



Technical Requisition For:

API 675 Pumps

Client: NIS AD, Novi Sad, Serbia

Project Number: U211

**Project Name: Replacement Of Rotary Equipment And Installations In Pancevo Oil
Refinery**

Location: Pancevo Oil Refinery

Item Summary

Item No.	Tag Number	Quantity	Description
1.0	GA-2517	1	Metering Pump
1.1	GA-2659/S	2	Dosing Pump
1.2	GA-2661/S	2	Dosing Pump
1.3	GA-2620	1	Metering Pump
1.4	GA-1005A/B	2	Hydrocarbon transfer pump
1.5	GA-1006A/B	2	Hydrocarbon transfer pump

List of Attachments

DOCUMENT NUMBER	DESCRIPTION TITLE	REVISION
1. TECHNICAL REQUISITION		
2. DATASHEETS		
2.1. U211-MR-0054	Datasheet (DS) – Metering Pump	01
2.2. U211-MR-0030	DS – Dosing Pump	01
2.3. U211-MR-0055	DS – Dosing Pump	01
2.4. U211-MR-0035	DS – Metering Pump	02
2.5. U211-MR-0031	DS - Transfer Pump for Hc-Condensate & Gasoline	01
2.6. U211-MR-0032	DS - Transfer Pump for Hc-Condensate & Gasoline	01
3. SUPPLIER DOCUMENT REQUIREMENTS (SDR)		
3.1. U211-SDR-0010	SDR – Mechanical	00
3.2. U211-SDR-0011	SDR – Electrical	00
4. SPECIFICATIONS		
4.1. U211-EL-SP-0009	ES for Low Voltage Cage Induction Motor	00
4.2. U211-PR-DS-0004	Site and Utility Data Sheet	00
5. MISCELLANEOUS		
5.1. U211-TR-0014	Tech. Excl. & Deviations Summary (TEDS)	00
5.2. U211-TR-0015	TEDS (Instructions for Completion)	00

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PUMPS (API 675)

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1. GENERAL

1.1 This **Technical Requisition** is issued to cover minimum requirements for material purchase, design, manufacturing, inspection, testing, documentation and supply of pumps including drivers and auxiliaries.

1.2 The equipment shall be in strict accordance with this Technical Requisition and all other documents, codes and standards referred to in the Technical Requisition and its attachments (as listed in the Technical Requisition index). Any **exception to the Technical Requisition** documents and referred codes and standards shall be clearly advised to Client (in writing).

1.3 **Order of precedence** to be used in realization of this job is as follows:

1st. Rules and regulations of Serbia,

2nd. Technical Requisition for pumps (this document) and all documents named in "List of Attachments" within this document.

3rd. Serbian or international technical standards.

4th. Vendor's specifications, documents and information.

Any conflict generated within this document and documents named in List of Attachments shall be referred to Client in writing for clarification and resolution.

1.4 Compliance with the Technical Requisition does not relieve Vendor from responsibility to deliver **equipment** of proper design, suitable for specified conditions. Any conflict between the "Technical Requisition" requirements and Vendor's opinion shall be clearly advised to Client (in writing).

Additionally Vendor is responsible for:

- All co-ordination with sub-suppliers and collection of all details, drawings, data and all calculations to achieve optimum design and for submission of all documents requested.
- Engineering, performance and guarantee of the complete scope of supply of purchased materials.

In principal all contacts with sub-suppliers shall be via the Vendor.

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1.5 Following **terms** are used in this text:

Vendor: company selected for equipment delivery
 Sub-supplier: company which provide particular equipment (e.g. pump, E-motor...) to Vendor
 WBD: project Contractor (Client's agent for design services)
 Client/Purchaser: company assigning the project and operating the plant (NIS Petroleum Industry of Serbia)

2. SCOPE OF SUPPLY

2.1 BY VENDOR

- Design, manufacturing and supply of equipment and material including relevant documents, inspections, testing etc. shall be, as a minimum, in accordance with this Technical Requisition and Pump Data sheets included in the Technical Requisition.
- Site Services:**
 Vendor's representative site supervision during equipment installation – SAT/COMMISSIONING and assistance during Start-up (assistance during the process of putting pumps into operation)
 - During shutdown approximately 4 consecutive weeks (6 days per week; 12 hours per day), is required (if longer/lesser duration needed for supervision services, payments will be per daily rate all in accordance with the Agreement).
 - During regular plant operation (outside shutdown period) approximately 4 consecutive weeks (5 days per week; 8 hours per day)
- Consumables:**
 Vendor will provide all lubricants for pre-commissioning, commissioning and start-up including one year of operation after successful start-up
- Spare parts:**
 Spare parts for pre-commissioning, commissioning and start-up shall be included in the supply.
- Special tools:**
 Special tools required for installation/maintenance (if applicable), shall be included in the supply.

