guaranteed parameters (specified in **CHAPTER III item 5** and in **technical documentation**) by the equipment delivered by the Bidder/Contractor and required parameters in accordance with the measurement procedure of technical and technological operation parameters of the system agreed with the Owner, and upon completion of 30-day availability tests of ACE system.

## 10. PAINTING

- The structure, its components and additional equipment require the application of additional corrosion and thermal protection (due to high ambient temperature) and due to possible acidic HCl fumes. The Bidder/Contractor shall submit proposals for the use of primers and finishing coats appropriate to the prevailing working conditions for the various zone components.
- Finishing coat for structure of guards - RAL1028.
- **Final thickness of protective coatings shall be 180-200 µm.**

## 11. PRICE

- The Bid price shall not be quoted in the Technical Bid.
- The Bid price shall be quoted by the Bidder/Contractor in the Commercial Bid.
- The Bid price shall cover all services (labour consumption), components (materials and parts), equipment (machines and special tools) and other expenditures (e.g. costs of trainings).
- The Bid price shall comprise costs of adaptation of employees and equipment to comply with OHS standards applicable in AMP.

## 12. PERFORMANCE GUARANTEE

- The Bidder/Contractor guarantees high quality of workmanship of engineering solutions and of materials selected for engineering solutions and high quality of workmanship of individual parts and combined components of the equipment, which is offered in accordance with the requirements of guaranteed parameters set forth in this Technical Specification.

- Performance guarantee (see below) shall comprise individual components and systems (including electric equipment) with respect to their accuracy, ratings/productivity and integrated operation. Performance guarantee shall also comprise individual electric and safety components and systems with respect to their accuracy, ratings/productivity and integrated operation.
- The Guaranteed parameters are specified in **CHAPTER III item 5**.
- The period of guarantee for the whole Project shall begin at the day of signing **STAGE II Completion Report**. Minimum period of guarantee for supplies and services expected by the Owner is 24 months.

### 13. GUARANTEE OF SUPPLY AND WORKMANSHIP QUALITY

- Delivered solutions shall be free of faults and defects arising from the use of defective materials and/or parts and/or from poor workmanship quality. The Bidder/Contractor shall guarantee that delivery will be effected on time and in a form compliant with the contract awarded.
- The Bidder/Contractor shall guarantee that state-of-the-art technical and engineering solutions are applied.

### 14. SAFETY OF PEOPLE, WORKS AND OFFERED SUPPLIES

Safety issues shall be the highest priority for the Owner at all stages of Project execution.

#### 14.1. PRE-CONDITIONS

- The most important consideration during performance of works within the scope of the Project shall be their compliance with applicable regulations concerning the safety of persons and work. The Bidder/Contractor shall make all personnel participating in the Project execution (including personnel of subcontractors accepted by the Owner) familiar with the documents concerning safety at work on the Owner's premises, submit these employees to initial Occupational Health and Safety trainings conducted by OHS Department of the Owner. Knowledge of AMP OHS requirements shall be verified by OHS examination for the contractors carried out by the Owner. Positive result shall be certified in the Safety Passport. The Contractor shall obtain the Passports entitling trained employees to perform work on the Owner's premises.
- Prior to commencement of the works the representatives of the Contractor shall submit proof of valid medical examinations in the form of appropriate document (certificate confirmed by signature and stamp of physician) and shall be trained in the scope of OHS rules and regulations effective at the Owner's site (including Safety Passports for employees of contractors and subcontractors and familiarity with the contents of the Owner's Health and Safety Agreement and standards).
- The approximate time for employees of a third-party Contractor and subcontractors to obtain Owner's OHS Department approval and be allowed to work at the Owner's site is approximately 10 working days, which shall be taken into account in the cost estimate and work schedule. Procedure of obtaining the foregoing authorisation is described in detail in **Health and Safety Agreement**.

## 14.2. TERMS AND CONDITIONS OF THE BID

- The solutions offered in the Bid shall have approved safety systems to protect employees from consequences of occurrence of potential hazards and to provide them with safe access to the equipment for maintenance or operation purposes.
- The Bid shall comprise declaration that the delivered and installed equipment will have safety features compliant with the Owner's standards (including **LOCK-OUT/TAG-OUT** system).
- The Bidder shall guarantee that the design and installation of the new OHT crane meet OHS requirements included in the Regulation of the Minister of Economy of 21 October 2008 on essential requirements for machinery.

## 14.3. TERMS AND CONDITIONS OF PERFORMANCE

- Prior to the commencement of the works, the Contractor shall prepare and sign:
  - Memorandum of Understanding,
  - Occupational Risk Assessment (“HIRA”) for works performed during the Project execution,
  - Work Organisation Plan (POR) for individual scopes of works,
  - Safety and Health Protection Plan (BIOZ),
  - High-Risk-Lifting Plan (PPWR) for operations performed with the use of lifting equipment,

The foregoing documents shall be prepared in accordance with AMP standards and agreed with appointed representatives of Health and Safety, technology and maintenance departments of Cold Rolling Mill and with representatives of the Project Owner.

- The Contractor shall commence works after take-over of the construction site and preparation of the Site Take-over Certificate with participation of the parties involved, including a representative of the Project Owner.
- During the execution of individual stages of manufacturing and delivery to the Owner's site, the Supplier shall meet safety requirements determined by the Polish law and applicable standards of the Owner (which are contained in the **Work Health & Safety Agreement**, and in the Internal Safety Standards and Regulations).
- Signing and accepting (without changes) the **Work Health & Safety Agreement** is a prerequisite for admission to commence works.
- **Continuous/permanent** supervision of the Contractor and/or its subcontractors by a coordinator in charge of occupational health and safety is required within the duration of the Project (during working hours of employees of the Contractor and/or its subcontractors). **The Contractor's OHS Coordinator may not perform other duties at the construction site.**
- The Contractor and its subcontractors shall carry out OHS audits according to the Owner's schedule within the duration of the Project.

## 15. REQUIREMENTS OF THE OWNER FOR THE BID

### 15.1. GENERAL REQUIREMENTS

- Technical and Commercial Bid shall be delivered separately, according to the Request for Quotation.

