

Technical Specification part 1 for construction of VTD Installation for the Project titled "Innovative high-silicon steel with adjustable low content of non-metallic impurities and inclusions with controlled morphology and appropriate level of AlN inhibitor for high-quality transformer sheets" (project no. : POIR.01.01.01-00-0238 / 17) to be performed on the Blast Furnace Plant and Steel Plant at AMP in Cracow.



**Technical Specification
for construction of steel ladles for the Project titled "Innovative high-silicon steel with adjustable low content of non-metallic impurities and inclusions with controlled morphology and appropriate level of AlN inhibitor for high-quality transformer sheets" (project no. : POIR.01.01.01-00-0238 / 17) to be performed on the Blast Furnace Plant and Steel Plant at AMP in Cracow. Part no. 1 (New VTD Installation).**

Part no.1 (VTD Installation) before signing the NDA

This specification is attached as Annex no.2 to the request for quotation no. 1/0238/2018

ArcelorMittal Poland S.A.

Unit in Cracow

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INTRODUCTION

ArcelorMittal Poland S.A. (hereinafter also AMP) carries out its business in various divisions in Poland, with a main focus on steel production in Kraków and Dąbrowa Górnicza and in other important production plants responsible for manufacturing of various steel products in Poland.

The subject of the order indicated in this specification applies to the project entitled "Innovative high-silicon steel with adjustable low content of non-metallic contaminants and non-metallic inclusions with controlled morphology and appropriate level of AlN inhibitor for high-quality transformer sheets" (project no. : SGD.01.01.01-00-0238 / 17, co-financed under Sub-measure 1.1.1 of the Intelligent Development Operational Program 2014-2020 co-financed by the European Regional Development Fund.

In connection with the Company's obligation to apply the competition principle, this technical specification is a detailed description of the subject of the order which allowing preparation of the Offers by Bidders.

This specification has been prepared with the most care to determine the full, unambiguous and comprehensive description of the subject of the Order so as to enable Bidders to determine all their obligations and risks and to account for the price and other elements of the offer.

This Technical Specification applies to turnkey implementation covering all necessary areas, such as i.e. design, manufacturing, delivery, development, assembly, testing and commissioning of the Vacuum Tank Degasser (VTD). The implementation of the subject of the Order also includes obtaining a permit for use by the Bidder.

All purchases, services and **delivery of DDP INCOTERMS 2010** subject to this tender 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 maintain the same technological conditions and the need to preserve the unification of equipment resulting from the expansion of existing infrastructure determined the provisions in this specification. The provisions used are justified in the need to ensure smooth implementation of the project. The indicated provisions do not require the Bidders to apply the indicated solutions and only inform about the minimum parameters and standards. The use of certain types of solutions is not obligatory but merely exemplary. Indications regarding expected technical parameters and indications regarding specific types and producer names are of a general nature, referring only to exemplary indications of

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equivalent products and are not the only accepted solution. On this basis, the Buyer allows equivalent solutions.

Bidders are expected to submit an offer considering the requirements of this AMP Technical Specification.

The Offer must be complete in all respects and must include all the components/equipment required to achieve proper construction, operation and maintenance of the installation.

The Bidder is required to familiarize 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 capacity, parameters as well as smooth and reliable functioning.

The detailed scope of works to be carried out under the Request for Quotation is presented hereunder.

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1. PURPOSE OF THE PROJECT

The aim of the project is to develop a new Vacuum Tank Degasser), hereinafter referred to as the VTD installation, which will enable the production of steel grades meeting high quality requirements. The Investor intends to achieve this objective through the manufacturing and installation of the VTD system, including associated and auxiliary equipment.

2. BUYER STANDARDS

During the execution of all phases of the works (Investments) on the premises of ArcelorMittal Poland S.A., the Supplier must observe and always apply the safety requirements contained in the Book of Safety, including all appendices, e.g. Standards for Prevention of Fatal Accidents:

- ST 000 H&S Policy
- ST 001 Isolation
- ST 002 Confined spaces
- ST 003 Working at Height
- ST 004 Rail safety
- ST 005 Audits
- ST 006 Vehicles and driving
- ST 007 Lifting equipment and operations
- ST 008 Contractors
- ST 009 Alert
- ST 010 Safety metrics
- ST 011 Incident investigation
- ST 012 Working in gas hazard areas
- ST 014 HIRA (Hazard Identification and Risk Assessment)
- ST 015 Golden Rules
- ST 018 Cargo securing
- ST 201 H&S Design Specification
- ST 301 Cell phones

(the above mentioned standards will be passed after the Bidder signs the confidentiality statement - NDA)

NOTE:

In case different requirements are quoted in subsequent norms or standards compliant with those specified above, more stringent (restrictive) norms or standards shall apply!

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3. CURRENT STATUS

Currently, there are three Oxygen Converters running in the Cracow Converter Steel Plant, with a secondary metallurgy unit for each of them. Each of the secondary metallurgy units is equipped with ceramic lances for argon blowing of the molten steel using the "from the top" method, ferroalloy tanks, four-strand wire feeding machine and tanks for ladle filler sand.

The average heat tonnage is 147 tonnes, capacity of steel-teeming ladles without freeboard is 150 tonnes.