2.2 BY OTHERS

Excluded from Vendor's scope is:

- Concrete foundation and grouting material.
- Off-skid Process piping (including on/off valves, instruments,...).
- Wiring (cables) to electrical consumers and to instruments out off pump skid.
- Cable glands.
- Local control station for E-motor (start/stop buttons).

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- Equipment installation to the foundation and grouting (however it has to be done under Vendor supervision).

3. VENDOR'S OBLIGATIONS / RESPONSIBILITIES

- 3.1. Vendor shall assume full and overall responsibility for the complete scope of supply.
- 3.2. Vendor shall be solely responsible for providing complete and operable API 675 PD pumps in full accordance with applicable industry codes and standards, Serbian regulations, and Purchaser's technical requirements.
- 3.3. Vendor's proposal shall be based on equipment that complies strictly with the requirements of tender documentation, and in conjunction with the technical requirements and listed attached documents.. Any proposed exceptions shall be recorded within the TEDS" document and accompanied by a description of the proposed substitution.
- 3.4. Proven, reliable, energy-efficient equipment is required.
 - Vendor may offer alternative designs that improve energy efficiency without reducing equipment reliability.
 - Proposed design features having less than two years' operating experience shall be specifically listed and details of construction shall be provided for Purchaser's review and written acceptance.
- 3.5. Vendor is fully responsible for the complete design, performance, implementation of quality assurance procedures and inspection of materials and components, manufacturing, testing and certification of the complete unit in full compliance with the requirements of this Technical Requisition and applicable Codes, Standards and Regulations.
- 3.6. Vendor shall obtain and co-ordinate all sub-supplier equipment activities as required to provide fully functional unit in accordance with the documents and requirements referenced herein (all requirements as listed in this Technical Requisition and its referenced documents shall be also imposed on his sub-suppliers).
- 3.7. In principle all contacts and correspondence between Purchaser and sub-suppliers will take place via the Vendor, if any.
- 3.8. Vendor shall ensure compliance with Serbian code and authority regulations . This includes delivery of all documents required to satisfy the code, the regulations and authorities. Status of authority approval shall be forwarded to Purchaser on a monthly basis..
- 3.9. Bidder shall indicate any deviation from tender documentation requirements and Technical Requisition as integral part within it's bidd. Requirements specified in the Technical Requisition shall be considered as minimum.
- 3.10. It is Vendor's responsibility to design, manufacture and deliver equipment in line with requirements of this Technical Requisition. Applicable exceptions, if any, to be listed in TEDS form attached.
- 3.11. For any technical concession request after order, Vendor is obliged to send to Client vendor concession request for approval. Technical concession request must include all cost and schedule impacts, material availability or delivery issues, if any. Insufficient

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information may result in rejection. The Vendor Concession Request requires Purchaser's verdict and signature prior to start of the related activities. Any cost consequences related to approved concession request will be at Vendor's cost.

- 3.12. Any increased cost due to changes in the design or fabrication to meet the requirements of this Technical Requisition which are not caused by Purchaser and define through approved technical concession request by Purchaser are at Vendor's cost. If changes are caused by Purchaser cost will be at Purchaser. It will be regulated through change request.
- 3.13. Vendor shall perform all NDE examinations and testing using properly qualified personnel or subcontractors In order to fulfill requirements from Serbian legislation.
- 3.14. Vendor is responsible for all coordination with sub-suppliers and collection of all details, drawings, data and all calculations to achieve optimum design and on time submission of all documents requested in the Technical Requisition.
- 3.15. Purchaser's review of Vendor's documents does not relieve the Vendor of his responsibilities to deliver equipment, documents and services conforming to this Technical Requisition.
- 3.16. Any inspection performed by Purchaser in no way relieves Vendor of his responsibility for equipment to meet the requirements of the Technical Requisition and Serbian legislation.
- 3.17. Vendor is obliged to submit all documents defined in SDR (for all disciplines) within MDB package for Client approval. Documents must be approved by Client prior shipment of equipment.
- 3.18. Final documentation (MDB) shall be submitted by Vendor in 1 (one) hard copy and 1 (one) electronic copy in English language (with exception of IOM manual with should be included in MDB in both: Serbian and English version, as defined in SDR). Electronic copy have to be "searchable" in the most extent (excluding scanned material certificates and similar documents). Binding and printing requirements will be provided by Client.