### 15.2. REQUIREMENTS FOR TECHNICAL BID

Technical Bid for completion of the scope of the works described in this Specification shall comprise the following sections:

- I. Name and registered office of the Bidder.
- II. General description and information of offered supplies and services.
- III. Scope of works comprised in the Bid.
- IV. Single line diagram of power supply systems.
- V. Single line diagram of safety zone system and networks.
- VI. Bill of materials and works with indication of quantities.
- VII. List of suppliers and potential sub-suppliers.
- VIII. Exclusions from the Bid (supplies and services to be provided by the Buyer/Owner).
- IX. Acceptance of the Owner's Responsibility Matrix or the Bidder's proposal for a Responsibility Matrix, i.e. division of responsibilities/works clearly defining the scope of the Supplier and the Buyer/Owner.
- X. Schedule showing milestones of supplies of components, installation, test runs, handover for operation, etc.).
- XI. Guaranteed performances (as per Technical Specification).
- XII. Guarantees.
- XIII. Safety at work guarantees according to effective provisions of Polish law and the Owner's standards (including organisation chart and rules of performance of safety at work supervision during execution of the whole Project).
- XIV. Declaration that the expertise and experience held and site visit are sufficient to complete the entire task.
- XV. Declaration that the scope of supplies and services will be completed in accordance with good engineering practice and in compliance with the provisions of law
- XVI. Declaration that the scope of the works will be completed in accordance with Technical Documentation prepared on the basis of Tender Documentation listed in Technical Specification.
- XVII. Statement of confidentiality confirming that the Bidder/Contractor will protect confidential information of the Owner and will not make available

technical, technological or any other information it has received in course of this request for bid to any third party.

- XVIII. The Bid validity.
- XIX. Statement and/or references (taking into account the records related to statements and/or references described in item 6 of this Specification and in the Request for Quotation).
- XX. Other information provided by the Bidder/Contractor, which do not bear any cost-related data but may affect the quality of the Technical Bid.

## 16. LANGUAGE OF THE CONTRACT

**Mandatory language of the Contract** (the bid, technical documentation, operating and maintenance manuals, masks of devices, diagrams, user manuals, the Contractor's supervision, contacts and agreements with the Owner's personnel and with government bodies, etc.) shall be **Polish**. All costs of translation and interpretation services during the period of Project execution shall be borne by the Bidder/Contractor.

## 17. INFORMATION, EXPLANATIONS AND AGREEMENTS

### 17.1. PERSONNEL OF THE BIDDER/CONTRACTOR

The Bidder/Contractor shall specify in the Bid the names and functions (scopes of responsibilities) of its employees (along with contact information) appointed and authorised to be in touch with the Owner at the stage of Bid Submission, Evaluation and Negotiation.

### 17.2. PERSONNEL OF THE OWNER

- Jacek Buzdygan (Project Manager) - AMP Engineering (e-mail: [jacek.buzdygan@arcelormittal.com](mailto:jacek.buzdygan@arcelormittal.com) ; phone no.: +48 668 634 934);
- Zbigniew Marzec (Electrical Specialist) - AMP Central Maintenance - Kraków (e-mail: [zbigniew.marzec2@arcelormittal.com](mailto:zbigniew.marzec2@arcelormittal.com); phone no.:+48 12 290 60 01, phone no.: +48 608 518 203)
- Jacek Cieślak (Mechanical Specialist) - AMP Central Maintenance - Kraków (e-mail: [jacek.cieslak@arcelormittal.com](mailto:jacek.cieslak@arcelormittal.com); phone no. +48 795 414 944)
- Grzegorz Łojek (Automation Specialist) - AIM (ACE) (e-mail: [grzegorz.lojek@arcelormittal.com](mailto:grzegorz.lojek@arcelormittal.com) ; phone no.: +48 882 115 043)
- Dariusz Kowalski (Automation Specialist) - AIM (ACE) (e-mail: [Dariusz.kowalski@arcelormittal.com](mailto:Dariusz.kowalski@arcelormittal.com) ; phone no.: +48 662 214 808)
- Krzysztof Krupa (User Leader) - Cold Rolling Mill in Kraków (e-mail: [krzysztof.krupa@arcelormittal.com](mailto:krzysztof.krupa@arcelormittal.com) ; phone no.: +48 662 214 675)
- Grzegorz Peciak (Health and Safety Specialist)- Kraków Hot Rolling Mill (e-mail: [grzegorz.peciak@arcelormittal.com](mailto:grzegorz.peciak@arcelormittal.com) ; phone no.: +48 668 110 634 )

### 17.3. INFORMATION, CORRESPONDENCE, EXPLANATIONS AND AGREEMENTS

All information regarding the Technical Bid coming from the Bidder/Contractor and directed to the Owner (including correspondence, explanations and agreements) shall be delivered only and exclusively through the persons referred to in the Request for Quotation, item VII 9.

## 18. OTHER

### 18.1. WASTE PRODUCTION AND RECYCLING

Production, segregation, transport, collection, storage and recycling of wastes produced during the implementation of the Project is the Bidder's/Contractor's responsibility. Wastes produced during performance of the works shall be disposed of at the disposal yard. **The Contractor shall hold appropriate licence required by the law to perform the foregoing activities, or, in contrary case, it shall hire licensed company(-ies) to complete these works.**

The only exception is scrap of non-ferrous metals and of iron alloys, which shall be processed to charge scrap (according to **Chapter III item 6**) and handed over to the Owner.

Costs of scrap processing to charge material shall be entirely borne by the Bidder/Contractor.

A list of codes of wastes (according to the Polish law) which will be most commonly is use under this Project is as follows:

- Scrap of ferrous metals                      waste code: 160117, 170405, 191001.
- Scrap of non-ferrous metals                waste code: 160118, 170401, 170402.
- Mixed metal scrap                            waste code: 170407.
- Ceramic waste                                 waste code: 161103, 161104.
- Concrete and debris waste                 waste code: 170101.
- Electric cables                                waste code: 170411, 170604.
- Oils, greases                                 waste code: 130110, 130208.
- Electric motor scrap                        waste code: 160216.
- Other waste                                     codes to be selected on case-by-case basis.

### 18.2. MEASUREMENTS

The measurements specified below shall be made at the Bidder's/Contractor's costs in the scope of the Project execution:

- Inventory surveying.
- Working geodetic measurements.
- As-built surveying (survey reports).
- Power measurements (effectiveness of electric shock protection, cable insulation resistance).
- Measurements of guaranteed performances.