4. SCOPE OF BIDDER WORKS

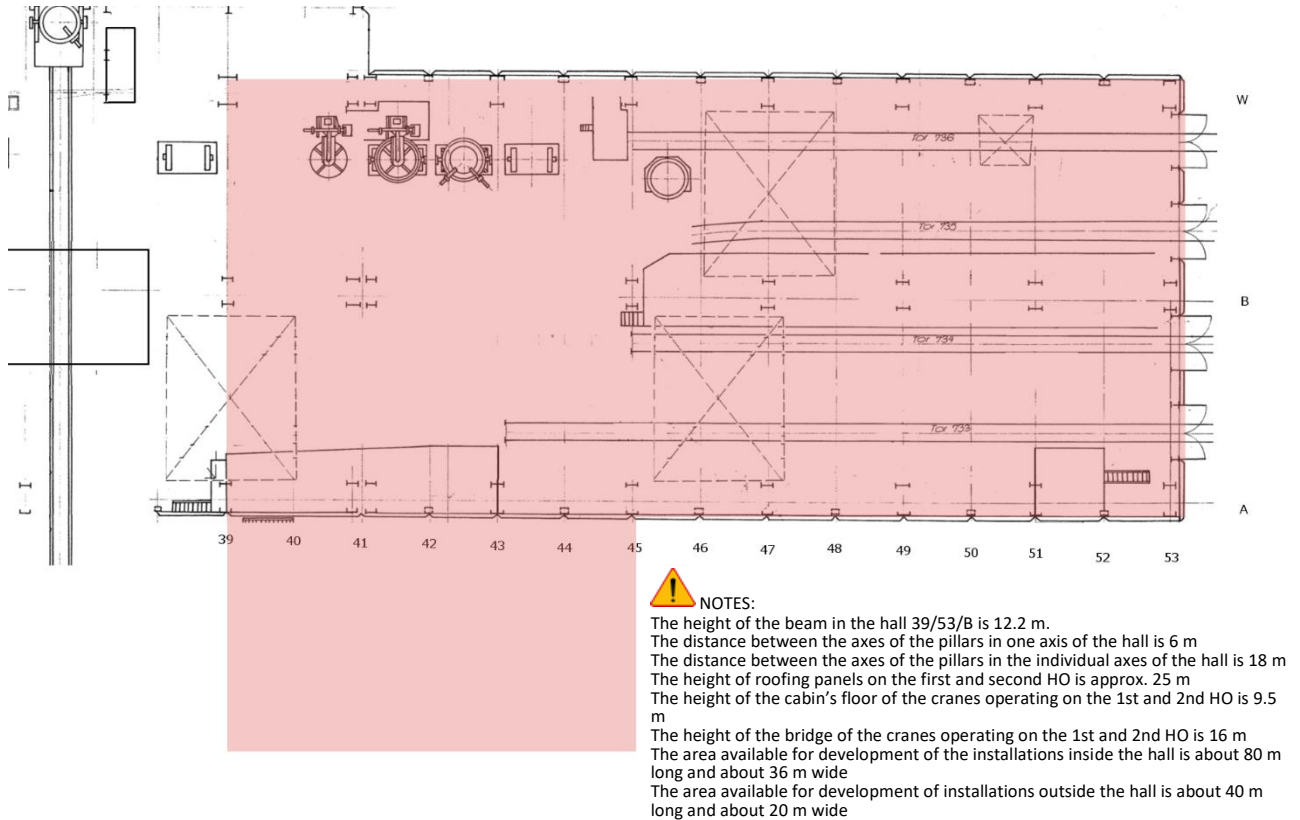
4.1 SUBJECT OF THE WORKS

The purpose of these technical specifications is to present the scope of "turnkey" works including preparation of project documentation (Basic Engineering Design and Detailed Engineering Design), prefabrication, **delivery of DDP INCOTERMS 2010**, unloading, loading, transport (also local), dismantling and installation, commissioning and supervision over the installation of VTD system together with:

- design and construction of two VTD stations with the necessary equipment included;
- design of new steel-teeming ladles with a capacity of approx. 150 tons and keeping the freeboard min. 75 cm, with two gas-permeable fittings;
- design and implementation of the argon stirring system through gas-permeable fittings for the ladle cars on two VTD stations, the system shall also provide the possibility of mixing the metal bath with nitrogen.
- design and implementation of auxiliary devices cooperating with steel ladles.
- obtaining a permit to use for the VTD installation.
- design and implementation of a dust extraction system from a VTD installation meeting the requirements of the best available technology (BAT); the measuring system shall meet the requirements of the QAL2 / QAL3 procedure in accordance with the PN-EN14181: 2015 standard;
- delivery of necessary utilities,
- ferroalloys feeding system & other devices listed below in item 4.2

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Drawing no. 2 Location of VTD stand. Including the detailed information on the restrictions inside the hall:



4.2.2 Design and implementation of the Vacuum Tank Degasser VTD consisting of:

- a). Two stations working independently (except for a common vacuum pump) equipped with:
 - vacuum chambers for a ladle with the melting capacity of circa 150 tonnes, a freeboard of at least 75 cm and an estimated annual capacity of 500,000 tonnes;
 - The area for development of VTD installation proposed by the Investor is shown in Fig. 1 and Fig. 2.
 - OB-type lances, capable of preheating the melt by 30 degrees Celsius within up to 5 minutes (submerged ceramic lance);

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- Passable covers with necessary equipment and necessary openings included. Inner cover (additional thermal screen) is to be built-in from outside with the use of ceramic material.
In addition, the covers should be equipped with splash shield which will be suspended inside the vacuum covers of the tanks during the vacuum process. The covers should be additionally equipped with a thermal protection system against thermal radiation.
- Installation for cleaning contact lids of the contact ring of the covers and tanks in order to ensure cleanness and tightness during the vacuum process shall be provided.
- device for automatic measurement of oxygen temperature and activity;
- device for automatic measurement of hydrogen;
- device for automatic sampling and sample analysis, as well as pneumatic mail for sending samples to the existing laboratory at the Steel Plant;
- two six-strand wire feeding machines, one for each VTD installation, with the necessary safe guards for the fed wire and racks with coils delivered to the area with the use of forklifts.
- an automatic ferroalloys dosing system with a discharge tank and an intermediate tank;
- an efficient dust extraction system consisting of a vacuum treatment filter and a dust removal system for feeding ferroalloys, backfills and other materials and technological operations from the unloading of trucks to feeding to the ladle located in the tank, consisting of a second independent filter.

The above mentioned installations shall comply with the applicable BAT requirements.

The scope of works includes proper feeding of accumulated dust from the outlet of the intake hopper to existing tank cars for the purpose of dust removal. The material to be collected from the funnel of intake hopper shall only be collected dust.

In case of necessity to collect dust to special containers, the Bidder will provide the right amount of tanks enabling efficient installation work.

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Proposals should be submitted for extraction system together with built-in connections to carry out measurements:

- < 10 mg/Nm³ for bag filters;
- The development of installation ensuring capturing any sparks that could ignite the filter bags (Spark Arrestor) shall also be provided.

- cooling system - water systems required for the correct operation of the VTD installation with a safety certificate compliant with the Ex-zones Directive (ATEX);
- emergency pits using shared buffer zones for easy evacuation of scraps.
- implementation of visualization software for all devices and processes along with automatic transmission of information on all performed operations to the KSSK system operating in the Converter Steelworks (Annexes No. 12.8 and 12.9 - **will be passed after the bidder signs the confidentiality statement - NDA**)
- monitoring including recording of the technological process of the entire installation, including monitoring of the process occurring in the vacuum chambers (installation of two infrared cameras for each station) and monitoring of the facility consisting of at least 12 stationary cameras and one rotary camera with the possibility of preview in the new VTD desktop and dispatcher's room. The system shall be compatible with IT standards applicable at AMP depend on the system for example Milestone XProtect Corporate in accordance with appendix 12.10 AIM Addendum to tender – Video Monitoring System requirements (**will be passed after the bidder signs the confidentiality statement – NDA**).
- Preparation of stands for ladles in vacuum tanks with appropriate guides to facilitate inserting the ladle and connecting the argon stirring/nitriding installation.

b). Installation of creating a vacuum with the necessary fittings and associated equipment. The offer shall include the development of a new facility for mechanical pumps, producing vacuum and the accompanying installations together with the overhaul crane.

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c). Ferroalloys feeding system with the development of twelve tanks. Six tanks with the capacity of 12 m³. Remaining tanks with the capacity of 6 m³. The tanks shall be equipped with an automatic loading system from 0 m level, together with vibratory feeders and the weighing system. Unloading of ferroalloys should take place to one unloading silo and then automatically fed to the main tanks. It is necessary to deliver a feeding system from the ferroalloy tanks to both VTD installation stations. The ferroalloy dosing process may be carried out simultaneously on both stands, and the degassing process alternately. The intermediate tank above the cover should provide a capacity of 3 tonnes of Fe-Si in order to ensure the smooth execution of electrical steels. The width of the tape shall be the same as the one, currently used in the plant, for the better transport of materials, the tape is to be "ribbed". The entire Fe-alloy transport system shall be furnished with covers, crates, and separated by fences.

The new system of ferroalloys should be able to load existing containers (for the existing secondary metallurgy system) from newly designed tanks for melts produced on the existing treatment.

d). System of automatic unloading dosing of Powder Materials with four separate tanks with unit capacity of 18m³.