4. CODES, SPECIFICATIONS AND STANDARDS

- 4.1 Unless otherwise specified, the latest edition of the specifications, codes and standards as specified in this Technical Requisition and/or its attachments shall be adhered to for the design and material requirements. As such, these documents form part of the Technical Requisition. It shall be Vendor's responsibility to acquire all required codes and standards.
- 4.2 The following listing shall not be considered as complete in case a reference is made in the below mentioned codes, specifications and standards to other relevant codes, specifications and standards these shall also be considered as applicable.
 - Project specifications as per documents listed in Attachments.
 - Serbian, International codes and standards referred to in Technical Requisition; latest edition unless specified otherwise.
- 4.3 Order of Precedence

The order of precedence shall be the latest revision of the following:

 1. Serbian regulations, standards and codes.
 2. Technical Requisition including all documents listed in Attachments

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3. International codes and standards

Any conflict generated within the Technical Requisition not solved by the order of precedence shall be referred to Purchaser in writing for clarification and resolution.

5. AUTHORITY APPROVALS

5.1 Serbian **authority approvals** (certificates) shall be arranged and delivered by Vendor. This includes submittal of all required documents, assessment of design, arrangement of inspection and tests and obtaining certificates of conformance.

Serbian authority regulations that have to be adhered:

a) For pressure equipment:

- "PRAVILNIK O OPREMI POD PRITISKOM" (Sl. glasnik RS, br. 114/2021) - Serbian Rulebook for pressure equipment

b) For non-pressure equipment Vendor is obliged to address to the Ministry of Economy in Republic of Serbia for approval of foreign conformity documents

c) For electrical equipment placed in hazardous area:

- "PRAVILNIK O OPREMI I ZAŠTITNIM SISTEMIMA NAMENJENIM ZA UPOTREBU U POTENCIALNO EKSPLOZIVNIM ATMOSFERAMA" (Sl. glasnik RS, br. 10/2017 i 21/2020) - Serbian rulebook on equipment and protective systems intended for use in potentially explosive atmospheres

d) For machinery:

- "PRAVILNIK O BEZBEDNOSTI MAŠINA" (Sl. Glasnik RS. br. 58/2016 i 21/2020) - Serbian rulebook on machinery safety

In accordance Serbian legislation and standards shall nameplate also bear Serbian mark of conformity "3A".

5.2 CE MARKING

Equipment, materials and components which are CE certified, shall bear CE marking (if applicable) and shall be compliant to applicable EC or EU Directives, such as, but not limited to:

Vendor shall supply all authority documents required by EU legislative:

- Declaration of Conformity is required for complete equipment and also for particular equipment parts (components). Mandatory codes and specifications shall be specified in the declaration.
- Certificates of Conformity issued by Notified Body according to EU directives (if applicable).

Each piece of equipment (including instruments) shall be clearly identified by a nameplate, permanently attached to the equipment.

Vendor shall supply all authority documents required by EU legislative:

EC Declaration of Conformity in accordance with all relevant EU directives (especially e.g. for electrical equipment: LVD 2006/95/EC (73/23/EEC), EMC 2004/108/EC (89/336/EEC), ATEX 94/9/EEC etc.).

EC Declaration of Conformity is required also for particular equipment parts (components).

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All equipment, material and components included in the delivery shall be CE certified and shall have CE marking (if applicable).

EC Certificate of Conformity issued by Notified Body, according to EU directives (e.g. ATEX 94/9/EEC, etc.).

All CE certified equipment shall be recertified in Serbia for approval of foreign conformity documents.

- 5.3 Vendor shall include all authority documentation, approval documentation, certification, etc, in the manufacturing data books.

