



**NUMBER: 6/034/2021**  
**DATE: 22.12.2021**



## **TECHNICAL SPECIFICATION**

### **Modernization of cooling system at Blast Furnace no. 2 in Dąbrowa Górnicza**

concerns the project entitled “Development and demonstration of an intelligent cooling system for a metallurgical unit by closing and integrating water circuits, increasing the operational reliability of the metallurgical process and improving the efficiency of industrial cooling water use.” (project no. POIR.01.01.01-00-0034/18), co-financed from the funds of the European Regional Development Fund and as part of the Smart Growth Operational Program 2014-2020, sub-measure 1.1.1 (the call for proposals organized by the National Centre for Research and Development, no. 2/1.1.1/2018)

This specification is attached as Annex 4. to the request for quotation no **6/034/2021**

**ArcelorMittal Poland S.A.**  
**Dąbrowa Górnicza**



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**SPECIFICATION NO.:** 6/034/2021

## 1. INTRODUCTION

ArcelorMittal Poland S.A. (AMP) operates in various branches in Poland, mainly concentrating steel production in Krakow and in Dąbrowa Górnicza and other important production units that are responsible for the production of various types of steel products in Poland.

ArcelorMittal Poland S.A. (AMP), as part of its project "Modernization of Blast Furnace No. 2" is interested in modernization of Blast Furnace No. 2 (BF#2) cooling system. Detailed scope of the works covered by this Request for Quotation is given below.

The subject matter of the contract indicated in this specification concerns the project entitled "Development and demonstration of an intelligent cooling system for a metallurgical unit by closing and integrating water circuits, increasing the operational reliability of the metallurgical process and improving the efficiency of industrial cooling water use." (project no. POIR.01.01.01-00-0034/18), co-financed from the funds of the European Regional Development Fund and as part of the Smart Growth Operational Program 2014-2020, sub-measure 1.1.1 (the call for proposals organized by the National Centre for Research and Development, no. 2/1.1.1/2018).

The subject of the contract is the design, purchase, delivery (in accordance with DDP INCOTERMS 2010), installation and commissioning of a pilot installation for new cooling system for blast furnace no 2 located in Dąbrowa Górnicza.

Due to the Company's obligation to apply the competition principle, this technical specification constitutes a detailed description of the subject matter of the contract allowing for the preparation of tenders by the Bidders.

This specification has been drawn up with the utmost care in order to provide a full, unambiguous and exhaustive description of the subject matter of the contract so as to enable economic operators to determine all their obligations and risks and to calculate the price and other elements of the offer in a responsible way.

All of the purchases, services and supplies which are the subject of this enquiry must be incorporated and cooperate with the existing infrastructure and equipment in the Company and also must meet the same technological standards. Therefore, the need to maintain the same technological conditions and the need to maintain the unification of equipment resulting from the expansion of the existing infrastructure have determined the provisions of this specification. The provisions applied are justified by the need to ensure the smooth running of the project. The provisions indicated do not impose an obligation on Economic Operators to apply the solutions indicated but only inform about minimal parameters and standards. Using certain types of solutions is not obligatory but only exemplary. The indications in relation to the expected technical parameters, as well as indications concerning specific types and manufacturers' names are of a general nature, referring only to sample indications of equivalent products and do not constitute the only acceptable solution. On this basis, the contracting authority shall accept equivalent solutions.

Bidders are expected to submit an offer taking into account the requirements of this Technical Specification



The offer must be complete in all respects and must include all components/devices necessary to achieve the sound design, operation and maintenance of the installation.

The Bidder must read this specification and ensure that the installation is technically feasible and also accept full responsibility for the guaranteed performance of the delivered installation and equipment in terms of efficiency, performance, smooth and reliable operation.

The detailed scope of the work subject to the Enquiry is presented later in this paper.

## **1.1. PROJECT OBJECTIVE**

The aim of this project is to conduct industrial research and experimental development works, the result of which will be the development of an innovative technical and technological solution in the field of cooling of metallurgical production units (along with a demonstration cooling installation). This subject of the contract will be part of the cooling system. Achieving the project objectives will allow for: lowering CO2 emissions, lowering fuel consumption, lowering electricity consumption and reducing the amount of cooling water - this will minimize the impact of the process on the environment.

## **1.2. SPECIFICATION CONTENT**

This specification provides the environment-related data, information on Investor's location in Dąbrowa Górnicza, required technical norms and standards, technical data, scope of Contractor's works, Customer's rights, requirements related to Contractor's technical potential, preliminary works schedule, requirements related to availability, replaceability, quality and safety and other information as required for the purposes of the Technical Offer (e.g. function guarantee).

## **2. STANDARDS, UNITS OF MEASURE, NORMS and REGULATIONS**

- 1) All other technical requirements should comply with the standards applied by ArcelorMittal Poland S.A., and should meet engineering standards such as DIN, ASME, GOST, BS and PN.
- 2) For detailed & workshop designs must be prepared by Polish version of Euro code.
- 3) Contractor's devices and technologies will be supplied based on the Contractor's knowledge of technology and standards effective world-wide and in Poland.
- 4) Devices, materials and parts used for the repair and revamping works should meet all technical and safety standards required by Polish law.
- 5) Project information is given in units and dimensions of the international metric system.
- 6) List of actual legal acts is presented in appendix 1.

### **2.1. DOCUMENTATION STANDARDS**

File formats - AMP standard:

1. Documents: \*.doc, \*.pdf, \*.xls (Microsoft Word 2010, Adobe Reader, Microsoft Excel 2010 or higher);
2. Time schedules: \*.mpp; (Microsoft Project 2010 or higher);
3. Mechanical documentation: \*.dwg, \*.dwt (AutoCAD ver. 13 or higher, Autodesk Design Review)
4. Electrical documentation: \*.zwt ; (EPlan ver.5.5/P8);
5. Pictures, images: \*.jpeg;



6. 3D model - refer to appendix 5.