Delivery of Powder materials will be carried out by cars (cisterns) from the level of 0 halls. On the existing treatment.

e). Delivery of ferroalloys will be carried out by car transport, and inside the hall the unloading solution shall be provided, which is why a new intake bunker should be built below the 0 floor level.

f). The installation is to be mandatory equipped with means which allow for manual feeding of ferroalloys prepared and weighed at a specially separated place.

g). Automatic installation for steel argon blowing through 2 porous plugs situated in the ladle bottom (Appendix 12.7 **will be passed after the bidder signs the confidentiality statement - NDA**):

- on three transfer cars (plus on the fourth as a reserve) working in conjunction with Oxygen Converters;
- on two VTD stands;
- in 16 steel teeming ladles through two porous plugs installed in the ladle bottom;
- system of mounting in the bottom of the ladle shall ensure secure attachment of the plug and replacement of the plug, if necessary, during the ladle campaign.
- Installation on ladle transfer cars and VTD stations shall include the connection of argon and nitrogen with automatic gas switching.

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- h). Installation of a new control panel for operating the VTD installation with the required equipment necessary to perform all operations on the VTD station, and a social room with bathroom compliant with the regulations. The equip of the panel with the necessary equipment (monitors, computers, desks, etc.) and the development of the necessary sewage /waste disposal system from these rooms shall also be considered.
- i). The scope shall also consider the development and implementation of a new model of process control occurring in the VTD installation.
- j). Necessary structures and platforms for operation and maintenance of the equipment shall comply with the safety/with AMP's guidelines.
- k). The design shall also consider the necessary modifications of the hall structure (including beams removal, dismantling of platform No. 1, dismantling of railway tracks in the hall and outside the hall until the junction, strengthening the hall and moving dryers, racks and other structures in the building area).

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l). The installation of the following positions for mobile covers shall be considered:

- Above the vacuum tank
- Parking stand
- Stand for craps removal and reparation of the cover.

m). Each station shall be equipped with dryers for heating the refractory lid after replacing the liner. The dryers are to be placed in the repair area of each station.

4.2.3 Transport to the designed chambers will take place with the use of already existing cranes No. 763 and 766. Capacity of crane No. 763 is 225 tons, and crane No. 766 - 220 tons. The offer shall consider the modernization of the existing steelworks cranes in terms of:

- Changes in the working height of cranes (ropes)
- Installation of new longer hooks - 14pcs. For 7 cranes (for handling new 16 ladles of a shape, different than currently).

4.2.4 **The design of 16 new round steel ladles (not oval)** to the required melt weight min 140 tonnes of steel and minimum freeboard of 75 cm while maintaining the current size of trunnions for operating cranes for the melts delivered to the VTD installation, and 155 tonnes of steel for the melts processed at the secondary metallurgy units. The nominal weight in both cases shall not exceed 220 tonnes. The slide gate system is to remain the same as in the currently used ladles. Take the following thickness of the refractory lining for the new ladles:

- Bottom of the ladle: 400-500mm
- Metal zone: 240mm
- Slag zone: 320mm

The Bidder should gain to design a ladle with the largest possible capacity considering the size of the converters and the requirements contained in this technical specification

Production and supply of the designed ladles will be executed in a separate tender.

The detailed design of the new ladle should be issued within max. 2 months from the moment of signing the order.

The commissioning of new ladles shall be carried out in close cooperation with the steel ladle supplier and the Client.

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- 4.2.5 During the transitional period, i.e. during the process of implementing new ladles, it should be possible to use old steel transfer cars to transport new ladles and to transport old ladles in new steel transfer cars.
- 4.2.6 During the transitional period, i.e. during the process of implementing new ladles, it should be possible to use the new COS turret arms to service old and new steel ladles (i.e. using adapters to change the width of the ladle support on the tower).
- 4.2.7 **Design and construction** of steel transfer cars with all accompanying installations (argon stirring, electric power supply, automation):
- 3 new steel transfer cars for each of the 3 converters
 - one backup for converters with the same parameters as above
 - one steel transfer car, for transporting ladles from and to CCM without argon stirring installation.
 - the development of min. 8 independent wheels is assumed, of which min. 50% are drive wheels
 - Each steel transfer car shall be equipped with an automatic coupling SA-3 type on both sides with a lever for manual opening.

The power supply of the above-mentioned steel transfer cars shall be carried out through existing cable ducts, steel transfer cars shall have an independent drive for min. 4 independent wheels, two per side (with separate power supply of each wheel) with properly selected engine power (currently 2x37 kW/ 220 VDC) to keep:

- Continuous reliable operation of the steel transfer car under load: ladle, melt, slag, scraps = 250 tonnes.
- Operation of steel transfer car without loading by ladle for transportation purposes 200 tons
- The assumed speed at full load is 5 km/h with smooth regulation.
- full functionality of the steel transfer car for half drive operation (50% in case of emergency)
- Quick replacement of damaged wheel sets, regardless of other serviceable wheel sets

The installation, assembly of auxiliary installations and commissioning of the steel transfer cars is within the scope of this specification.

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- 4.2.8 The paint coating of steel transfer cars and ladles shall be designed in accordance with RAL 9006. The corrosion protection shall consider work in a highly corrosive (e. g. industrial or marine) environment with high temperatures and for other elements the ambient temperature (corrosive environment: C5-I and C5-M in accordance with PN-EN ISO 12944-2) and in accordance with the requirements of the visual decree (Annex in point 12.6 **will be passed after the bidder signs the confidentiality statement - NDA**)
- 4.2.9 Design and manufacture of additional equipment as below due to the new shape of steel ladles:
- New 2 sets of COS tower arms with a complete weighing system, similar to already existing one, with the design and manufacture of additional adapters enabling cooperation with old ladles during the transition period.
 - 4 covers for secondary metallurgy unit
 - 6 covers for the ladle during transport to the COS tower
 - Covers for dryers: 5 horizontal and 5 vertical
 - Stators: 15 vertical and 10 horizontal
 - Modifications of the metacon trolley designed for ladle service employees for safe and ergonomic operations of replacement of the ladle closure system, ladle nozzle and exchange of gas-permeable fittings in the ladle.
- 4.2.10 All works related to the replacement of the above-mentioned equipment and the commissioning of new ladles must be carried out within max. 5 days of Steelworks shutdown in consultation with representatives of the Plant.
- 4.2.11 Within the scope of the project the Bidder will cut out all dismantled structures, railway tracks, decommissioned ladles, steel transfer cars, covers, stators, tower arms and other decommissioned elements into the batch elements.

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- 4.2.12 Carrying out the analysis of the strength of the construction of cable tunnels going under the steel transfer cars and the tracks in order to perform the necessary repairs and reinforcements resulting from the above analysis.
- 4.2.13 Analysis of possible collisions with the existing equipment (KT, OPP, COS ladle turret). Preparation of the 3D project together with the simulation of the technological chain of steel ladles from BOF through OPP, VTD, to the COS turret.
- 4.2.14 Making provision for two gas permeable fittings in the bottom of the ladle.
- 4.2.15 Design of the ladle shall ensure pouring of steel into oxygen converter in case of return of the molten metal from CCM.
- 4.2.16 When designing a new ladle, the structures of existing cranes throughout the process line that will not be modernized shall be taken into account.
- 4.2.17 The Project shall take into account the necessary modifications to power installations in order to provide utilities necessary for the proper functioning of the installations. Modifications to electrical installations (modernization of substations) are necessary. Analysis of the possibility of supplying power utilities from the given connection points and execution of necessary energy installations projects (additional information in point 6.5 and in Annex No. 12.2 **will be passed after the bidder signs the confidentiality statement - NDA**)
- 4.2.18 Design and preparation of electrical and power installations as well as control and measurement equipment (measuring and control equipment, additional information in point 12.8 **will be passed after the bidder signs the confidentiality statement - NDA**).
- 4.2.19 The Project shall contain a list of the necessary utilities, along with the assumed consumption and parameters needed to operate the system.
- 4.2.20 The project shall include an analysis of the displacement of the existing overhead crane repair area, which will be partially taken over by the VTD installation.
- 4.2.21 The technical offer shall include three-dimensional (3D) modelling of the entire VTD installation in the existing bay.
- 4.2.22 The technical offer shall include a simulation analysis of existing overhead cranes, steel transfer cars and secondary metallurgy equipment operating TOGETHER in the new VTD installation - to avoid any collisions and "bottlenecks" in the overall operation of the Converter Steelworks (from the discharge of liquid steel from the converter to the casting machine) after the new VTD installation is commissioned.
- 4.2.23 Design and the installation of the facility control system using Siemens S7 400 PLC controllers or equivalent, which are compatible with the first level of control existing in the Plant - (Annex no. 12.9 **will be passed after the bidder signs the confidentiality statement - NDA**).