6. ENGINEERING REQUIREMENTS

6.1 GENERAL

- 6.1.1 Requirements for the PD pumps are based on API Standard 675, latest edition.
- 6.1.2 Requirements of this specification are supplementary to API 675, forming a single set of specification requirements for the pumps.
- 6.1.3 Requirements in the API standard which are not ammended by or mentioned in this specification remain applicable.
- 6.1.4 "Technical Requisition" including all documents listed in Attachment shall be applied for this project.
- 6.1.5 **SI units** shall be used (except of "bar" required for pressure).
- 6.1.6 Equipment shall be designed for **four (4) years of uninterrupted service** (scheduled plant overhaul interval is 4 years) under conditions specified herein.
- 6.1.7 Unless otherwise stated in Data Sheets Outdoor, **unsheltered installation** is considered. Manufacturer shall design proper winterization measures (e.g. scope of electrical tracing and insulation – supplementary material will supplied and installed by Client). See "Site & Utility Data-Sheet" (U211-PR-DS-004) for climatic conditions and design conditions.
- 6.1.8 Equipment shall be **delivered pre-assembled** to the maximum possible level. All components (include auxiliaries or seal flush plan), after assembly, must be within the boundaries of the baseplate.
- 6.1.9 Vendor may offer **alternative design** if thus obtaining improvement over the specified equipment at the same or better cost with better operation or maintenance conditions and without decrease in quality. Alternatives require Client's approval.
- 6.1.10 Vendor shall review equipment design with regard to discover and eliminate any **safety hazards** and to assure comfortable operability and maintainability (good equipment **ergonomics**).
- 6.1.11 Vendor shall within offer submitt information regarding location of maintenance facilities applicable for the Client Site (closest to the Site). During equipment guarantee period Vendor's maintenance representative shall respond on Client's request till 48 hours after

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the request (equipment failure announcement) and solve the failure till 10 calendar days after the request (equipment failure announcement)

6.1.12 Experience

All equipment and its elements shall be of a proven design / size and shall be well within Vendor's actual experience.

6.1.13 Laws and Regulations / Authority Requirements

Serbian laws, standards and regulations must be followed. Serbian standards are harmonized with EU standards. If EU certification is done Serbian recertification is required.

Vendor is responsible to obtain all required certificates and approvals.

6.1.14 Vendor can use his standard equipment manufacturers (his standard Vendor List), if not specified otherwise within this Technical Requisition.

6.2 REFERENCES

Directive 2014/34/EU	Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres (ATEX) – mandatory from 20-Apr-2016
Directive 2014/68/EC	Pressure Equipment Directive
Directive 2006/95/EC	Low Voltage Electrical Equipment Directive
Directive 2014/30/EC	Electromagnetic compatibility (EMC)
Directive 2006/42/EC	Machinery Directive
API 675	Positive displacement pumps (Controlled volume)
IEC 60079	Electrical Apparatus for Explosive Gas Atmospheres
IEC 60529	Degrees of Protection Provided by Enclosures (IP Code)
IEC 60034	Rotating electrical machines
	Rotating electrical machines - Part 2: Methods for determining losses and efficiency of rotating electrical machines
IEC 60034-2	IEEE Recommended Practice and Requirements for Harmonic Control in Electric Power Systems
	Adjustable speed electrical power drive systems
IEEE Std 519	Amendment 1 - Adjustable speed electrical power drive systems - Part 5-1: Safety requirements - Electrical, thermal and energy
IEC61800 1-5	Adjustable speed electrical power drive systems
IEC61800-5 1	Adjustable speed electrical power drive systems - Part 5-1: Safety

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1:2007/AMD1:2016	requirements - Electrical, thermal and energy
IEC 60146	Semiconductor converters - General requirements and line commutated converters
IEC 61508	Functional safety of electrical/electronic/programmable electronic safety-related systems
IEC 61511	Functional safety – Safety instrumented systems for the process industry sector
EN 62337	Commissioning of Electrical, Instrumentation and Control Systems in the Process Industry – Specific Phases and Milestones
EN 62381	Automation Systems in the Process Industry – Factory Acceptance Test (FAT), Site Acceptance Test (SAT) and Site Integration Test (SIT)
EN 62382	Control Systems in the Process Industry – Electrical and Instrumentation Loop Check
EN 13445	Unfired pressure vessels
EN 13480	Metallic industrial piping
IEC 60502	Power cables with extruded insulation and their accessories for rated voltages from 1 kV
IEC 60445	Basic and safety principles for man-machine interface, marking and identification – Identification of equipment terminals, conductor terminations and conductors
IEC 61439	Low-voltage Switchgear and Control Gear Assemblies
IEC 60085	Electrical insulation – Thermal evaluation and designation
IEC 60027-1	Letter symbols to be used in electrotechnology
IEC 60204-1	Electrical equipment of industrial machines
IEC 60617-DB	Graphical symbols for diagrams
IEC 61082	Preparation of documents used in electrotechnology
IEC 61346	Industrial systems, installations and equipment and industrial products - Structuring principles and reference designations
IEC 60073	Basic and Safety Principles for Man-Machine Interface, Marking and Identification - Coding Principles for Indicators and Actuators