## 2.2. INVESTOR'S STANDARDS

The Contractor is required to be familiar with and respect Investor's standards, in particular H&S standards and performance standards (Investor's standards are available at [www.arcelormittal.com/poland](http://www.arcelormittal.com/poland), tab "FOR CONTRACTORS"). Furthermore, Investor's standards are enclosed with the Contractor's Safety Manual and will be provided to the Contractor by the Investment Purchasing Office. The Contractor is obliged to respect and follow them at all times on a regular basis at all stages of the investment:

- ST 000 H&S Policy
- ST 001 Insulation
- ST 002 CONFINE SPACE
- ST 003 WORK AT HEIGHT
- ST 004 SECURE OF TRAIN RAILS
- ST 005 Audits
- ST 006 VEHICLES AND ROAD TRAFFIC
- ST 007 OVERHEAD CRANES AND LIFING EQUIPMENT
- ST 008 Contractor
- ST 009 Alarm
- ST 010 Safety indicators
- ST 011 Incident/Accident investigation
- ST 012 WORK AT GAZ HAZARDOUS AREA
- ST 014 HIRA (ang. Hazard Identification and Risk Assessment)
- ST 015 Golden Rules
- ST 018 Loading protection
- ST 201 H&S specification
- ST 301 Mobile phones

**NOTE: In case norms/standards define different requirements for the same topic which comply with the requirements above, the stricter norms/standards should be applicable!**

## 3. ENVIRONMENT- RELATED DATA

Investor's local environmental data for Dąbrowa Górnicza location, defined for project purposes, can be found in appendix 2 "Location and environmental data".

## 4. TECHNICAL INFORMATION:

### 4.1. AVAILABLE BACKGROUND DOCUMENTATION

- 1) The investor has basic documentation prepared by Bocard. It is attached to the inquiry. The documentation is presented in the form of a 3D model in NWD, NWF format and the appropriate CAD files for the model. Schematic diagrams and single-line diagrams are in electronic form.
- 2) Background technical documentation of existing situation is available in softcopy (PDF, JPG). Detailed designs are available in Investor's archive. The cost of printing out the documentation necessary for Bid preparation is to be borne by the Potential Contractor.
- 3) Documentation provided by the Investor may not be complete, therefore it is necessary for Contractors to rely on their own stocktaking, tests of the construction, foundations and land. Documentation provided by the Investor should not restrict the launch of works.



## 5. HEALTH & SAFETY

During the implementation of specific project phases, manufacturing and delivery to ArcelorMittal Poland S.A. Dąbrowa Górnicza Unit, the supplier has to fulfill safety requirements defined in ArcelorMittal Poland S.A. documentation:

- 1) Works contractors, before they start work, must receive trainings in scope of OH&S and fire protection regulations effective at AMP;
- 2) Works must be performed according to the technical conditions for the performance and acceptance of construction and assembly works and currently effective regulations and standards, OH&S rules and fire protection rules;
- 3) Regulations on personnel, vehicle and material traffic effective in the premises of AMP must be followed;
- 4) Works site must be secured against unauthorized third party access;
- 5) OH&S and fire protection for the site and works must comply with the regulations effective at AMP.
- 6) During investment realization period at AMP site, supplier must respect and apply all H&S rules mentioned in H&S contract, including all appendix described in Investor Standards, mentioned in point 2.2.
- 7) In case of using forklift, jib cranes, others lifting equipment and devices, certification by Polish Technical Office UDT is a must. Others certificate are not accepted;
- 8) Employees, who will operate the hooks, lifting equipment must speak polish language.
- 9) Necessity to equip of all employees i.e. fire protection clothes, proper shoes, helmet with 4-point belt locked under the chin, safety glasses, gas detector CO and O<sub>2</sub>, in case of working at height - (individual) harness with safety ropes, shock absorber and other equipment which will be agreed during elaboration of project documentation or during execution at site.
- 10) **The Contractor will have a H&S inspector present on site 24h/day. The inspector will be responsible for safety of the Contractor during performance of works as well as for preparation of reports from safety audits carried out jointly with AMP representatives.**

## 6. SCOPE OF THE BIDDER'S WORKS

### 6.1. SUBJECT OF THE WORKS

In the current situation, water is supplied to BF2 from pumping station No. 7 through an energy tunnel. The current cooling system consists of 2 circuits, closed and open.

Open circuit:

Its main task is to cool the tuyere sets. From the energy tunnel, the water is supplied to the booster pumps through DN500 pipelines. After increasing the pressure, the water is divided into two valve stations A and B located at the level of the cast house. There are manifolds in the valve stations that separate the system into individual elements of the tuyere sets.

Moreover, the open circuit serves the function of cooling some elements of the hot blast stoves, it is fed to the cast house for technological purposes and it serves as an emergency circuit for a closed circuit which is the main cooling circuit of the furnace.

Closed cooling circuit with treated water is the main cooling circuit of BF2, it covers such areas as:

- herth cooling zone with cast iron staves in rows I ÷ V,



- a zone for cooling the tap holes with cast iron staves,
  - bosh cooling zone with horizontal copper plates,
  - belly and shaft cooling zone with vertical copper staves in rows VI ÷ IX
  - shaft cooling zone with cast iron staves in rows XI ÷ XVII,
  - cooling some of the hot blast stoves elements,
- The closed circuit is supplied with treated water.

In the new system, the function of cooling the tuyere sets and hot blast stoves fittings will be taken over by a new closed cooling circuit supplied with treated water. The circuit will be equipped with two types of pumps, with medium pressure for the fittings of the hot blast stoves and high pressure for the tuyere sets. The pumping station with the place for the water conditioning will be located at the level of +0.000 in the area of the hot blast stoves. The basic design provides the installation of three heat exchangers located below BF2 cast house, which will be cooled from the cold side by the current open circuit. Water collectors and valves for the elements of the tuyere sets will be located on the newly constructed structure on the BF shaft. The circuit will be equipped with a compensation tank with a capacity of 15 m<sup>3</sup> located on the BF top.

The current open circuit will be modified. Due to the limitation of its functionality, the pumps supplying water from pumping station No. 7 will be reduced, as well as the diameters of supply and discharge pipelines. The current closed system will be reduced only by the cooling part of the hot blast stoves elements. Due to the replacement of the cast iron and copper staves inside the BF2, the project also envisages modifying the stave connections in certain areas. Works related with open circuit are not part of this tender.

The purpose of these technical assumptions is to present the scope of turnkey works for modernization of tuyere cooling system on BF#2.

**Note:** Prior to the submission of the bid, it is possible to carry out an on-site inspection.

The Contractor's task shall be a complete **design and turnkey execution** of particular scopes of works described below in detail.