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Remark: For standardization reasons, the preferred PLC is Siemens S7-400H or equivalent, the same as other existing Siemens controllers in the Converter Steelworks.

The supplier will present in the offer of the controller manufacturer as above– there is no possibility to install other controllers.

- 4.2.24 Development of a computer program to allow control and tracking of the VTD installation.
- 4.2.25 Erection of the necessary structures and screens made from sheet metal to a height of 6m separating the construction site from the remaining active production part to the width of the hall.
- 4.2.26 Development and approval of projects regarding the fulfillment of the fire-fighting and environmental protection requirements:
- a) Implementation of the Investment Safety Analysis, necessary to obtain the Conditions of Development on the premises of the plant with a high risk of a serious industrial accident (Legal basis: Environmental Protection Act Article 73.3, consolidated text Dz.U.2017 item.519).
 - b) Preparation of the assumption regarding Fire Operation, specifying the requirements for fire protection. The above scope also includes the reconciliation of the construction design for building permit with an expert in fire protection (Legal basis: Regulation of the Ministry of Interior and Administration of December 2, 2015 regarding the reconciliation of a construction design in terms of fire protection, Journal of Laws of 14/12/2015, item 2117).
 - c) Development of the Fire Scenario, (Legal basis: Regulation of the Ministry of Interior and Administration of December 2, 2015 regarding the reconciliation of a construction design in terms of fire protection, Journal of Laws of 14.12.2015, item 2117).
 - d) Execution of the Explosion Risk Assessment, including:
 - indication of rooms in danger of explosion,
 - designation of explosion hazard zones,
 - identification of factors that could initiate ignition
 - graphical classification documentation containing situational plans, illustrating the type and extent of explosion hazard zones, as well as the location and identification of emission sources.Legal basis: Regulation of the Minister of Interior and Administration of 7 June 2010. on fire protection of buildings, other construction objects and areas (Journal of Laws No. 109, item 719).

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e) Developing a Hazard and Operational Readiness Study HAZOP, which is a system identification of hazards, failures and losses resulting from the occurrence of disturbances from normal, assumed parameters and operating conditions of the installation. The study should be performed, for example, using a set of "keywords" that will be appropriately combined with the name of a specific parameter, defining the proper conditions for the conduct of the technological process. Using this technique, a description of possible deviations and counteracting methods will be obtained.

f) Preparation of the analysis of the effects of possible major industrial failures that may occur on the planned installation. The analysis should include:

- representative emergency scenarios, specifying the extent and effects of explosive, toxic and thermal radiation hazards for the media collected in the planned installation.
- assessment of the proposed location taking into account the effects of the consequences specified in representative scenarios and the fire and explosion risk assessment.

Legal basis for points e and f:

- Environmental Protection Law art. 73.3, consolidated text Dz.U.2017 item.519 with executive acts
- EU Council Directives - formerly "Seveso I" (82/501 / EEC of July 24, 1982), then "Seveso II" (96/82 / EC from December 9, 1996), and now from the provisions of European Parliament and Council Directive 2012 / 18 / EU of 4 July 2012 on the control of major-accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82 / EC - Seveso III Directive.

g) Development of the analytical part of the Safety Report for VTD installations with an indication of possible directions of changes that the operator of the Large Risk Plant will be obliged to perform in connection with the investment being carried out

Legal basis: Environmental Protection Act art. 73.3, consolidated text Dz.U.2017 item.519 with executive acts.

Execution of the fire protection system together with the sensors connected to the existing warning system in accordance with the provisions of the State Fire Service, additionally based on Schrack Seconet N3 Fire Central Panel or equivalent system, using system software in ver. 6.x.x .., with visualization at the

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Headquarters of the Fire Brigade at ul. Mrozowa, Kraków acc. to State and AMP Plant Fire-Fighting regulations.

The Bidder will connect the new FF-system for VTD with the existing FF system operating at the AMP plant.

4.2.27 In the area of VTD stations, filters, and vacuum pumps, a CO detection system with monitoring on the desktop shall be installed

4.2.28 Technology of dismantling and installation of the necessary structures and platform (general guidelines).

- I. Adaptation of existing grounds for the purpose of building the VTD installation.
- II. Installation plan defining the milestones of preparatory operations prior to commencement of repairs;
- III. All protective screens and barriers, along with their arrangement as agreed with the Investor during the works;
- IV. All elements and structures necessary to complete the process of removal and installation – resulting from the prepared project documentation, bracing, supports, and other required elements;
- V. Drawing-up technical documentation of all additional structures and special equipment required in the process of installation, dismantling.
- VI. All the elements necessary for the lifting operations (beams, shackles, slings, traverses, etc.);
- VII. Framework and a detailed work schedule taking into account the cutting of disassembled components to the dimensions of the batch;

4.2.29 Preparation of complete designs:

- technical,
- detailed (working),
- as-built

in full scope and for all branches (including purchasing, delivery, unloading, loading, transport (also local), dismantling, installation, etc.) of all necessary components according to the technical data and basic requirements contained in this technical specification and technological know-how and experience of the Contractor;

4.2.30 Making inventory of the current status regarding the existing archival documentation due to the lack of complete documentation of the current facilities of the Plant;

4.2.31 Ensuring the author's supervision to the full extent of the contract, which includes consultations on the project site, additional drawings, sketches and explanations of (without hour limit). Supervision of the project.

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- 4.2.32 Expert opinions and construction approvals, obtaining of a building permit administrative decision in accordance with the requirements of the construction law;
- 4.2.33 Surveying;
- 4.2.34 In case of the absence of archival documentation, one shall rely on the independently made inventories as well as expert opinions and technical evaluations, after their content is agreed upon with AMP;
- 4.2.35 Static calculations of the structure made by the constructor on the part of the Contractor having Polish building rights;
- 4.2.36 Preparation in coordination with AMP of the schedule, Quality Assurance Plan (QAP), Health and Safety Plan, Work Organization Plan (POR plan);
- 4.2.37 The Bidder shall provide to AMP company, within mutually agreed time limit, comprehensive design documentation in Polish and English, detailed and as-built in electronic form (electrical documentation in EPlan, the other documents in AutoCad 3D (three-dimensional) + .pdf and 3 sets in paper and electronic form;
- 4.2.38 The Bidder shall submit complete BE, DE and as-built documentation, error-and omission-free, suitable to be reviewed and copied. Should any drawing or document have to be returned because of improper quality, and should it cause any obstacle to its review and approval, the Bidder shall be held liable for any delay pertaining to such reason.
- 4.2.39 Technical Documentation submitted by service provider shall comprise:
- a. All diagrams, drawings, calculations, including lists of materials;
 - b. Bills of parts and materials required to complete the project;
 - c. Requirements for qualifications of personnel employed to work for the Project (required polish technical licence)
 - d. Requirements for the materials used, their certificates and approvals;
 - e. Scopes of required tests and their acceptance criteria;
 - f. Lists of works and take-offs of works and materials (for the not "turn-key" scope);
 - g. Information on any additional tests carried out by the inspections of Office of Technical Inspection (UDT);
 - h. The Operating & Maintenance Documentation (DTR) in the part covering changes resulting from the modernization, including detailed instructions for the whole VTD installation.
- 4.2.40 The Bidder shall provide any other drawings, documents and analysis deemed necessary to carry out the design review.
- 4.2.41 The Bidder shall be solely responsible for the accuracy of the information and dimensions specified in the documents and liable for any losses arising from quoting erroneous data.