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IEC 60079-14	Explosive atmospheres Gas & Dust - Part 14: Electrical installations design, selection and erection
IEC 60204	Safety of machinery – Electrical equipment of machines
IEC 60227	Polyvinyl Chloride Insulated Cables of Rated Voltages up to and Including 450/750 V
IEC 60287	Electrical Cables – Calculation of the Current Rating
IEC 60332	Tests on electric and optical fibre cables under fire conditions
IEC 60364	Electrical Installations of Buildings
IEC 60668	Dimensions of Panel Areas and Cutouts for Panel and Rack-mounted Industrial Process Measurement and Control Instruments
IEC 62305	Protection of Structures against Lightning
IEC 60072	Dimensions and Output Series for Rotating Electrical Machines
IEC 60331	Tests for Electric Cables under Fire Conditions – Circuit Integrity
ISA S5.1	Instrumentation Symbols and Identification
ISA S5.2	Binary Logic Diagrams for Process Operations
ISA S5.3	Graphic Symbols for Distributed/Shared Display Instrumentation, Logic and Computer Systems
ISA S5.5	Graphic Symbols for Process Displays
EN 10204:2004	Metallic products - Types of inspection documents
EN 13463 –1: 2009	Non-electrical equipment for potentially explosive atmosphere
EN 13463 – 5:2011	Non-electrical equip. for potent. ex atm. Protection by constr. Safety
IEC 61000	Electromagn. Compatib. for Industrial Process Meas. and Control
IEC 61131	Programmable Controllers
IEC 61784	Industrial Communication Networks - Profiles
IEC 62443	Industrial Automation and Control System Security
ISO 20816-1	Mechanical vibration — Measurement and evaluation of machine vibration
ISO 7919-3	Mechanical vibration — Evaluation of machine vibration by measurements on rotating shafts — Part 3: Coupled industrial machines
ISO 281	Rolling Bearings - Dynamic Load Ratings and Rating Life
API 670	Machinery Protection Systems

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API 671	Special-Purpose Couplings for Petroleum, Chemical, and Gas industry services
ASME B16.5	Pipe Flanges and Flanged Fittings
ASME B16.10	Face to Face and End-to-End Dimensions of Valves
ASME B16.34	Valves – Flanged, Threaded and Welding End
ASME B31.3	Process Piping
ASME B46.1	Surface Texture (Surface Roughness, Waviness and Lay)
ASME B1.20.1	Pipe Threads, General Purpose (Inch)
API 614	Lubrication, Shaft Sealing, and Control-oil Systems and auxiliaries for Petroleum, Chemical and Gas Industry Services
API 541	Form wound squirrel cage induction motors – 345 kW (500HP) and larger
API 547	General purpose Form-wound Squirrel cage induction motors-185 kW through 2240 kW
API 686	Recommended Practice for Machinery Installation and Installation Design

6.3 PUMP

- 6.3.1 **API 675** (last edition) and corresponding “Engineering Specifications” (attached) are applicable for this project.
- 6.3.2 It is assumed that all pumps in services with operating temperature less than 150°C are suitable for instantaneous start-up from ambient to full operating temperature. For higher operating temperatures (or if a/m assumption is wrong), Vendor shall provide suitable start-up procedure (as part of the operating manual) and any recommended monitoring equipment (e.g. skin temperature probes) to ensure that the pump (including shaft seals) does not incur damage due to rapid heat-up.
- 6.3.3 Vendor shall design proper equipment & auxiliary piping heating / tracing in case that the fluid handled can solidify at ambient temperature. Procedure, how to keep the stand-by pump in “ready for start-up” mode shall be confirmed by Client and clearly described in Vendor’s equipment operating manual. This is applicable namely for following items:
- Pour point [°C] of pumped liquids:
- GA-XXX + XX °C
- 6.3.4 All **special tools** (not commercially available) required for installation / maintenance shall be included in the equipment delivery.
- 6.3.5 All **of the pump equipment**, motor, vessels and accessories shall be delivered on a single skid. Vendor shall provide information on the skid general arrangements, with dimensions and static and dynamic loads transferred on to foundations.