Work must be carried out in accordance with Bocard's base documentation, any deviations or changes must be approved by the investor and Bocard.

## 6.2. SCOPE OF WORKS

The main scope includes detailed design works, disassembly works, supply of cooling system components for tuyeres specified in the documentation, erection and commissioning of the new cooling system.

As part of the project, the Contractor shall prepare detailed technical documentation for the new tuyere cooling circulation system. The Basic Engineering (BE) documentation developed by Bocard shall be the basis for the preparation of Detailed Engineering (DE) documentation. The BE documentation includes all required information on the operation of new cooling system, location of pumps, location of piping and automation.

The main components of the new cooling system are as follows:

- pump room in the area of hot stoves
- heat exchanger room in the area under the cast house
- new valve platform
- connection to the industrial water circuit
- system for cooling elements of hot stoves





As part of the project, the Contractor shall prepare as-built documentation for the entire scope including the new cooling system.

The BE documentation includes the design of a new closed cooling system for tuyeres and hot stoves consisting of:

- high-pressure pumps supplying water to tuyere sets
- medium-pressure pumps supplying water to hot stoves
- heat exchangers for exchanging heat between the new circuit and the open circuit

The Contractor's scope of work includes:

### 6.2.1. Energetic scope

#### NEW SYSTEM (COOLING OF TUYERES AND HOT STOVES)

##### 1) Design for foundation and installation of high-pressure pumps

The design involves the foundation of two electric pumps and one pump with combustion motor.

Details of the pumps:

- Electric pump
  - Flow rate - 1150m<sup>3</sup>/h
  - Discharge pressure - 12.5 bar
  - Motor 550kW
- Pump with combustion motor (pump from BF5 in Kraków)
  - Flow rate - 960m<sup>3</sup>/h
  - Discharge pressure - 9 bar

##### 2) Installation of medium-pressure pumps - 2 electric pumps

The design involves the foundation of two electric pumps and one pump with combustion motor.

Details of the pumps:

- Electric pump (pumps from BF5 in Kraków)
  - Flow rate - 650 m<sup>3</sup>/h
  - Discharge pressure - 4 bar
  - Motor: 110kW
- Pump with combustion motor (pump from BF5 in Kraków)
  - Flow rate - 650m<sup>3</sup>/h
  - Discharge pressure - 4 bar

##### 3) Installation of heat exchangers in the area below the cast house

Design for foundation and installation of 3 heat exchangers in a newly prepared room in the area below the cast house.

Heat exchanger power: 12660kW

Total flow rate: 1800m<sup>3</sup>/h

##### 4) Design and execution of the installation for supplementing internal combustion engines with fuel

##### 5) Detailed Engineering and installation of suction and discharge piping including pump fittings as per the Basic Engineering. The scope includes among others:





- Circulating pumps for tuyere sets
  - Circulating pumps for hot stove fittings
  - Piping of heat exchangers
- 6) Design and foundation of water circuit conditioning station. The design should include such elements as specifically designated fenced area, retaining mats, drip trays and routing of feeding tubes for each circuit. AMP shall be responsible for delivery of pumps, while the Bidder - for electrical and power connection of the system.
  - 7) Detailed Engineering and installation of tuyere sets collectors on a newly erected structure on BF2 shaft. The Basic Engineering provides for a supporting structure along with service platforms for tuyere valves, on which 4 supply collectors for feeding tuyere elements with by-passes for adjusting the flow are to be installed.
  - 8) Detailed Engineering and installation of pipelines connecting the main components of the system as per the design (thick pipelines) - Closed circuit
  - 9) Connection of make-up water (softened) from CHP according to BE. Weld tie-in point at the height of hot stove chimney.
  - 10) Insulation of make-up water pipelines: from the CHP and open-circuit water pipeline.
  - 11) Installation of tuyere valves and other piping fittings as per the Basic Engineering. The design provides for the erection of a new structure on BF2 shaft together with service platforms for tuyere valves.
  - 12) Selection of fittings in accordance with the Basic Engineering and the requirements contained in the specification
  - 13) Disassembly and installation of flow meters on the new system of tuyere assemblies - 192 pcs + connection to the existing leak detection system
  - 14) Installation of 15m<sup>3</sup> tank together with measuring instrumentation.  
It is allowed to use the tank from BF5 cooling system in Krakow. There are two options for performing the works:
    - installation of a new tank
    - disassembly of the tank from BF5 in Krakow (with or without structure) and its adaptation to BF2 in Dąbrowa Górnicza.The selection of solution is at the Contractor's discretion.
  - 15) Purchase - as per specification --and installation of flexible connections for tuyere sets
  - 16) Disassembly, Detailed Engineering and installation of cooling system for elements of hot stoves as per the Basic Engineering. The Contractor shall be responsible for connection of the system for hot stove elements.
    - Hot blast valves
    - Burner gate valves
    - Smoke dampers
    - Blow-off valve+ Connection of flow meters for hot stove elements to the existing leak detection system
  - 17) Detailed design and execution of an open circuit installation for heat exchangers in accordance with the basic design
  - 18) Design and construction of nitrogen system for the compensation tank

#### **DISASSEMBLY WORKS**

- 1) Disassembly of flow meters from open circuit cooling system.
- 2) Disassembly of cooling system components in Kraków to be reused for BF2:
  - Pump with combustion motor CO3



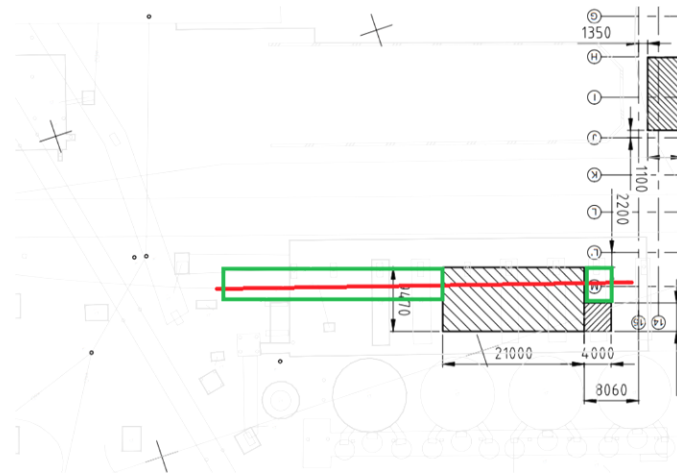
- Electric pumps CO1 - 2 pcs
  - Pump with combustion motor CO1 - 1 pc
  - Compensation tanks 15m<sup>3</sup> - if necessary
- 3) Disassembly of open cooling system of hot stoves according to the design.