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4.2.42 In the drawings and in technical documentation metric units shall be used.
Complete documentation will be prepared in Polish and English.

4.3 SCOPE OF WORKS - engineering and construction works

Scope of works:

All engineering construction works and performance of engineering and construction works required for the successful implementation of the investment project are within the scope of the winning Bidder and include, inter alia:

4.3.1 ENGINEERING WORKS:

- 1) Checking the durability of existing foundations/buildings and structural supports, which will be directly or indirectly affected by assembly work of new equipment carried out by the winning Bidder in accordance with applicable Polish standards.
- 2) If, as a result of checking the technical condition of the structure and its strength, it turns out that as a result of the works, the existing structure or foundations shall be strengthened, the bidder will be obliged to carry out the above-mentioned works at his own costs.
- 3) The design, construction or execution of new constructions or foundations shall be carried out in accordance with the relevant Polish standards, in accordance with previously prepared by authorized industrial designers project documentation

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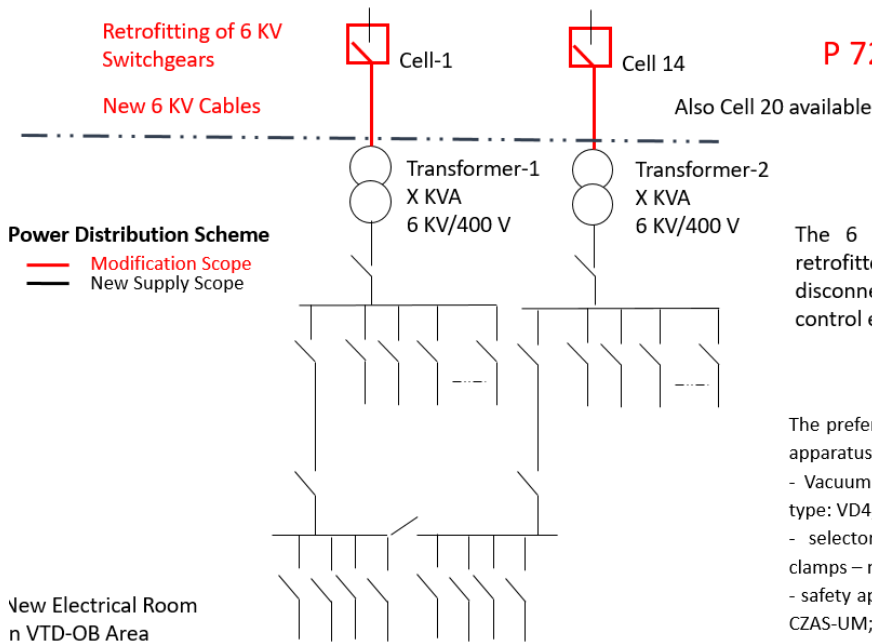
4.4 SCOPE OF WORKS ON ELECTRICAL INSTALLATIONS:

1. Modernization of the Cell in P-72 substation (rail disconnecter, cable disconnecter, MV switch, earthing switch, auxiliary circuits, etc.),
2. Construct of two cable lines between substation 6kV P-72 and newly designed transformers - modernization of cable routes (new routes, shelves, fire barriers) should be foreseen within the main scope of Contractor,
3. Delivery of two 6 / 0.4kV transformers (equipped with a disconnecter and earthing switch on the MV side). Each of the transformer should be treated as a reserve for the other.
4. Low Voltage Cabinets with AS automatics, keeping 20% of the reserves.

Transformers and electrical installation shall be designed in such a way that in emergency situations one transformer could handle the entire vacuum treatment installation.

All cabinets / switchboards / control boxes should have protection of min. IP44 due to the nature of the plant (large dust).

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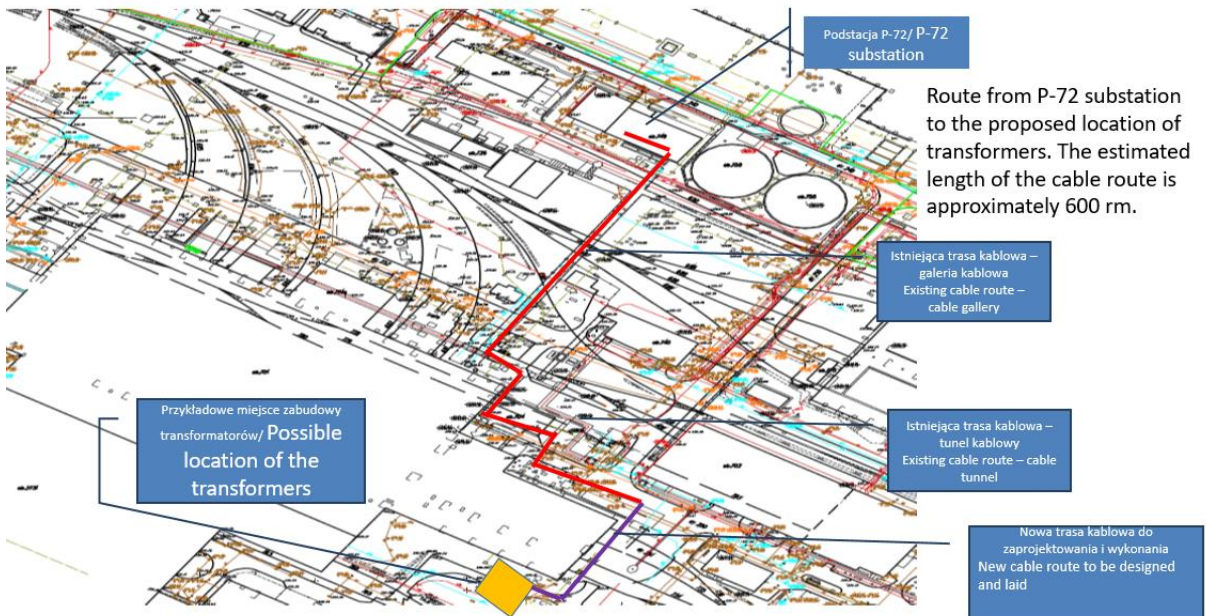