### 18.3. PROTECTION OF CONTRACTOR'S PROPERTY

The Contractor shall be responsible for protection of its own property and the property of its sub-contractors, including parts, components and complete equipment stored at the Owner's site and intended to be used under this Project over the duration of the Project until commissioning and handing over to the Owner for operation.

### 18.4. ENTRY/EXIT OF THE BIDDER'S/CONTRACTOR'S PERSONNEL AND MATERIALS TO/FROM THE SITE

- The Contractor shall strictly adhere to the regulations on movement of persons and materials at the Owner's site in AMP Kraków.
- Handling of project-related supplies (i.e. their loading and unloading, storage and transport between different operations) is within the Contractor's scope of responsibility.  
The Owner may make available the areas which may be used to store supplies to and at the cost of the Contractor.

### 18.5. ADDITIONAL CONDITIONS OF PROJECT EXECUTION

Additional requirements/expectations of AMP to be fulfilled by the Bidder/Contractor during execution of the Project, which may considerably affect calculation of the task value are as follows:

- The Bidder/Contractor shall agree to participate in coordination meetings at dates to be determined by the Owner.
- The Bidder/Contractor shall agree to prepare notes, reports and schedules in accordance with the requirements of the Owner.
- The Bidder/Contractor shall be solely and entirely responsible for correctness of information, parameters and dimensions quoted in the documentation and shall be held liable for any damage arising from provision of incorrect information.
- Acceptance of technical documentation by ArcelorMittal Poland S.A. shall not assume mitigation or lifting of the Contractor's liability for the equipment.
- The Bidder/Contractor shall nominate the **Site Manager** with appropriate/required approvals for the whole period of construction/project execution until its completion.
- The Bidder/Contractor shall provide geodetic services for construction/project being executed.
- The Bidder/Contractor shall provide source codes for PLC programs and HMI panels.

## CHAPTER II

### 1. ENVIRONMENTAL DATA

Local environmental data for the location of ArcelorMittal Poland S.A. Cold Rolling Mill in Kraków.

#### 1.1. LOCATION

Altitude above sea level	219 m asl
Longitude	50° 05'16.6"N
Latitude	20° 05'30.6"E
Nearest urban agglomeration	Kraków
Nearest airport	Balice - Kraków

#### 1.2. ENVIRONMENTAL DATA

Data	Value, measurement unit
Maximum temperature	+37.4 °C (historical value)
Minimum temperature	-32.7 °C (historical value)
Average annual temperature	+8.7 °C
Average annual relative humidity	77 %
Maximum monthly precipitations	313 mm
Maximum momentary wind velocity	3.5 m/s
Seismic zone	no



Fig. Location of crane safety zone for the pickling line.

## 2. STANDARDS, NORMS AND REGULATIONS

### GENERAL COMMENTS

Equipment, services and technologies offered by the Bidder/Contractor shall comply with its best technical and technological expertise and norms and standards specified below.

Equipment, materials and parts used to implement the Project shall meet all technical, environmental protection and safety standards required by the provisions of Polish law.

Appendix no. 1 - Legal instruments

Appendix no. 2 - Location and environmental data

Appendix no. 3 - LOTO

Appendix no. 4 - Visual management

Appendix no. 5 - Automation standard (AIM Addendum to tender - automation system requirements PL V16)

### 2.1. Formats of documentation files - standards applicable in ArcelorMittal Poland S.A.

Documents: \*.\*.doc, \*.\*.pdf, \*.\*.xls (Microsoft Word 2010, Microsoft Excel 2010, Adobe Reader)

Schedules: \*.\*.mpp (Microsoft Project 2010)

Mechanical documentation: \*.\*.dwg, \*.\*.dwf (AutoCAD ver. 13 or higher, Autodesk Design Review)

Electrical documentation: \*.\*.zw1 (PDF, EPlan ver.5.5/P8)

Photos, images: \*.\*.jpg

## 3. BASIC DOCUMENTATION

### List of basic documentation

Item	No. of design/drawing	Title
1	Plan stref bezpieczeństwa.xlsx (safety zone plan)	Conceptual and illustrative drawings of safety zones

## CHAPTER III - SCOPE OF THE BIDDER/CONTRACTOR'S WORKS

### 1. ELEMENTS OF SAFETY ZONE FENCING TOGETHER WITH ELECTRICAL AND NETWORK INFRASTRUCTURE

- 1.1 The following works shall be performed under the supply of safety zone fencing elements:
- Preparing and agreeing - with AMP and the crane Contractor - on the DE (Detailed Engineering) technical documentation for safety zones and prefabrication of all components of zones (optionally, purchase of complete solutions if the Bidder/Contractor does not manufacture this type of equipment).
  - Supply of prefabricated units of safety zones to the Owner (location - ArcelorMittal Poland S.A. - Cold Rolling Mill in Krakow) and storage of the components in a designated storage place.
- 1.2 The following works shall be performed under the supply of safety zone electric infrastructure:
- Preparing and agreeing with AMP on DE technical documentation for electrical infrastructure of safety zones and prefabrication of all electrical components (optionally, purchase of complete solutions if the Bidder/Contractor does not manufacture this type of equipment).
  - Supply of prefabricated units of electrical infrastructure of safety zones to the Owner (location - ArcelorMittal Poland S.A. - Cold Rolling Mill in Krakow) and storage of the components in a designated storage place.

Detailed technical and technological data of safety zones and their electrical infrastructure are given in the table below.

Item	Technical and technological information	Description
1	SAFETY SYSTEM	The file "Plan stref bezpieczeństwa.xlsx" contains an illustrative safety zone plan with the location of the equipment. The final arrangement of zones and design of safety system may differ from that shown.
2	S1 safety zone.	
2.1	Structure of fixed guards	To be implemented under another project.
2.2	Interlocking guards with locking mechanism	To be implemented under another project.