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6.4 STATIC EQUIPMENT

6.4.1 Serbian authority regulations that have to be adhered:

- "PRAVILNIK O OPREMI POD PRITISKOM" (Sl. glasnik RS, br. 114/2021) - Serbian Rulebook for pressure equipment

- For non-pressure equipment Vendor is obliged to address to the Ministry of Economy in Republic of Serbia for approval of foreign conformity documents

6.4.2 Serbian regulations are harmonized with "Requirements of "Pressure Equipment Directive" PED 97/23/EC

Vendor shall provide equipment classification according to PED and this classification will be submitted to Client for review (draft of "Declaration of Conformity") prior to equipment manufacturing (or sub-contracting). Corresponding level of "authority / notified body" involvement will be applied during equipment design / manufacturing / inspection and testing.

6.4.3 Static equipment should be fabricated, welded and tested in accordance with EN13445.

6.4.4 Minimum design metal temperature shall be -28 °C (minus).

6.4.5 All documents according to appropriate attached SDR form shall be supplied. All documents shall be marked with valid Client Technical Requisition Number, Client Document Code and signed by responsible person. All revisions/changes shall be marked clearly.

6.4.6 If equipment requires insulation then it will have insulation clips (if needed).

6.4.7 A pulsation dampener must be offered for capacities greater than 100 l/h. Suction dampener, to improve intake conditions to prevent cavitation, is offered if the bidder deems it necessary.

6.4.8 For capacities greater than 1000 l/h The bidder must perform a control calculation of pipeline pulsations.

6.5 MATERIALS & MATERIAL INSPECTION

6.5.1 Unless otherwise specified by Client, construction material shall be selected by manufacturer based on attached "Data Sheets".

6.5.2 Vendor shall indicate the material code (Serbian) and the actual grade of material he is supplying in the equipment "Data-Sheet". ASTM, AISI or ASME equivalent designation shall be always added.

6.5.3 Following requirements should be understood as minimal for material certificates:

- Material certificates 3.1B according to EN 10204 shall be submitted at least for pressure-containing parts (including piping) in contact with the fluid handled if being in a service belonging to inspection category B / C (see below), for parts operating in a corrosive atmosphere and for materials not covered by recognized international standards (e.g. APIs).

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- Material certificates at least 3.1A in accordance with EN 10204 shall be submitted for pressure-containing parts in a service belonging to inspection category A as well as for non-pressurized parts in contact with the fluid handled and for all auxiliary equipment and piping in non-hazardous service (e.g. lube-oil system, cooling water piping, nitrogen system, air supply...).

6.5.4 Equipment and piping (in both process and auxiliary service) material shall be inspected (non-destructive testing) and certified as follows:

All welds and critical areas of castings shall be inspected in accordance with the requirements of the relevant inspection category (if not given otherwise by relevant standards or mutual agreement). The minimum inspection requirements for given inspection category are following:

Category A: Visual inspection.

Category A is applicable only for non-hazardous services (flammable fluid is not understood as "hazardous") within the following process design pressure and temperature range:

0 to 25 bar(g) and –28 °C to +150 °C.

Category B: Visual inspection and magnetic particle or liquid penetrant inspection (all welds including auxiliary piping and critical areas of castings).

Category B is applicable for non-hazardous services (flammable fluid is not understood as "hazardous") within the following process design pressure and temperature range:

25 to 90 bar(g) or –28 °C to –50 °C or +150 °C to +400 °C

Category C: Requirements of inspection category B together with radiographic or ultrasonic inspection.

Category C is applicable for all **hazardous services** (e.g. fluid handled is indicated as toxic, poisonous, self-igniting, carcinogenic, liquids with vapor pressure above 5 bara) or non-hazardous services within the following process design pressure and temperature range:

above 90 bar(g) or above +400 °C or below –50 °C.

Ultrasonic inspection shall be executed when radiographic inspection is not feasible. Dye penetrant inspection shall be provided when magnetic particle inspection is not feasible.

