

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.



ArcelorMittal

**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).**

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 grade with adjusted small content of impurities and non-metallic inclusions and with controlled morphology and proper amount of AlN inhibitor, intended to be used for high quality transformer sheets" (project no. : POIR.01.01.01-00-0238 / 17,) Measure 1.1. "R&D projects carried out by enterprises", Sub-measure 1.1.1 "Industrial research and development works carried out by enterprises" 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 the subject of the contract that allows potential Contractors to estimate the value of the contract.

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

The valuation prepared on the basis of this specification will not constitute as an offer within the meaning of the Commercial Code.

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).**

All purchases, services and delivery subject to this inquiry for the estimation of the contract value 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 Contractors to apply the indicated solutions and only inform about the minimum parameters and standards. The use of certain types of solutions is not

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

AMP expects a **technical solution** to meet the requirements of the installation. Contractors are expected to submit a basic offer considering the requirements of this Technical Specification

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

The Contractor 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.

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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

Buyer's standards are available on www.arcelormittal.com/poland at "**FOR CONTRACTORS**". Login and access password is defined by H&S Team Supervising the subsidiaries in AMP.

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 CONTRACTOR 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, unloading, loading, transport (also local), dismantling and installation, commissioning and supervision over the installation of VTD system together with:

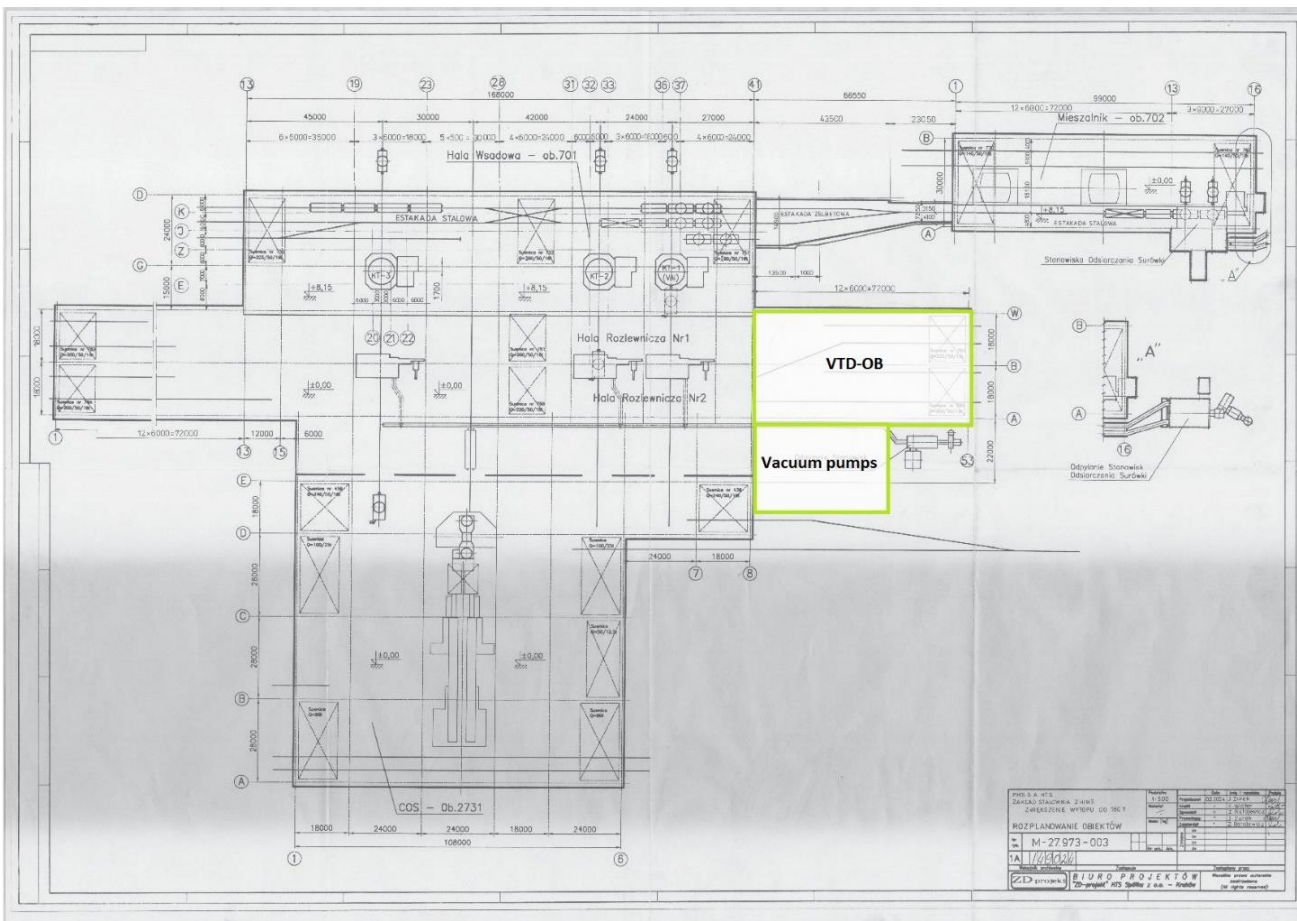
- design and construction of two VTD stations with the necessary equipment included;
- design of new steel-teeming ladles with a capacity of approx. 150 tons and keeping the freeboard min. 75 cm, with two gas-permeable fittings;
- design and implementation of the argon stirring system through gas-permeable fittings for three 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.
- 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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4.2 Scope of works:

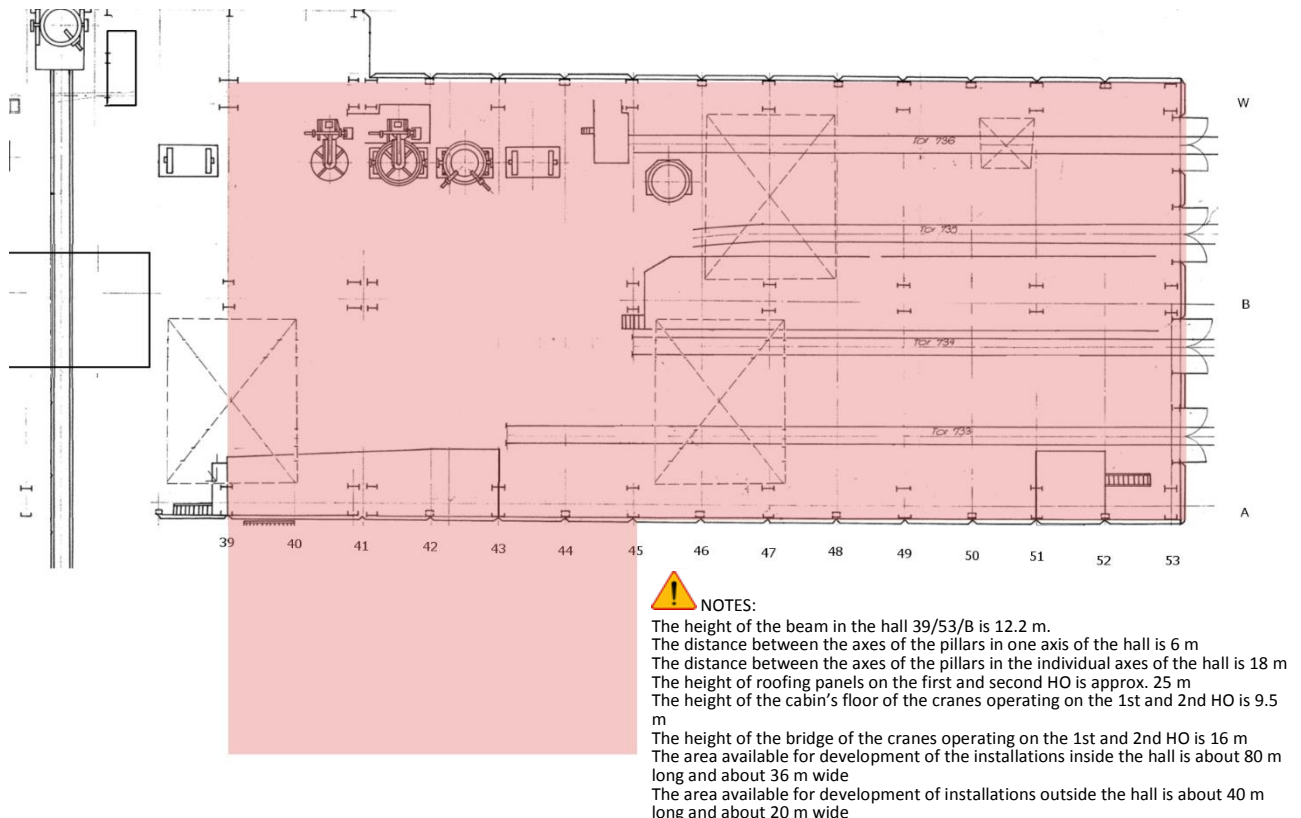
4.2.1 Execution of surveying, geological and other measurements necessary to carry out all the required works in the area of the VTD system installation acc. to the location indicated below on the drawings 1 and 2.