2.3	Control box with emergency stop function	To be implemented under another project.
2.4	Emergency stop system and function	To be implemented under another project.
2.5	Light curtains	To be implemented under another project.
2.6	Light signal	To be implemented under another project.
2.7	Interface with S1 zone safety controller	Interface between the ACE zone system controller and S1 zone controller should be provided. Communication and data exchange must be carried out in a secure manner. It will be probably based on secure digital signals through the use of remote I/O module.
3	<b>S2 safety zone.</b>	
3.1	Structure of fixed guards	<p>Design of fixed guards at the boundary of S1 and S2 zones is beyond the scope of this project and will be performed during revamping of a conveyor beam.</p> <p>Fixed guard located at the border of S2 zone by the passageway to the canteen should be made in such a way as to support the fall (rolling) of a 30 t coil, while maintaining the height of protective structure at a minimum of 200 cm.</p> <p>Other sections of zone should be designed in accordance with the requirements of <b>PN-EN ISO 14120</b>. The required minimum height of protective structure was set at the level of 200 cm.</p> <p>The shape of zone must be designed taking into account the location of the current storage area for coils to be fed into the pickling line.</p> <p>The distance between coils and fixed guards including their safety devices must be at</p>

		<p>least 50 cm.</p> <p>The structure of fixed guards must be designed in such a way that they can be disassembled and reassembled without damaging safety system components and devices. Disassembly should be possible with the use of generally accessible tools. Removal of guards will be needed for the duration of maintenance works in the bay. After their removal, structural elements must not protrude above the floor level.</p> <p>In the area of windows located along the S2 zone, gratings (mesh min. 240x240mm) should be installed as fixed guards.</p>
<p>3.2</p>	<p>Interlocking guard with locking mechanism,</p>	<p>Five safety doors with a locking function are to be provided in S2 safety zone, marked GL3, GL4, GL5, GL7, GL8 respectively.</p> <p>The unlocking function of interlocking guards should be designed in accordance with the shutdown matrix to be developed and agreed upon with AMP by the Crane Contractor and as per PN EN ISO 14119:2013 standard.</p> <p>Required unlocking function - conditional unlocking. The required level of reliability for the locking mechanism of interlocking guards is PL c CAT 1. Sensors and control signals must be connect to remote inputs/outputs of the ACE system safety controller.</p> <p>The doors must allow for the possibility of attaching LOTO padlocks (5) which prevent the safety zone from being</p>

		activated.
3.3	Control box with emergency stop function	<p>A control box with the following push-button arrangement should be placed at each door:</p> <ol style="list-style-type: none"> <li>1. Emergency stop push-button.</li> </ol> <p>Buttons and installation locations are marked on the Safety Zone Plan as <b>E3, E4, E5, E7, E8</b>.</p> <ol style="list-style-type: none"> <li>2. Three-position selector switch - one on each box.             <ol style="list-style-type: none"> <li>a. Pos. 0 - guard locked</li> <li>b. Pos. 1 - making request to enter the zone. Permission to enter is only possible after authorisation from the ACE system (e.g. after the beam has been loaded or cranes have left the area).</li> <li>c. Pos. 2 - request to enter the zone immediately - cranes finish their transport cycle and stop; after that the lock is released.</li> </ol> </li> <li>3. Blue illuminated button - Resetting the safety system after leaving the zone and closing the guards. Reset buttons are marked as R3, R4, R5, R7 and R8 on the Safety Zone Plan.</li> </ol> <p>The stop function should be designed in accordance with the shutdown matrix to be developed and agreed upon with AMP by the Crane Contractor.</p> <p>The minimum required reliability level of the emergency stop function of S2 zone is <b>PL c CAT 1</b> (as per PN-EN ISO 13850 standard).</p>

3.4	Emergency stop system	<p>Emergency stop devices for <b>S2</b> zone (except for those installed in control boxes) should be designed taking into account the extensive area of the zone. Pull-wire emergency stop devices should be used in accordance with their location as marked on the Safety Zone Plan - they are marked <b>ER21</b>, <b>ER23</b>, <b>ER27</b>, <b>ER28</b> (arrangement within the safety zone).</p> <p>Activation of emergency stop device must cause the safety system to generate an emergency stop signal for the cranes and to unlock the doors in this zone.</p> <p>The emergency stop system for <b>S2</b> zone must have the reliability level at least <b>PL c CAT 1</b> (as per <b>PN EN ISO 13850</b>). The stop function shall be designed in accordance with the shutdown matrix.</p>
3.6	Light signal	<p>Due to the lack of full zone visibility when the safety system is reset, a pre-start signal function must be used. A 15J,1Hz,10s light signal system should be used to ensure this function. The light signal should be emitted in a different colour for each zone. Signalling devices should be placed at each control box.</p>
3.7	Distributed I/O and network devices	<p>Each box should be equipped with a distributed module for inputs and outputs of ACE system safety controller, to which sensors and actuators of the control system will be connected. Each I/O module must be connected to the Ethernet network, which may require installing a network switch together with a power</p>

		supply unit in the control box.
<b>4</b>	<b>Zone S3</b>	
<b>4.1</b>	<b>Structure of fixed guards</b>	<p>The required minimum height of protective structure at the border of zones <b>S2/S3</b> was set at the level of 200 cm. The shape of zone must be designed taking into account the location of the current storage area for coils to be fed into the pickling line and the track. The structure of fixed guards must be designed in accordance with the requirements of <b>PN-EN ISO 14120</b>.</p> <p>In the area of windows located along the <b>S3</b> zone, gratings (mesh min. 240x240mm) should be installed as fixed guards.</p> <p>The structure of fixed guards must be designed in such a way that they can be disassembled and reassembled without damaging safety system components and devices. Disassembly should be possible with the use of generally accessible tools. Removal of guards will be needed for the duration of maintenance works in the bay. After their removal, structural elements must not protrude above the floor level.</p> <p>The distance between loading gauge and fixed guards including their safety devices must be at least 50 cm.</p>
<b>4.2</b>	<b>Wide interlocking guard with locking mechanism</b>	<p>A safety door with locking function marked as <b>GL6</b> is to be provided in <b>S3</b> safety zone.</p> <p>The door must double-leafed and wide enough (2m total) to enable the Pickling Line team to approach the scrap car with a ladder. The door must be openable over the full height</p>