6.5.5 The inspection acceptance limits (evaluation criteria) for non-destructive testing (including the visual one) shall be advised prior the inspection.

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6.6 PUMP DRIVER /ELECTRIC MOTORS

- 6.6.1 Pumps shall be driven with either Electric Motor or pneumatic drive with a regulator.
- 6.6.2 For the electric motor the Requirements of following “Engineering Specification” shall be followed:

- U211-EL-SP-0013 ES for LV Motors

E-motor Subsuppliers shall be subject of Client approval.

Electrical equipment protection level shall be appropriate to the hazardous area classification of the package installation.

Nevertheless the supplier have to adopt sizing and technical characteristic of the cables.

6.6.3 **Explosion protection**

Electrical equipment for installation in zone 2 hazardous area shall be suitable also for installation in Zone 1. Motors for use in zone 1 and zone 2 hazardous area shall be flameproof with an increased safety terminal box, in accordance with IEC 60079. Ex motors in increased safety (e) or non-sparking (n) execution are not acceptable.

- 6.6.4 Application of “maintenance-free” **bearings** (greased for the whole lifetime) is preferred against bearings with greasing nipples - if applicable.

6.6.5 **Earthing**

The equipment installed on base-frames shall be bonded. The base frames shall be equipped with a stainless steel earthing lugs at two point located diagonally opposite. The minimum conductor size for bonding shall be 16mm². The equipment which will be installed separately from base frames e.g. excitation panels shall be equipped with earthing lug.

7. Nameplates & Rotational Arrows

A nameplate shall be securely attached at a visible location on the pump frame, and on any major piece of auxiliary equipment.

Nameplates and rotation arrows (if attached) shall be of austenitic stainless steel or nickel-copper (UNS N04400 alloy). Attachment pins shall be of the same material. Welding is not permitted.

The following data, as a minimum, shall be clearly stamped or engraved on the frame. Units used on the nameplates shall correspond to those used on the datasheets:

- Project tag number;
- year of manufacture;
- Vendor's name;
- serial number;
- model number;

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- Rated capacity;
- Rated power;
- Maximum allowable working pressure;
- Minimum and maximum allowable working temperature;
- Rated speed;
- Hydrostatic test pressure

The following data, as a minimum, shall be clearly stamped on the nameplate of any major piece of auxiliary equipment:

- Project tag number, if any;
- year of manufacture;
- Vendor's name;
- serial number;
- model;
- Certification marking („3A“/CE)

Nameplates shall be positioned to be clear of equipment surface or insulation by 40mm and in such a way that they can be easily read, wherever possible from grade, adjacent to a man-way or from an access platform.

Any additional information required by the Vendor or by the Client shall be defined during the detail engineering phase.

The Vendor shall reference the Project equipment and instrumentation tag numbers in its technical documentation. The Client will provide the tag numbers during the detail engineering phase.

8 CIVIL

- 8.1.1 Equipment is intended for installation on concrete foundation. The cement & sand based grouting (non-shrinking) is intended to fill-up entirely the base-plate. Vendor shall notify Client (as soon as possible) if such equipment installation would not meet his recommendation.
- 8.1.2 Anchor bolts (for grouting to “pockets”) shall be delivered by Client. Vendor shall recommend type of anchor bolts and size of pockets (in general arrangement drawing)

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9 SPARE PARTS

- 9.1.1 Spare parts recommended by Vendor for equipment commissioning and plant start-up (i.e. first 2-3 months of equipment operation) shall be included in equipment delivery. Client assumes, that set of gaskets and O-rings (required for equipment disassembly / assembly) and a set of diaphragms and suction and discharge check valves is satisfactory for this purpose.

10 SURFACE PREPARATION AND PAINTING

- 10.1.1 Painting and coating of equipment shall comply with Datasheet. Vendor's standard painting system may be proposed as an alternative, but shall be subject to Client's review and approval.
- 10.1.2 Vendor's standard painting procedure is acceptable (if suitable for given industrial chemical plant environmental area-class C5-I – very high (industrial)), however top coating colour shall be in accordance with enclosed Specification for Surface Preparation and Painting (RAL 6029 "mint green" for Compressors, pumps, electromotors, etc.).