P 72 Substation 6 KV

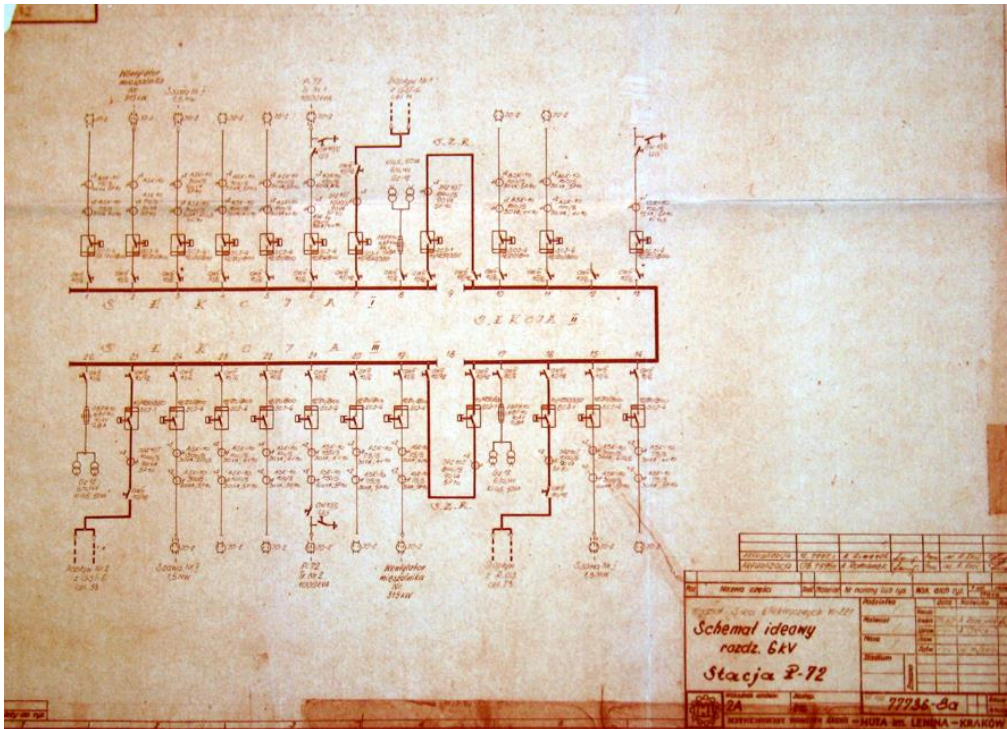
The 6 KV Breaker panels need to be retrofitted by replacing: selector switch disconnector, circuit-breaker, safety and control equipment

The preferred equipment manufacturers for this apparatus:

- Vacuum circuit-breaker – manufacturer: ABB, type: VD4;
- selector switch disconnector with earthing clamps – manufacturer: ABB;
- safety apparatus – manufacturer: KOPEX, Type: CZAS-UM;
- electricity meter – manufacturer: Pozyton.



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P-72 single-line diagram with three bays available – bay 1, bay 14 and bay 20.

2. Execution of necessary electrical power supply installations for all the devices built into the project
3. Installation of the lighting system for all installed devices, emergency lighting and lighting systems to inform about escape routes.
4. The electrical power supply of new steel transfer cars shall be made in the same way as it is currently done, i.e. by cable tunnels from an existing station located on the converter engine room.
5. The Bidder will submit two power supply concepts for steel transfer cars drives: for direct current and alternating current with power demand.
6. Use vacuum switches with mechanical drive (for example VD4 from ABB or equivalent).
7. Lighting systems should be designed and manufactured based on LED technologies in the IP 65 protection class.
8. Cable structures should be designed and made as a system, as galvanized steel should be used as the material.
9. In the control and power cabinets, Cu flat bars should be used as earthing, FeZn flat bars in constructions and machines, Cu links connected to the earthing in apparatus and devices.
10. The complete scope of the electrical branch must be designed and made by people with Polish construction permits + current insurance.

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5. GUARANTEED PARAMETERS

The vacuum time process in VTD device should guarantee continuous production works using the CCM process, assuming following input parameters from current data (before VTD) listed in the table below and the following duration times:

Item	Technical parameters of Steel before VTD	Unit	Value
1	C	ppm	250
2	S	ppm	50
3	H	ppm	6
4	O (active)	ppm	40
5	N	ppm	60

Above parameters refer to the average chemical analyzes of electrotechnical steels produced at the steel plant in Kraków.

Additionally, in the table below we present a list of average input parameters before VTD for other steel grades:

Item	Technical parameters of Steel before VTD	Unit	Value
2	C	ppm	810
3	S	ppm	80
4	H	ppm	6
5	O (active)	ppm	40
6	N	ppm	50

Casting electrical steels:

- casting time: 50 minutes;

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- number of melts in the sequence: 5

Time of casting other steel grades:

- shortest time of casting the melt: 24 minutes;
- average time of casting the melt: 35 minutes;
- average number of melts in sequence: 7.

- 1) Heating a metal bath by 3-6 degrees Celsius per minute.
- 2) Capability of melt desulphurization to S - 0.0020 content.
- 3) Carbon content to a level of C 0.0040 to be achieved after casting on CCM machine.
- 4) Nitrogen content below N_2 - 0.0040 after casting on CCM machine.
- 5) Hydrogen content below H_2 - 0.00015 to be achieved.
- 6) Oxygen content below O_2 - 0.0012 to be achieved.
- 7) Minimum pressure in the 0.67 mbar vacuum chamber (deep vacuum).
- 8) No collisions with the surrounding equipment and structures while turning and transporting the ladle from Oxygen Converter to vacuum processing stand up to the CCM rotating turret .
- 9) The ladle structure is to be designed so as to ensure steel pouring into Oxygen Converter.
- 10) Design and commissioning of 16 new steel ladles for the required melt weight of min 140 tonnes of steel and freeboard at least 75 cm, while maintaining the current spigot dimensions for operating cranes for melts steered to the VTD installation.
- 11) Hot start-up of steel transfer cars - reliability for 1 month of operation (transportation of about 500 melts)
- 12) Continuous reliable operation of the steel transfer car under load: ladle, melt, slag, scraps = 250 tonnes.
- 13) Operation of steel transfer car without being loaded with ladle for transportation purposes: 200 tons
- 14) Speed of steel transfer cars at full load 5 km/h.
- 15) Gas-permeable fittings: The tightness of the installation and the flow rate of argon/nitrogen through the fittings shall be between 50 and 800 litres/minute per fitting.
- 16) The investor will carry out a Factory Acceptance Test ("FAT") in the plant/workshop of the Contractor at a previously agreed point in time. All technical

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parameters set-forth in the technical documentation, Quality Plan and certificates shall be verified during the performance of FAT tests.

- 17) The Bidder of the service shall confirm results of the acceptance of project documentation, calculations and leak testing by UDT (if required).
- 18) A measuring system complying with the BAT requirements for the VTD dust extraction system must comply with the QAL2/QAL3 procedure of PN-EN 14181:2015 standard (allowable emission): < 10 mg /Nm³
- 19) Dust concentration in the working area: Maximum allowable dust concentration (NDS) according to the Regulation of the Minister of Labour and Social Policy on maximum allowable concentrations and factor intensities.

6. REQUIREMENTS FOR OFFERS

6.1. REQUIREMENTS FOR TECHNICAL OFFER

General description and information on the offered equipment / systems / service.

- 1) Scope of work included in the offer (stating the amount),
- 2) Preliminary strength analyses of the existing structures and foundations in the Facility 701 to confirm the feasibility of VTD installation.
- 3) Bill of materials and works with indication of quantities.
- 4) Demand for utilities (oxygen, compressed air, electricity).
- 5) Exclusions shall be indicated in detail in the table of responsibility matrix.
- 6) Matrix of responsibility (i.e. division of labour clearly defining the Contractors' and the Ordering Party's extent - see the example below):

Table 1. Matrix of responsibility (example)

Item	Description	Responsibility		Remarks
		Bidder	ArcelorMittal Poland S.A.	
1	Execution of Basic design	x		
2	Execution of Detail design including obtaining Building Permit	x		
3	Supplies to AMP	X		
4	Unloading of goods	X		
5	Disassembly works			
6	Assembly works	X		Required TOP utilities etc.
7	Preparing the system for testing:	X	X	
8	Cold and hot commissioning	x		
9	Fullfilment of guaranteed parameters	x		

- 7) Necessary drawings.