		<p>of the fencing. When the door is opened, it must be possible to bring the ladder in - there must be no threshold or other protruding elements above the floor level.</p> <p>The unlocking function of interlocking guards should be designed in accordance with the shutdown matrix to be developed and agreed upon with AMP by the Crane Contractor and as per <b>PN EN ISO 14119:2013 standard</b>.</p> <p>Required unlocking function - conditional unlocking. The required level of reliability for the locking mechanism of interlocking guards is <b>PL c CAT 1</b>.</p> <p>Sensors and control signals must be connect to remote inputs/outputs of the ACE system safety controller.</p> <p>The doors must allow for the possibility of attaching LOTO padlocks (5) which prevent the safety zone from being activated.</p>
4.3	Control box with emergency stop function.	<p>A control box with the following push-button arrangement should be placed at GL6 door:</p> <ol style="list-style-type: none"> <li>1. Emergency stop push-button.</li> </ol> <p>The button and installation location is marked on the Safety Zone Plan as <b>E6</b>.</p> <ol style="list-style-type: none"> <li>2. Three-position selector switch - one on each box.             <ol style="list-style-type: none"> <li>a. Pos. 0 - guard locked</li> <li>b. Pos. 1 - making request to enter the zone. Permission to enter is only possible after authorisation from the ACE system (e.g. after the beam has been loaded or cranes have left the area).</li> </ol> </li> </ol>

		<p>c. Pos. 2 - request to enter the zone immediately - cranes finish their transport cycle and stop; after that the lock is released.</p> <p>3. Blue illuminated button - Resetting the safety system after leaving the zone and closing the guards. Reset button is marked as <b>R6</b> on the Safety Zone Plan.</p> <p>The stop function should be designed in accordance with the shutdown matrix to be developed and agreed upon with AMP by the Crane Contractor.</p> <p>The minimum required reliability level of the emergency stop function of <b>S3</b> zone is <b>PL c CAT 1</b> (as per <b>PN-EN ISO 13850</b> standard).</p>
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4.4	Emergency stop system	<p>Emergency stop devices for <b>S3</b> zone (except for those installed in the control box) should be designed taking into account the extensive area of the zone. Pull-wire emergency stop devices should be used in accordance with their location as marked on the Safety Zone Plan - they are marked <b>ER25 and ER26 (shared with S4)</b> (location inside the safety zone).</p> <p>Activation of emergency stop device must cause the safety system to generate an emergency stop signal for the cranes and to unlock the doors in this zone.</p> <p>The emergency stop system for <b>S3</b> zone must have the reliability level at least <b>PL c CAT 1</b> (as per <b>PN EN ISO 13850</b>). The stop function shall be designed in accordance with the shutdown matrix.</p>
4.5	Light signal	<p>Due to the lack of full zone visibility when the safety system is reset, a pre-start signal function must be used. A 15J,1Hz,10s light signal system should be used to ensure this function. The light signal should be emitted in a different colour for each zone. Signalling devices should be placed at each control box.</p>
4.6	Distributed I/O and network devices	<p>Each box should be equipped with a distributed module for inputs and outputs of ACE system safety controller, to which sensors and actuators of the control system will be connected. Each I/O module must be connected to the Ethernet network, which may require installing a network switch together with a power</p>

		supply unit in the control box.
<b>5</b>	<b>Zone S4</b>	
<b>5.1</b>	<b>Structure of fixed guards</b>	<p>The required minimum height of protective structure at the border of zones <b>S2/S4</b> and <b>S4/S5</b> was set at the level of 200 cm. The shape of zone must be designed taking into account the location of the current storage area for coils to be fed into the pickling line and the track. The structure of fixed guards must be designed in accordance with the requirements of <b>PN-EN ISO 14120</b>.</p> <p>In the area of windows located along the <b>S4</b> zone, gratings (mesh min. 240x240mm) should be installed as fixed guards.</p> <p>The structure of fixed guards must be designed in such a way that they can be disassembled and reassembled without damaging the safety system components and devices. Disassembly should be possible with the use of generally accessible tools. Removal of guards will be needed for the duration of maintenance works in the bay. After their removal, structural elements must not protrude above the floor level.</p> <p>The distance between loading gauge and fixed guards including their safety devices must be at least 50 cm.</p> <p>Entrances to the crane tracks (<b>GL10</b>, <b>GL11</b>) in the area of <b>S4</b> zone must be secured with fixed guards up to the minimum height of 140 cm counting from the floor.</p>
<b>5.2</b>	<b>Interlocking guard with locking mechanism</b>	Safety doors with locking function marked <b>GL2</b> , <b>GL10</b> and <b>GL11</b> are to be provided

		<p>in <b>S4</b> safety zone.</p> <p>The unlocking function of interlocking guards should be designed in accordance with the shutdown matrix to be developed and agreed upon with AMP by the Crane Contractor and as per <b>PN EN ISO 14119:2013</b> standard.</p> <p>Required unlocking function - conditional unlocking. The minimum required level of reliability for the locking mechanism of interlocking guards is <b>PL c CAT 1</b>. Sensors and control signals must be connect to remote inputs/outputs of the ACE system safety controller.</p> <p>The doors must allow for the possibility of attaching LOTO padlocks (5) which prevent the safety zone from being activated.</p>
<p>5.3</p>	<p><b>Interlocking guard (roller shutter door) - retrofitting of an existing roller shutter door</b></p>	<p>A locking guard designated as <b>G1</b> is to be provided in the form of a roller shutter door (the door is already in place and in operation) in <b>S4</b> safety zone.</p> <p>Opening of the interlocking guard should stop specific devices in <b>S4</b> zone in accordance with the shutdown matrix to be developed and agreed upon with AMP by the crane contractor. It is therefore necessary to retrofit the existing door with suitable limit switches and controls.</p> <p>The minimum level of reliability for the interlocking guard is <b>PL c CAT 1</b>.</p> <p>The door or the actuators / controls must allow for the possibility of attaching LOTO padlocks (5) which prevent the safety zone from being</p>