### 6.2.2. Civil engineering and construction works

The Contractor shall be responsible for comprehensive preparation of Detailed Engineering and turnkey completion with complete deliveries for works listed below:

- 1) Pumphouse building in the area of hot stoves with fire resistance REI 120, fire resistance of passages and fire resistance doors- REI 120. The pumping station complex includes two cubature facilities:
  - main building consisting of a pump room and a circulating water conditioning room,
  - electrical building, located in the immediate vicinity of the pumping station.

The buildings shall constitute a separate fire zone and shall be adapted to applicable technical conditions, including technical conditions to be met by buildings and their location. Systems and networks required by the technical conditions must be provided, e.g. ventilation, heating, air-conditioning, fire-extinguishing, sewage systems etc.
- 2) Disassembly of the existing track under the hot stove bay (orientation drawing - red colour).
- 3) Paving of surface left after dismantled tracks (orientation drawing - green colour) - design bearing capacity of paved surface - minimum 120MPa (road slabs or aggregate)



- 4) Foundations for heat exchangers below the cast house and the floor around the foundations of the exchangers within the casing.
- 5) The casing of the heat exchangers below the cast house in a light insulated structure (sandwich panels) with gravity ventilation - in the scope of the contractor only the design - no execution and deliveries.
- 6) Detailed Engineering, delivery and installation of the supporting structure for piping platform and service platform for tuyere assembly valves
- 7) Detailed Engineering, delivery and installation of supporting structures for new cooling circuits for tuyeres and hot stoves.
- 8) Detailed Engineering and construction of foundations for pumps: High- and medium-pressure pumps, pumps with combustion engine and heat exchangers



- 9) Design and installation of supporting structures for the 15m<sup>3</sup> expansion tank with cladding made of sandwich panels on steel frame (covers protecting against weather conditions). It is allowed to use supporting structures from the Blast Furnace #5 in Kraków.
- 10) Design and installation of all service platforms for fittings provided in the Basic Engineering as well as service platforms for new tuyere sets circuit.
- 11) Design and preparation of new passageways providing access to all fittings and control & measuring instrumentation and automation (AKPiA) included in the design for new tuyere sets circuit.
- 12) Other civil engineering and construction works (including design) that may result from rebuilding the tuyere sets cooling system.
- 13) Preparation of documentation allowing to obtain UDT (Office of Technical Inspection) permits for lifting equipment installed in the new pump building and obtaining of UDT acceptance.

The Detailed Documentation should be prepared on the basis of Basic Engineering (Boccard) and **implementation guidelines (ZD Projekt)**. Both documents constitute the basis for the development of the Detailed Engineering, but they are not complete, hence they should be verified and appropriately modified, and in the event of non-compliance, corrected or supplemented accordingly. The study aims to better illustrate the scope of the Contractor and to facilitate the valuation of the scope. **The fire protection requirements REI 120, which are a prerequisite for obtaining a building permit, are not subject to change.**

The Contractor will prepare the Detailed Engineering constituting the basis for the development of the Building Design, i.e. in the scope of the pump building (i.e. pump room, circulating water conditioning room, electric room) with equipment, power supply, drains and other necessary media entering and leaving the buildings. The Detailed Documentation necessary to obtain the permits should be submitted to the Investor **by the end of April 2022.**

### 6.2.3. Electrical works

The Contractor shall be responsible for preparation of design, delivery and commissioning of the following system and equipment:

Design works:

The task includes preparation of comprehensive Detailed Engineering (as per appendix Skład dokumentacji elektrycznej.doc [Composition of electrical documentation]), which shall be coordinated with all other works; selected parts of the documentation should be confirmed by a fire protection specialist. The entire DE must be submitted to AMP for approval prior to commencement of works. Remarks made by the Owner must be taken into account.

After the completion of works, the supplier shall provide complete as-built documentation in hard and soft copy (USB stick) in editable form (3 sets), with all corrections made - during the commissioning period RED COPY documentation should be made available.

Scope of works:

1. Supplying power to two 6kV high-pressure pumps for P11-1, P11-2 tuyeres from 6kV S107 switching station. 2 outgoing bays shall be prepared in the switching station by AMP (retrofit). The scope of works shall include:

- a. Delivery, installation of two XRUHAKXS 3x1x120/25 cable lines, control cable (interlock, AV, etc.) cable for control & measuring instrumentation and automation (control, current measurement, mapping), distance - approx. 200m on the existing cable rack, supplementing cable routes - approx. 20%.



*Fig. MV cable routing between S107 and the new pump house*

- b. Delivery, installation of two disconnector bays with MV earthing switch (limit switches, interlocks, reactance insulators etc.) - for the operation of motors, including a flexible motor feeder cable
  - c. Implementation of possible modifications in S107 switching station
  - d. Configuration of feeder protection (set-ups are within the Supplier's scope) and comprehensive start-up of the whole system - voltage test, effective touch voltage, post-installation reports etc.
2. Supplying power to MCC technological switching station for the needs of the new pump house located under the electrical rack near hot stoves via two YAKY 2x(5x240)mm<sup>2</sup> cable lines with the length of 100m.