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- 8) Detailed work schedule (arranged at least by weeks) specifying milestones.
- 9) Guaranteed parameters.
- 10) Credentials (name of the buyer, location, value and year).
- 11) List of spare parts for two years of normal operation and for start-up period. A detailed list of spare parts provided by the Bidder shall be approved by the Ordering Party at the stage of project implementation.
- 12) Average yearly cost of operation (including description).
- 13) Declaration that the expertise, experience held and Site visit are sufficient to complete the whole scope of works.
- 14) Statement that the scope of works will be executed in accordance with good engineering practice and in accordance with the applicable law.
- 15) Statement of labour intensity to perform task by individual industries (if necessary).
- 16) The Bid validity.
- 17) The Bidder will clearly specify any deviations in its bid from the technical conditions presented here, if it is unable to strictly meet these requirements.
- 18) Other information, which do not bear any cost-related data, but may affect the quality of Offer provided by the Bidder.
- 19) List of all subcontractors submitted for approval by AMP
- 20) Preparation of complete documentation for obtaining the Environmental Decision in the City Hall in Cracow (including information and environment impact report).
- 21) Preparation of complete documentation for obtaining building conditions in the City Hall in Cracow.
- 22) Preparation of the complete documentation (including the BIOZ Safety and Health Protection Plan and 3D map for design purposes), including the required arrangements by industry experts to obtain the building permit in the City Hall in Cracow (also for the necessary demolition works). The documentation must be signed by persons holding Polish licenses.
- 23) Required geotechnical investigation.
- 24) Preparation of the complete documentation to change the integrated permit.
- 25) Complete risk analysis of the system.
- 26) Process safety – design and realization
- 27) Performing acceptances directly in the Office of Technical Inspection (UDT) by the Contractor, including preparation of the documentation subject to be supervised.
- 28) Determination of the axes and points of reference for the system to be installed. The supplier must employ a surveying firm for the entire duration of the contract in order to:
 - execute measurements and determination of reference points and construction axes for the facility according to the existing infrastructure.
 - execution of geodetic inventory of vanishing works and as-built site survey (results to be included in the surveying resources of the City Hall of Cracow and ArcelorMittal Poland company).
- 29) Fire protection systems as agreed with AMP.

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- 30) Equipotential Bonding (lightning and grounding system). Lightning protection and grounding system shall be made in accordance with requirements of the Building Code and recommendations of the Polish Standards. For the protection against hazards caused by the lightning current, the primary source of technical knowledge shall be standards for lightning protection of buildings, protection against lightning electromagnetic impulse, and related standards outlining the basic principles of limiting the surge in electrical systems and signal transmission systems.
- 31) The offer shall include the necessary relocation of networks and installations, being in conflict with the newly designed VTD installation.
- 32) The execution of connections and their connection to the company network at TOP points should be included in the offer price.
- 33) Access roads, squares, sidewalks (pavements, lighting, fencing, drainage with connections to sewerage systems, etc.), as well as the macro and micro levelling of construction site, areas for storage and fabrication, and own sanitary facilities for the period of construction.
- 34) Emergency lighting.
- 35) Dielectric and fire-fighting equipment.
- 36) Work Organization Project and Quality Assurance Plan for the whole task.
- 37) CE certificate for the system.
- 38) Approvals and certifications of materials and equipment.
- 39) Warranty for corrosion protection for at least 10 years.
- 40) Corrosion protection shall allow for work in highly corrosive environments (e.g. industry, marine), temperature values up to 300°C for components being in contact with hot exhaust gases, and the ambient temperature for other elements (corrosive environment: I C5 and C5 - M acc. to PN-EN ISO 12944-2).
- 41) Presentation of the results i.e. of measurements of noise, dust, ventilation, lighting intensity and electric shock protections.
- 42) Allocation of the task costs for created fixed assets.
AMP shall inform the Bidder of the number and type of fixed assets of the task to ensure that they are correctly allocated. The Contractor has to allocate costs based on this breakdown (e. g. labour, spare parts and transport). This task shall be performed prior to completion of the project.
- 43) Breakdown of project's costs.
- 44) Schedules, reports and statements.
- 45) Preparation of documents for acceptance by the State Fire Service (PSP) and the State Sanitary Inspection (PIS) According to the building law, after completion of the investment, acceptance documentation shall be prepared for the relevant state institutions - District Building Supervision Inspectorate, State Fire Service and State Sanitary Inspection (acceptance certificates, trials and tests reports and measurement reports), asbuilt survey with the clause from Cracow city hall.
- 46) All necessary structures, machines and equipment as well as materials necessary for the realization of the project shall be made and delivered at one's own expense.

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- 47) Realize the "turnkey" construction, including the commissioning as well as adjustment and alignment works during operation.
- 48) Partial and final acceptance reports shall be prepared.
- 49) Deliver commissioning, service, operation, maintenance and repair manuals for machinery and equipment and conduct training for employees of all industries.
- 50) The fence and surveillance of the Investment area shall be ensured together with storage and assembly areas, taking into account the costs of acquisition of the necessary utilities (temporary connections on the bidder's side based on agreements with the company). This obligation applies until start-up of the installation and commissioning of the system to the Investor.
- 51) Disposal and management of waste resulting from executed works on Bidder's side.
- 52) Provision of municipal waste containers and the disposal of municipal waste on Investor's side.
- 53) Delivery services related to the investment, i. e. unloading, storage, loading and inter-operational transport are included in the scope of the Contractor's work. AMP may provide the Contractor at his expense with a storage area for deliveries, provided that the surface of required storage space is determined in advance.
- 54) There is an absolute requirement to provide the source codes for L1, HMI and L2 software together with the runtime versions and descriptions for control system administrators.
- 55) The project is a construction undertake, which concerns "the installation for the primary or secondary melting of pig iron or crude steel" as referred to in § 2 par. 1 p. 9 of Ordinance of the Council of Ministers dated 9 November 2010 on projects which may have significant impact on the environment (consolidated text in the Decree of the Prime Minister dated 21.12.2015, Journal of Laws of 2016, item....), so it will be required to obtain a decision on the environmental conditions of project implementation. Taking this requirement into account, it shall be assumed that in the implementation schedule of the task, the period for obtaining such a decision will be at least 6 months, and the period necessary for the execution of the tender and the preparation of the environmental report, which will constitute the basis for obtaining the environmental decision, will be 2-3 months. The environmental report shall be based on the technical design and the environmental decision shall be issued prior to obtaining the construction permit. This gives a period of approximately 9-10 months prior to obtaining the construction permit. Practice shows (although this is not an absolute determinant) that the environmental decision is submitted together with the application for a construction permit, so the period of 9-10 months of its proceeding is already completed.
- 56) If it is required to obtain a decision on land development conditions /planning permission, e. g. a construction object will be added, which was not included in the spatial development plan, then at this stage an environmental decision will also be required. The process of obtaining the decision on WZiZT, preceded by the period