		activated.
5.4	Light curtains	<p>Due to the necessity of dividing the railway track area into two independent zones <b>S3</b> and <b>S4</b>, a three-beam light barrier <b>LB30</b> must be installed between these zones, between the scrap cars and cars with coils.</p> <p>Since it is necessary to carry out repairs in <b>S5</b> repair zone, access to <b>S4</b> zone must be restricted. To do so, a three-beam light barrier <b>LB31</b> must be installed as an extension of the structure of fixed guards.</p> <p>Activation of the barrier by an operator intending to enter <b>S4</b> zone should stop specific devices in <b>S4</b> zone in accordance with the shutdown matrix to be developed and agreed upon with AMP by the crane contractor.</p>
5.5	Control box with emergency stop function.	<p>A control box with the following push-button arrangement should be placed at the light curtains <b>LB30</b>, <b>LB31</b>, interlocking guards with locking function <b>GL2</b>, <b>GL10</b> and <b>GL11</b>, and door <b>G1</b>:</p> <ol style="list-style-type: none"> <li>1. Emergency stop buttons.</li> </ol> <p>Buttons and installation locations are marked on the Safety Zone Plan as <b>E1</b>, <b>E2</b>, <b>E10</b>, <b>E11</b>, <b>E30</b>, <b>E31</b>.</p> <ol style="list-style-type: none"> <li>2. Three-position selector switch - one on each box. <ol style="list-style-type: none"> <li>a. Pos. 0 - guard locked</li> <li>b. Pos. 1 - making request to enter the zone. Permission to enter is only possible after authorisation from the ACE system (e.g. after the beam has been loaded or cranes have left the area).</li> <li>c. Pos. 2 - request to enter the zone immediately - cranes finish their transport cycle and stop; after that the lock is released.</li> </ol> </li> </ol>

		<p>3. Blue illuminated button - Resetting the safety system after leaving the zone and closing the guards. Reset buttons are marked as <b>R1, R2, R10, R11, R30, R31</b> on the Safety Zone Plan.</p> <p>The stop function should be designed in accordance with the shutdown matrix to be developed and agreed upon with AMP by the Crane Contractor.</p> <p>The minimum required reliability level of the emergency stop function of <b>S4</b> zone is <b>PL c CAT 1</b> (as per <b>PN-EN ISO 13850</b> standard).</p>
<p>5.6</p>	<p>Emergency stop device</p>	<p>Emergency stop devices for <b>S4</b> zone (except for those installed in control boxes) should be designed taking into account the extensive area of the zone. Pull-wire emergency stop devices should be used in accordance with their location as marked on the Safety Zone Plan - they are marked <b>ER20, ER22, ER24 and ER26 (shared with S3)</b> (location inside the safety zone).</p> <p>Activation of emergency stop device must cause the safety system to generate an emergency stop signal for the cranes and to unlock the doors in this zone.</p> <p>The emergency stop system for <b>S4</b> zone must have the reliability level at least <b>PL c CAT 1</b> (as per <b>PN EN ISO 13850</b>). The stop function shall be designed in accordance with the shutdown matrix.</p>
<p>5.7</p>	<p>Light signal</p>	<p>Due to the lack of full zone visibility when the safety system is reset, a pre-start signal function must be used. A 15J,1Hz,10s light signal system should be used to ensure this</p>

		function. The light signal should be emitted in a different colour for each zone. Signalling devices should be placed at each control box.
5.8	Distributed I/O and network devices	Each box should be equipped with a distributed module for inputs and outputs of ACE system safety controller, to which sensors and actuators of the control system will be connected. Each I/O module must be connected to the Ethernet network, which may require installing a network switch together with a power supply unit in the control box.
	Zone S5	
6.1	Service area	The service area itself is not a safety zone but is adjacent to safety zones S2, S4 and S6.
	Zone S6 - crane tracks	
7.1	Interlocking guards with locking mechanism	<p>Interlocking guards marked consecutively as GL12, GL13, GL14, G15 are to be provided in S6 safety zone.</p> <p>The minimum level of reliability for the interlocking guard is PL c CAT 1.</p> <p>Triggering of push buttons shall switch off specific equipment in accordance with the shutdown matrix to be developed and agreed upon with AMP by the Crane Contractor.</p> <p>Sensors and control signals must be connect to remote inputs/outputs of the ACE system safety controller.</p> <p>The doors must allow for the possibility of attaching LOTO padlocks (5) which prevent the safety zone from being activated.</p>
7.2	Control box with emergency stop function.	A control box with the following push-button arrangement should be placed at interlocking guards with locking function GL12,

		<p><b>GL13, GL14, GL15:</b></p> <p>1. Emergency stop buttons.</p> <p>Buttons and installation locations are marked on the Safety Zone Plan as <b>E12, E13, E14, E15</b>.</p> <p>2. Three-position selector switch - one on each box.</p> <p>a. Pos. 0 - guard locked</p> <p>b. Pos. 1 - making request to enter the zone. Permission to enter is only possible after authorisation from the ACE system (e.g. after the beam has been loaded or cranes have left the area).</p> <p>c. Pos. 2 - request to enter the zone immediately - cranes finish their transport cycle and stop; after that the lock is released.</p> <p>3. Blue illuminated button - Resetting the safety system after leaving the zone and closing the guards.</p> <p>Reset buttons are marked as <b>R12, R13, R14, R15</b> on the Safety Zone Plan.</p> <p>The stop function should be designed in accordance with the shutdown matrix to be developed and agreed upon with AMP by the Crane Contractor.</p> <p>The minimum required reliability level of the emergency stop function of <b>S4</b> zone is <b>PL c CAT 1</b> (as per <b>PN-EN ISO 13850</b> standard).</p>
7.3	Light signal	<p>Due to the lack of full zone visibility when the safety system is reset, a pre-start signal function must be used. A 15J,1Hz,10s light signal system should be used to ensure this function. The light signal should be emitted in a different colour for each zone. Signalling devices should be placed at each control box.</p>

7.4	Distributed I/O and network devices	Each box should be equipped with a distributed module for inputs and outputs of ACE system safety controller, to which sensors and actuators of the control system will be connected. Each I/O module must be connected to the Ethernet network, which may require installing a network switch together with a power supply unit in the control box.
8	Control panel in the ACE system supervision room	
8.1	Control box with emergency stop function.	<p>In the ACE system supervision room, there should be a control panel for the entire system including:</p> <ol style="list-style-type: none"> <li>1. Emergency stop buttons for the entire ACE system - <b>E50</b>.</li> <li>2. Blue illuminated push-buttons for resetting safety zones - <b>R50 (general), R51 (S1), R52 (S2), R53 (S3), R54 (S4), R56 (S6)</b>.</li> <li>3. Yellow illuminated buttons for resetting crane safety - <b>R120 (crane #1020) and R125 (crane #1025)</b>.</li> <li>4. Three-position mode selector switches for cranes - two (<b>P120</b> - crane #1020 and <b>P125</b> - crane #1025):             <ol style="list-style-type: none"> <li>a. Pos. 0 - manual control of crane</li> <li>b. Pos. 1 - radio control of crane.</li> <li>c. Pos. 2 - automatic control of crane.</li> </ol> <p>Required reliability level for functioning of <b>P120</b> and <b>P125</b> elements is <b>PL e</b>.</p> </li> <li>5. Two red buttons - <b>STOP</b> - for cranes #1020 (<b>STOP120</b>) and #1025 (<b>STOP125</b>) - stop in automatic mode.</li> </ol>