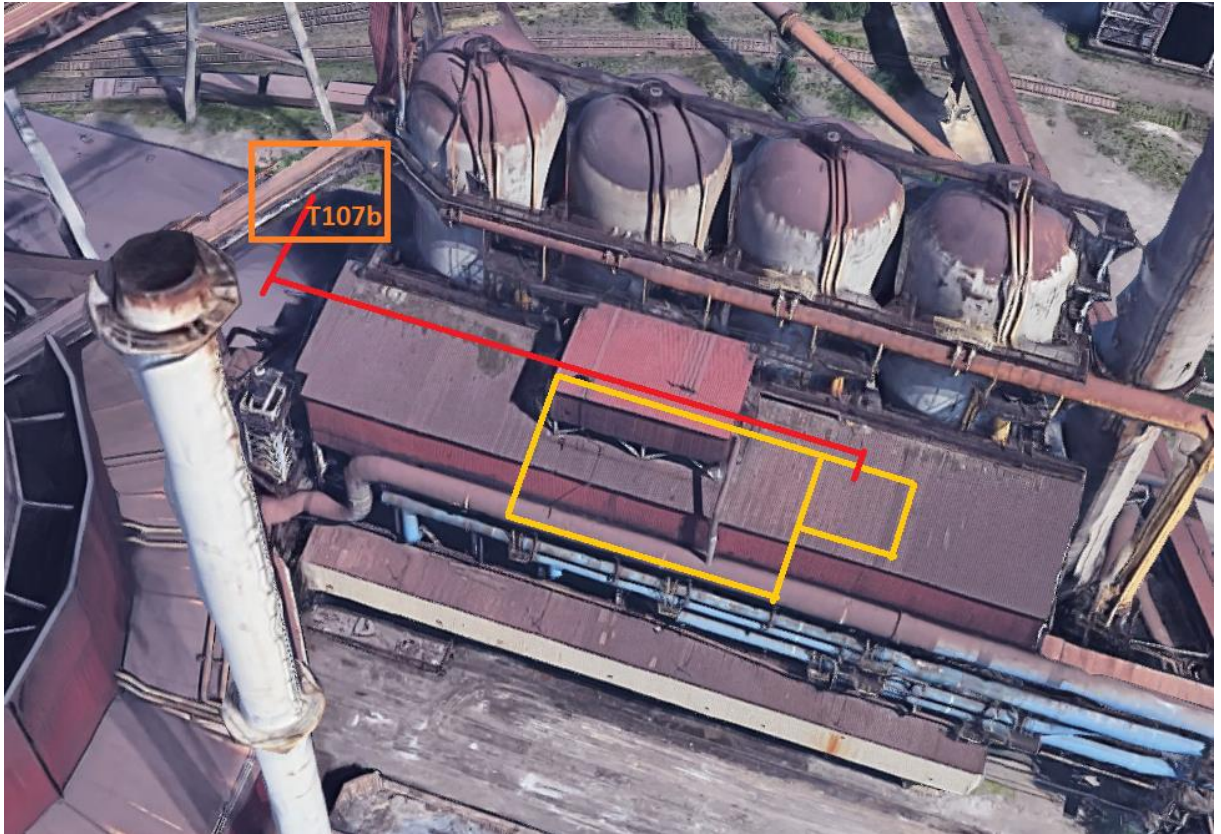


Fig. LV cable routing between T107b and the new pump house MCC switching station



Fig. 0.4kV T107b switching station

3. Supply and installation of MCC two-section switching station for pump house with two power supplies with a coupling in the building under the hot stoves. The outgoing bays must be



distributed evenly, constituting a reserve for each other. Fully equipped reserves of every kind must be provided in the switching station. Motor outgoing bays must have controls and mappings to the control & instrumentation and automation (AKPiA) system according to AMP assumptions. Each outgoing bay above 20kVA must be equipped with an ammeter and a 4..20mA transducer for continuous monitoring. Amount, type and synchronism of outgoing bays is described in Appendix 0699-620-A.xsl

Basic details of the switching station:

- a. Wall-mounted switching station with access from the front side
- b. Rated voltage  $U_e$ : 690V AC
- c. Rated current  $I_n$ : 630A
- d. Short-circuit current  $I_k$ : 50kA
- e. Rated frequency  $f_r$  50Hz
- f. Protection rating IP41 - met in case of protected outgoing bays
- g. Mechanical impact resistance rating IK10
- h. Resistance to electric arc 100kA during 0.3s
- i. Distribution of 4b segments according to PN-EN 61439-1

Each motor outgoing bay must be equipped with a local control module (IP56) containing:

- a. Emergency stop - with protection against accidental switch-on
- b. ON button - green
- c. OFF button - red
- d. Selection of control mode - local/remote
- e. Signalisation of drive operation
- f. Signalisation of permission for local control

4. Delivery of wireless UPS for powering the control & instrumentation and automation equipment with 30 min hold-up time, with manual bypass allowing for wireless switch-over to the emergency power supply (e.g. replacement of power supply unit or batteries). The power supply unit should be equipped with a communication card in the SNMP v2 standard and be incorporated in the AMP buffer power supply monitoring system
5. Delivery, assembly, commissioning along with the necessary cabling of elements of the control and measuring system based on the basic design, such as:
  - sensors
  - valves
  - telemechanics
  - local control
  - etc.

All cabling must be made in separate cable trays separated from power cables.

The TOP point is the control cabinet clamp. The control cabinet is not in the scope of work.

6. Delivery and installation of all electrical systems for own needs:
  - a. Basic (LED) and emergency (battery-powered) lighting in the new pump house in IP54 version; illuminance should be coordinated with legal requirements
  - b. Basic (LED) and emergency (battery-powered) lighting in the room under furnace hearth in IP54 version; illuminance should be coordinated with legal requirements
  - c. Basic (LED) and emergency (battery-powered) lighting within the building and system area in IP54 version; illuminance should be coordinated with legal requirements



- d. Network of 400V utility sockets - in the new pumping station and in the room under hearth
  - e. Primary and secondary grounding system - in the electrical room and near the equipment, a ground ring with prepared connections to the equipment should be made around the wall at a height of 80 cm from the floor using a 120mm<sup>2</sup> galvanised flat bar marked in yellow and green. All electrical equipment and pipelines (flanges) must be earthed with Lgy 16mm<sup>2</sup> cable
7. The scope of works associated with the fire protection system in the room of the new pump house shall include:
- a. Installation of a fire detection system with manual call points (ROPs) meeting the requirements of the existing system on the premises of AMP Dąbrowa Górnicza, based on a design confirmed by a fire protection specialist
  - b. Signals must be introduced into the existing system - modification works in the monitoring system may be performed by AMP only.
  - c. Delivery, assembly and start-up of fire dampers in ventilation system as per the design
8. MV electric motors supplied by the contractor must be provided with:
- a. Winding temperature measurement (4 points)
  - b. Vibration measurement
  - c. IP protection rating adapted to the working conditions but not less than IP43
  - d. Anti-condensation heaters
  - e. Easy access to junction boxes

All works associated with control and measuring instrumentation should be performed in accordance with Appendix 4 and 6.