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- of 6 months of applying for an environmental decision, shall be taken into account by the Bidder in the schedule of task completion.
- 57) Due to the necessity to prepare an environmental report, one shall strive to submit as many texts, drawings and diagrams as possible made in Polish, since the Krakow City Council examining the application for issuing an environmental decision will require materials in Polish. These will often be additional, timely responses in the course of long lasting decision-making procedures.
- 58) Note: In a future contract, the fact, that the environmental decision issued by the authority may cause additional conditions for the commissioning of the installation, shall be taken into account.
- 59) In addition, the Bidder shall also consider the fact that when applying for an amendment of the integrated permit (hereinafter referred to as "PZ"), the impact of the AMP Cracow Branch's complex of emission sources on the environment will be checked. The PZ will not be issued if the reference values of the substance in air are exceeded. The Designer of the Contractor is obliged to consider the necessity of meeting these national requirements.
- 60) Noise: All relevant cumulative noise sources shall be considered during the preparation of the environmental report and it should be examined how noise levels are formed at selected observation points. Fulfilment of noise emission requirements at selected points outside the AMP fence in accordance with acceptable parameters, i.e. 40 dB.
- 61) In the case of BAT (Best Available Techniques) as required by law, it is possible that suitable acoustic protection equipment (i.e. silencers) may have to be offered in order to meet the required noise limits.
- 62) Granting of appropriate licenses for the applied solutions - in accordance with legal requirements;
- 63) Guidelines for conducting periodic inspections and preventive measures of the maintenance services.
- 64) Full as-built documentation, including, among others:
- electrical diagrams,
 - technical drawings,
 - cable routes,
 - block scheme of the entire installation,
 - protocols of electrical measurements,
 - CE Declaration of Conformity,
 - service manual.

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- 65) - data about the operation of the equipment: electricity and compressed air consumption etc., The Bidder shall attach to the technical offer in a tabular form a list of consumption of necessary utilities according to Si system.
- 66) costs of replacement of consumables, such as bag filters, etc., required to estimate the operating costs of the system during the warranty and post-warranty period, the number of employees to operate the system and/or man-hours on an annual basis.
- 67) During execution of works, the 24-hour supervision of OHS inspectors is required. At each shift inspector conducts OHS audit and communicates its results to the AMP project manager.
- 68) A list of persons responsible for OHS supervision along with their experience shall be added to the technical offer.
- 69) The Contractor's responsibility shall include providing the facilities with:
- Fire-fighting equipment, as agreed with Fire Protection and Gas Rescue AMP service,
 - dielectric equipment.
- 70) Requirements for Control and measuring apparatus - see attachment No. 12.8
(will be passed after the bidder signs the confidentiality statement – NDA)
- 71) Requirements for the automation system - see attachment No. 12.9
(will be passed after the bidder signs the confidentiality statement – NDA)
- 72) Requirements for the monitoring system – see attachment No. 12.10
(will be passed after the bidder signs the confidentiality statement – NDA)
- 73) Requirements for the LOTO system – see attachment No. 12.11
(will be passed after the bidder signs the confidentiality statement – NDA)

7. DATE OF WORKS' COMPLETION AND MILESTONES

- 1) Execution of the full scope of works in compliance with this Technical Specification will take place according to the following general time frames (guidelines):

Table 1. General timetable

Technical Specification part 1 for construction of VTD Installation for the Project titled "Innovative high-silicon steel with adjustable low content of non-metallic impurities and inclusions with controlled morphology and appropriate level of AIN inhibitor for high-quality transformer sheets" (project no. : POIR.01.01.01-00-0238 / 17) to be performed on the Blast Furnace Plant and Steel Plant at AMP in Cracow.

Item	Task / Description	Maximum time
1.	Signing the Order / Contract	D
2.	Submission of the Quality Assurance Plan	D + 8 weeks
3.	Submission of the draft OSH Plan and execution of works (description of all activities – method of plant construction, equipment used, list of sub-contractors, etc.)	D + 8 weeks
4.	Preparation of the detailed design of the ladle, agreed upon and approved by AMP	D+8 weeks
5.	Development of the detailed design for the steel transfer cars and arms of the COS turret agreed upon and approved by AMP	D+10 weeks
6.	Commencement of works: prefabrication of steel transfer cars, arms of COS turret, racks, covers, crane hooks, dismantling, assembly, preparation of terrain for investments Inside and outside the hall	D+11 weeks
7.	Submitting to the authorities with the required documentation in order to obtain the building permit decision	D + 12 weeks
8.	Preparation, agreement and approval of OHS documents and POR, IWBR, PZJ, detailed schedule and other necessary documents for the whole investment task with representatives of the plant and the project team.	D + 20 weeks
9.	Preparation of the detailed design of VTD installation, agreed upon and approved by AMP	D + 20 weeks
10.	Commencement of works: prefabrication of VTD elements, disassembly, assembly, site preparation for investments Inside and outside the hall	D + 21 weeks
11.	Commencement of works related to the power supply of steel transfer cars	D + 25 weeks
12.	Acquisition of 16 ladles at the Cracow plant to be further equipped in accordance with the scope of the order	D + 36 weeks
13.	Obtaining the relevant permits required by national legislation (Building permit)	D + 42 weeks
14.	Commencement of the works according to the building permit for the VTD installation	D + 43 weeks
15.	Completion of the equipment of ladles and steel transfer cars, building on the plant covers, stands, hooks and other equipment cooperating with the new ladles and steel transfer cars.	D+44 weeks
16.	Commissioning of ladles and steel transfer cars (during plant's standstill) together with the replacement of the COS turret arms.	D+52 weeks
17.	Completion of the installation works of VTD installation	D + 72 weeks
18.	Cold start	D + 73 weeks
19.	Hot start (first heat)	D + 79 weeks
20.	End of the 30-day performance test	D + 83 weeks
21.	Signing the Preliminary Acceptance Certificate (PAC)	D + 91 weeks

- 2) The dismantling, construction and assembly/installation works on the AMP premises shall be planned on the 24 hrs/day, 7 days a week basis.
- 3) Detailed work schedule shall be submitted to the Investor for approval in the frame of performance of the Contractor's scope of work, with consideration of the stages of erection site organization and securing, execution of all activities related with admission of the Contractor by the Investor's Safety at Work Department to work at the Investor's

Technical Specification part 1 for construction of VTD Installation for the Project titled "Innovative high-silicon steel with adjustable low content of non-metallic impurities and inclusions with controlled morphology and appropriate level of AIN inhibitor for high-quality transformer sheets" (project no. : POIR.01.01.01-00-0238 / 17) to be performed on the Blast Furnace Plant and Steel Plant at AMP in Cracow.

site, completion of purchases, prefabrication, assemblies, tests and commissioning. This schedule must also comprise description (list) of tasks forming critical path of the Project and its milestones.

- 4) The Bidder is required to submit together with the offer document a project schedule in the form of a histogram indicating the individual activities and corresponding deadlines in relation to the table of key milestones for each area.
- 5) Stage points indicating completion of the basic project, detailed project, etc. shall be clearly indicated in the project schedule.
- 6) The Bidder is required to provide a detailed method of investment execution.
- 7) The Bidder shall ensure the shortest possible standstill time in individual areas of the installation.
- 8) **The following boundary conditions shall be considered when preparing the work schedule:**
 - a.) The maximum period of the Steelworks' standstill for the commissioning of new ladles, replacement of CCM turret arms, assembly of new steel transfer cars, racks, covers is max. 5 calendar days. The offer shall include an additional schedule for these works.
 - b.) Necessary safety measures resulting from normal plant operation.
 - c.) The location and load capacity of the cranes as well as the duration of their use, indicating the maximum mass of a single lifted unit.
 - d.) Execution of the whole project shall be completed within a deadline period of 83 weeks.
- 9). Commissioning of new steel ladles with armour, new steel transfer cars, stand covers and new CCM turret arms as well as new crane hooks shall be carried out at least 6 months prior to the planned start-up of the VTD system.

Any deviations from the aforementioned staged points or the total duration of the project envisaged by the Investor must be clearly indicated and distinguished by the Bidder in the quotation.