		<p>6. Two green buttons - START - for cranes #1020 (START120) and #1025 (START125) in automatic mode.</p> <p>7. Two coloured (each with three colours) small lamps for indicating operating mode of particular crane.</p> <p>8. SIEMENS 24'' control panel with visualisation of zone security status and system diagnostics. Panel software for commissioning tests shall be prepared by the Zone Contractor.</p> <p>Elements on the ACE control panel should be arranged in accordance with the illustrative concept included in the file "Plan stref bezpieczeństwa.xlsx".</p> <p>A distributed module for inputs and outputs of ACE system safety controller, to which actuators of the control system will be connected, must be provided at the control panel. The distributed I/O module must be connected to the Ethernet network, which may require installing a network switch together with a power supply unit.</p>
9	PLC & software	
9.1		<p>The Zone Contractor shall install the ACE system safety controller in a designated location in the server room. It shall prepare power supply for it and connect it to the network.</p> <p>The Zone Contractor shall write basic software regarding the interface with beam/robot, functioning and safety of zones,</p>

		<p>system diagnostics and interface with cranes.</p> <p>The Zone Contractor shall prepare visualisation on operator's panel for safety zone logic and system diagnostics.</p> <p>The Contractor shall provide all source codes for the software and visualisation developed. The developed software and visualisation shall be the property of AMP.</p> <p>AMP reserves the right to use or modify the entire or part of Contractor's software/visualisation.</p> <p>NOTE! The entire logic of safety zones must be handled by the safety controller program. All software must be fully accessible and editable by AMP professionals.</p> <p>NOTE! The entire PLC safety software must be implemented in Step 7 environment in a single runtime group. The exact version of the development environment must be agreed with AMP in order to make it compatible with the crane software environment.</p> <p>Names of variables in the software should be in English. Descriptions are to be made in Polish (e.g. on visualisation). Comments should be implemented in a reasonable way to facilitate code analysis; comments should be in Polish and English.</p> <p>Removable electrical equipment (control boxes, pull-wire emergency stop switches, light curtains) must be connected using industrial connectors. They must ensure easy assembly and disassembly. It is also necessary</p>
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		to provide a method of securing connectors for the time of removal of guards (they may not protrude above the floor level).
<b>10</b>	<b>General electrical and network requirements</b>	
<b>10.1</b>		<p>Power supply and network connection (fibre optic or copper cable) must be provided to all devices listed in this specification. 48VDC power supply units are required for network devices. Active network devices shall be provided and programmed by AMP for security reasons.</p> <p>The Zone Contractor shall install the missing cable routes to ensure continuity of network and power connections with the rest of the infrastructure. Power cable routes must be separated from signal routes and properly protected.</p> <p>All electrical boxes - including those for control boxes - shall be rated IP65 or higher. Boxes and actuators (where necessary) shall be adequately protected against the negative effects of HCl acid fumes and high ambient temperature.</p> <p>Description of buttons and switches - verbal and symbolic - according to their functions and design.</p>
<b>11</b>	<b>Network connections</b>	
<b>11.1</b>	<b>Connection of distributed inputs/outputs of controller (RIO) to network nodes in the bay</b>	<p>Network connections should be made according to the following guidelines:</p> <p>RIO 15 - Y95 to node PRE23 STP (in protective tube, route to be determined)</p> <p>RIO 8 - Y99 to node PRE23 STP (entry in the floor <math>\varnothing 40</math> - to be</p>

		<p>determined)</p> <p>RIO 13 - Y116 to node Y112 STP (in protective tube, route to be determined)</p> <p>RIO 3 - Y115 to node Y112 STP (in protective tube - route along the existing cable route, in protective tube, route to be determined)</p> <p>RIO 1 - Railway gate to node Z117 STP (in protective tube, route to be determined)</p> <p>RIO 10 - Z118 to node Z117 STP (in protective tube, route to be determined)</p> <p>RIO 2 - Z116 to node Z117 STP (in protective tube outside the cable entry, entry from RIO 5 ø40, route to be determined)</p> <p>RIO 12 - Z116 to node Z117 STP (in protective tube, route to be determined)</p> <p>RIO 31 - Z115 to node Z117 STP (in protective tube, route to be determined)</p> <p>RIO 4 - Z115 to node Z117 STP (in protective tube outside the cable entry, entry from RIO 2 ø40, route to be determined)</p> <p>RIO 5 - Z108 new network node (cabinet for assets - to be determined) to node PRE23 FO SM x 6, (in protective tube outside the cable entry, entry ø40 from PRE23, route to be determined)</p> <p>RIO 11 - Z106 to node Z107 STP (in protective tube, route to be determined)</p> <p>RIO 30 - Z103 to node Z107 STP (in protective tube, route to be determined)</p>
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		<p>RIO 6 - Z100 to node Z97 STP (in protective tube outside the cable entry, entry <math>\varnothing 40</math>, route to be determined)</p> <p>RIO 7 - Z99 to node Z97 STP (in protective tube outside the cable entry, entry <math>\varnothing 40</math> from RIO 6, route to be determined)</p> <p>RIO 50 - Z97 to node Z97 STP (in cable tray)</p> <p>RIO 14 - Z95 to node Z97 STP (in protective tube, route to be determined)</p> <p>RIO 51 - Control room to node PRE23 STP (in protective tube, route to be determined)</p> <p>Safety controller in server room - Control room to PRE23 STP node (in protective tube, route to be determined)</p>
11.2	Additional network requirements	<p>Redundancy for STP routes must be taken into account - a single cable must have 100% reserve in the form of a second cable.</p> <p>The Contractor should design the passive network infrastructure based on a 'design and build' approach, following the guidelines and topology provided by GMN. The design must be approved by AIM/GMN.</p> <p>Active nodes: PRE23, Y100, Y112, Z117, Z108, Z107, Z97, Z92. Proposed installation location for access points: Z118, Z111, Z107, Z100, Z92, Z87, Z79, Z73.</p>
12	ACE system supervision room	
12.1	Access control	The ACE system supervision room should be secured with an access