#### 6.2.4. Commissioning

As part of the project, the Contractor shall carry out commissioning and all necessary tests and technical acceptance necessary for the operation of the system. The Contractor will also take part in full automation tests of system operation.

Detailed scope of acceptance:

- 1) Carrying out leakage tests of the system - no leakage of the cooling system is allowed, compensation tanks must maintain the level for at least 24 hours at the working pressure of the system
- 2) The Contractor shall submit acceptance documents for welded joints of pipelines
- 3) The Contractor shall carry out trial runs of installed pumps together with measurements of their parameters (capacity, head, vibrations, current consumption of electric motors)
- 4) The Contractor shall take part in test of the proper operation of the cooling system and its automation. During the tests following points will be checked, among others:
  - a. leakage simulation - correct operation of the make-up water circulation system in case of leakage
  - b. functioning of the emergency circuit (combustion engines)
  - c. system behaviour in the event of pump failure - for all circulating pumps
  - d. Primary pump switchovers





- e. Damage to the SCADA visualization
- f. UPS tests
- g. Tests of emergency control panels
- h. Power section failures - for all sections
- i. Leak detection system on tuyere sets
- j. Operation of compensation tank automation (continuous measurement of water level in the tank, fittings, water level sensors and cooling system response to each of them)
- k. Functioning of combustion motors test system

### **Electrical start-up**

The Contractor shall carry out a comprehensive electrical start-up of the entire system as well as provide 24/7 supervision after putting Blast Furnace #2 into operation in close cooperation with other companies that will be working during the repair of BF in 2023. During the start-up, all necessary tests and trials shall be carried out. The Contractor shall prepare complete quality documentation (as-built documentation, post-assembly reports, appendices, certificates, instructions etc.)

The Contractor shall submit reports confirming positive results of tests and acceptances.

#### **6.2.5. Additional information:**

- a. The attached drawings from the conceptual documentation are indicative only; however, AMP accepts deviations from the solutions described in the study provided that the new solution will allow to achieve the project objectives and performance parameters.
- b. The Contractor is required to provide services of an interpreter who should be present on site during the entire disassembly / installation / commissioning phase (24/7).
- c. Storage of material. The Contractor is responsible for the storage and safety of materials supplied. AMP can provide open space based on the requirements given. The contractor may prepare a temporary storage area by mutual agreement with AMP.
- d. Pre-installation and prefabrication area - to be agreed with AMP.
- e. AMP has its own documentation numbering system. The Bidder is obliged to use the AMP numbering system which will be presented to the Contractor at the kick-off meeting.
- f. AMP shall identify space for repair-related facilities. The arrangement of repair-related facilities is the Contractor's responsibility.
- g. The Contractor shall secure spare parts for the commissioning time according to the list agreed with AMP.
- h. The Contractor shall propose Industry 4.0 solutions that can be implemented in the scope of the project.



- i. The Contractor will make the markings: flow direction, direction of rotation, type of media, evacuation routes, etc. According to the user's instructions. The contractor will also mark all the pipes of tuyere sets and furnace staves in accordance with the numbering adopted in the project, using engraved or cut metal hangers.
- j. Corrosion protection should cover the entire structure and energetic installations and should enable operation in highly corrosive environments, corrosion protection of steel, mechanical structures in class "C5 very high" in accordance with PN-EN ISO 12944-2 and a guarantee for anti-corrosion protection of min. 10 years. Metal sheets for the cover and vestibule made of galvanized and coated trapezoidal sheet metal in class "RC5" according to PN-EN ISO 10169).

#### 6.2.6. Responsibility matrix

The Contractor is obliged to prepare and deliver to the Owner proposed responsibility matrix to be accepted by the design team.

### 7. OFFER-RELATED REQUIREMENTS

- 1) Technical offer should include:
  - a. General description and information about the service offered;
  - b. Scope of works under the bid (with defined quantity);
  - c. List of elements/works and quantity;
  - d. Exclusions (work to be performed by the buyer);
  - e. The offer will include a detailed responsibility matrix between AMP and the contractor with a breakdown into documentation, material delivery, demolition, assembly, trials and tests, start-up of the installation for individual chapters in the offer in order to verify the understanding of the inquiry / offer by the parties
  - f. Contractor is obligated to secure all necessary heavy equipment (cranes; forklifts; excavators; etc.)
  - g. Contractor is obligated to deliver logistics plan and layout of works including all crane operations. Possible crane location areas will be defined by AMP.
  - h. Necessary drawings
  - i. Submission of at least 1 reference letter issued by the entity for which the cooling installation of industrial facilities was performed with the use of welded joints, min. 3,000 linear meters of steel pipes diameter to DN500 in the last 10 years (name of the buyer, location, year, description). If it is not possible to provide a reference letter, the Tenderer shall submit a statement containing a reference list with a list of completed industrial facilities cooling installations using welded joints, min. 3,000 m of steel pipes with a diameter to DN500 in the last 10 years The list must include: name of the buyer, location, year, description and contact details of the buyer's representative (name and surname, e-mail address, telephone number) enabling AMP to confirm the information contained in the reference letter. Works schedule on a weekly basis with the milestones;
  - j. Warranty parameters;
  - k. Procedure for checking compliance with guaranteed parameters (proposal for AMP approval before signing the contract).
  - l. Quality control plan
  - m. List of potential subcontractors for AMP approval
  - n. List of utility requirements with parameters (nitrogen, oxygen, compressed air, instrument air, service water, steam etc.)
  - o. List of spare parts for at least two years of normal operation and for commissioning;



- p. Declaration that Contractor's knowledge, experience and site visit are sufficient to perform the whole scope of work;
  - q. Declaration that the whole scope of work will comply with good construction practices and with the effective law;
  - r. Bid validity period;
  - s. References for similar scopes
  - t. **Other information disclosed by the Contractor which does not include any cost data that could influence the quality of the offer.**
- 2) Supplier will present in detail all the elements of their offer which vary from the technical conditions set forth here if they are not able to fully meet all conditions.
  - 3) The offer must contain a description of how the work will be organized, together with the anticipated human resources, heavy equipment for specific work groups. The contractor will present a plan for the organization of works, including places of work and storage of structural elements
  - 4) The offer in the final part must contain an index of all changes that will appear in the content as a result of technical meetings, arrangements. The index must contain a brief description of the change and the locations of the change in the offer text.
  - 5) Indication of subcontractors or partners in the case of a consortium, together with an indication of the relevant work packages
  - 6) The commercial part will have a price breakdown consistent with the breakdown of the request for quotation, including additionally for the supply of materials and labor.