11 NOISE LEVEL

- 11.1.1 Every attempt shall be made to minimize noise. If the allowable noise limits can not be met, Vendor shall propose sound attenuation measures in order to reduce noise to minimum applicable level.
- 11.1.2 "Low Noise" E-motor (= with noise optimised air cooling system) will be applied as first noise reduction measure in case that noise limit could be jeopardized.

12 INSPECTION AND TESTING

- 12.1.1 Inspection test plan (ITP) for fabrication and Vendor requirements for installation shall be prepared by Vendor following requirements within this procurement package, Serbian law and approved by Client before start of fabrication.
- 12.1.2 Acceptance of shop tests does not constitute a waiver of requirements to meet field performance under specified operations conditions, nor does inspection relieve the Vendor of his responsibilities.
- 12.1.3 Refer to the Pumps data sheets and Technical Requisition to determine the complete scope of inspection, testing and Purchaser participation therein.
- 12.1.4 The Purchaser's and the Vendor's representatives, as applicable, shall indicate compliance in accordance with the inspector's checklist by initialing, dating, and submitting the completed checklist to the Purchaser prior to shipment.
- 12.1.5 Unless specified otherwise by the Client or legislative requirements, nondestructive examination (NDE) of materials shall be in accordance with PED.

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- 12.1.6 Mechanical Run test procedure, Performace test procedure and FAT procedure shall be subject to client approval.

13 WARRANTY PERIOD

- 13.1.1 The warranty period for the Goods lasts for a period of 3 years (36 months) from putting the Goods into operation, but not more than 4 years (48 months) as of the date of delivery of the Goods.

14 PREPARATION FOR SHIPMENT

- 14.1.1 Vendor's standard **painting** procedure is acceptable (if suitable for given industrial chemical plant environmental area-class C5 for long lasting period), however top coating colour according to plant standard ("mint "green RAL 6029 for all surfaces up to max. 120 °C including E-motor and base-plate; RAL 9006 "white aluminium" for hot surfaces) is required.

- 14.1.2 Equipment **preparation** (conservation,...) shall allow outdoor installation at Site (on the foundation; protected only by a plastic foil) for at least 6 months period of Plant erection till the equipment first start-up (see "Site & Utility Data Sheet" for climatic conditions).

In case that preservation renewal / prolongation would be required by Vendor then appropriate procedure including time schedule shall be included in Instructions for Storage. Vendor shall also specify if his supervision is required.

Equipment shall be prepared (protected, conserved ...) for oversea transportation.

- 14.1.3 As a minimum, the Vendor shall:

- prepare the supply for shipment and deliver to nominated delivery point i.e. Pancevo Oil refinery, Spoljnostarcevaccka 199A, 26000 Pancevo, Republic of Serbia on DAP Incoterms 2020
- furnish internal and external shipping braces required to prevent damage or movement during transportation;
- preservation must be done for oversea transport
- furnish all the crates with relevant Packing List and Shipping Documentation;
- provide shipping, installation, operation and maintenance weights and centre of gravity;

- 14.1.4 The Vendor shall provide Storage and Maintenance Procedures for Client's review and approval, which shall include, as a minimum, the following subjects:

- weather protection;
- equipment storage maintenance;
- periodical inspection;
- periodical maintenance;
- notice required for equipment usage;
- corrosion protection and application of temporary coatings;
- storage conditions including temperature range and humidity.

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Storage and Maintenance Procedures should also take in to account filling requirement with nitrogen or adequate alternative for prolonged storage, preservation and transportation.

- 14.1.5 Interior surfaces shall be thoroughly dried and preserved with suitable **rust preventative**. Type of conservation and suitable solvent shall be indicated on a tag attached on the device. Preferred type of conservation is such one, which does not require removal prior to operation.
- 14.1.6 All customer's **connections** shall be identified, according to markings on the general arrangement drawing, with waterproof and weatherproof labels fastened with stainless-steel wire.
- 14.1.7 All **openings** shall be blinded with suitable covers (fastened in such way that the cover can not be removed without a tool.) and sealed against water and dust. Flanged connections shall be provided preferably with a bolted wooden (or aluminium) cover.
- 14.1.8 All **valves** will be checked for operability (= hand wheels turn easily after equipment painting) and all will be at "closed" position.
- 14.1.9 If any **loose equipment** / accessories is to be delivered, it shall have a label with corresponding item № (to make clear to what equipment it belongs). It should be boxed separately.