		<p>control system in order to grant entry authorisation to selected AMP personnel by scanning currently used employee passes. Access control must be compatible with UNIQUE and MIFARE cards. Access should be also permitted after entering an access code.</p> <p>The system should be programmable by AMP and signal an alert in case of irregularities.</p>
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- Descriptions of control panels masking, operating manual and job instructions shall be made in Polish.
- The shutdown matrix must be agreed with the Crane Contractor and approved by the Office of Technical Inspection as a whole project.
- Responsibility matrix:

Task:	Responsibility:	
Design / Preparation of documentation	Zone Contractor	
Approvals and arrangements with the Office of Technical Inspection	Zone Contractor	Crane Contractor
Purchase of PLC controller, I/O modules, HMI panel		AMP
Purchase of components for electrical cabinets	Zone Contractor	
Purchase of components and supplying power	Zone Contractor	
Installation of equipment	Zone Contractor	
Purchase of network/electrical cabinets	Zone Contractor	
Electrical start-up	Zone Contractor	
Purchase of passive network equipment and arrangement in the bay	Zone Contractor	
Purchase of active network equipment		AMP
Programming of controllers	Zone Contractor	At a later stage, AMP
Configuring network devices		AMP
Configuring devices	Zone Contractor	
Final acceptances by the Office of Technical Inspection		Crane Contractor
Purchase and installation of guards and safety elements	Zone Contractor	
Final start-up	Zone Contractor	AMP
Trainings	Zone Contractor	
Other project-related work not included in this list	Zone Contractor	

AMP shall purchase the following equipment: PLC with necessary distributed modules and I/O cards, HMI panel and network switches. All other equipment and elements shall be purchased by the Zone Contractor as part of the project.

## 2. INSTALLATION OF FENCING AROUND SAFETY ZONES

The following works shall be performed within the scope of OHT crane erection:

- Performance of safety audits at the erection site (in the place of safety zone installation) and in erection site facilities (over the whole period of the erection according to the schedule),
- Performance of continuous/permanent safety supervision of works executed by the Contractor and/or its Sub-contractors by safety at work service (OHS Inspector) over the whole period of the erection,
- Execution of working land surveys and measurements required by law (as-built survey reports),
- Delivery of prefabricated elements for safety zones to the erection site, aisle Z-Y
- Fastening of individual elements of safety zones in the Z-Y aisle,
- Installation of prefabricated safety zone elements in Z-Y aisle
- Installation of safety zone equipment
- Installation of electrical systems for safety zones as per the technical documentation,
- Marking of safety zones

## 3. Integration of delivered and installed safety zones with overhead cranes #1020 and #1025 as well as other machinery within the zones.

As part of commissioning of the safety system for overhead cranes operating in automatic mode, the following scope of works shall be performed:

- Performance of safety audits at the erection site (in the place of installation of safety zone elements) and in erection site facilities (over the whole period of crane commissioning according to the schedule),
- Performance of continuous/permanent safety supervision of works executed by the Contractor and / or its Subcontractors by a safety at work services (OHS Inspector) over the whole period of safety system commissioning,
- Connecting the power supply to the safety zone system,
- Making measurements of cable insulation conditions, efficiency of electric shock protection,
- Integration of the designed safety system for installed zones with the safety system of #1020 and #1025 cranes,
- Completion of cold commissioning,

- Functional tests of all safety system elements (emergency stop, tripping of E-STOP safety switches, opening of interlocking guards, activation of light curtains, making request for entering the safety area),
- Completion of hot commissioning,
- Performance of necessary adjustments and removal of all defects and faults,
- Preparation of as-built documentation (including operating instructions, operating and maintenance manuals and Occupational Risk Assessment (HIRA) for operation, maintenance and repair and procedure to be followed in case of occurrence of emergency conditions and need of evacuation),
- Providing training for the Owner's employees (to be concluded with issuance of certificates stating names of the trainees for individual employee groups),
- Preparation of safety zone system for acceptance by the Office of Technical Inspection (including preparation of acceptance documentation),
- Cooperation with the Crane Contractor within the scope of acceptance of the whole ACE system, including #1020 and #1025 cranes and safety zones, by the Office of Technical Inspection (to be concluded with issuance of Certificate of unconditional crane and safety zone acceptance and approval for use),
- Completion of availability tests of safety zones (to be carried out by Cold Rolling Mill and supervised by the Contractor) within 30 days from unconditional acceptance by UDT. During the availability tests all guaranteed parameters must be tested,
- Acceptances of zones and crane safety system by Working Team composed of the Owner's, User's and Contractor's employees.

#### **4. DOCUMENTATION REQUIRED DURING PROJECT EXECUTION**

- Verified/up-dated Work Schedule,
- Memorandum of Understanding,
- Occupational Risk Assessment ("HIRA") for works performed,
- BIOZ (Health and Safety Plan),
- Work Organisation Plan prepared on the basis of the Schedule attached in appendix to this Technical Specification,
- Preparation and submission of weekly work progress reports expressed in percentage, according to the Buyer's/Owner's instructions,
- Preparation of Reports of safety at work audits.

#### **5. GUARANTEED PARAMETERS**

List of guaranteed parameters, which shall be verified during acceptance performed by the Buyer:

##### **5.1 Meeting system and safety zone performance requirements by:**

Emergency stopping of the movement of overhead travelling cranes, robot, walking beam in case of activation of the specified safety system (E-stop button marked as E on

the Safety Zone Plan) and (emergency stop devices marked as ER on the Safety Zone Plan) according to the shutdown matrix. Checking the interruption of LB light barriers

## 5.2 Performance and operation of safety system devices.

Carrying out three tests of the entire system behaviour for independent tripping of each safety circuit, in accordance with the safety requirements.

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