## **8. REQUIRED CONTENT OF THE TECHNICAL DOCUMENTATION SUPPLIED BY SERVICE PROVIDER:**

- 1) Works schedule;
- 2) Detailed risk analysis for all the investment stages for the required scope of works (technical risk, OH&S risk) indicating preventive measures to be taken in order to eliminate or significantly reduce the risk. It must be agreed with and finally validated by the Investor before the repair and revamping works start.
- 3) Health and Safety plan;
- 4) Works organization plan;
- 5) Quality Assurance Plan for Investor's approval;
- 6) Manufacturing inspection documentation.
- 7) Division of works into tasks being the responsibility of the Contractor and Customer;
- 8) Bi-Weekly progress reports prepared according to the Customer's guidelines and defining the percentage of works done relative to the plan;
- 9) Detailed and as-built documentation of the designed installations
- 10) List of fittings
- 11) List of pumps
- 12) Commissioning documents
- 13) Detailed 3D model of the entire designed installation
- 14) Spare parts list for 2 years of normal system operation.
- 15) Final report.

## **9. SUPERVISION, ASSEMBLY, TESTS AND COMMISSIONING**

- 1) Contractor will deliver all materials, tools and specialized equipment required for work completion. The Contractor undertakes to perform the commissioned work according to the arrangements made at the contract finalization stage. The contractor will provide a construction and civil Works Manager who will take over the duties of the Works Manager for the entire scope of the cooling system in accordance with the Polish construction law. The



contractor will provide branch works managers in accordance with the requirements of the specificity of the project. The Contractor will provide also H&S inspector present on site during the entire period of works performance.

- 2) Supplier undertakes to install and set all devices, commission, hand over the equipment for use and train AMP employees.
- 3) Commissioning
  - a. Cold commissioning  
Cold commissioning (partial) for equipment will be performed after works at a given point are completed, possible defects and faults removed, additional works that may turn out to be necessary to perform during the investment execution are completed, after the Buyer's safe work requirements are met, after the Contractor reports their readiness for cold commissioning and its conditions and date are agreed with the Buyer.
  - b. Hot commissioning  
Hot commissioning for equipment will be performed after all works are completed, after cold (partial) commissioning of equipment is done, possible defects and faults removed, additional works that may turn out to be necessary to perform during the investment execution are completed, after the Buyer's safe work requirements are met, after the Contractor reports their readiness for hot commissioning and its conditions and date are agreed with the Buyer.
- 4) The project will be put into use after PAC is signed for specific equipment groups and/or entire investment project.
- 5) Welding procedure:
  - a. The welding procedures should be submitted to the leader for previous approval before starting manufacturing. As per this specific technical condition for standards and drawing, the contractor will follow all the needed requests and will inform the welders and the responsible accordingly.
  - b. All the welders should submit their own welding qualifications through contractor to AMP before starting manufacturing.
  - c. The contractor should perform these welding tests as per the mentioned drawings and standards indications. The AMP has the right to check the welding at any moment. The contractor assistance to these controls (polishing, scaffoldings) is indispensable.

## 10. WORKS PERFORMANCE DEADLINE

The start of the BF2 shutdown is planned from beginning of March 2023. The contractor will start design works immediately after receiving the order. The preparatory work that can be done before the BF2 shutdown and deliveries of main materials must be completed within 42 weeks from signing the contract. The contractor will have **90 days** at his disposal to carry out the works during the BF2 shutdown. The assembly works will be carried out in a 2 or 3 shift system and will last 24 hours a day, taking into account all days as working.

### Main milestones:

- a. Delivery of detailed engineering: 6 months from signing the contract (indicative deadline, time must be assumed to allow for the timely completion of the next milestones)
- b. Completion of preparatory work: 42 weeks from signing the contract
  - Execution of civil works
  - Delivery of main materials
- c. Industrial start-up of installations: 90 days from the start of BF2 shutdown
- d. Provision of documentation necessary to apply for an occupancy permit: 2 weeks after the industrial start-up of the installation

- e. Reliability test for 72 hours: 1 month after start the industrial commissioning
- f. Verification of the achievement of the guaranteed parameters: 1 month after BF2 blow-in
- g. Signing the PAC protocol: 1 month after BF2 blow-in (after verifying that the guaranteed parameters are achieved)

## 11. WORKS SCHEDULE

The Contractor should deliver the draft works schedule for Investor's consultation and approval.

The main assumptions for the development of the work schedule by the Contractor:

1. Works possible to be performed before the start of the BF2 main shutdown:
  - Construction of a pumping station under the hot stoves hall, along with the disassembly of the rail track and hardening the road
  - Installation of heat exchangers below the cast house
  - Installation of the supporting structure for the collectors on the BF shaft - during BF2 standstill for 64 hours in September / October 2022
  - Closed circuit make-up water connection
  - Other scopes of work in consultation with the Investor:
2. Handing over the front of the works for:
  - Small diameter piping between the collectors and tuyere sets: in 25th day of BF2 shutdown, execution time: max. 60 days.
  - The possibility of early entry into the above-mentioned scope of works will depend on the arrangements with the Investor and other contractors for the BF2 repair.

Note 1: 2 or 3-shift work system must be planned. Work to be performed 24h/day

Note 2: Detailed works schedule will be coordinated with the potential Contractor implementing other revamping works.

### 11.1. PRELIMINARY SCHEDULE

The offer should include a preliminary schedule with specific time slots in which the Contractor will provide the Investor with drawings, documents and other materials, as well as time slots for the implementation of the specific Investment phases. Schedule dates will be guaranteed by the Contractor and will be subject to specific commercial clauses in the Commercial Offer.

### 11.2. DETAILED SCHEDULE

Detailed schedule of the works scope should be provided for approval by the Investor as part of Contractor's work performance, taking into consideration the stages of organization and securing of the site/works, arranging all the matters related to getting Investor's OH&S Office clearance for the works to be done on their premises, purchasing and prefabrication, erection, tests and commissioning, and putting into operation. This schedule should also include the description (specification) of the so-called critical path tasks and the so-called investment milestones.