Drawing no. 1 Location of VTD stand



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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 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.
- 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 contractor will provide the right amount of tanks enabling efficient installation work.

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

- < 10 mg/Nm³ for bag filters;

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- 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 .
 - monitoring 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 the existing monitoring at the Plant as well as with IT standards applicable at AMP in accordance to Milestone XProtect Corporate software.
 - 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.

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

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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.

d). System of automatic, pneumatic unloading and dosing of filler sands with four separate tanks with unit capacity of 18m³. Deliveries of the powder will be performed by car tankers from 0 level of the main hall.

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:

- on three transfer cars 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.

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 steel ladles** to the required melt weight of 150 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 designed ladles will be Contracted in the 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 Ordering Party.

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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 COS 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.
- 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 Contractor 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 COS.
- 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.
- 4.2.18 Design and preparation of electrical and power installations as well as control and measurement equipment.
- 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, which are compatible with the second level of control existing in the Plant.

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

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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 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.

Elaborate on fire protection requirements for the project, approved by the Fire Fighting Expert for fire protection, development of the "Fire scenario" for the project. Execution of a fire protection installation based on Schrack Seconet N3 central units, using system software in ver. 6.x.x .., with visualization at the Headquarters of the Fire Brigade at ul. Mrozowa State and AMP Fire Fighting regulation.

The Contractor will connect the new Fire Fighting system for VTD with the existing Fire Fighting 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;

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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.

4.2.32 Expert opinions and construction approvals, obtaining of a building permit 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;

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.

- c. Requirements for qualifications of personnel employed to work for the Project;
 - 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.
- 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 Contractor and cover as follows:

4.3.1 ENGINEERING WORKS:

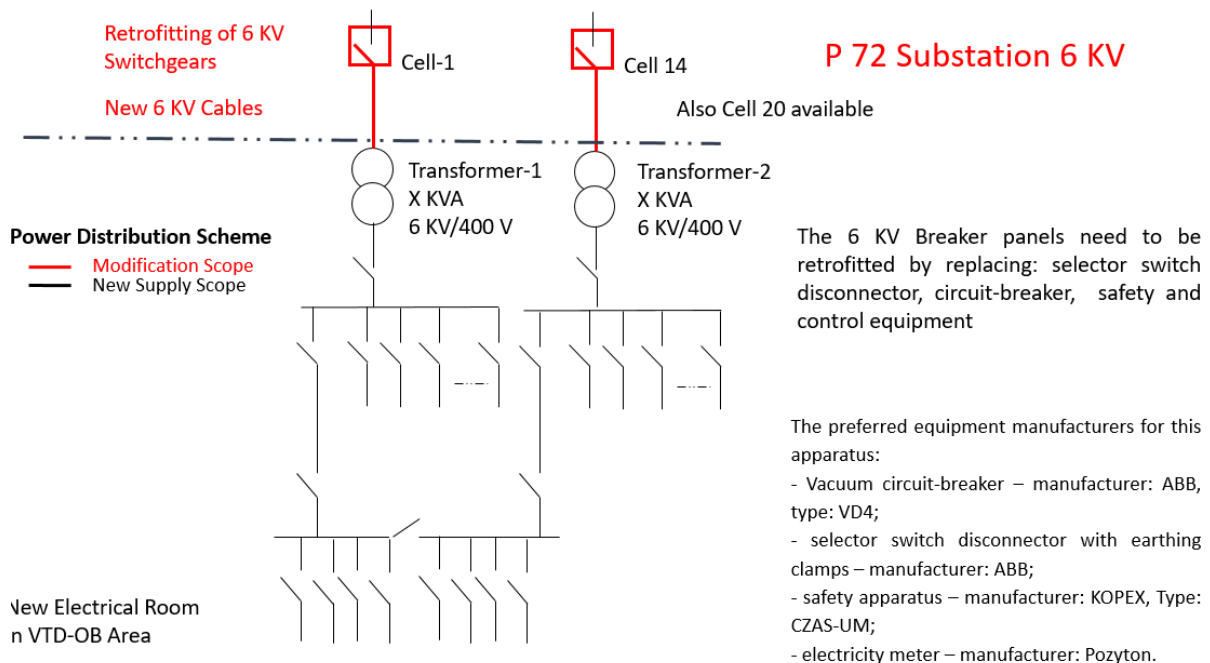
- 1) Checking the durability of existing foundations/buildings and structural supports, which will be directly or indirectly affected by assembly work of new equipment carried out by the winning Bidder in accordance with applicable Polish standards.
- 2) If, as a result of checking the technical condition 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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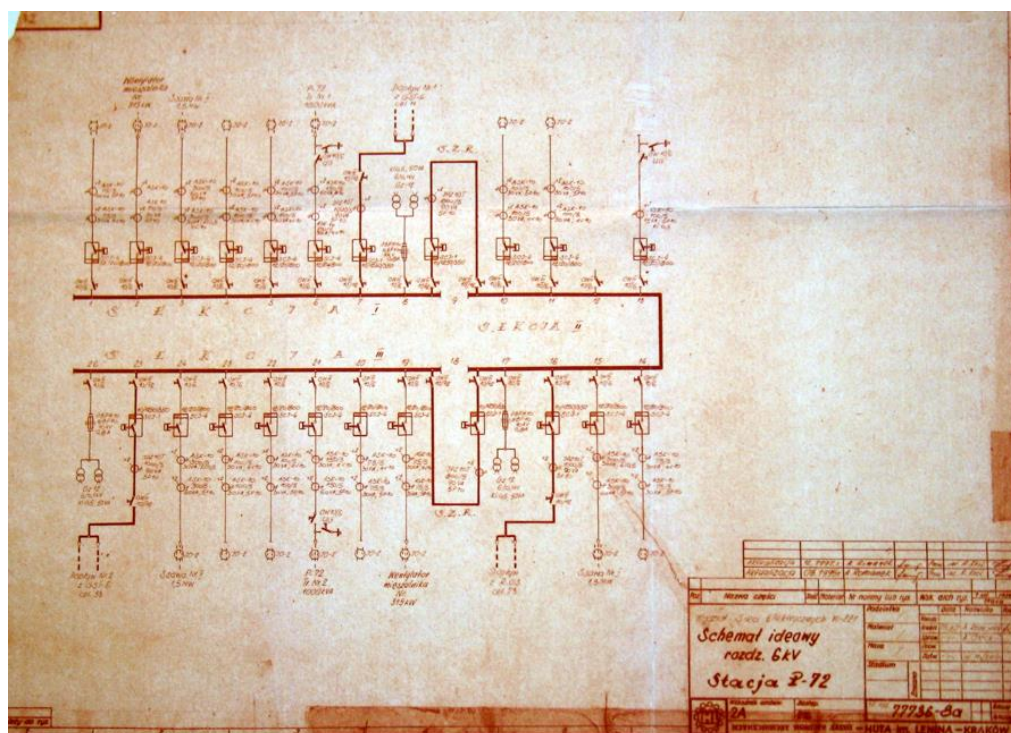
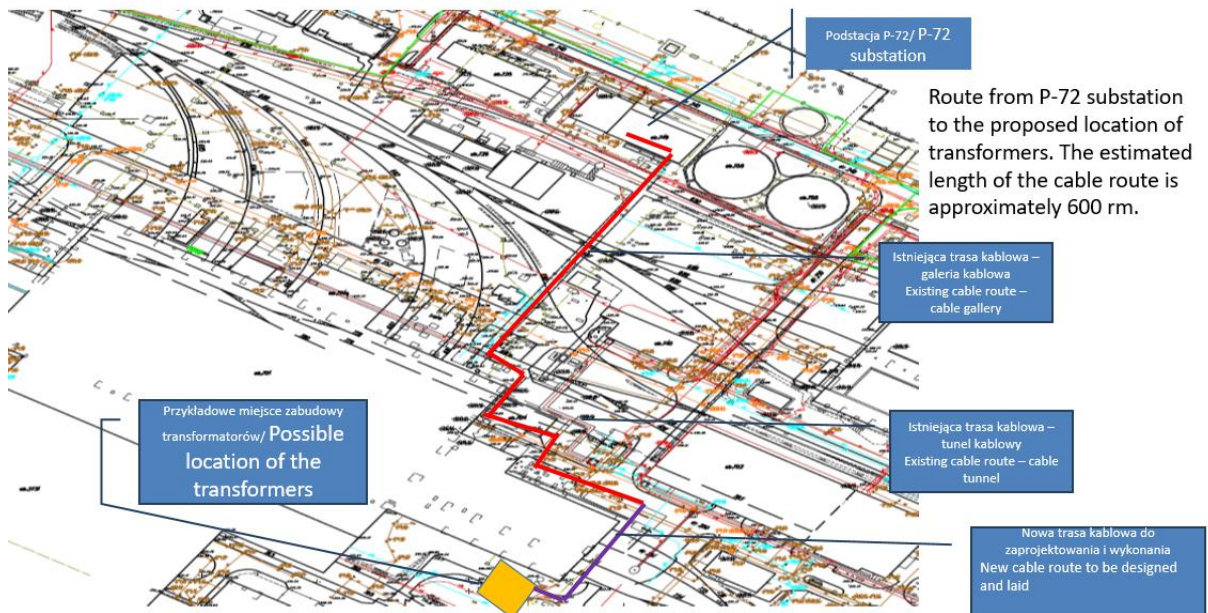
4.4 SCOPE OF WORKS ON ELECTRICAL INSTALLATIONS:

1. Modernization of the Cell in P-72 substation (rail disconnector, cable disconnector, 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 disconnector 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.



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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.

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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.

5. GUARANTEED PARAMETERS

The VTD-OB time shall permit smooth production using the COS process, assuming the following duration times:

Casting electrical steels:

- casting time: 50 minutes;
- 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 4-6 degrees Celsius per minute.
- 2) Capability of melt desulphurization to S - 0.0010 content.
- 3) Carbon content to a level of C 0.0040 to be achieved after casting on COS machine.
- 4) Nitrogen content below N_2 - 0.0040 after casting on COS machine.
- 5) Hydrogen content below H_2 - 0.0002 to be achieved.
- 6) Oxygen content below O_2 - 0.0010 to be achieved.
- 7) Design and commissioning of 16 new steel ladles for the required melt weight of 150 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.
- 8) Hot start-up of steel transfer cars - reliability for 1 month of operation (transportation of about 500 melts)

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6. ADDITIONAL REQUIREMENTS

- 1) The Bid price shall comprise costs of adaptation of employees and equipment to comply with Occupational Health and Safety standards applicable in the AMP Company.

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

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 9 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

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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 + 84 weeks
21.	Signing the Preliminary Acceptance Certificate (PAC)	D + 84 weeks