## 12. RIGHTS OF THE CUSTOMER

- 1) All valuable materials /scrap/objects of archeological value recovered or found during works performance are the customer's property and will be handed over to them.
- 2) Customer reserves the right to restrict access to the plant for any person associated with the Contractor found to be e.g. under the influence of alcohol or in a condition that may create a threat to themselves and other people performing work or a group of people. Detailed information will be presented in Health & Safety Policy applied at ArcelorMittal. This policy shall constitute an integral part of the contract concluded with the Contractor.

## 13. DELIVERY AND QUALITY GUARANTEE

- 1) Delivered solutions will be free of any defects being the result of faulty engineering, materials and/or poor quality of manufacturing. The Contractor will guarantee the delivery by the date and in the form as defined in the order.
- 2) The Contractor will guarantee the use of the state-of-the-art solutions.
- 3) The Contractor will guarantee high quality of the structural solutions, high quality of materials in the proposed solutions and high quality of performance for all individual and assembled elements of equipment parts, specific machines and equipment, offered by them on the basis of the required performance guarantees defined in the specification of the offer.
- 4) Performance guarantee will cover all individual elements and weighing and metering systems, as far as their accuracy, nominal values/capacity and integrated operation are concerned.
- 5) The minimum warranty period expected by the Investor is 24 months from the moment of signing the Preliminary Acceptance Certificate.

## 14. PARAMETERS AND CONDITIONS FOR SIGNING PAC (PROVISIONAL ACCEPTANCE CERTIFICATE)

**Guaranteed parameters:**

No.	Performance parameter	Guaranteed value	Acceptable limit
1	Positive leakage test result on full pump parameters for all circuits. No water loss for tuyere set and hot blast stoves circuits, minimum 72h.	Water loss: 0 m <sup>3</sup> /72h	Water loss: 0,1 m <sup>3</sup> /72h

**Other conditions for PAC signing:**

- 1) Compliance of the work and installation with documentation, including the construction part, installation of the pumping station under the hot blast stoves hall, supply and discharge pipework, collectors, power stations
- 2) Positive leakage test result on full pump parameters for all circuits. No water loss for the tuyere and hot blast stoves circuits, minimum 72h.
- 3) Positive result of the functionality test for control of drives and instrumentation





- 4) Visual assessment of the correctness of all works by both parties.
- 5) Positive result of all necessary technical inspections by Office of Technical Inspection (UDT) and Transport Technical Inspection (TDT).
- 6) Submission of complete as-built documentation.
- 7) Submission of documents necessary to apply for an occupancy permit for the system.
- 8) Completion of all construction works including provision of access to all cooling system fittings.
- 9) Keeping the work areas in good order.

## 15. CONTACT PERSONS

No.	Name	Responsibility	Plant/Dept.	Phone / e-mail
1	Jakub Stawowy	Technical Leader – BF Plant	ArcelorMittal Poland S.A. Al. J. Piłsudskiego 92 41 – 308 Dąbrowa Górnicza	+ 48 882 172 292 <a href="mailto:Jakub.Stawowy@arcelormittal.com">Jakub.Stawowy@arcelormittal.com</a>
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4	Marta Bodnar	Lead Buyer - Purchasing Office		EPO Al. J. Piłsudskiego 92 41 – 308 Dąbrowa Górnicza +48 668 562 376 <a href="mailto:Marta.Bodnar@arcelormittal.com">Marta.Bodnar@arcelormittal.com</a>

## 16. OTHER TOPICS (NOT DISCUSSED ELSEWHERE)

### 16.1. WASTE DISPOSAL

Contractor is responsible for the disposal of waste generated as a result of investment works. All waste products, which will be produced during the works, should be removed to the industrial waste storage area.

The only exception is scrap of non-ferrous materials and iron scrap which must be sorted so that it can be suitable for transport and loaded onto the means of transport provided by the investor: trucks and / or wagons.

Total cost of preparation scrap for transportation and loading will be borne by the Contractor. Below you can find the list of waste codes (according to Polish law), referring to the most frequent types of waste to be generated in the course of the Investment:

- Scrap of ferrous metals waste code 160117, 170405, 191001.
- Scrap of non-ferrous metals waste code 160118, 170401, 170402.
- Scrap of mixed metals waste code 170407.
- Ceramic waste waste code 161103, 161104.
- Concrete and debris waste waste code 170101.
- Electrical cables waste code 170411, 170604.
- Oils, greases waste code 130110, 130208.
- Electric motors scrap waste code 160216.
- Other waste individual waste codes.

### 16.2. ANALYSES AND MEASUREMENTS

Below you can find the analyses and measurements to be done by the Contractor, at their own expense, as part of the investment project:





- Steel structures strength analysis within the work site.
- Inventory-taking geodetic measurements.
- Working geodetic measurements.
- As-build geodetic measurements (geodetic surveys).
- Installation measurements

### **16.3. CONTRACTOR'S PROPERTY SECURITY**

In the course of the Investment's duration, the Contractor is responsible for securing their own property and the property of their subcontractors, parts, subassemblies and entire equipment stored in the Investor's premises and planned for project purposes in the period of commissioning and hand-over to the Investor.

## **17. APPENDIXES**

1. Appendix - Legal acts
2. Appendix - Location and environmental data
3. Appendix - AIM Addendum to tender - TLS EN V3
4. Appendix - AIM Addendum to tender - automation system requirements EN V16
5. Appendix - AIM Addendum to tender - 3D EN V2
6. Appendix - Technical documentation
7. Appendix - Requirements for detailed design and as-built documentation
8. Appendix - Author Supervision Card PL EN\_01
9. Appendix - Partial commissioning protocol PL EN\_01
10. Appendix - Document transmittal protocol PL EN\_01
11. Appendix - Material card PL EN\_01
12. Appendix - Concreting log PL EN\_01
13. Appendix - Inspection and test plan for earthworks and foundation works PL EN\_00.
14. Appendix - Drawing numbering system
15. Appendix - Schedule milestones EN
16. Appendix - New pumphouse - implementation guidelines EN
17. Appendix - Material requirements for valves
18. Appendix - Scope visualization